CDC

CENTERS FOR DISEASE CONTROL
AND PREVENTION

Health Information for International Travel 1996-97

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service

ATTENTION READERS

It is impossible for an annual publication on international travel to remain absolutely current given the nature of disease transmission in the world today. For readers of this text to be the most up-to-date on travel-related diseases and recommendations, this text must be used in conjunction with the other services provided by the Travelers' Health Section of the Centers for Disease Control and Prevention (CDC). Changes such as vaccine requirements, disease outbreaks, drug availability, or emerging infections will be posted promptly on these services. For these and other changes, please consult either our Voice or Fax Information Service at 404-332-4559 or our Internet address on the World Wide Web Server at http://www.cdc.gov or the File Transfer Protocol server at ftp.cdc.gov .

Because certain countries require vaccination against yellow fever only if a traveler arrives from a country currently infected with this disease, it is essential that up-to-date information regarding infected areas be maintained for reference. The CDC publishes a biweekly "Summary of Health Information for International Travel" (Blue Sheet) which lists yellow fever infected areas. Subscriptions to the Blue Sheet are available to health departments, physicians, travel agencies, international airlines, shipping companies, travel clinics, and other private and public agencies that advise international travelers concerning health risks they may encounter when visiting other countries. The Blue Sheet is also available by dialing our fax information service at (404) 332–4565 and requesting document number 220022#.

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402, (202) 512–1800.

Health Information for International Travel 1996-97

December 1996

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
Centers for Disease Control and Prevention
National Center for Infectious Diseases
Division of Quarantine
Atlanta, Georgia 30333

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PREFACE

One of the important responsibilities of the Centers for Disease Control and Prevention is to provide up-to-date and comprehensive information on immunization requirements and recommendations for international travelers. Readers are invited to send comments and suggestions regarding this book to:

CENTERS FOR DISEASE CONTROL AND PREVENTION
National Center for Infectious Diseases
Division of Quarantine (E-03)
Attention: Travelers' Health Section
Atlanta, Georgia 30333

CENTERS FOR DISEASE CONTROL AND PREVENTION

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The Travelers' Health Section gratefully acknowledges the considerable contributions and assistance of the staff of the National Center for HIV, STD and TB Prevention, the National Center for Infectious Diseases, the National Immunization Program, and the National Center for Environmental Health.

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TABLES

ILLUSTRATIONS AND MAPS

CHANGES SINCE 1995 EDITION

HOW TO USE THIS BOOK

New text to facilitate the use of this book has been added on page 13.

REFERENCES

References have been updated.

VACCINATION CERTIFICATE REQUIREMENTS

Vaccinations Required and Information on Malaria Risk and Prophylaxis, by country, has been revised as of December 1996.

- — Countries which require an international certificate of vaccination have been updated.
- — Information on malaria risk and areas with chloroquine-resistant *P. falciparum* have been updated and specific prophylaxis regimens by country have been revised.
- — Countries for which CDC recommends yellow fever vaccination, even though vaccination may not be required, have been identified in this section.

The need for continuous cross-referencing with the biweekly "Summary of Health Information for International Travel" (also known as the Blue Sheet) has been emphasized throughout the text.

UNITED STATES PUBLIC HEALTH SERVICE RECOMMENDATIONS

Spacing of Immunobiologics — Text modified and new table added.

SPECIFIC RECOMMENDATIONS FOR VACCINATION AND PROPHYLAXIS

AIDS — Text for HIV infected travelers modified.

Cryptosporidiosis — New text.

Cyclospora — New text.

Filariasis, Lymphatic — New text.

Hepatitis A — Discussion of new vaccine added.

Plague — Table revised.

Polio — ACIP released the revised recommendations for routine childhood polio immunization as this book went to press. A copy can be obtained by calling 1-800-CDC-SHOT or through the CDC, National Immunization Program homepage on the Internet at URL <http://www.cdc.gov/> .

GEOGRAPHIC DISTRIBUTION OF POTENTIAL HEALTH HAZARDS

Text updated on disease risks.

INTRODUCTION

This book is published annually by the Division of Quarantine, National Center for Infectious Diseases, Centers for Disease Control and Prevention (CDC), for use as a reference by health departments, physicians, travel agencies, international airlines, shipping companies, and other private and public agencies that advise international travelers concerning the risks they might encounter when visiting other countries. It specifies the vaccinations required by different countries and includes information on measures for travelers to take to protect their health and facilitate their travel.

The purpose of the International Health Regulations (IHR) adopted by the World Health Organization (WHO) is to ensure maximum security against the international spread of diseases with minimum interference with world traffic. In addition to the quarantinable diseases (cholera, yellow fever, and plague), covered by the IHR, there are other conditions of importance to travelers, their families, and to the community when the travelers return home.

Because some countries require vaccination against yellow fever only if a traveler arrives from a country infected with this disease, it is essential that current information regarding infected areas be taken into consideration in determining whether vaccinations are required. The Division of Quarantine publishes a biweekly "Summary of Health Information for International Travel" (also known as the Blue Sheet) to show where cholera and yellow fever are being reported. The “Blue Sheet” is available by fax by calling (404) 332–4565 and requesting document 220022#.

Official changes in individual country vaccination requirements reported by WHO are published in the Blue Sheet. These changes should be entered in the Vaccination Certificate Requirements section of this book (pp. 17-77) to keep information on vaccination requirements current. This book, when kept up-to-date with changes in individual vaccination requirements, and utilized in conjunction with the Blue Sheet provides accurate information on vaccinations required for international travel.

Occasionally, the Division of Quarantine issues an Advisory Memorandum containing special recommendations or information about newly identified health problems associated with international travel. International travelers are advised to contact their local health department, physician, or private or public agency that advises international travelers at least 6 weeks prior to departure to obtain current health information on countries they plan to visit. They may also call the Centers for Disease Control and Prevention automated travelers' hotline accessible from a touchtone phone 24 hours-a-day, 7 days-a-week at (404) 332-4559. This system provides information on requirements and recommendations for the international traveler and is updated as needed. This information is also available by facsimile at (404) 332-4565. Also this same information is available on the Internet on the Worldwide Web at http://www.cdc.gov/ and by file transfer protocol at ftp.cdc.gov .

REFERENCES

☆ International Health Regulations (1969) Third Annotated Edition, World Health Organization, Geneva, 1983

☆ International Travel and Health, Vaccination Requirements and Health Advice—Situation as of 1 January 1996. World Health Organization, Geneva, 1996

☆ Weekly Epidemiological Record-World Health Organization, Geneva, 1995-1996

☆ *Dengue*—Hemorrhagic Fever—Puerto Rico, MMWR 35:50, 1986

☆ *Dengue* and *Dengue* Hemorrhagic Fever in the Americas, 1986, MMWR 37:7, 1988

☆ Travelers' Diarrhea, National Institutes of Health Consensus Development Conference Statement. Volume 5 Number 8

☆ Recommendations of the Advisory Committee on Immunization Practices (ACIP):

Update on Adult Immunization: MMWR 40:RR-12,1991

General Recommendations on Immunization, MMWR 43:1, 1994

Cholera Vaccine, MMWR 37:40, 1988

Diphtheria, Tetanus, and *Pertussis:* Recommendations of the ACIP for Vaccine Use and other Preventive Measures, MMWR 40:RR-10, 1991

Pertussis Vaccination: Acellular Pertussis Vaccine for Reinforcing and Booster Use—Supplementary ACIP Statement, MMWR 41:RR-1, 1992

Pertussis Vaccination: Acellular Pertussis Vaccine for the Fourth and Fifth Doses of the DTP Series: Update to Supplementary ACIP Statement; Recommendations of the ACIP, MMWR 41:RR-15, 1992

Haemophilus b Conjugate Vaccines, MMWR 40:RR-1,1991

Haemophilus b Conjugate Vaccines and a Combined Diphtheria, Tetanus, Pertussis and Haemophilus b Vaccine, MMWR 42:RR-13, 1993

Protection against Viral *Hepatitis*, MMWR 39:RR-2, 1990

Hepatitis B Virus: A Comprehensive Strategy for Eliminating Transmission In the United States Through Universal Childhood Vaccination. MMWR 40:RR-13, 1991

Use of Vaccine and Immune Globulins in Persons with Altered Immunocompetence, MMWR 42:RR-4, 1993

Immunization of Children Infected with Human T-Lymphotropic Virus Type III/ Lymphadenopathy-Associated Virus, MMWR 35:38, 1986

Immunization of Children Infected with Human Immunodeficiency Virus-Supplementary ACIP Statement, MMWR 37:12, 1988

Inactivated Japanese Encephalitis Virus Vaccine, MMWR 42:RR-1, 1993

Measles Prevention, MMWR 38:S-9, 1989

Meningococcal Vaccines, MMWR 34:18, 1985

Mumps Vaccine, MMWR 38:22, 1989

Plague Vaccine, MMWR 45:R-14, 1996

Pneumococcal Polysaccharide Vaccine Usage—United States, MMWR 38:5, 1989

Poliomyelitis Prevention, MMWR 31:3, 1982

Poliomyelitis Prevention: Enhanced-Potency Inactivated Poliomyelitis Vaccine—Supplementary Statement, MMWR 36:48, 1987

Rabies Prevention — United States 1991, MMWR 40:RR-3, 1991

Rubella Prevention, MMWR 39:RR-15, 1990

Vaccinia (Smallpox) Vaccine, MMWR 40:RR-14, 1991

Typhoid Vaccine, MMWR 43:RR-14, 1994

Varicella-Zoster Immune Globulin for the Prevention of Chickenpox, MMWR 33:7, 1984

Yellow Fever Vaccine, MMWR 39:RR-6, 1990

VACCINATION INFORMATION

LIST OF COUNTRIES BY REGION

To facilitate the use of this book, the following list of countries and other areas by region is provided. These regions correspond with those used in CDC's Fax Information Service for international travel. For region specific vaccine recommendations and requirements you may want to use the fax service at (404) 332-4565.

AFRICA

NORTH AFRICA

Algeria
Canary Islands
Egypt
Libyan Arab Jamahiriya
Morocco
Tunisia

SOUTHERN AFRICA

Botswana
Lesotho
Namibia
South Africa
St. Helena
Swaziland
Zimbabwe

CENTRAL AFRICA

Angola
Cameroon
Central African Republic
Chad
Congo
Equatorial Guinea
Gabon
Sudan
Zaire
Zambia

EAST AFRICA

Burundi
Comoros
Djibouti
Eritrea
Ethiopia
Kenya
Madagascar
Malawi
Mauritius
Mayotte
Mozambique
Reunion
Rwanda
Seychelles
Somalia
Tanzania
Uganda

WEST AFRICA

Benin
Burkina Faso
Cape Verde Islands
Cote d'Ivoire
Gambia
Ghana
Guinea
Guinea-Bissau
Liberia
Mali
Mauritania
Niger
Nigeria
São Tome & Principe
Senegal
Sierra Leone
Togo

THE AMERICAS

MEXICO & CENTRAL AMERICA

Belize
Costa Rica
El Salvador
Guatemala
Honduras
Mexico
Nicaragua
Panama

TROPICAL SOUTH AMERICA

Bolivia
Brazil
Colombia
Ecuador
French Guiana
Guyana
Paraguay
Peru
Suriname
Venezuela

TEMPERATE SOUTH AMERICA

Argentina
Chile
Falkland Islands (U.K.)
Uruguay

THE CARIBBEAN

Antigua & Barbuda
Bahamas
Barbados
Cayman Islands (U.K.)
Bermuda (U.K.)
Cuba
Dominica
Dominican Republic
Grenada
Guadeloupe
Haiti
Jamaica
Martinique (Fr.)
Montserrat (U.K.)
Netherlands Antilles:
Aruba, Bonaire,
Curacao, Saba,
Saint Eustatius,
Saint Maarten
Puerto Rico (U.S.)
Saint Lucia
Saint Pierre & Miquelon (Fr.)
St. Vincent & the Grenadines
Saint Christopher (St. Kitts)
& Nevis (U.K.)
Trinidad and Tobago
Virgin Islands, U.S.
Virgin Islands, U.K.

ASIA

EAST ASIA

China
Hong Kong
Japan
Macao
Mongolia
North Korea
South Korea
Taiwan

SOUTHEAST ASIA

Brunei Darussalam
Cambodia
Indonesia
Laos
Malaysia
Myanmar (Burma)
Philippines
Singapore
Thailand
Vietnam

INDIAN SUBCONTINENT

Afghanistan
Bangladesh
Bhutan
India
Maldives
Nepal
Pakistan
Sri Lanka

MIDDLE EAST

Bahrain
Cyprus
Iran
Iraq
Israel
Jordan
Kuwait
Lebanon
Oman
Qatar
Saudi Arabia
Syrian Arab Republic
Turkey
United Arab Emirates
Yemen

EUROPE and the NEW INDEPENDENT STATES OF THE FORMER SOVIET UNION (N.I.S.)

EASTERN EUROPE & N.I.S.

Albania
Armenia*
Azerbaijan*
Belarus*
Bosnia/Herzegovina
Bulgaria
Croatia
Czech Republic
Estonia*
Georgia*
Hungary
Kazakstan*
Kyrgyzstan*
Latvia*
Lithuania*
Moldova, Republic of*
Poland
Romania
Russia*
Serbia/Montenegro
Slovak Republic
Slovenia
Tajikistan*
Turkmenistan*
Ukraine*
Uzbekistan*

WESTERN EUROPE

Andorra
Austria
Azores
Belgium
Denmark
Faroe Island
Finland
France
Germany
Gibraltar
Greece
Greenland
Iceland
Ireland
Italy
Liechtenstein
Luxembourg
Madeira
Malta
Monaco
Netherlands
Norway
Portugal
San Marino
Spain
Sweden
Switzerland
United Kingdom

*New Independent States of the former Soviet Union.

AUSTRALIA/OCEANIA		
American Samoa	Northern Mariana Islands	Vanuatu
Christmas Island	Papua New Guinea	Wake Island
Cook Island	Pitcairn	Wallis and Futuna
Fiji	Samoa (formerly Western	
Guam	Samoa)	
Kiribati	Solomon Island	
Micronesia (Fed. States of)	Tahiti	
Nauru	Tonga	
New Caledonia	Tokelau	
New Zealand	Tuvalu	
Niue	U.S. Trust Territories—Pacific Islands	

EXEMPTION FROM VACCINATION

Age: Some countries do not require an International Certificate of Vaccination for infants under 6 months or 1 year of age. Check the individual country requirements for age exemptions.

Medical grounds: If a physician thinks that a particular vaccination should not be performed for medical reasons, the traveler should be given a signed, dated statement of the reasons on the physician's letterhead stationery.

There are no other acceptable reasons for exemption from vaccination.

UNVACCINATED PERSONS

Travelers who do not have the required vaccinations upon entering a country may be subject to vaccination, medical follow-up, and/or isolation. In a few countries, unvaccinated travelers are denied entry.

TRAVEL ON MILITARY ORDERS

Since military requirements may exceed the requirements indicated in this booklet, any person who plans to travel on military orders (civilians and military personnel) should contact the nearest military medical facility to determine the requirements for the trip.

PERSONS AUTHORIZED TO VACCINATE AND TO VALIDATE THE INTERNATIONAL CERTIFICATE OF VACCINATION

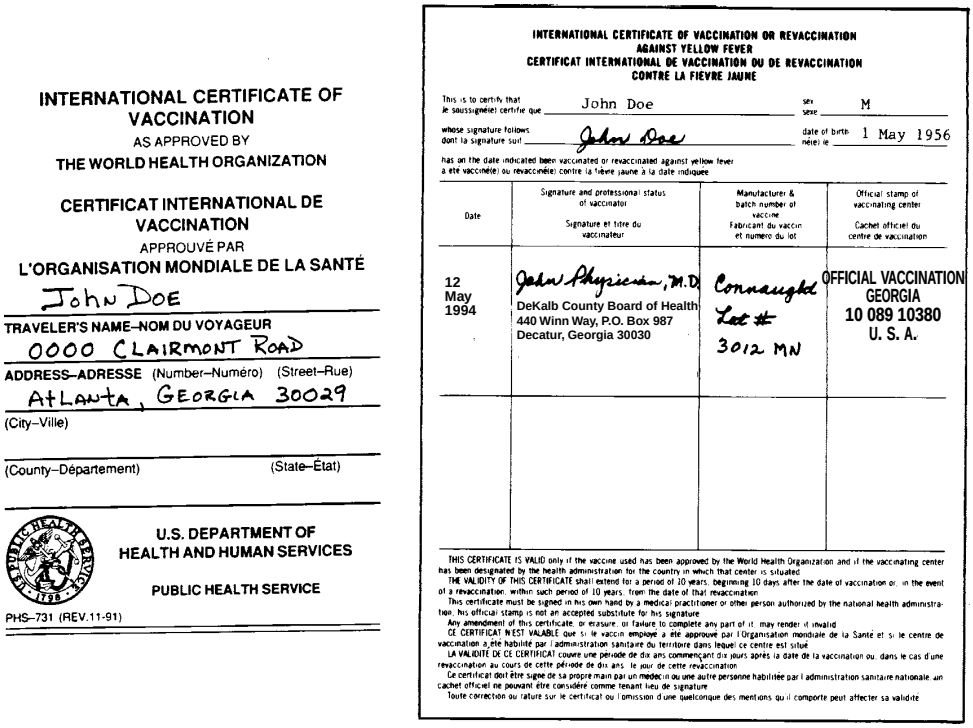
Yellow fever vaccinations must be given at official Yellow Fever Vaccination Centers as designated by respective State health departments, and the certificate must be validated by the center that administers the vaccine. Other vaccinations may be given under the supervision of any licensed physician. Validation of the certificate can be obtained at most city, county, and State health departments, or from vaccinating physicians who possess a "Uniform Stamp." State health departments are responsible for designating non-Federal Yellow Fever Vaccination Centers and issuing Uniform Stamps to be used to validate the International Certificate of Vaccination. Information regarding the location and hours of Yellow Fever Vaccination Centers may be obtained by contacting local or State health departments. Physicians administering vaccine to travelers should emphasize that an International Certificate of Vaccination must be validated to be acceptable to quarantine authorities. Failure to secure validation may cause a traveler to be revaccinated, quarantined, or denied entry.

PERSONS AUTHORIZED TO SIGN THE CERTIFICATE

The International Certificate of Vaccination must be signed by a licensed physician or by a person designated by the physician to sign the certificate. A signature stamp is not acceptable.

MODEL OF A CORRECTLY COMPLETED CERTIFICATE

An International Certificate of Vaccination must be complete in every detail; if incomplete or inaccurate, it is not valid. Revisions of this certificate dated 9–66, 9–69, 9–71, 1–74, 9–77, 1–82, or 11–91, are acceptable.



INTERNATIONAL CERTIFICATE OF VACCINATION
AS APPROVED BY
THE WORLD HEALTH ORGANIZATION

CERTIFICAT INTERNATIONAL DE VACCINATION
APPROUVÉ PAR
L'ORGANISATION MONDIALE DE LA SANTÉ

John Doe
TRAVELER'S NAME–NOM DU VOYAGEUR

0000 Clairmont Road
ADDRESS–ADRESSE (Number–Numéro) (Street–Rue)

Atlanta, Georgia 30029
(City–Ville)

(County–Département) (State–État)

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
PHS–731 (REV.11-91)

INTERNATIONAL CERTIFICATE OF VACCINATION OR REVACCINATION AGAINST YELLOW FEVER
CERTIFICAT INTERNATIONAL DE VACCINATION OU DE REVACCINATION CONTRE LA FIEVRE JAUNE

This is to certify that / Je soussigné(e) certifie que: John Doe — sex / sexe: M
whose signature follows / dont la signature suit: John Doe — date of birth / né(e) le: 1 May 1956
has on the date indicated been vaccinated or revaccinated against yellow fever / a été vacciné(e) ou revacciné(e) contre la fièvre jaune à la date indiquée

Date	Signature and professional status of vaccinator / Signature et titre du vaccinateur	Manufacturer & batch number of vaccine / Fabricant du vaccin et numéro du lot	Official stamp of vaccinating center / Cachet officiel du centre de vaccination
12 May 1994	John Physician, M.D. DeKalb County Board of Health 440 Winn Way, P.O. Box 987 Decatur, Georgia 30030	Connaught Lot # 3012 MN	OFFICIAL VACCINATION GEORGIA 10 089 10380 U. S. A.

THIS CERTIFICATE IS VALID only if the vaccine used has been approved by the World Health Organization and if the vaccinating center has been designated by the health administration for the country in which that center is situated.
THE VALIDITY OF THIS CERTIFICATE shall extend for a period of 10 years, beginning 10 days after the date of vaccination or, in the event of a revaccination, within such period of 10 years, from the date of that revaccination.
This certificate must be signed in his own hand by a medical practitioner or other person authorized by the national health administration; his official stamp is not an accepted substitute for his signature.
Any amendment of this certificate, or erasure, or failure to complete any part of it, may render it invalid.
CE CERTIFICAT N'EST VALABLE que si le vaccin employé a été approuvé par l'Organisation mondiale de la Santé et si le centre de vaccination a été habilité par l'administration sanitaire du territoire dans lequel ce centre est situé.
LA VALIDITÉ DE CE CERTIFICAT couvre une période de dix ans commençant dix jours après la date de la vaccination ou, dans le cas d'une revaccination au cours de cette période de dix ans, le jour de cette revaccination.
Ce certificat doit être signé de sa propre main par un médecin ou une autre personne habilitée par l'administration sanitaire nationale; un cachet officiel ne pouvant être considéré comme tenant lieu de signature.
Toute correction ou rature sur le certificat ou l'omission d'une quelconque des mentions qu'il comporte peut affecter sa validité.

The International Certificate of Vaccination, PHS-731 may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, telephone: (202) 512-1800. The stock number is 017-001-00483-9 and the price is $1.00 each or $15.00 per 100.

VACCINATION CERTIFICATE REQUIREMENTS

Under the International Health Regulations adopted by the World Health Organization, a country under certain conditions may require an International Certificate of Vaccination against Yellow Fever from international travelers. *Smallpox was deleted from the diseases subject to the Regulations effective January 1, 1982. Smallpox vaccination should not be given,* *see p. 154.* No country requires a certificate of cholera immunization. Vaccination against cholera cannot prevent the introduction into a country. The World Health Assembly therefore amended the International Health Regulations in 1973 so that cholera vaccination should no longer be required of any traveler. Information on vaccination requirements included in this booklet has been furnished WHO by the countries.

TABLE 1. Summary of Vaccinations That May Be Required by International Health Regulations (WHO)

Type	Doses	Comments
Cholera		No longer required.
Yellow Fever	1	Certificate valid for 10 years beginning 10 days after primary vacination or on the date of revaccination if within 10 years of first injection.

Vaccination Certificate Requirements for Direct Travel from the United States to Other Countries

For direct travel from the United States, only the following countries require an International Certificate of Vaccination:

Cholera
None

Yellow fever
Benin
Burkina Faso
Cameroon
Central African Republic
Congo
Côte d'Ivoire
French Guiana
Gabon
Ghana
Liberia
Mali
Mauritania (for stay of >2 weeks)
Niger
Rwanda
Sao Tome and Principe
Togo
Zaire

For travel to and between other countries, check the individual country requirements.

Return to the United States
No vaccinations are required to return to the United States.

VACCINATION INFORMATION

HOW TO USE THIS BOOK TO DETERMINE VACCINATIONS REQUIRED OR RECOMMENDED

The following steps are suggested to determine vaccinations required:

1. List the traveler's itinerary in the sequence in which the countries will be visited. Consider the length of stay in each country. For the purpose of the International Health Regulations, the incubation periods of the quarantinable diseases are:

Cholera — 5 days Plague — 6 days Yellow Fever — 6 days

2. Check the current biweekly Blue Sheet to determine if any country on the itinerary is currently infected with yellow fever. This is essential because some countries require vaccination only if a traveler arrives from an infected area. The Blue Sheet is available via the INTERNET Worldwide Web. The URL is <http://www.cdc.gov/> choose Travelers' Health. Look for first document in References entitled "Biweekly HIIT Summary" (Blue Sheet). The Blue Sheet is also available from the CDC Fax Information Service by dialing (404) 332-4565 and requesting document number 220022#.

3. Use the Vaccinations Required section of this booklet (yellow pages) to determine the vaccinations required by each country. Read all notes carefully. INFECTED COUNTRIES and INFECTED AREAS are reported in the biweekly "Summary of Health Information for International Travel" (Blue Sheet). READ BOTH OF THESE RESOURCES CAREFULLY, since they are interdependent.

Some immunizations are not required under the International Health Regulations but are recommended to protect the health of the travelers. For some diseases there are no vaccines available so specific behaviors or medications are a necessity. Along with the summary below use the Specific Recommendations section of this booklet (pp. 101-159) to determine immunizations that are recommended for the specific itinerary.

The following is an outline of vaccine recommendations for most adult travelers. Exceptions to this guide may be pregnant women, infants, children, the elderly and immunocompromised patients or patients with unusual itineraries. For these special patients read the corresponding text. This page is meant only as a guide and MUST be read **along with the full text sections** of this book. Use table of contents to find text for each disease. As recommendations can change based on an outbreak, it is necessary to also check our outbreak menu on either the Fax Information service (phone number above) and request document number 000005# or see our Internet pages as described above.

Tetanus/Diphtheria	After completion of a primary series, a booster should be administered once every 10 years for the rest of life.
Polio	After completion of a primary series, we recommend one additional dose ONCE in adult life if traveling to a country where the disease occurs. See Geographic Distribution Section to find countries with polio.
Measles	Recommend a dose of measles vaccine for persons born in or after 1957 who have not had two doses on or after the first birthday. Exceptions: pregnant women and other persons for whom it is contraindicated (e.g., those who are severely immunocompromised) should not get measles vaccine. Vaccination is not necessary for persons with documentation of physician-diagnosed measles or serological evidence of measles immunity.

Hepatitis B	Consider for long-term travelers (staying ≥6 months) going to intermediate or high prevalence areas (see hepatitis B map) and ANY short-term traveler who may have contact with blood or body fluids (e.g., healthcare workers) if they have not had the vaccine previously.
Varicella	Discuss with one's physician. Not discussed in this text.

TRAVEL VACCINES

Cholera	Almost never recommended, see text pages for rare exceptions.
Hepatitis A	Consider for all travelers except those traveling to developed countries in Europe, Japan, Australia, New Zealand, or Canada (see hepatitis A map and text).
Japanese Encephalitis	Should generally consider for travelers who will be visiting 30 days or longer, risk areas in all of Asia, the Indian Subcontinent and Western Pacific (for areas and seasons of risk, see specific text and accompanying tables).
Meningococcal	Consider if traveling between December and June to the Meningitis Belt (see map) and all year for travelers to Burundi, the Delhi region of India, Kenya, Mongolia, Nepal, Saudi Arabia, and Tanzania.
Plague	Rarely recommended, see text for exceptions.
Rabies	Consider for travelers staying 30 days or more in all countries except those found on rabies table in text.
Tickborne Encephalitis	Rarely recommended, see text "Encephalitis, tickborne" for discussion. Use insect repellant to minimize risk.
Typhoid Fever	Consider for travelers staying 6 weeks or longer in areas of questionable sanitation. See Typhoid text for vaccine options.
Yellow Fever	Follow steps 1, 2, and 3 on preceding page to determine if required by country of destination. CDC recommendations for this vaccine are listed by country in yellow pages of text.

Malaria Prophylaxis (No vaccine available)

Malaria	Important to consider if traveling to Mexico, Central and South America, Dominican Republic, Haiti, Africa, parts of the Middle East, Asia, and a few countries within Eastern Europe. See country specific risk information in yellow pages and comprehensive discussion of prophylactic medication in "Specific Recommendations" chapter of this book.

OTHER DISEASE CONSIDERATIONS (No vaccines available)

Where these and other diseases occur are discussed in the "Geographic Distribution" chapter of this text. Detailed information on these diseases is found in the "Specific Recommendations" section of this book. This is not a comprehensive list but rather the more frequently occurring.

African Sleeping Sickness
(African Trypanosomiasis)
Amebiasis
Chagas' Disease

Cryptosporidiosis

Cyclospora

Dengue

Filiariasis, Lymphatic

Giardiasis

Lassa Fever

Leishmaniasis

Onchocerciasis
(River Blindness)

Schistosomiasis

Typhus*

In the "Health Hints for the International Traveler" chapter it is especially important to read the following:

1. Risks from Food and Water
2. Protection against mosquitoes and other arthropod vectors
3. Injuries
4. Environmental Effects

*Production of a vaccine discontinued in the U.S.

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Afghanistan	If traveling from an **infected area** (see the Blue Sheet)	All	Confirmed	mefloquine
Albania	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		
Algeria	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	Very limited in Sahara Region	None	None
Andorra	Not required	None		
Angola	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	All	Confirmed	mefloquine
Antigua and Barbuda	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Argentina	Not required Risk in northeastern forest areas only However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	Rural areas near Bolivian border, i.e., Salta and Jujuy Provinces and along border with Paraquay, i.e., Misiones and Corrientes Provinces	None	chloroquine
Armenia	Not required	None		
Australia **Note:** Australia is not bound by the International Health Regulations (see p. 1).	If traveling within 6 days of having stayed overnight or longer in an infected area (see the Blue Sheet) and if more than 1 year of age	None		
Austria	Not required	None		
Azerbaijan	Not required	Very small areas of southern border	None	chloroquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Azores (Portugal)	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age **Exception**: Not required if in transit at Santa Maria	None		
Bahamas	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		
Bahrain	Not required	None		
Bangladesh	If traveling from **a country any part of which is infected** (see the Blue Sheet) Required **also** for travelers arriving from or transiting **Africa** Angola Benin Burkina Faso Burundi Cameroon Central African Republic Chad *(Continued on next page)*	All, except no risk in city of Dhaka	Widespread along northern and eastern borders	mefloquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Bangladesh (Cont'd)	Congo Côte d'Ivoire Equatorial Guinea Ethiopia Gabon Gambia Ghana Guinea Guinea-Bissau Kenya Liberia Malawi Mali Mauritania Niger Nigeria Rwanda Sao Tome and Principe Senegal Sierra Leone Somalia Sudan (south of 15° N) Tanzania, United Republic of Togo Uganda Zaire Zambia *(Continued on next page)*			

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Bangladesh (Cont'd)	**Americas** Belize Bolivia Brazil Colombia Costa Rica Ecuador French Guiana Guatemala Guyana Honduras Nicaragua Panama Peru Suriname Venezuela **Caribbean** Trinidad and Tobago Any person (including infants) arriving by air or sea without a certificate within 6 days of departure from or transit through an infected area will be isolated up to 6 days.			
Barbados	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Belarus	Not required	None		
Belgium	Not required	None		
Belize	If traveling from an **infected area** (see the Blue Sheet)	Rural (including forest preserves and offshore islands, including the resort areas) **Exception**: no risk in central coastal District of Belize	None	chloroquine
Benin	Required upon arrival from **all countries** if traveler is more than 1 year of age.	All	Confirmed	mefloquine
Bermuda (U.K.)	Not required	None		
Bhutan	If traveling from an **infected area** (see the Blue Sheet)	Rural, in districts bordering India	Confirmed	mefloquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Bolivia	If traveling from an **infected area** (see the Blue Sheet) Bolivia recommends vaccination for travelers who are destined for risk areas such as the Departments of Beni, Chuquisaca, Cochabamba, Pando, Santa Cruz, Tarija, and part of La Paz Department However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	Rural only, except no risk in highland areas: Oruro Department Province of Ingavi Los Andes Omasuyos Pacajes (La Paz Department) Southern and central Potosi Department	Confirmed	mefloquine
Bosnia/Herzegovina	Follow regulations for Yugoslavia	None		
Botswana	Not required	Northern part of country (north of 21° latitude south)	Confirmed	mefloquine
Brazil	If traveling from an **infected area** (see the Blue Sheet) and more than 9 months of age unless traveler has a waiver stating that immunization is contraindicated on medical grounds. *(Continued on next page)*	Acre and Rondonia States; Territories of Amapa and Roraima; *(Continued on next page)*	Confirmed	mefloquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Brazil (Cont'd)	However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas. **Also** required for travelers arriving from **Africa** Angola Cameroon Gabon Gambia Ghana Guinea Kenya Mali Nigeria Sudan Zaire **Americas** Bolivia Ecuador Colombia Peru Brazil recommends vaccination for travel to rural areas in Acre Amazonas Goiás Maranhaõ Mato Grosso Mato Grosso do Sul Pará State Rondônia State Territories of Amapá and Roraima	Part of rural areas of the following states: Amazonas Maranhao Mato Grosso Pará Tocantins Also in the outskirts of Manaus and Porto Velho **Note:** Travelers who will visit only the coastal states from the horn to the Uruguay border and Iguassu Falls are not at risk and need no prophylaxis.		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Brunei Darussalam	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age **Note**: Required **also** for travelers coming from or transiting endemic zones within the preceding 6 days (see pp. 163-164)	None		
Bulgaria	Not required	None		
Burkina Faso	Required upon arrival from **all countries** if traveler is more than 1 year of age	All	Confirmed	mefloquine
Burma (see Myanmar)				
Burundi	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	All	Confirmed	mefloquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Cambodia	If traveling from an **infected area** (see the Blue Sheet)	All, except no risk in Phnom Penh	Confirmed	mefloquine In Western provinces, doxycycline
Cameroon	Required upon arrival from **all countries** if traveler is more than 1 year of age	All	Confirmed	mefloquine
Canada	Not required	None		
Canary Islands (Spain)	Not required	None		
Cape Verde	If traveling from **a country any part of which is infected** (see the Blue Sheet) and more than 1 year of age Required **also** if coming from countries having reported cases in the last 6 years	Limited to Island of São Tiago	None	None
Cayman Islands (U.K.)	Not required	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Central African Republic	Required upon arrival from **all countries** if traveler is more than 1 year of age	All	Confirmed	mefloquine
Chad	Not required; however, Chad recommends vaccination for all travelers more than 1 year of age. CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	All	Confirmed	mefloquine
Chile	Not required	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
China	If traveling from an **infected area** (see the Blue Sheet)	Rural only, except no risk in northern provinces bordering Mongolia and in the western provinces of Heilungkiang, Kirin, Ningsia Hui Tibet, and Tsinghai North of latitude 33° N, transmission occurs July to November; from latitude 33° N to 25° N, transmission occurs May to December; south of latitude 25° N, transmission occurs year-round. *(Continued on next page)*	Confirmed in southern China, Hainan Island and provinces bordering Myanmar, Lao People's Democratic Republic, and Viet Nam	chloroquine mefloquine for travelers in areas of chloroquine resistance

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
China (Cont'd)		**Note:** Travelers visiting cities and popular rural sites on usual tourist routes are generally not at risk, and chemoprophylaxis is therefore not recommended. Travelers on special scientific, educational, or recreational visits should check whether their itineraries include evening or nighttime exposure in areas of risk or in areas of chloroquine resistance.		
Christmas Island (Australia) **Note:** Christmas Island is not bound by the International Health Regulations (see p. 1).	If traveling within the preceding 6 days of having stayed overnight or longer in an infected area (see the Blue Sheet) and if more than 1 year of age	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Colombia	Not required; however, Colombia recommends vaccination for travelers to middle valley of the Magdalena River; eastern and western foothills of the Cordillera Oriental from the frontier with Ecuador to that with Venezuela; Urabá; foothills of the Sierra Nevada; eastern plains (Orinoquia); and Amazonia. CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	Rural areas only of Alto Vaupes (Vaupes Comisaria) Amazonas Ariari (Meta Dept.) Bajo Cauca-Nechi (Cauca and Antioquia Dept.) Caqueta (Caqueta Intendencia) Catatumbo (Norte de Santander Dept.) Guainia (Comisarias) Magdalena Medio Pacifico Central and Sur Putumayo (Putumayo Intendencia) Sarare (Aruca Intendencia) Urabá (Antioquia Dept.) **Exception:** No risk in Bogota and vicinity.	Confirmed	mefloquine
Comoros	Not required	All	Confirmed	mefloquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Congo	Required upon arrival from **all countries** if traveler is more than 1 year of age	All	Confirmed	mefloquine
Cook Islands (New Zealand)	Not required	None		
Costa Rica	Not required	Rural areas only (including tourist areas), except no risk in central highlands (i.e., Cartago and San Jose Provinces)	None	chloroquine
Côte d'Ivoire (formerly Ivory Coast)	Required upon arrival from **all countries** if traveler is more than 1 year of age	All	Confirmed	mefloquine
Croatia	Not required	None		
Cuba	Not required	None		
Cyprus	Not required	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Czech Republic	Not required	None		
Denmark	Not required	None		
Djibouti	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	All	Confirmed	mefloquine
Dominica	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		
Dominican Republic	Not required	Rural, except no risk in tourist resorts. Highest risk in provinces bordering Haiti.	None	chloroquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Ecuador	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	All provinces along eastern border and Pacific coast: Cañar Cotopasi El Oro Esmeraldas Guayas (including Guayaquil) Los Rios Manabi Morona-Santiago Napo Pastaza Pinchincha Sucumbios Zamora-Chinchipe **Note:** Travelers who will visit only Quito and vicinity, the central highland tourist areas, or the Galapagos Islands are not at risk and need no prophylaxis.	Confirmed	mefloquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Egypt	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age **Also** required if arriving from or transiting **Africa** Angola Benin Botswana Burkina Faso Burundi Cameroon Central African Republic Chad Congo Côte d'Ivoire Equatorial Guinea Ethiopia Gabon Gambia Ghana Guinea Guinea-Bissau Kenya Liberia Malawi Mali Mauritania Niger Nigeria Rwanda Sao Tome and Principe *(Continued on next page)*	El Faiyum area **Note:** Travelers visiting main tourist areas, including cruises, are not at risk and need no prophylaxis.	None	chloroquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Egypt (Cont'd)	Senegal Sierra Leone Somalia Sudan (south of lat. 15° N) Tanzania, United Republic of Togo Uganda Zaire Zambia **Americas** Belize Bolivia Brazil Colombia Costa Rica Ecuador French Guiana Guatemala Guyana Honduras Nicaragua Panama Peru Suriname Venezuela **Caribbean** Trinidad and Tobago *(Continued on next page)*			

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Egypt (Cont'd)	Air passengers in transit but coming from these countries or areas without a certificate will be detained in the precincts of the airport until they resume their journey. All travelers arriving from Sudan are required to possess a vaccination certificate or a location certificate issued by a Sudanese official center stating that they have not been in Sudan south of 15° N latitude within the preceding 6 days.			
El Salvador	If traveling from an **infected area** (see the Blue Sheet) and more than 6 months of age	Rural only	None	chloroquine
Equatorial Guinea	If traveling from an **infected area** (see the Blue Sheet) However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	All	Confirmed	mefloquine
Eritrea	If traveling from an **infected area** (see the Blue Sheet) However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	All, except no risk at altitudes higher than 2,000 meters. No risk in Asmara.	Confirmed	mefloquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Estonia	Not required	None		
Ethiopia	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	All, except no risk in Addis Ababa and at altitudes higher than 2,000 meters	Confirmed	mefloquine
Falkland Islands (U.K.)	Not required	None		
Faroe Islands (Denmark)	Not required	None		
Fiji	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		
Finland	Not required	None		
France	Not required	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
French Guiana	Required upon arrival from **all countries** if traveler is more than 1 year of age	All	Confirmed	mefloquine
French Polynesia (Tahiti)	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		
Gabon	Required upon arrival from **all countries** if traveler is more than 1 year of age	All	Confirmed	mefloquine
Gambia	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age. Required **also** for travelers arriving from countries in the endemic zones (pp. 163-164) CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	All	Confirmed	mefloquine
Georgia	Not required	None		
Germany	Not required	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Ghana	Required upon arrival from **all countries**.	All	Confirmed	mefloquine
Gibraltar (U.K.)	Not required	None		
Greece	If traveling from an **infected area** (see the Blue Sheet) and more than 6 months of age	None		
Greenland (Denmark)	Not required	None		
Grenada	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		
Guadeloupe (France)	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		
Guam (U.S.)	Not required	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Guatemala	If traveling from **a country any part of which is infected** (see the Blue Sheet) and if more than 1 year of age	Rural only, except no risk in central highlands	None	chloroquine
Guinea	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	All	Confirmed	mefloquine
Guinea-Bissau	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas. Required **also** for travelers arriving from **Africa** Angola Benin Burkina Faso Burundi Cape Verde *(Continued on next page)*	All	Confirmed	mefloquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Guinea-Bissau (Cont'd)	Central African Republic Chad Congo Côte d'Ivoire Djibouti Equatorial Guinea Ethiopia Gabon Gambia Ghana Guinea Kenya Liberia Madagascar Mali Mauritania Mozambique Niger Nigeria Rwanda Sao Tome and Principe Senegal Sierra Leone Somalia Tanzania, United Republic of Togo Uganda Zaire Zambia *(Continued on next page)*			

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Guinea-Bissau (Cont'd)	**Americas** Bolivia Brazil Colombia Ecuador French Guiana Guyana Panama Peru Suriname Venezuela			
Guyana	If traveling from an **infected area** (see the Blue Sheet) However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas. Required **also** for travelers arriving from **Africa** Angola Benin Burkina Faso Burundi Cameroon Central African Republic Chad *(Continued on next page)*	Rural, in all interior regions including Rupununi and North-West Regions and areas along Pomeroon river.	Confirmed	mefloquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Guyana (Cont'd)	Congo Côte d'Ivoire Gabon Gambia Ghana Guinea Guinea-Bissau Kenya Liberia Mali Niger Nigeria Rwanda São Tome and Principe Senegal Sierra Leone Somalia Tanzania, United Republic of Togo Uganda Zaire **Americas** Belize Bolivia Brazil Colombia Costa Rica Ecuador French Guiana Guatemala *(Continued on next page)*			

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Guyana (Cont'd)	Honduras Nicaragua Panama Peru Suriname Venezuela			
Haiti	If traveling from an **infected area** (see the Blue Sheet)	All	None	chloroquine
Honduras	If traveling from an **infected area** (see the Blue Sheet)	Rural only	None	chloroquine
Hong Kong (U.K.)	Not required	None		
Hungary	Not required	None		
Iceland	Not required	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
India	If traveling from **a country any part of which is infected** (see the Blue Sheet) Required **also** for travelers arriving from or transiting **Africa** Angola Benin Burkina Faso Burundi Cameroon Central African Republic Chad Congo Côte d'Ivoire Equatorial Guinea Ethiopia Gabon Gambia Ghana Guinea Guinea-Bissau Kenya Liberia Mali Niger Nigeria Rwanda São Tome and Principe Senegal Sierra Leone Somalia *(Continued on next page)*	All, including the cities of Delhi and Bombay, except no risk in parts of the states of Himechel Pradesh Jammu Kashmir Sikkim	Confirmed	mefloquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
India (Cont'd)	Sudan Tanzania, United Republic of Togo Uganda Zaire Zambia **Americas** Bolivia Brazil Colombia Ecuador French Guiana Guyana Panama Peru Suriname Venezuela **Caribbean** Trinidad and Tobago Any person (except infants up to the age of 6 months) arriving without a certificate within 6 days of departure from or transit through an infected area will be isolated up to 6 days.			

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Indonesia	If traveling from an **infected area** (see the Blue Sheet) Required **also** from travelers arriving from countries in the endemic zones (see pp. 163-164)	Rural only, except high risk in all areas of Irian Jaya (western half of island of New Guinea). No risk in cities of Java and Sumatra and no risk for the main resort areas of Java and Bali. **Note:** Transmission in Indonesia (except for Irian Jaya) is largely confined to rural areas not visited by most travelers; most travel to rural areas of Indonesia is during daytime hours when the risk of exposure is minimal.	Confirmed	mefloquine Chemopro-phylaxis is recommended only for travelers who will have outdoor exposure during evening and nighttime hours in rural areas.

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Iran (Islamic Republic of)	Not required	Rural only in the provinces of Sistan-Baluchestan, the tropical part of Kerman, Hormozgan, parts of Bushehr Fars Ilam Kohgiluyeh-Boyar Lorestan Chahar Mahal-Bakhtiari and the north of Khuzestan	Confirmed	mefloquine
Iraq	If traveling from an **infected area** (see the Blue Sheet)	All of northern region; provinces of Duhok Erbil Ninawa Sulaimaniya Támim Basrah	None	chloroquine
Ireland	Not required	None		
Israel	Not required	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Italy	Not required	None		
Jamaica	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		
Japan	Not required	None		
Jordan	If traveling from an **infected area** (see Blue Sheet) and more than 1 year of age	None		
Kazakstan	Not required	None		
Kenya	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	All (including game parks), except no risk in Nairobi and at altitudes higher than 2,500 meters	Confirmed	mefloquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Kiribati (formerly Gilbert Islands)	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		
Korea, Democratic People's Republic of (North)	Not required	None		
Korea, Republic of (South)	Not required	None		
Kuwait	Not required	None		
Kyrgyzstan	Not required	None		
Lao People's Democratic Republic	If traveling from an **infected area** (see the Blue Sheet)	All, except no risk in city of Vientiane	Confirmed	mefloquine
Latvia	Not required	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Lebanon	If traveling from an **infected area** (see the Blue Sheet)	None		
Lesotho	If traveling from an **infected area** (see the Blue Sheet)	None		
Liberia	Required upon arrival from **all countries** if traveler is more than 1 year of age	All	Confirmed	mefloquine
Libyan Arab Jamahiriya	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	Very limited risk in two small foci in southwest of country	None	None
Liechtenstein	Not required	None		
Lithuania	Not required	None		
Luxembourg	Not required	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Macao (Portugal)	Not required	None		
Madagascar	If traveling from an **infected area** (see the Blue Sheet); includes travelers in transit	All (highest risk in coastal areas)	Confirmed	mefloquine
Madeira (Portugal)	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age **Exception:** Not required for travelers in transit at Funchal and Porto Santo	None		
Malawi	If traveling from an **infected area** (see the Blue Sheet)	All	Confirmed	mefloquine
Malaysia	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age Required **also** for travelers arriving from countries in the endemic zones (see pp. 163-164)	Peninsular Malaysia and Sarawak (NW Borneo): malaria limited to remote areas Urban and coastal areas: malaria-free *(Continued on next page)*	Confirmed	mefloquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Malaysia (Cont'd)		Sabah (NE Borneo): malaria throughout **Note:** Malaria transmission in Malaysia (except Sabah) is largely confined to rural areas not visited by most travelers; most travel to rural areas is during daytime hours when the risk of exposure is minimal.		Chemoprophylaxis is recommended only for travelers who will have outdoor exposure during evening and nighttime hours in rural areas.
Maldives	If traveling from an **infected area** (see the Blue Sheet)	None		
Mali	Required upon arrival from **all countries** if traveler is more than 1 year of age	All	Confirmed	mefloquine
Malta	If traveling from an **infected area** (see the Blue Sheet) and more than 9 months of age Children under 9 months of age arriving from an **infected area** may be subject to isolation or surveillance.	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Marshall Islands	Not required	None		
Martinique (France)	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		
Mauritania	Required upon arrival from **all countries** if traveler is more than 1 year of age **Exception:** Not required for travelers from a noninfected area who stay less than 2 weeks	All, except no risk in the northern region: Adrar Dakhlet-Nouadhibou Inchiri Tiris-Zemour	Probable	mefloquine
Mauritius	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age Required **also** for travelers arriving from countries in the endemic zones (see pp. 163-164)	Rural only, except no risk on Rodrigues Island	None	chloroquine
Mayotte (French territorial collectivity)	Not required	All	Confirmed	mefloquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Mexico	If traveling from an **infected area** (see the Blue Sheet) and more than 6 months of age	Rural areas of the following states: Campeche Chiapas Guerrero Michoacan Nayarit Oaxaca Quintana Roo Sinaloa Tabasco	None	chloroquine Although chemoprophylaxis is not recommended for travel to the major resort areas on the Pacific and Gulf Coasts, travelers should use insect repellents and other measures for personal protection (see p. 131).
Micronesia (Federated States of)	Not required	None		
Monaco	Not required	None		
Mongolia	Not required	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Montserrat (U.K.)	Not required	None		
Morocco	Not required	Very limited risk in rural areas of some provinces	None	None
Mozambique	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	All	Confirmed	mefloquine
Myanmar	If traveling from an **infected area** (see the Blue Sheet) Required **also** for nationals and residents of Myanmar departing for an infected area.	Rural only Note: Travelers who visit the cities of Yangon (formerly Rangoon) and Mandalay are not at risk and need no prophylaxis.	Confirmed	mefloquine Chemoprophy-laxis is recommended only for travelers who will have outdoor exposure during evening and nighttime hours in rural areas.

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Namibia	If traveling from a **country any part of which is infected** (see the Blue Sheet) and more than 1 year of age Required **also** for travelers arriving from countries in the endemic zones (see pp. 163-164) and for travelers on unscheduled flights who have transited an infected area. Children under 1 year of age may be subject to surveillance.	All Ovamboland and Caprivi Strip	Confirmed	mefloquine
Nauru	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		
Nepal	If traveling from an **infected area** (see the Blue Sheet)	Rural in Terai District and Hill Districts below 1,200 meters. No risk in Katmandu.	Confirmed	mefloquine
Netherlands	Not required	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Netherlands Antilles	If traveling from an **infected area** (see the Blue Sheet) and more than 6 months of age	None		
New Caledonia and Dependencies (France)	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age **Note:** Cholera - not required; however, travelers from infected areas are required to complete a form for the Health Service.	None		
New Zealand	Not required	None		
Nicaragua	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	Rural only; however, risk exists in outskirts of Bluefields Bonanza Chinandega Leon Puerto Cabeza Rosita Siuna	None	chloroquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Niger	Required upon arrival from **all countries** if traveler is more than 1 year of age Niger **also** recommends vaccination for travelers leaving the country.	All	Confirmed	mefloquine
Nigeria	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	All	Confirmed	mefloquine
Niue (New Zealand)	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		
Northern Mariana Islands (U.S.)	Not required	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Norway	Not required	None		
Oman	If traveling from an **infected area** (see the Blue Sheet)	All	Confirmed	mefloquine
Pacific Islands, Trust Territory of the U.S.A.	Not required	None		
Pakistan	If traveling from **a country any part of which is infected** (see the Blue Sheet) Required **also** for travelers arriving from countries in the endemic zones (see pp. 163-164). Not required of infants less than 6 months of age if the mother's certificate shows she was vaccinated before the child's birth.	In all areas below 2,000 meters, including the cities	Confirmed	mefloquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Panama	Not required, but Panama recommends for travelers who are destined for the province of Darien. However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	Rural, in the eastern provinces (Darien and San Blas), northwestern provinces (Boca del Toro and Veraguas), Lake Boyana area, and Lake Gatun **Exception:** No risk in the Canal Zone or in Panama City and vicinity	Confirmed in areas east of Canal Zone, including San Blas Islands	chloroquine for travelers to rural areas west of the Canal Zone mefloquine for travelers to areas east of the Canal Zone (including the San Blas Islands)
Papua New Guinea	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	All	Confirmed	mefloquine
Paraguay	If traveling from an **infected area** (see the Blue Sheet) However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas. Required **also** for travelers going to or coming from endemic zones (see pp. 163-164)	Rural, bordering Brazil	None	chloroquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Peru	If traveling from an **infected area** (see the Blue Sheet) and more than 6 months of age Peru recommends for those who intend to visit any rural areas of the country. CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	Rural Risk exists in rural areas of departments of Amazonas Cajamarca (except Hualgayoc Province) La Libertad (except Otuzco, Santiago de Chuco Provinces) Lambayeque Loreto Piura (except Talara Province) San Martin and Tumbes Provinces of Santa (Ancash Dept.) parts of La Convension (Cuzco Dept.) Tayacaja (Huancavelica Dept.) Satipo (Junin Dept.) **Note:** Travelers who will visit only Lima and vicinity, coastal areas south of Lima, or the highland tourist areas (Cuzco, Machu Picchu, Lake Titicaca) are not at risk and need no prophylaxis.	Confirmed in provinces bordering Brazil and Ecuador. Suspected in Piura and Tumbes departments	chloroquine mefloquine for travelers to the provinces bordering Brazil and Ecuador who will have rural exposure during evening and nighttime hours

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Philippines	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	Rural only, except no risk in provinces of Bohol Catanduanes Cebu and metropolitan Manila **Note:** Malaria transmission in the Philippines is largely confined to rural areas not visited by most travelers; most travel to rural areas in the Philippines is during daytime hours when the risk of exposure is minimal.	Confirmed in islands of Basilian Luzon Mindanao Mindoro Palawan Sulu-Archipelago	Chemoprophylaxis is recommended only for travelers who will have outdoor exposure during evening and nighttime hours in rural areas: chloroquine mefloquine for travelers to areas of confirmed chloroquine resistance
Pitcairn (U.K.)	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		
Poland	Not required	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Portugal	Required **only** for travelers more than 1 year of age arriving from **infected areas** who are destined for the Azores and Madeira. However, no certificate is required for passengers in transit at Funchal, Porto Santo, and Santa Maria.	None		
Puerto Rico (U.S.)	Not required	None		
Qatar	Not required	None		
Republic of Moldova	Not required	None		
Reunion (France)	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		
Romania	Not required	None		
Russian Federation	Not required	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Rwanda	Required upon arrival from **all countries** if traveler is more than 1 year of age	All	Confirmed	mefloquine
Saint Christopher (Saint Kitts) and Nevis (U.K.)	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		
Saint Helena (U.K.)	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		
Saint Lucia	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		
Saint Pierre & Miquelon (France)	Not required	None		
Saint Vincent and the Grenadines	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Samoa (formerly Western Samoa)	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		
Samoa, American (U.S.)	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		
San Marino	Not required	None		
São Tome and Principe	Required upon arrival from **all countries** if traveler is more than 1 year of age	All	Confirmed	mefloquine
Saudi Arabia	If traveling from **a country any part of which is infected** (see the Blue Sheet)	All of western provinces, except no risk in the high altitude areas of Asir Province (Yemen border) and the urban areas of Jeddah, Mecca, Medina, and Taif	Suspected	chloroquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Senegal	Required upon arrival from an **infected area** (see the Blue Sheet) Required **also** for travelers arriving from countries in the endemic zones (see pp. 163-164) However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	All	Confirmed	mefloquine
Serbia/Montenegro	Follow regulations for Yugoslavia.	None		
Seychelles	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age A certificate is **also** required from travelers who have, within preceding 6 days, transited an endemic area (see pp. 163-164).	None		
Sierra Leone	If traveling from an **infected area** (see the Blue Sheet) However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	All	Confirmed	mefloquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Singapore	If traveling from **a country any part of which is infected** (see the Blue Sheet) and if more than 1 year of age Required **also** for travelers arriving from or transiting countries in the endemic zones (see pp. 163-164).	None		
Slovak Republic	Not required	None		
Slovenia	Not required	None		
Solomon Islands	If traveling from an **infected area** (see the Blue Sheet)	All	Confirmed	mefloquine
Somalia	If traveling from an **infected area** (see the Blue Sheet)	All	Confirmed	mefloquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
South Africa	If traveling from **a country any part of which is infected** (see the Blue Sheet) and if more than 1 year of age Required **also** for travelers arriving from countries in the endemic zones (see pp. 163-164).	Rural (including game parks) in the northern, eastern, and western low altitude areas of Transvaal and in the Natal coastal areas north of 28° S.	Confirmed	mefloquine
Spain	Not required	None		
Sri Lanka	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	Risk in all rural areas. No risk in the districts of Colombo, Kalutara, and Nuwara Eliya.	Confirmed	mefloquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Sudan	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age Required **also** for travelers arriving from countries in the endemic zones (see pp. 163-164) However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas. May be required for travelers leaving Sudan	All	Confirmed	mefloquine
Suriname	If traveling from an **infected area** (see the Blue Sheet) However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	Rural only, except no risk in Paramaribo District and coastal areas north of 5° N.	Confirmed	mefloquine
Swaziland	If traveling from an **infected area** (see the Blue Sheet)	All lowlands	Confirmed	mefloquine
Sweden	Not required	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Switzerland	Not required	None		
Syrian Arab Republic	If traveling from an **infected area** (see the Blue Sheet)	Rural only, except no risk in southern and western districts of Deir-es-zor and Sweida	None	chloroquine
Taiwan	If traveling from an **infected area** (see the Blue Sheet)	None		
Tajikistan	Not required	Southern border	Suspected	chloroquine
Tanzania, United Republic of	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age Required **also** for travelers arriving from countries in the endemic zones (see pp. 163-164) Risk in northwestern forest areas only However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	All	Confirmed	mefloquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Thailand	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age Required **also** from travelers arriving from countries in the endemic zones (see pp. 163-164)	Limited risk Transmission largely confined to forested rural areas, principally along the borders with Cambodia and Myanmar, not visited by most travelers; most travel to rural areas in Thailand is during daytime hours when the risk of exposure is minimal. No risk in cities and major tourist resorts (e.g., Bangkok, Chiangmai, Pettaya, Phuket)	Confirmed	Doxycycline is the drug of choice for travelers who overnight in the few areas with risk of malaria.
Togo	Required upon arrival from **all countries** if traveler is more than 1 year of age	All	Confirmed	mefloquine
Tokelau (New Zealand)	Not required	None		
Tonga	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Trinidad and Tobago	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	None		
Tunisia	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	None		
Turkey	Not required	Southeast Anatolia; Cukorova/Amikova areas	None	chloroquine
Turkmenistan	If traveling from an **infected area** (see Blue Sheet)	None		
Tuvalu	Not required	None		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Uganda	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age Required **also** from travelers arriving from countries in the endemic zones (see pp. 163-164) However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	All	Confirmed	mefloquine
Ukraine	Not required	None		
(Former) Union of Soviet Socialist Republics	Not required except for Turkmenistan (see above) Presume requirements will remain the same for Russia and other new independent states. You may check with respective embassies to be certain.	See individual countries.		

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
United Arab Emirates	Not required	Northern emirates except no risk in Emirate of Abu Dhabi or in cities of Ajman Dubai Sharjah Umm al Qaiwan	None	chloroquine
United Kingdom (with Channel Islands and the Isle of Man)	Not required	None		
United States of America	Not required	None		
Uruguay	Not required	None		
Uzbekistan	Not required	None		
Vanuatu (formerly New Hebrides)	Not required	All, except no risk on Fortuna Island	Confirmed	mefloquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Venezuela	Not required However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	Rural, in all border states and territories and the states of Barinas Merida Portugesa	Confirmed	mefloquine
Viet Nam	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	Rural only, except no risk in the Red River Delta and the coastal plain north of Nha Trang	Confirmed	mefloquine
Virgin Islands, British	Not required	None		
Virgin Islands, U.S.	Not required	None		
Wake Island (U.S.)	Not required	None		
Yemen	If traveling from an **infected area** (see the Blue Sheet) and more than 1 year of age	All, except no risk in Aden and airport perimeter	Confirmed	mefloquine

Yellow Fever Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country (Continued)

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 128-137)
Yugoslavia (The Former Yugoslav Republic of Macedonia)	Not required	None		
Zaire	Required upon arrival from **all countries** if traveler is more than 1 year of age However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	All	Confirmed	mefloquine
Zambia	Not required Risk in northwestern forest areas only However, CDC recommends for all travelers (from any country) more than 9 months of age who go outside urban areas.	All	Confirmed	mefloquine
Zimbabwe	If traveling from an **infected area** (see the Blue Sheet)	All, except no risk in cities of Harare and Bulawayo	Confirmed	mefloquine

UNITED STATES
PUBLIC HEALTH SERVICE
RECOMMENDATIONS

UNITED STATES PUBLIC HEALTH SERVICE RECOMMENDATIONS

INTRODUCTION

Recommendations for individuals engaging in international travel apply primarily to vaccinations and prophylactic measures for U.S. travelers planning to spend time in areas of the world where diseases such as measles, poliomyelitis, typhoid fever, viral hepatitis, and malaria occur, posing a threat to their health. In addition, some countries require an International Certificate of Vaccination against yellow fever as a condition for entry. The majority of U.S. international travelers probably do not need any additional immunizations or prophylaxis, provided their routine immunization status is up-to-date according to the standards of the Public Health Service Advisory Committee on Immunization Practices (ACIP).

The extent to which advisory statements can be made specific for each country and each disease is limited by the lack of reliable data. Although data on the occurrence of many of these diseases are published regularly by WHO, these figures represent only a small percentage of the total number of cases that actually occur. Communicable diseases are not well reported by practicing physicians, and in some countries many cases never come to medical attention. For these reasons, any recommendations must be interpreted with care.

In general, the risk of acquiring illness when engaging in international travel depends on the areas of the world to be visited—travelers in developing countries are at greater risk than those traveling in developed areas. In most developed countries (i.e., Canada, Australia, New Zealand, Japan, and western Europe), the risk to the general health of the traveler will be no greater than that incurred throughout the United States. However, a higher risk of measles, mumps, and rubella may exist. Likewise, in many developed countries such as Germany, Ireland, Italy, Spain, Sweden, and the United Kingdom, pertussis immunization is not as widely practiced as in the United States, and the risk of acquiring pertussis is greater. Living conditions and standards of sanitation and hygiene vary considerably throughout the world, and immunization coverage levels may be low. Thus the risk of acquiring disease also can vary greatly in these locations. Travelers visiting primarily tourist areas on itineraries that do not include travel or visits in rural areas have less risk of exposure to food or water that is of questionable quality. Travelers who visit smaller cities off the usual tourist routes, who spend time in small villages or rural areas for extended periods, or who expect to have extended contact with children are at greater risk of acquiring infectious diseases, because of exposure to water and food of uncertain quality and closer contact with local residents who may harbor the organisms that cause such diseases. Consequently, the added protection of booster or additional doses of certain vaccines and other prophylaxis is recommended for these persons.

More detailed comments can be found under “Specific Recommendations for Vaccination and Prophylaxis” section in this book.

GENERAL RECOMMENDATIONS ON HUMAN IMMUNODEFICIENCY VIRUS (HIV) INFECTION AND ACQUIRED IMMUNODEFICIENCY SYNDROME (AIDS)

Acquired immunodeficiency syndrome (AIDS) is a severe, often life-threatening, illness caused by the human immunodeficiency virus (HIV). The incubation period for AIDS is very long and variable, ranging from a few months to many years. Some individuals infected with HIV have remained asymptomatic for more than a decade. Currently, there is no vaccine to protect against infection with HIV. Although there is no cure for AIDS, treatments for HIV infection and prophylaxis for many opportunistic diseases that characterize AIDS are available.

HIV infection and AIDS have been reported worldwide. Comprehensive surveillance systems are lacking in many countries, so that the true number of cases is likely to be far greater than the numbers officially reported from some, particularly the non-industrialized nations. The number of persons infected with HIV is estimated by WHO to be approaching 18 million worldwide. Because HIV infection and AIDS are globally distributed, the risk to international travelers is determined less by their geographic destination than by their sexual and drug-using behaviors.

The global epidemic of HIV infection and AIDS has raised several issues regarding HIV infection and international travel. The first is the need of information for international travelers regarding HIV transmission and how HIV infection can be prevented.

HIV infection is preventable. HIV is transmitted through sexual intercourse, needle or syringe-sharing, by medical use of blood or blood components, and perinatally from an infected woman to her baby. HIV is not transmitted through casual contact; air, food, or water routes; contact with inanimate objects; or through mosquitoes or other arthropod vectors. The use of any public conveyance (e.g., airplane, automobile, boat, bus, train) by persons with AIDS or HIV infection does not pose a risk of infection for the crew or other passengers.

Travelers are at risk if they:

- have sexual intercourse (heterosexual or homosexual) with an infected person;
- use or allow the use of contaminated, unsterilized syringes or needles for any injections or other skin-piercing procedures including acupuncture, use of illicit drugs, steroid or vitamin injections, medical/dental procedures, ear or body piercing, or tattooing;
- use infected blood, blood components, or clotting factor concentrates. HIV infection by this route is a rare occurrence in those countries or cities where donated blood/plasma is screened for HIV antibody.

Travelers should avoid sexual encounters with a person who is infected with HIV or whose HIV-infection status is unknown. This includes avoiding sexual activity with intravenous drug users and persons with multiple sexual partners, such as male or female prostitutes. Condoms, when used consistently and correctly, prevent transmission of HIV. Persons who engage in vaginal, anal, or oral-genital intercourse with anyone who is infected with HIV or whose infection status is unknown should use a latex condom. For those who are sensitive to latex, polyurethane or other plastic condoms are available (look for the words “for the prevention of disease” on the condom packaging).

In many countries, needlesharing by IV drug users is a major source of HIV transmission and other infections such as hepatitis B and C. Do not use drugs intravenously or share needles for any purpose.

In the United States, Australia, New Zealand, Canada, Japan, and western European countries, the risk of infection of transfusion-associated HIV infection has been virtually eliminated through required testing of all donated blood for antibodies to HIV. In the United States, donations of blood and plasma must be screened for antibodies to HIV-1 and HIV-2 and HIV-1 P24 antigen.

If produced in the United States according to procedures approved by the Food and Drug Administration, immune globulin preparations (such as those used for the prevention of hepatitis A and B) and hepatitis B virus vaccine undergo processes that are known to inactivate HIV and therefore these products should be used as indicated.

In less-developed nations, there may not be a formal program for testing blood or biological products for antibody to HIV. In these countries, use of unscreened blood clotting factor concentrates or those of uncertain purity should be avoided (when medically prudent). If transfusion is necessary, the blood should be tested, if at all possible, for HIV antibodies by appropriately-trained laboratory technicians using a reliable test. For WHO blood transfusion guidelines for international travelers, see p. 179.

Needles used to draw blood or administer injections should be sterile, preferably of the single-use disposable type, and prepackaged in a sealed container. Insulin-dependent diabetics, hemophiliacs, and other persons who require routine or frequent injections should carry a supply of syringes, needles and disinfectant swabs (e.g., alcohol wipes) sufficient to last their entire stay abroad.

International travelers should be aware that some countries serologically screen incoming travelers (primarily those with extended visits, such as for work or study) and deny entry to persons with AIDS and those whose test results indicate infection with HIV. Persons who are intending to visit a country for a substantial period or to work or study abroad should be informed of the policies and requirements of the particular country. This information is usually available from consular officials of individual nations.

GENERAL RECOMMENDATIONS ON VACCINATION AND PROPHYLAXIS

The Advisory Committee on Immunization Practices (ACIP) meets periodically and makes recommendations to the Public Health Service. Benefits and risks are associated with the use of all immunobiologics—no vaccine is completely effective or completely safe. The recommendations are based on scientific evidence of benefits and risks in order to achieve optimal levels of protection against infectious or communicable diseases. The recommendations include information on general immunization issues and on the use of specific vaccines. When these recommendations are revised, they are published in the *Morbidity and Mortality Weekly Report*.

Vaccinations against diphtheria, tetanus, pertussis, measles, mumps, rubella, poliomyelitis, and *Haemophilus influenzae* type b meningitis and invasive disease are routinely administered in the United States, usually in childhood. Routine vaccination against hepatitis B virus infection also is now recommended for all infants beginning either at birth or at 2 months of age. If persons do not have a history of adequate protection against these diseases, immunizations appropriate to their age and previous immunization status should be obtained, whether or not international travel is planned. Text and Tables 2-23 present recommendations for use, the number of doses, dose intervals, boosters, side effects, precautions and contraindications of vaccines and toxoids which may be indicated for travelers. For specific vaccines and toxoids, additional details on background, side effects, adverse reactions, precautions, and contraindications are available in the appropriate ACIP statements.

AGE AT WHICH IMMUNOBIOLOGICS ARE ADMINISTERED

Factors which influence recommendations concerning the age at which a vaccine is administered include the age-specific risks of the disease and its complications, the ability of individuals of a given age to respond to the vaccine(s), and the potential interference with the immune response by passively transferred maternal antibody. Vaccines are recommended for the youngest age group at risk of developing the disease whose members are known to develop an adequate antibody response to vaccination.

The routine immunization recommendations and schedules for infants and children in the United States (Table 2 and 3) do not provide specific guidelines for infants and young children who will travel internationally before the age when specific vaccines and toxoids are routinely recommended. The section titled IMMUNIZATION SCHEDULE MODIFICATIONS FOR INTERNATIONAL TRAVEL FOR INFANTS AND INADEQUATELY IMMUNIZED YOUNG CHILDREN <2 YEARS OF AGE (p. 95) provides revised recommendations and schedules for active and passive immunization of such infants and children.

SPACING OF IMMUNOBIOLOGICS

Multiple doses of same antigen

Some products require more than 1 dose for adequate protection. The use of multiple reduced doses or the use of doses given at less than minimum intervals may lessen the antibody response and is not endorsed or recommended; such doses should not be counted as part of the vaccinaton series. The minimum interval between subsequent doses of vaccine are shown in Table 5. It is unnecessary to restart an interrupted series of a vaccine or toxoid or to add extra doses. However, some products require periodic booster doses to maintain protection.

Simultaneous administration

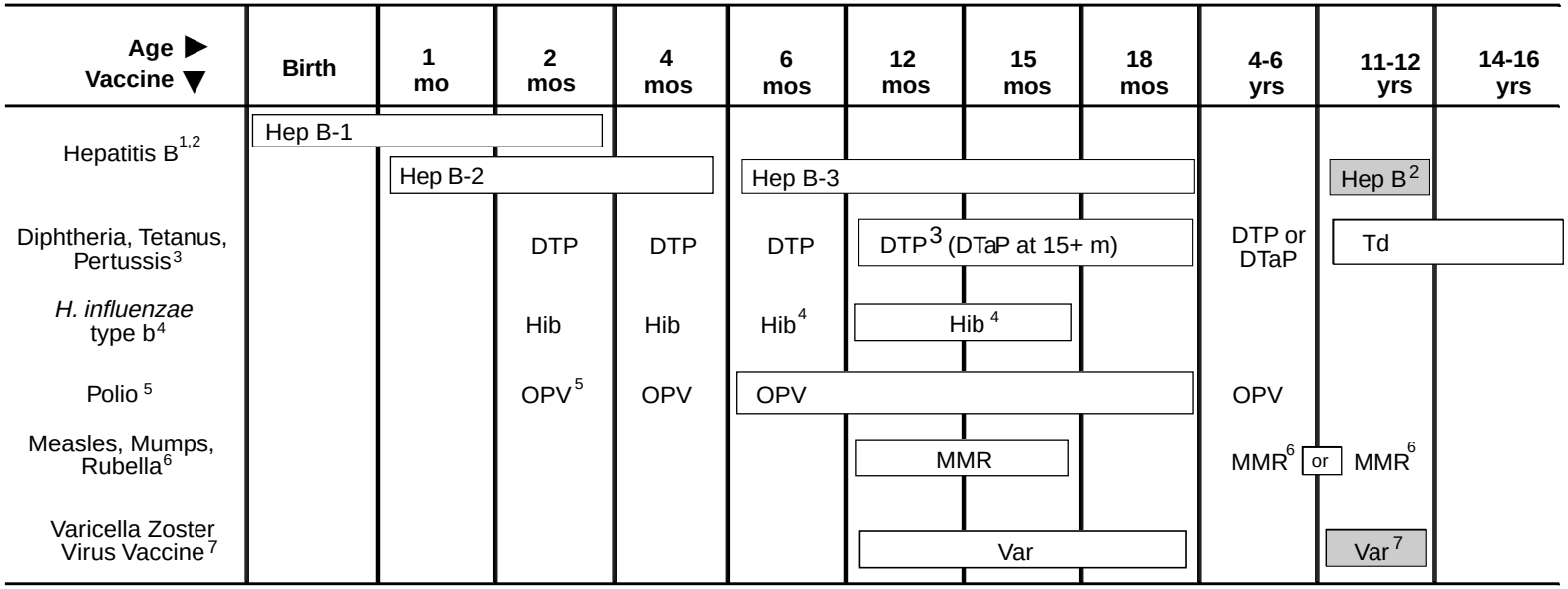
Most of the widely used antigens can safely and effectively be given simultaneously (i.e., on the same day) without impairing antibody responses or increasing rates of adverse reactions. This is particularly helpful for international travelers for whom exposure to several infectious diseases may be imminent.

In general, inactivated vaccines can be administered simultaneously at separate sites. However, when vaccines commonly associated with local or systemic reactions e.g., cholera, parenteral typhoid, and plague are given simultaneously, reactions may be accentuated. It is preferable to administer these vaccines on separate occasions.

When administered at the same time and at separate sites, DTP, OPV, and MMR have produced seroconversion rates and rates of side effects similar to those observed when the vaccines are administered separately. Simultaneous vaccination of infants with DTP, OPV (or IPV), and either Hib vaccine or hepatitis B vaccine has resulted in acceptable response to all antigens. Routine simultaneous administration of DTP (or DTaP), OPV (or IPV), Hib vaccine, MMR, and hepatitis B vaccine is encouraged for children who are the recommended age to receive these vaccines and for whom no specific contraindications exist at the time of the visit. Administration of MMR and Hib vaccine at 12 to 15 months of age, followed by DTP (or DTaP, if indicated) at 15-18 months, remains an acceptable alternative for children with caregivers known to be compliant with other health-care recommendations and who are likely to return for future visits; hepatitis B vaccine can be administered at either of these two visits. DTaP may be used instead of DTP only for the fourth and fifth dose in children 15 months of age through 6 years (i.e., before the seventh birthday).

Table 2. Recommended Childhood Immunization Schedule United States, July-December 1996

Vaccines are listed under the routinely recommended ages. Bars indicate range of acceptable ages for vaccination. Shaded bars indicate catch-up vaccination: at 11-12 years of age, hepatitis B vaccine should be administered to children not previously vaccinated, and Varicella Zoster Virus vaccine should be administered to children not previously vaccinated who lack a reliable history of chickenpox.



[1]**Infants born to HBsAg-negative mothers** should receive 2.5 µg of Merck vaccine (Recombivax HB) or 10µg of SmithKline Beecham (SB) vaccine (Engerix-B). The second dose should be administered ≥1 month after the first dose.

Infants born to HBsAg-positive mothers should receive 0.5 mL hepatitis B immune globulin (HBIG) within 12 hours of birth, and either 5 µg of Merck vaccine (Recombivax HB) or 10µg of SB vaccine (Engerix-B) at a separate site. The second dose is recommended at 1-2 months of age and the third dose at 6 months of age.

Infants born to mothers whose HBsAg status is unknown should receive either 5 µg of Merck vaccine (Recombivax HB) or 10 µg of SB vaccine (Engerix-B) within 12 hours of birth. The second dose of vaccine is recommended at 1 month of age and the third dose at 6 months of age.

[2]Adolescents who have not previously received 3 doses of hepatitis B vaccine should initiate or complete the series at the 11-12 year-old visit. The second dose should be administered at least 1 month after the first dose, and the third dose should be administered at least 4 months after the first dose and at least 2 months after the second dose.

[3]DTP4 may be administered at 12 months of age, if at least 6 months have elapsed since DTP3. DTaP (diphtheria and tetanus toxoids and acellular pertussis vaccine) is licensed for the fourth and/or fifth vaccine dose(s) for children aged ≥15 months and may be preferred for these doses in this age group. Td (tetanus and diphtheria toxoids, adsorbed, for adult use) is recommended at 11-12 years of age if at least 5 years have elapsed since the last dose of DTP, DTaP, or DT.

[4]Three *H. influenzae* type b conjugate vaccines are licensed for infant use. If PRP-OMP (Pedvax HIB [Merck]) is administered at 2 and 4 months of age, a dose at 6 months is not required. After completing the primary series, any Hib conjugate vaccine may be used as a booster.

[5]Oral poliovirus vaccine (OPV) is recommended for routine infant vaccination. Inactivated poliovirus vaccine (IPV) is recommended for persons with a congenital or acquired immune deficiency disease or an altered immune status as a result of disease or immunosuppressive therapy, as well as their household contacts, and is an acceptable alternative for other persons. The primary 3-dose series for IPV should be given with a minimum interval of 4 weeks between the first and second doses and 6 months between the second and third doses. **[Also see IMPORTANT Editor's Note on page 145.]**

[6]The second dose of MMR is routinely recommended at 4–6 years of age OR at 11–12 years of age, but may be administered at any visit, provided at least 1 month has elapsed since receipt of the first dose.

[7]Varicella zoster virus vaccine (Var) can be administered to susceptible children any time after 12 months of age. Unvaccinated children who lack a reliable history of chickenpox should be vaccinated at the 11-12 year-old visit.

Approved by the Advisory Committee on Immunization Practices (ACIP), the American Academy of Pediatrics (AAP), and the American Academy of Family Physicians (AAFP)

TABLE 3. Recommended Accelerated Immunization Schedule for Infants and Children <7 Years of Age Who Start the Series Late* or Who Are >1 Month Behind in the Immunization Schedule† (i.e., Children for Whom Compliance With Scheduled Return Visits Cannot be Assured)

Timing	Vaccine(s)	Comments
First visit (≥4 months of age)	DTP§, OPV, Hib¶,§, Hepatitis B, MMR (should be given as soon as child is age 12–15 months)	All vaccines should be administered simultaneously at the appropriate visit
Second visit (1 month after first visit)	DTP§, Hib¶,§, Hepatitis B	
Third visit (1 month after second visit)	DTP§, OPV, Hib¶,§	
Fourth visit (6 weeks after third visit)	OPV	
Fifth visit (≥6 months after third visit)	DTaP§ or DTP, Hib¶,§, Hepatitis B	
Additional visits (Age 4–6 yrs)	DTaP§ or DTP, OPV, MMR	Preferably at or before school entry.
(Age 11–16 yrs)	Td	Repeat every 10 yrs through-out life.

DTP	Diphtheria-tetanus-pertussis
DTaP	Diphtheria-tetanus-acellular pertussis
Hib	Haemophilus influenzae type b conjugate
MMR	Measles-mumps-rubella
OPV	Poliovirus vaccine, live oral, trivalent **[See IMPORTANT Editor's Note on page 145]**
Td	Tetanus and diphtheria toxoids (for use among persons ≥7 years of age

*If initiated in the first year of life, administer DTP doses 1, 2, and 3, and OPV doses 1, 2, and 3 according to this schedule; administer MMR when the child reaches 12–15 months of age.

†See individual ACIP recommendations for detailed information on specific vaccines.

§Two DTP and Hib combination vaccines are available (DTP/HbOC [TETRAMUNE™]; and PRP-T [ActHIB™, OmniHIB™] which can be recconstituted with DTP vaccine produced by Connaught). DTaP preparations are currently recommended only for use as the fourth and/or fifth doses of the DTP series among children 15 months through 6 years of age (before the seventh birthday). DTP and DTaP should not be used on or after the seventh birthday.

¶The recommended schedule varies by vaccine manufacturer. For information specific to the vaccine being used, consult the package insert and ACIP recommendations. Children beginning the Hib vaccine series at age 2–6 months should receive a primary series of three doses of HbOC [HibTITER®] (Lederle-Praxis), PRP-T [ActHib™, OmniHIB™] (Pasteur Merieux; SmithKline Beecham; Connaught), or a licensed DTP-Hib combination vaccine; or two doses of PRP-OMP [PedvaxHIB®] (Merck, Sharp, and Dohme). An additional booster dose of any licensed Hib conjugate vaccine should be administered at 12–15 months of age and at least 2 months after the previous dose. Children beginning the Hib vaccine series at 7–11 months of age should receive a primary series of two doses of an HbOC, PRP-T, or PRP-OMP-containing vaccine. An additional booster dose of any licensed Hib conjugate vaccine should be administered at 12–18 months of age and at least 2 months after the previous dose. Children beginning the Hib vaccine series at ages 12–14 months should receive a primary series of one dose of an HbOC, PRP-T, or PRP-OMP-containing vaccine. An additional booster dose of any licensed Hib conjugate vaccine should be administered 2 months after the previous dose. Children beginning the Hib vaccine series at ages 15-59 months should receive one dose of any licensed Hib vaccine. Hib vaccine should not be administered after the fifth birthday except for special circumstances as noted in the specific ACIP recommendations for the use of Hib vaccine.

TABLE 4. Recommended Immunization Schedule for Persons ≥7 Years of Age Not Vaccinated at the Recommended Time in Early Infancy*

Timing	Vaccine(s)	Comments
First visit	Td†, OPV§, MMR¶, and Hepatitis B**	Primary poliovirus vaccination is not routinely recommended for persons ≥18 years of age.
Second visit (6–8 weeks after first visit)	Td, OPV, MMR††,¶, Hepatitis B**	
Third visit (6 months after second visit)	Td, OPV, Hepatitis B**	
Additional visits	Td	Repeat every 10 years throughout life.

MMR Measles-mumps-rubella
OPV Poliovirus vaccine, live oral, trivalent **[See IMPORTANT Editor's Note on page 145]**
Td Tetanus and diphtheria toxoids (for use among persons ≥7 years of age)

*See individual ACIP recommendations for details.
†The DTP and DTaP doses administered to children <7 years of age who remain incompletely vaccinated at age ≥7 years should be counted as prior exposure to tetanus and diphtheria toxoids (e.g., a child who previously received two doses of DTP needs only one dose of Td to complete a primary series for tetanus and diphtheria).
§When polio vaccine is administered to previously unvaccinated persons ≥18 years of age, inactivated poliovirus vaccine (IPV) is preferred. For the immunization schedule for IPV, see specific ACIP statement on the use of polio vaccine.
¶Persons born before 1957 can generally be considered immune to measles and mumps and need not be vaccinated. Rubella (or MMR) vaccine can be administered to persons of any age, particularly to nonpregnant women of childbearing age.
**Hepatitis B vaccine, recombinant. Selected high-risk groups for whom vaccination is recommended include persons with occupational risk, such as health-care and public-safety workers who have occupational exposure to blood, clients and staff of institutions for the developmentally disabled, hemodialysis patients, recipients of certain blood products (e.g., clotting factor concentrates), household contacts and sex partners of hepatitis B virus carriers, injecting drug users, sexually active homosexual and bisexual men, certain sexually active heterosexual men and women, inmates of long-term correctional facilities, certain international travelers, and families of HBsAg-positive adoptees from countries where HBV infection is endemic. Because risk factors are often not identified directly among adolescents, universal hepatitis B vaccination of teenagers should be implemented in communities where injecting drug use, pregnancy among teenagers, and/or sexually transmitted diseases are common.
††The ACIP recommends a second dose of measles-containing vaccine (preferable MMR to assure immunity to mumps and rubella) for certain groups. Children with no documentation of live measles vaccination after the first birthday should receive two doses of live measles-containing vaccine not less than 1 month apart. In addition, the following persons born in 1957 or later should have documentation of measles immunity (i.e., two doses of measles-containing vaccine [at least one of which being MMR], physician-diagnosed measles, or laboratory evidence of measles immunity): a) those entering post-high school educational settings; b) those beginning employment in health-care settings who will have direct patient contact; and c) travelers to areas with endemic measles.

Table 5. Minimum age for initial vaccination and minimum interval between vaccine doses, by type of vaccine

Vaccine	Minimum *age* for first dose*	Minimum *interval* from dose 1 to 2*	Minimum *interval* from dose 2 to 3*	Minimum *interval* from dose 3 to 4*
DTP (DT)[†]	6 weeks[§]	4 weeks	4 weeks	6 months
Combined DTP-Hib	6 weeks	1 month	1 month	6 months
DTaP*	15 months			6 months
Hib (primary series)				
HbOC	6 weeks	1 month	1 month	¶
PRP-T	6 weeks	1 month	1 month	¶
PRP-OMP	6 weeks	1 month	¶	
OPV	6 weeks[§]	6 weeks	6 weeks	
IPV	6 weeks	4 weeks	6 months[††]	
MMR	12 months[§§]	1 month		
Hepatitis B	birth	1 month	2 months[¶¶]	

DTP	Diphtheria-tetanus-pertussis
DTaP	Diphtheria-tetanus-acellular pertussis
Hib	*Haemophilus influenza* type b conjugate
IPV	Inactivated poliovirus vaccine
MMR	Measles-mumps-rubella
OPV	Live oral polio vaccine **[See IMPORTANT Editor's Note on page 145]**

*These minimum acceptable ages and intervals may not correspond with the optimal recommended ages and intervals for vaccination. See tables 2–4 for the current recommended routine and accelerated vaccination schedules.

[†]DTaP can be used in place of the fourth (and fifth) dose of DTP for children who are at least 15 months of age. Children who have received all four primary vaccination doses before their fourth birthday should receive a fifth dose of DTP (DT) or DTaP at 4–6 years of age before entering kindergarten or elementary school **and** at least 6 months after the fourth dose. The total number of doses of diphtheria and tetanus toxoids should not exceed six each before the seventh birthday.

[§]The American Academy of Pediatrics permits DTP and OPV to be administered as early as 4 weeks of age in areas with high endemicity and during outbreaks.

[¶]The booster dose of Hib vaccine which is recommended following the primary vaccination series should be administered no earlier than 12 months of age **and** at least 2 months after the previous dose of Hib vaccine (Tables 2 and 3).

[††]For unvaccinated adults at increased risk of exposure to poliovirus with <3 months but >2 months available before protection is needed, three doses of IPV should be administered at least 1 month apart.

[§§]Although the age for measles vaccination may be as young as 6 months in outbreak areas where cases are occurring in children <1 year of age, children initally vaccinated before the first birthday should be revaccinated at 12–15 months of age and an additional dose of vaccine should be administered at the time of school entry or according to local policy. Doses of MMR or other measles-containing vaccines should be separated by at least 1 month.

[¶¶]This final dose is recommended no earlier than 4 months of age.

Hepatitis B vaccine administered with yellow fever vaccine is as safe and efficacious as when these vaccines are administered separately. Measles and yellow fever vaccines have been administered together safely and with full efficacy of each of the components.

The antibody response of yellow fever and cholera vaccines is decreased if administered simultaneously or within a short time of each other. If possible, yellow fever and cholera vaccinations should be separated by at least 3 weeks. If there are time constraints and both vaccines are necessary, the injections can be administered simultaneously or within a 3-week period with the understanding that antibody response may not be optimal.

Decisions on the need for yellow fever and/or cholera immunizations should take into account the amount of protection afforded by the vaccine, the importance of vaccination versus environmental or hygienic practices in avoiding disease exposure, and whether there is an actual vaccination requirement for entry into a country. Certain countries require yellow fever vaccination with documentation in an International Certificate of Vaccination. Yellow fever vaccine is highly effective in protecting against a disease with substantial mortality for which no therapy exists. The currently used cholera vaccine provides only limited protection of brief duration; few indications exist for its use.

Limited data suggest that the immunogenicity and safety of Japanese encephalitis (JE) vaccine is not compromised by simultaneous administration with DTP vaccine. No data exist on the effect of concurrent administration of other vaccines, drugs (e.g., chloroquine, mefloquine), or biologicals on the safety and immunogenicity of JE vaccine.

Non-Simultaneous Administration

Inactivated vaccines generally do not interfere with the immune response to other inactivated or live vaccines. In general, an inactivated vaccine can be given either simultaneously or at any time before or after a different inactivated vaccine or a live vaccine. An exception, as noted above, is the recommendation that yellow fever and cholera vaccines should be separated by at least 3 weeks, if possible.

Theoretically, the immune response to one live-virus vaccine might be impaired if administered within 30 days of another live- virus vaccine; however no evidence exists for currently available vaccines to support this concern, whenever possible, live virus vaccines administered on different days should be administered at least 30 days apart. However, OPV and MMR vaccine can be administered at any time before, with, or after each other, if indicated.

Live virus vaccines can interfere with an individual's response to tuberculin testing. Tuberculin testing, if otherwise indicated, can be done on the day that live viral vaccines are administered or 4-6 weeks later.

Immune globulin (IG preparations)*

When certain live attenuated vaccines are given with immune globulin (IG) preparations, antibody response can be diminished. IG preparations do not interfere with the immune response to either OPV or yellow fever vaccine. However, immune globulin can inhibit the immune response to other parenterally-administered live-attenuated vaccine viruses (measles, mumps, rubella); the duration of inhibition is related to the dose of immune globulin. Administration of MMR and its component vaccines should be delayed for a) at least 3 months after IG administration given in doses to prevent hepatitis A, hepatitis

*Formerly called immune serum globulin and immunoglobulin.

B, or tetanus prophylaxis b) at least 4 months after rabies prophylaxis, c) at least 5 months after measles or varicella prophylaxis, and d) at least 6 months after receipt of whole blood or packed red blood cells or measles prophylaxis in an immunocompromised person. Receipt of higher doses of immune globulins in immunocompromised persons or receipt of intravenous immune globulin or certain other blood products may interfere with the immune response to MMR vaccine for longer periods. The General Recommendations on Immunization (MMWR:1994;43(RR-1)) should be consulted for specific guidance on MMR vaccination following use of these products.

Because of imminent exposure to disease, immune globulin administration may become necessary after MMR or its individual component vaccines have been given, and interference can occur. Vaccine virus replication and stimulation of immunity usually will occur within 1-2 weeks after vaccination. If the interval between administration of these vaccines and the subsequent administration of an immune globulin preparation is 14 days or longer, vaccine need not be readministered. If the interval is less than 14 days, the vaccine should be readministered a) at least 3 months after hepatitis A, hepatitis B, or tetanus prophylaxis, b) at least 4 months after rabies prophylaxis, and c) at least 5 months after measles or varicella prophylaxis, unless serologic testing indicates that antibodies have been produced. If administration of immune globulin becomes necessary because of imminent exposure to disease, MMR or its component vaccines can be administered simultaneously with immune globulin, with the recognition that vaccine-induced immunity may be compromised. The vaccine should be administered in a site remote from that chosen for the immune globulin inoculation. Vaccination should be repeated after the interval noted above unless serologic testing indicates antibodies have been produced.

When immune globulin is given with the first dose of hepatitis A vaccine, the proportion of persons who develop protective levels of antibody is not affected, but antibody concentrations are lower. Because the final concentrations of anti-HAV are many-fold higher than that considered protective, this reduced immunogenicity is not expected to be clinically important. Immune globulin preparations interact minimally with other inactivated vaccines and toxoids. Therefore, other inactivated vaccines can be given simultaneously or at any time interval after or before an immune globulin product is used. However, vaccines should be administered at sites different than the immune globulin.

HYPERSENSITIVITY TO VACCINE COMPONENTS

Vaccine components can cause allergic reactions in some recipients. These reactions can be local or systemic, and can include mild to severe anaphylaxis or anaphylactic-like responses. The vaccine components responsible can include: (1) vaccine antigen, (2) animal proteins, (3) antibiotics, (4) preservatives, and (5) stabilizers. The most common animal protein allergen is egg protein in vaccines prepared using embryonated chicken eggs (e.g., influenza and yellow fever vaccines) or chicken embryo cell cultures (e.g., mumps and measles). Generally, persons who are able to eat eggs or egg products safely may receive these vaccines, while persons with histories of anaphylactic allergy (e.g., hives, swelling of the mouth and throat, difficulty breathing, hypotension, or shock) to eggs or egg proteins ordinarily should not.

Screening persons by asking whether they can eat eggs without adverse effects is a reasonable way to identify those who might be at risk from receiving measles, mumps, MMR, yellow fever and influenza vaccines. Protocols requiring caution have been developed for testing and vaccinating with measles and mumps vaccines those persons with anaphylactic reactions to egg ingestion. (1991 Redbook—Report of the Committee

on Infectious Diseases. (Peter G., LePow ML., McCracken, GH Jr., Phillips CF, editors, American Academy of Pediatrics; 1991, Greenberg MA, et al. Safe administration of mumps-measles-rubella vaccine in egg-allergic children. J. Pediatr 1988;113:504-506. Lavi S., et al. Administration of measles, mumps, and rubella virus vaccine (live) to egg-allergic children. JAMA 1990;263:269-271. Kemp A, et al. Measles immunization in children with clinical reactions to egg protein. AJDC 1990;144:33-35). A regimen for administering influenza vaccine to children with egg hypersensitivity and severe asthma has also been published. (Murphy and Strunk. J. Pediatr 1985;106:931-3)

Some vaccines contain preservatives (e.g., thimerosal, a mercurial compound) or trace amounts of antibiotics to which patients may be hypersensitive. Persons administering vaccines should carefully review the information provided in the package insert before deciding if the rare patient with such hypersensitivity should receive the vaccine(s). No currently recommended vaccine contains penicillin or penicillin derivatives. Some vaccines (e.g., MMR and its individual component vaccines) contain trace amounts of neomycin. This amount is less than would usually be used for the skin test to determine hypersensitivity. However, persons who have experienced anaphylactic reactions to neomycin should not receive these vaccines. Most often, neomycin allergy is a contact dermatitis—a manifestation of a delayed-type (cell-mediated) immune response—rather than anaphylaxis. A history of delayed-type reactions to neomycin is not a contraindication to receiving these vaccines.

Certain bacterial vaccines, such as cholera, DTP, plague, and parenteral typhoid, are frequently associated with local or systemic adverse effects. These reactions appear to be of a toxic rather than a hypersensitivity nature and are difficult to link with a specific sensitivity to vaccine components. On rare occasions, urticarial or anaphylactic reactions have been reported in DTP, DT, Td, or tetanus toxoid recipients. Appropriate skin testing can be performed to determine sensitivity to tetanus toxoid before discontinuing its use. (Jacobs RL, et al. Adverse reactions to tetanus toxoid. JAMA 1982;247:40-42). Alternatively, the need for a booster dose of tetanus toxoid can be evaluated by serologic testing.

ALTERED IMMUNOCOMPETENCE

Killed or inactivated vaccines do not represent a danger to immunocompromised persons and generally should be administered as recommended for healthy persons. Frequently, however, the immune response to these vaccines is suboptimal.

Virus replication after administration of live, attenuated-virus vaccines can be enhanced in persons with immunodeficiency diseases, and in those with suppressed capacity for immune response, as occurs with leukemia, lymphoma, generalized malignancy, or therapy with corticosteroids, alkylating agents, antimetabolites, or radiation. Severe complications have been reported following vaccination with live attenuated virus vaccines and with live bacterial vaccines (e.g., BCG) in patients with leukemia, lymphoma and other persons with suppressed capacity for immune response. In general, patients with such conditions should not be given live vaccines. Vaccine recommendations specific for persons infected with Human Immunodeficiency Virus (HIV) are found under the individual diseases in the "Specific Recommendations for Vaccinations and Prophylaxis," pp. 101-164.

OPV should not be given to any immunocompromised patient, their household members, or their close contacts. If polio immunization is indicated for these persons, IPV is recommended. Because of the possibility of immunodeficiency in other children born to a family in which there has been a case of congenital immunodeficiency, family members

should not receive OPV until the immune status of the recipient and other children in the family is known.

Patients with leukemia in remission whose chemotherapy has been terminated for at least 3 months may receive live virus vaccines. Most experts agree that steroid therapy usually does not contraindicate administration of live virus vaccine when it is short-term; low to moderate dose; (<2 weeks); long-term, alternate-day treatment with short-acting steroids; maintenance physiologic doses (replacement therapy); or administered topically (i.e., skin or eyes) by aerosol; or by intra-articular, bursal or tendon injection.

Children infected with HIV should receive on schedule all of the routinely recommended inactivated childhood vaccines (i.e., DTP, Hib, and hepatitis B vaccine) whether or not they are symptomatic. IPV is the polio vaccine of choice for HIV-infected asymptomatic and symptomatic persons and their household members and other close contacts. Limited studies of MMR immunization of asymptomatic and symptomatic HIV-infected persons have not documented unusual or severe adverse events. Because disease can be severe in such persons, MMR vaccine is recommended for all asymptomatic HIV- infected persons and should also be considered strongly for all those who are symptomatic. Pneumococcal vaccine is recommended for any person >2 years of age with HIV infection. Because influenza may result in serious illness and complications, vaccination against influenza is a prudent precaution in HIV-infected persons.

VACCINATION OF PERSONS WITH ACUTE ILLNESSES

The decision to administer or delay vaccination because of a current or recent acute illness depends largely on the severity of the symptoms and their etiology. Although a moderate or severe febrile illness is sufficient reason to postpone vaccination, minor illnesses, such as diarrhea, mild upper-respiratory infection with or without low-grade fever, or other low-grade febrile illness are not contraindications to vaccination. Likewise, antimicrobial therapy is not a contraindication to vaccination. In persons whose compliance with medical care cannot be assured, it is particularly important to take every opportunity to provide appropriate vaccinations. Persons with moderate or severe illness with or without fever should be vaccinated as soon as they have recovered from the acute phase of the illness. This precaution is to avoid superimposing adverse effects from the vaccine on the underlying illness or mistakenly attributing a manifestation of the underlying illness to the vaccine.

Routine physical examinations or temperature measurements are not prerequisites for vaccinating infants and other persons who appear to be in good health. Asking if the person is ill, postponing vaccination for those with moderate or severe acute illnesses, and vaccinating those without contraindications are appropriate procedures in immunization programs.

VACCINATION DURING PREGNANCY

Risk from vaccination during pregnancy is largely theoretical. The benefit of vaccination among pregnant women usually outweighs the potential risk when a) the risk for disease exposure is high, b) infection would pose a special risk to the mother or fetus, and c) the vaccine is unlikely to cause harm.

OPV can be administered to pregnant women who are at substantial risk of imminent exposure to natural infection. Although OPV is preferred, IPV may be considered if full immunization can be completed before the anticipated exposure. Pregnant women traveling to areas where the risk of yellow fever is high should receive a yellow fever

vaccine. Under these circumstances, the small theoretical risk from vaccination is far outweighed by the risk of yellow fever infection. Known pregnancy is a contraindication for rubella, measles, and mumps vaccines. Although of theoretical concern, no case of congenital rubella syndrome or abnormalities attributable to a rubella vaccine virus infection have been observed in infants born to susceptible mothers who received rubella vaccine during pregnancy.

Persons who receive measles, mumps, or rubella vaccines can shed these viruses but generally do not transmit them. These vaccines can be administered safely to the children of pregnant women. Although live polio virus is shed by persons recently vaccinated with OPV (particularly after the first dose), this vaccine can also be administered to the children of pregnant women because experience has not revealed any risk of polio vaccine virus to the fetus.

Japanese encephalitis vaccine poses an unknown but theoretical risk to the developing fetus, and the vaccine should not be administered routinely during pregnancy. Pregnant women who must travel to an area where risk of JE is high should be vaccinated when the theoretical risks of immunization are outweighed by the risk of infection to the mother and developing fetus.

No evidence exists to indicate that tetanus and diphtheria toxoids administered during pregnancy are teratogenic. Pregnant women who are unvaccinated, especially those whose child may be born under unhygienic conditions (i.e., without sterile technique), should receive two doses of Td 4-8 weeks apart before delivery. Pregnant women in similar circumstances who are only partially vaccinated against tetanus should complete the 3-dose primary series. Depending on when the woman seeks prenatal care and the required interval between doses, one or two doses of Td can be administered before delivery. Previously immunized pregnant women who have not received a Td vaccination within the last 10 years should receive a booster dose.

There is no convincing evidence of risk from vaccinating pregnant women with other inactivated virus or bacteria vaccines or toxoids. In addition, there is no known risk to the fetus from passive immunization of pregnant women with immune globulin.

BREAST-FEEDING

Neither killed nor live vaccines affect the safety of breast- feeding for mothers or infants. Breast-feeding does not adversely affect immunization and is not a contraindication for any vaccine. Breast-fed infants should be vaccinated according to routine recommended schedules.

Inactivated or killed vaccines do not multiply within the body. Therefore they should pose no special risk for mothers who are breast-feeding or for their infants. Although live vaccines do multiply within the mother's body, most have not been demonstrated to be excreted in breast milk. Although rubella vaccine virus may be transmitted in breast milk, the virus usually does not infect the infant, and if it does, the infection is well tolerated. There is no contraindication for vaccinating breast-feeding mothers with yellow fever vaccine. Breast-feeding mothers can receive OPV without any interruption in the feeding schedule.

TABLE 6. Vaccination During Pregnancy

	Vaccine	Indications for vaccination during pregnancy
Live virus vaccine		
Measles Mumps Rubella	Live-attenuated	Contraindicated.
Yellow fever	Live-attenuated	Contraindicated except if exposure to yellow fever virus is unavoidable.
Poliomyelitis	Trivalent live-attenuated (OPV)	Persons at substantial risk of exposure to polio.
Inactivated virus vaccines		
Hepatitis A	Killed virus	Data on safety in pregnancy are not available. Should weigh the theoretical risk of vaccination against the risk of disease.
Hepatitis B	Recombinant produced, purified hepatitis B surface antigen	Pregnancy is not a contraindication.
Influenza	Inactivated type A and type B virus vaccines	Usually recommended only for patients with serious underlying disease. Consult health authorities for current recommendations.
Japanese Encephalitis	Killed virus	Should reflect actual risks of disease and probable benefits of vaccine.
Poliomyelitis	Killed virus (IPV)	OPV preferred when immediate protection of pregnant females is needed; however, IPV is alternative if complete vaccination series can be administered before exposure.
Rabies	Killed virus Rabies IG	Substantial risk of exposure.
Live bacterial vaccines		
Typhoid (Ty21a)	Live bacterial	Should reflect actual risks of disease and probable benefits of vaccine.
Inactivated bacterial vaccines		
Cholera Typhoid	Killed bacterial	Should reflect actual risks of disease and probable benefits of vaccine.
Plague	Killed bacterial	Selective vaccination of exposed persons.
Meningococcal	Polysaccharide	Only in unusual outbreak situations.
Pneumococcal	Polysaccharide	Only for high-risk persons.
Haemophilus b conjugate	Polysaccharide-protein	Only for high-risk persons.
Toxoids		
Tetanus-diphtheria (Td)	Combined tetanus-diphtheria toxoids, adult formulation	Lack of primary series, or no booster within past 10 years.
Immune globulins, pooled or hyperimmune	Immune globulin or specific globulin preparations	Exposure or anticipated unavoidable exposure to measles, hepatitis A, hepatitis B, rabies, or tetanus.

IMMUNIZATION SCHEDULE MODIFICATIONS FOR INTERNATIONAL TRAVEL FOR INFANTS AND INADEQUATELY IMMUNIZED YOUNG CHILDREN < 2 YEARS OF AGE

Routine Childhood Vaccine Preventable Diseases (measles, mumps, rubella, polio, diphtheria, tetanus, pertussis, *Haemophilus influenzae* type b, and hepatitis B)

Diphtheria and tetanus toxoid and pertussis vaccine

Diphtheria is an endemic disease in many developing countries and is currently found throughout the New Independent States of the former Soviet Union. Tetanus is ubiquitous worldwide. Pertussis is common in developing countries and in other countries where routine immunization against pertussis is not practiced widely. Because the risk of contracting pertussis in other countries and of diphtheria in developing countries is higher than in the United States, children who will be leaving the United States should be as well immunized as is possible before departing. Optimum protection against diphtheria, tetanus, and pertussis in the first year of life is achieved with 3 doses of DTP, the first administered at 6-8 weeks of age and the next two at 4-8 week intervals, as is generally the practice in the United States. A fourth dose of DTP 6-12 months after the third dose or diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP), at 15 months, maintains protection. Infants traveling to areas where diphtheria and/or pertussis are endemic or epidemic preferably should have received 3 doses; the first dose may be given to infants as young as 4 weeks of age and the next 2 doses at intervals of no less than 4 weeks. Two doses of DTP received at intervals of at least 4 weeks may provide some protection particularly against diphtheria and tetanus, while a single dose is of little protective benefit. Parents who are traveling with young infants should be informed that infants who have not received 3 doses of DTP are at greater risk of contracting pertussis than children who have been adequately vaccinated. Infants and other children less than 7 years of age who at the time of travel have received less than 3 doses of DTP and who will remain for extended periods in areas of increased risk of exposure to pertussis and/or diphtheria should complete their remaining doses at 4-week intervals.

For infants and children traveling internationally or remaining in areas of increased risk of exposure, reducing the interval between the third and fourth doses of the primary series to 6 months may be considered.

Measles vaccine

Measles is an endemic disease in many developing countries and in other countries where measles immunization levels are low. Because the risk of contracting measles in many countries is greater than in the United States, children should be as well protected as possible before departing from the United States. Measles vaccine, preferably in combination with rubella and mumps vaccines, i.e., MMR vaccine, should be administered to all children 12-15 months of age and older. A second dose is currently recommended for all children, and is usually given at school entry (Table 2).

The age at vaccination should be lowered for infants traveling to areas where measles is endemic or epidemic. Infants 6-11 months of age who will be traveling to areas where measles is endemic or epidemic should receive a dose of single measles antigen vaccine before departure, although MMR may be used if single antigen measles vaccine is not

available. Children vaccinated prior to their first birthday must be revaccinated with two doses of MMR vaccine on or after their first birthday and at least 1 month apart. The optimal age for the first revaccination is 12-15 months. The second revaccination dose should normally be given at school entry. Since virtually all infants less than 6 months of age will be protected by maternally derived antibodies, no additional means to provide protection against measles is generally necessary in this age group.

Mumps and rubella vaccine(s)

Because the risk of serious disease from infection with either mumps or rubella in infants is so small, mumps or rubella vaccine generally should not be administered to children below the age of 12 months, unless measles vaccine is indicated and single antigen measles vaccine is not available. However, parents of children less than 12 months of age should be immune to mumps and rubella so they will not become infected if their infants develop illness.

Polio vaccine*

Trivalent oral polio vaccine (OPV) is the vaccine of choice for all infants and children if there are no contraindications to vaccination (see p. 145). Inactivated polio vaccine (IPV) also is available.

When time permits, children traveling to polio-endemic areas should receive at least 3 doses of OPV at intervals of at least 6 weeks. Children who have received 3 prior doses of OPV should receive a fourth dose if at least 6-8 weeks have elapsed since the third dose. In the United States, the Advisory Committee on Immunization Practices (ACIP) recommends that a primary series of 3 doses of oral poliovirus vaccine (OPV) be given at 2, 4, and 6 months of age. The OPV series may start as early as 6 weeks of age and at intervals of at least 6 weeks. However, in polio endemic areas, the "Expanded Programme on Immunization" of the World Health Organization recommends that a dose of OPV be given in the newborn period, e.g., at birth or before 6 weeks of age, with 3 additional doses (the primary series) given subsequently at 6, 10, and 14 weeks of age. While ideally the ACIP recommendations on age and intervals between doses of OPV should be followed, if travel to an endemic country will occur before a child is 6 weeks of age, a dose of OPV should be given prior to travel. A dose of vaccine administered before 6 weeks of age should not be counted as part of the standard 3-dose primary series. If the child remains in an endemic country, the child should receive the first dose of the standard 3-dose primary series no sooner than 4 weeks after the newborn period dose and the remaining 2 doses of the primary series at 4-week intervals. If the child has left the endemic area, the first dose of the primary series should be given 6-8 weeks after the newborn period dose, the second dose 6-8 weeks after the first dose and the third dose of the primary series 6-8 weeks after the second as is now recommended by the ACIP.

Children traveling to an endemic country who have received a first or second dose of the primary series of OPV but lack sufficient time to complete the primary series schedule as generally practiced in the United States should receive their second and/or third doses of OPV 4 weeks after their prior dose(s). Children with less than a primary series at the time of departure to an endemic area and who remain in an endemic area should complete the 3-dose primary series within the endemic area with doses at 4-week intervals.

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*See IMPORTANT Editor's Note on page 145.

No data or recommendations are available for the use of IPV prior to 6 weeks of age. Otherwise, if IPV is indicated, a primary series of IPV consists of 3 doses which can be given at 2, 4, and 15-18 months of age. The interval between doses 1 and 2 should be 6-8 weeks and between doses 2 and 3 at least 6 months.

Haemophilus influenzae type b Conjugate Vaccine

Haemophilus influenzae type b is an endemic disease worldwide. Risk of acquiring disease may be higher in developing countries than in the United States. In the United States, three types of *Haemophilus influenzae* type b conjugate vaccines (HbCV) are recommended for use in infants beginning at 6 weeks of age, and a fourth is recommended for use as a primary vaccination only in children age 15 months and older. Two of the Hib conjugates vaccines for infants are also available as combined DTP-Hib vaccines. Routine vaccination is recommended beginning at 2 months of age for all U.S. children. The number and timing of remaining doses depend on the type of conjugate vaccine used (see *Haemophilus influenzae* type b section, p. 118, for additional details). If vaccination is started at >7 months of age, fewer doses may be required. The same conjugate vaccine should preferably be used for all doses in the primary series. If, however, different vaccines are administered, a total of three doses of Hib conjugate vaccine is adequate. After completion of the primary infant vaccination series, any of the licensed Hib conjugate vaccines may be used for the booster dose at 12-15 months.

Infants and children should have optimal protection prior to travel. If previously unvaccinated, children less than 15 months of age should ideally receive at least 2 vaccine doses prior to travel. An interval as short as 1 month is acceptable.

Children between 15 months and 2 years of age require a single dose of vaccine.

Hepatitis B Vaccine

Since November, 1991, hepatitis B vaccine has been recommended for all infants beginning either at birth or by 2 months of age. Infants and young children who have not previously been vaccinated and who are traveling to areas with intermediate and high hepatitis B virus (HBV) endemicity may be at risk if they are directly exposed to blood from the local population. Circumstances in which HBV transmission could occur include receipt of blood transfusions not screened for HBsAg, exposure to unsterilized needles (or other medical/dental equipment) in local health facilities, or continuous close contact with local children who have open skin lesions (impetigo, scabies, scratched insect bites). Such exposures are most likely to occur if the child is living for long periods in smaller cities or rural areas and in close contact with the local population. Children who will live in an intermediate or high HBV endemic area for six or more months and who are expected to have the above exposures should receive the 3 doses of hepatitis B vaccine. The interval between doses 1 and 2 should be 1-2 months. Between doses 2 and 3 the interval should be a minimum of 2 months however, 4-12 months is preferred. (see Table 2, p. 85, for the suggested schedule, and Table 13 for vaccine specific doses, p. 126).

Other Vaccines and Immune Globulin

Cholera vaccine

One cholera vaccine administered parenterally with a 2-dose primary series, is currently licensed in the United States. The risk of cholera to U.S. travelers of any age is so low

that it is questionable whether vaccination is of benefit. No data are available concerning the efficacy or side effects of cholera vaccine in children less than 6 months of age. Cholera vaccine is not recommended for children less than 6 months of age. Breast-feeding is protective against cholera; careful preparation of formula and food from safe water and foodstuffs should protect nonbreast-fed infants. If a child less than 6 months of age is to travel to areas requiring cholera immunization, a medical waiver should be obtained before travel. For older infants and children traveling to countries that require vaccination, a single dose of vaccine is sufficient to satisfy local requirements.

Typhoid vaccine

Typhoid vaccination is not required for international travel. No data are available concerning the efficacy of typhoid vaccine in infants. Breast-feeding is likely to be protective against typhoid; careful preparation of formula and food from safe water and foodstuffs should protect nonbreast-fed infants. Typhoid vaccine is recommended for older children traveling to areas where there is a recognized risk of exposure to *Salmonella typhi* (see Typhoid fever for information on dosage and route of administration of the vaccines, p. 155).

Yellow Fever Vaccine

Because infants are at high risk of developing encephalitis from yellow fever vaccine, the recommendations for vaccinating infants should be considered on an individual basis. Although the incidence of these adverse events has not been clearly defined, 14 of 18 reported cases of post-vaccination encephalitis were in infants under 4 months of age. One fatal case confirmed by viral isolation was in a 4 year old child. The ACIP and the World Health Organization recommend that yellow fever vaccine should never be given to infants <4 months. Yellow fever vaccine can be given to children ≥9 months of age if they are traveling to or living in areas of South America and Africa where yellow fever infection is officially reported (see "Summary of Health Information for International Travel", also known as Blue Sheet) or to countries that require yellow fever immunization (see "Vaccinations Required And Information On Malaria Risk And Prophylaxis, By Country," pp. 17-77). Children 9 months of age or older also should be immunized if they travel outside urban areas within the yellow fever endemic zone (see pp. 17-77 and maps pp. 163-164). Infants 6-9 months of age should be vaccinated only if they travel to areas of ongoing epidemic yellow fever, and a high level of protection against mosquito bites is not possible. Immunization of children 4-6 months of age should be considered only under unusual circumstances (consult CDC), and in *no* instance should infants under 4 months of age receive yellow fever vaccine. Information on yellow fever risk is also available from the CDC travel hotline, telephone (404) 332-4559.

Hepatitis A Vaccine or Immune globulin for Hepatitis A

Infants and children traveling to developing countries are at increased risk of acquiring hepatitis A virus infection, especially if their travel is outside usual tourist routes, if they will be eating food or drinking water in settings of questionable sanitation, or if they will be in contact with local young children in settings of poor sanitation (see p. 119). Although hepatitis A is rarely severe in children under age 5 years, infected children efficiently transmit infection to older children and adults. Immune globulin (IG) should be given to children younger than 2 years old in the same schedule as recommended for adults (Table 11 with IG doses). Children 2 years of age and older should receive the pediatric formulation of hepatitis A vaccine (Table 12) or IG (Table 11: Immune Globulin for Protection Against Viral Hepatitis A).

Other diseases

See pp. 128 and 190 for discussion of malaria and diarrhea in infants.

ADVERSE EVENTS FOLLOWING IMMUNIZATION: REPORTING

Modern vaccines are extremely safe and effective. However, adverse events following immunization have been reported with all vaccines. These range from frequent, minor, local reactions to extremely rare, severe, systemic illness such as paralysis associated with OPV. Information on side effects and adverse events following specific vaccines and toxoids are discussed in detail in each ACIP statement. Health care providers are required by law to report selected adverse events occurring after vaccination with DTP, DT, Td, MMR, MR, measles, OPV, and IPV. Events reportable are listed in MMWR 1988;37:197-200 and, in general, are events usually requiring the recipient to seek medical attention. These events, and all temporally associated events following receipt of all other vaccines severe enough to require the recipient to seek medical attention, should be reported to the Vaccine Adverse Event Reporting System (VAERS) (telephone: 1-800-822-7967) maintained by the Centers for Disease Control and Prevention and the Food and Drug Administration.

COMMUNICABLE DISEASES IN DISASTERS

Natural disasters can contribute to the transmission of some diseases; however, unless the causative agent is in the environment, transmission cannot take place. Studies of flood and earthquake disasters have shown that communicable disease outbreaks rarely result. Natural disasters often disrupt water supplies and sewage systems. Epidemic typhoid has been conspicuously absent following natural disasters in developing countries where typhoid is endemic. It takes several weeks for typhoid antibodies to develop and even then immunization provides only moderate protection. Floods pose no additional risk of typhoid.

Of greatest importance in preventing enteric disease transmission when water and sewage systems have been disrupted is to ensure that water and food supplies are safe to consume. When contamination is suspected, water should be boiled or appropriately disinfected (see pp. 183-185).

SPECIFIC RECOMMENDATIONS FOR VACCINATION AND PROPHYLAXIS

■ ACQUIRED IMMUNODEFICIENCY SYNDROME (AIDS)

There is no vaccine available to prevent infection with human immunodeficiency virus (HIV), the virus that causes AIDS. For general information on HIV and AIDS and how to prevent HIV infection, please refer to p. 82, "General Recommendations on Human Immunodeficiency Virus (HIV) Infection and Acquired Immunodeficiency Syndrome (AIDS)," under U.S. Public Health Service Recommendations; or call (800) 342-AIDS, toll free from the U.S. or its territories. (For Spanish speaking callers, (800) 344-SIDA, or for hearing-impaired callers with teletype equipment (800) AIDS-TTY).

Scientists have reviewed the safety and efficacy of vaccines (such as for measles, yellow fever, influenza, pneumococcal, and other infections) in persons with HIV infection or AIDS. No increased incidence of adverse reactions to inactivated vaccines has been noted in these persons. However, administration of live organism vaccines may carry increased risks of adverse reactions (see especially the sections on polio and yellow fever). In addition, the likelihood of successful immune response is reduced in some HIV-infected persons (depending on the degree of immunodeficiency). On the other hand, because of their immunodeficiency, many HIV-infected persons are at increased risk for complications of vaccine-preventable diseases. Thus, the risk benefit balance usually tips in favor of administration of vaccine to HIV-infected persons, especially for inactivated vaccines. Administration of vaccines should be backed up by behaviors to prevent infections (e.g., avoid mosquito bites in yellow fever areas; avoid exposure to measles or chickenpox patients).

Health care providers should advise HIV-infected patients of the following:

1. Travel, particularly to developing countries, may carry significant risks for exposure to opportunistic pathogens for HIV-infected persons, especially those who are severely immunosuppressed. Consultation with the provider, or with experts in travel medicine, will help in planning itineraries.

2. During travel to developing countries, HIV-infected persons are at even higher risk for food and waterborne disease than they are in the United States. Food and beverages--in particular, raw fruits and vegetables, raw or undercooked seafood or meat, tap water, ice made with tap water, unpasteurized milk and dairy products, and food and beverages purchased from street vendors--may be contaminated. Foods and beverages that are generally safe include steaming hot foods, fruits that are peeled by the traveler, bottled (especially carbonated) beverages, hot coffee or tea, beer, wine, or water brought to a rolling boil for one minute. When local sources of water must be used and boiling is not practical, certain portable water filtration units when used in conjunction with chlorine or iodine can increase the safety of water. Some units are available that offer the effects of iodine treatment with filtration in the same unit. For more information about how to select a proper water filter, write to the CDC National AIDS Clearinghouse for CDC's pamphlet, "You can prevent cryptosporidiosis: a guide for people with HIV infection" at P.O. Box 6003, Rockville, MD 20849-6003 or call 800-458-5231. International callers must dial: 301-217-0023.

3. Waterborne infections may also result from swallowing water during recreational water activities. To reduce the risk of cryptosporidiosis and giardiasis, avoid swallowing water during swimming and avoid swimming in water that may be contaminated (e.g., with sewage or animal waste).

4. Prophylactic antimicrobial agents against travelers' diarrhea are not recommended routinely for HIV-infected persons traveling to developing countries. These agents have adverse effects and can promote the emergence of drug-resistant organisms. Several studies have shown that prophylactic antimicrobials can reduce the risk of diarrhea in travelers, though none has involved an HIV-infected population. In

selected circumstances (e.g., a brief period of travel to an area where the risk of infection is very high), after weighing the potential risks and benefits, the provider and patient may decide that prophylactic antibiotics are warranted.

For those individuals to whom prophylaxis is offered, fluoroquinolones, such as ciprofloxacin 500 mg taken once daily, can be considered. Trimethoprim-sulfamethoxazole (TMP-SMX) (one double strength tablet daily) has also been shown to be effective as a prophylactic agent against travelers' diarrhea, but drug resistance is now common in tropical areas. Persons already taking TMP-SMX for prophylaxis against *Pneumocystis carinii* pneumonia (PCP) may receive some protection against travelers' diarrhea. For HIV-infected persons who are not already taking TMP-SMX, the provider should carefully consider using this agent solely for diarrhea prophylaxis because of high rates of adverse reactions and the anticipated future need for the agent (e.g., for PCP prophylaxis).

5. All HIV-infected travelers to developing countries should carry an antimicrobial (e.g., ciprofloxacin 500 mg twice a day for 3-7 days) with them to be taken as empirical therapy should diarrhea develop. Alternative antibiotics (e.g., TMP-SMX) for empirical therapy for children and pregnant women should be discussed. Travelers should consult a physician if the diarrhea is severe and does not respond to empiric therapy, if there is blood in the stool, if fever occurs with shaking chills, or if there is dehydration. Antiperistaltic agents, e.g., diphenoxylate (Lomotil) and loperamide (Imodium), are used for treatment of diarrhea; however they should not be used in patients with high fever or with blood in the stool; these drugs should be discontinued if symptoms persist beyond 48 hours. These drugs are not recommended for children.

6. Travelers should be advised about other preventive measures appropriate for anticipated exposures, such as malaria chemoprophylaxis, protection against arthropod vectors, immune globulin, and vaccination. Avoid direct soil and sand contact with skin (e.g., by wearing shoes, protective clothing, use of towels on beaches) in areas where fecal contamination of soil is likely.

7. In general, live virus vaccines should be avoided. An exception is measles vaccine, which is recommended for non-immune persons. Inactivated (killed) polio vaccine should be used instead of oral (live) polio vaccine. Persons at risk for exposure to typhoid fever should be given the inactivated, parenteral typhoid vaccine, instead of the live, attenuated oral typhoid vaccine. Yellow fever vaccine is a live virus vaccine with uncertain safety and efficacy in HIV-infected persons. Travelers with asymptomatic HIV infection who cannot avoid potential exposure to yellow fever should be offered the choice of vaccination. If travel to a yellow fever infected zone is necessary and immunization is not performed, advise patients of the risk, instruct in methods to avoid bites of vector mosquitoes, and provide a vaccination waiver letter.

8. In general, use killed vaccines (e.g., diphtheria-tetanus, rabies, Japanese encephalitis vaccines) in HIV-infected persons as they would be used for non-HIV-infected persons anticipating travel. Preparation for travel should include a review and updating of routine vaccinations, including diphtheria-tetanus in adults and routine immunizations for children. The currently available cholera vaccine is not recommended for persons following the usual tourist itinerary, even if travel includes countries reporting cholera cases.

9. Identify other area-specific risks and instruct travelers in ways to reduce the risk of infection. Geographically focal infections that pose high risk to HIV-infected persons include: visceral leishmaniasis, a protozoan infection transmitted by the sandfly, and several fungal infections (e.g., *Penicillium marneffei*, coccidioidomycosis,histoplasmosis). Many tropical and developing areas of the world have high rates of tuberculosis. (Refer to the section on tuberculosis, p. 155)

■ AFRICAN SLEEPING SICKNESS (African Trypanosomiasis)

African trypanosomiasis is confined to tropical Africa between 15° North and 20° South latitude. It is transmitted by the bite of the tsetse fly, a large gray-brown insect approximately the size of a honeybee, which bites during the day. Chronic trypanosomiasis (caused by the parasite *Trypanosoma brucei gambiense*) may not cause symptoms until months to years following travel to an endemic area, but the incubation period of acute trypanosomiasis (caused by the parasite *Trypanosoma brucei rhodesiense*) ranges from 6 to 28 days, and travelers frequently become ill during their trips or shortly after returning home. Fever, rash or skin lesions, lethargy, and confusion are usually the predominate signs and symptoms.

Although the risk to international travelers is relatively low, persons traveling to game parks and sparsely inhabited areas should take precautions. Tsetse flies appear to be attracted to moving vehicles and dark, contrasting colors. The flies are capable of biting through lighter weight clothing. Areas of heavy infestation tend to be sporadically distributed and are usually well known to local inhabitants. Avoidance of such areas is the best means of prevention. Travelers at risk should use “deet” containing insect repellents liberally and wear clothing of wrist and ankle length that blends with the background environment and is constructed of heavy, e.g., canvas weight, fabric (see “Protection Against Mosquitoes and Other Arthropod Vectors”, p. 180).

■ AMEBIASIS

Amebiasis, which is caused by the protozoan parasite *Entamoeba histolytica*, occurs worldwide, especially in regions with poor sanitation. Infection is acquired by the fecal-oral route, either by person-to-person contact or indirectly by eating or drinking fecally contaminated food or water. Travelers to developing countries are advised to follow the precautions included under “Risks From Food and Drink” (p. 183).

The clinical spectrum of intestinal amebiasis ranges from asymptomatic infection to fulminant colitis. Most infected persons do not have symptoms. In infected persons who are symptomatic, the most common symptom is diarrhea. The diarrhea may evolve to painful, bloody bowel movements, with or without fever (amebic dysentery). Occasionally, amebiasis causes disease outside the intestines, most notably in the liver (amebic liver abscess).

■ AMERICAN TRYPANOSOMIASIS (Chagas' Disease)

Chagas' disease occurs throughout much of the Western hemisphere from Mexico to Argentina. The disease is caused by the protozoan parasite, *Trypanosoma cruzi*. Acute infection may be asymptomatic or accompanied by a febrile illness with meningoencephalitis and/or myocarditis. Manifestations of chronic infection include cardiomyopathy and intestinal “mega” syndromes, e.g., megaesophagus and megacolon. Chagas' disease is usually transmitted by contact with feces of an infected reduviid (“cone nose” or “kissing”) bug; transmission may also occur through blood transfusion or via transplacental infection. Reduviid bugs typically infest buildings constructed of mud, adobe brick, or palm thatch, particularly those with cracks or crevices in the walls and roof. Avoidance of overnight stays in dwellings infested by the reduviid bug vector greatly reduces the risk of acquiring the infection. Alternate preventive measures include insecticide spraying of infested houses and the use of bed netting. The latter is recommended if camping or sleeping out-of-doors in highly endemic areas. In some regions, travelers should be aware that blood for transfusion may not be routinely tested or treated for *T. cruzi*. While anti-trypanosomal treatment exists for acute disease, currently there is no accepted anti-parasitic treatment for chronic infection. Persons with chronic cardiac or mega-syndromes may, however, benefit from symptomatic therapy.

■ CHOLERA

Cholera is an acute intestinal infection caused by toxigenic *Vibrio cholerae* O-group 1 or O-group 139. The infection is often mild and self-limited or subclinical. Persons with severe cases respond dramatically to simple fluid- and electrolyte-replacement therapy. Infection is acquired primarily by ingesting contaminated water or food; person-to-person transmission is rare.

Persons following the usual tourist itinerary who follow the food safety recommendations below while in countries reporting cholera are at virtually no risk of infection. Travelers to cholera-affected areas are advised to avoid eating high-risk food, especially fish and shellfish. Food that is cooked and served hot, fruits or vegetables peeled by the traveler himself, and beverages and ice that are made from boiled or chlorinated water or are carbonated are usually safe.

One cholera vaccine, administered parenterally with a 2-dose primary series, is currently licensed in the United States. This vaccine provides only about 50 percent effectiveness in reducing clinical illness from *Vibrio cholerae* O1 infection for 3-6 months after vaccination, with the greatest protection for the first 2 months. This vaccine probably provides no protection against illness caused by the recently discovered *Vibrio cholerae* O-group 139. The risk of cholera to U.S. travelers is so low that it is questionable whether vaccination is of benefit.

Currently no country or territory requires vaccination as a condition for entry. Local authorities, however, may continue to require documentation of vaccination against cholera; in such cases, a single dose of vaccine is sufficient to satisfy local requirements. The complete 2-dose primary series is suggested only for special high-risk groups that work and live in highly endemic areas under less than adequate sanitary conditions. The primary series need never be repeated for the booster doses to be effective. Table 7 summarizes the recommended doses for primary and booster vaccinations. Cholera vaccine is not recommended for infants under 6 months of age. See p. 97 for discussion of cholera immunization schedule for infants who will be traveling. See Yellow Fever Simultaneous Administration of Other Vaccine and Drugs for information about the timing of the administration of Yellow Fever and Cholera vaccines (p. 161).

TABLE 7. Cholera Vaccine

Doses	Intradermal route*	Subcutaneous or intramuscular route			Comments
	5 years of age and over	6 months-4 years of age	5-10 years of age	>10 years of age	
Primary series: 1 & 2	0.2 ml	0.2 ml	0.3 ml	0.5 ml	Give 1 week to 1 month or more apart
Booster	0.2 ml	0.2 ml	0.3 ml	0.5 ml	1 dose every 6 months

*Higher levels of protection (antibody) may be achieved in children less than 5 years of age by the subcutaneous or intramuscular routes.

Precautions and Contraindications

Reactions

Vaccination often results in 1-2 days of pain, erythema, and induration at the site of injection. The local reaction may be accompanied by fever, malaise, and headache. Serious reactions to vaccination are extremely rare. If a person has experienced a serious reaction to the vaccine, revaccination is not advisable.

Pregnancy

Specific information is not available on the safety of cholera vaccine during pregnancy. Therefore, it is prudent on theoretical grounds to avoid vaccinating pregnant women.

■ CRYPTOSPORIDIOSIS

Cryptosporidiosis occurs worldwide. Transmission occurs after ingestion of fecally contaminated food or water, including water swallowed while swimming; from exposure to fecally contaminated environmental surfaces; and from person-to-person by the feces to hands to mouth route (e.g., changing diapers or caring for an infected person) or direct fecal-oral route, particularly sexual behavior involving contact with feces. Symptoms include watery diarrhea, abdominal cramps and a slight fever and normally last 1 to 3 weeks in immunocompetent individuals. In persons with a severely weakened immune system, cryptosporidiosis is not self-limiting and can be fatal. There is no known chemoprophylaxis for cryptosporidiosis and no anti-parasitic drug has yet been found that can shorten the duration of infection. To avoid contracting cryptosporidiosis, travelers should follow the precautions included under “Risks From Food and Drink” on page 183-185.

■ CYCLOSPORA

Cyclospora cayetanensis, previously known as cyanobacterium-like, coccidia-like, and *Cyclospora*-like body (CLB)is a protozoan(one-celled) parasite that causes gastrointestinal infection. Travelers to tropical countries may be at increased risk for this infection, and the risk may vary with season (e.g., in Nepal, risk is highest during the rainy season). Infection is acquired by ingestion of something (e.g.,water, food) contaminated with the parasite. Travelers to developing countries are advised to follow the precautions included under "Risks From Food and Drink" (p. 183). Direct person-to-person transmission is unlikely. Infection can be asymptomatic or be manifested by such symptoms as watery diarrhea, loss of appetite, weight loss, bloating, increased gas, stomach cramps, nausea, vomiting, tiredness, muscle aches, and low-grade fever. Some persons first notice flu-like symptoms. If untreated, the illness can last for weeks to months.

■ DENGUE FEVER

Dengue fever/dengue hemorrhagic fever is a viral disease transmitted by urban *Aedes* mosquitoes, usually *Aedes aegypti*. There are four dengue viruses which are immunologically related, but which do not provide cross-protective immunity.

Dengue fever is characterized by sudden onset, high fever, severe frontal headache, joint and muscle pain. Many patients have nausea, vomiting, and rash. The rash appears 3 to 5 days after onset of fever and may spread from torso to arms, legs, and face. The disease is usually benign and self-limited, although convalescence may be prolonged. Many cases of subclinical or nonspecific infection occur, but dengue may also present as a severe and fatal hemorrhagic disease called dengue hemorrhagic fever (DHF). There is no specific treatment for dengue infection and vaccines are not available.

Dengue fever is a rapidly expanding disease in most tropical areas of the world. In the past 20 years, it has become the most important arborvirus disease of humans. There are now over 2 billion persons at risk of infection and millions of cases occur each year. Epidemics caused by all four virus serotypes have become progressively more frequent and larger. Since 1982, major epidemics have occurred for the first time in over 30 years in Bolivia, Brazil, Costa Rica, Ecuador, Panama, Paraquay, Peru, and Venezuela in the Americas; Saudi Arabia; Somalia, Kenya, Djibouti, Mozambique, Angola, and Burkino Faso in Africa; and China and Taiwan in Asia. In 1996, dengue viruses are endemic in most tropical countries of the South Pacific, Asia, the Caribbean Basin, Mexico, Central and South America, and Africa (see map). It is not possible to accurately predict future dengue incidence, but it is anticipated that there will be increased dengue transmission in all tropical areas of the world during the next several years.

The incidence of the severe disease, DHF, has increased dramatically in Southeast Asia in the past 20 years, with major epidemics occurring in most countries every 3 to 4 years. Dengue hemorrhagic fever first occurred in the Americas in 1981, with a major epidemic in Cuba. A second major epidemic of DHF occurred in Venezuela in 1989–90, and smaller outbreaks have occurred in Brazil, Colombia, French Guiana and Nicaragua. DHF has also been confirmed as sporadic cases in many countries of the region including Mexico, El Salvador, Honduras, Suriname, Ecuador, Curacao, Aruba, St. Lucia, Puerto Rico, and the Dominican Republic. Although not completely understood, current data suggest that virus strain, together with age, immune status, and genetic background of the human host are the most important risk factors for developing DHF. In Asia, children under the age of 15 years who are experiencing a second dengue infection appear to have the highest risk.

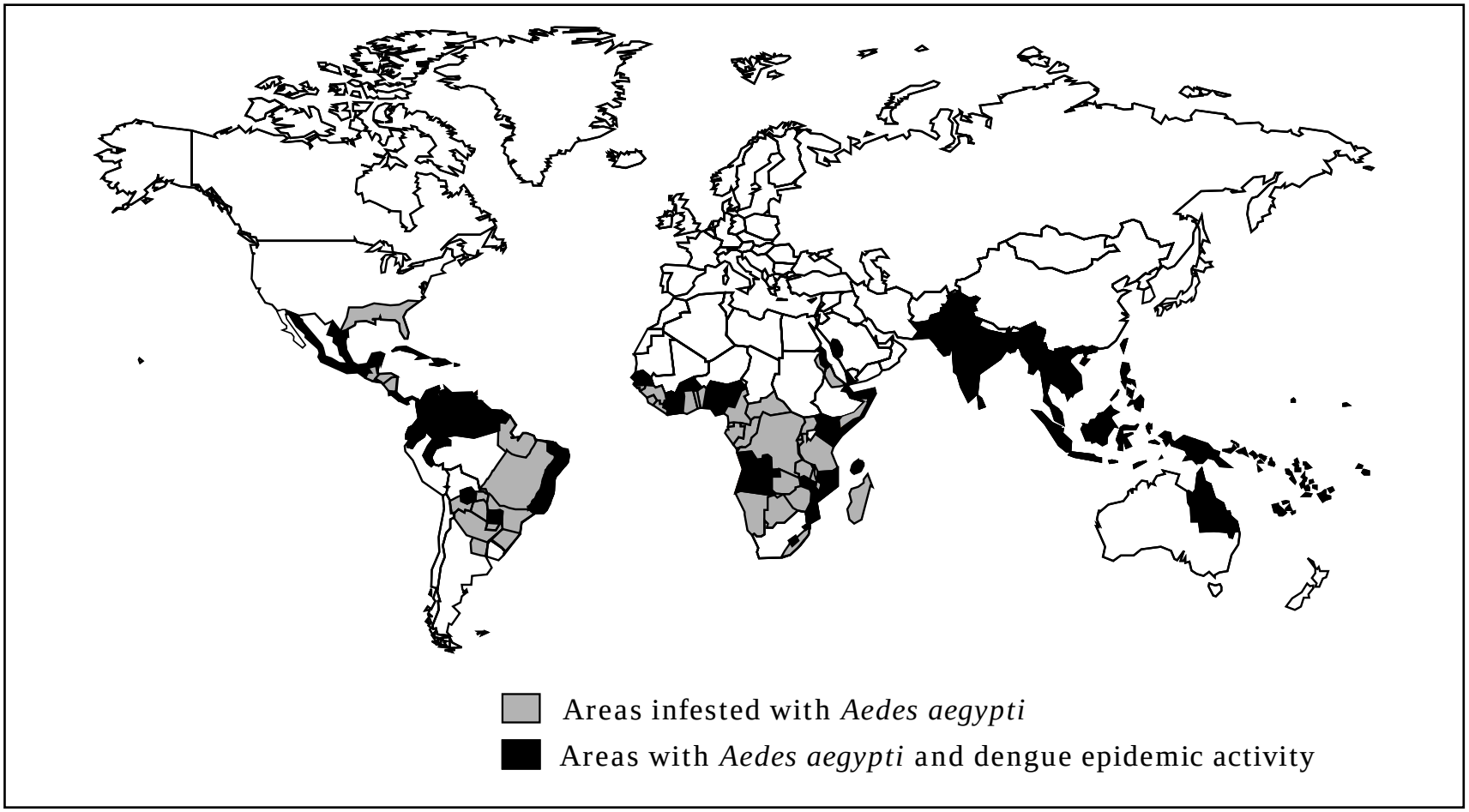
Although adults can also develop DHF, this suggests that most international travelers from nonendemic areas such as the United States are at low risk for severe dengue infection.

The principal vector mosquito, *Aedes aegypti*, prefers to feed on humans during the daytime and most frequently is found in or near human habitations. There are two peaks of biting activity, in the morning for several hours after daybreak and in the late afternoon for several hours before dark. The mosquito may feed at any time during the day, however, especially indoors, in shady areas, or when it is overcast. Larval habitats include artificial water containers such as discarded tires, barrels, buckets, flower vases/pots, cans, and cisterns.

The risk of dengue infection for the international traveler appears to be small, unless an epidemic is in progress. However, cases of dengue are confirmed every year, in travelers returning to the U.S. from visits to endemic areas. Travelers to endemic and epidemic areas, therefore, should take precautions to avoid mosquito bites. Travelers can reduce their risk of acquiring dengue by remaining in well-screened areas when possible, by wearing clothing that adequately covers the arms and legs, and by applying mosquito repellent. The most effective repellents are those containing N,N-diethyl-metatoluamide (DEET) at a concentration equal to or greater than 30 percent. High concentration (>30% DEET) products for the skin, particularly in children, should be avoided.

Travelers should advise their physician of any acute febrile illness occurring within 1 month after returning from an endemic area. Physicians should notify the state health department of any suspected or confirmed case of dengue.

World Distribution of Dengue — 1996



■ DIPHTHERIA, TETANUS, AND PERTUSSIS

Diphtheria remains a serious disease throughout much of the world. In particular, large outbreaks of diphtheria are currently occurring throughout the New Independent States of the former Soviet Union. Most cases occur in unimmunized or inadequately immunized persons.

Tetanus is a global health problem. The disease occurs almost exclusively in persons who are unimmunized or inadequately immunized or whose history is unknown. In developing countries most reported illness occurs in infants and young children.

Pertussis primarily occurs in children and is common in countries where immunization is not generally provided. It is highly communicable, often associated with complications, and has a relatively high case-fatality ratio in infants.

Immunizations for Persons Less Than 7 Years of Age

Simultaneous immunization against diphtheria, tetanus, and pertussis during infancy (see Tables 2 and 3) is recommended. Because the incidence and severity of pertussis decreases with age and because the vaccine may cause side effects and adverse reactions, pertussis vaccination is not recommended for children after their seventh birthday or for adults.

Primary immunization for children up to the seventh birthday consists of four doses of DTP vaccine*, the first three doses given at 4-to 8-week intervals and the fourth dose given 6 to 12 months after the third dose, (generally at 12-15 months of age) to maintain adequate immunity during the preschool years. Ideally, immunization should begin at 6 weeks-two months of age. Once the primary series is started, interrupting the recommended schedule or delaying subsequent doses does not require restarting a series. A booster dose is recommended between 4 and 6 years of age. The booster dose is not necessary if the fourth dose in the primary series was given after the fourth birthday. Children inadequately immunized for their age should be brought up-to-date prior to travel. For children less than 7 years of age with a contraindication to the pertussis component of DTP, DT should be used. See p. 95 for discussion of DTP immunization schedule modifications for infants who will be traveling.

In December 1991, the Food and Drug Administration approved a combination diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP). This vaccine is licensed *only* for use as the fourth and fifth doses for children who have previously been vaccinated against diphtheria, tetanus, and pertussis with three doses of whole-cell diphtheria and tetanus toxoids and pertussis vaccine (DTP). DTaP is not licensed for the initial three-dose series in infants and children regardless of the child's age; whole-cell DTP should continue to be used for these initial doses. Because it causes less fever and fewer local reactions and other common systemic symptoms, DTaP is preferred for the fourth and fifth vaccine doses; however, whole-cell DTP continues to be an acceptable alternative for these doses. DTaP is not licensed for use in children <15 months of age or after the seventh birthday. The fourth dose should be given at least 6 months after the third dose of whole-cell DTP and is usually administered to children 15-18 months of age. A dose of DTaP may be given as the fifth dose in the series for children aged 4-6 years who have received either all four prior doses as whole-cell vaccine or three doses of whole-cell DTP plus one dose of DTaP; this fifth dose should be given before the child enters

*Official name: Diphtheria and Tetanus Toxoids and Pertussis Vaccine Adsorbed. Two combined DTP-HbCV vaccines are also available and may be used whenever both vaccines are indicated.

kindergarten or elementary school. The fifth dose in the vaccination series is not necessary if the fourth dose was given on or after the fourth birthday.

Immunizations for Persons 7 Years of Age and Older

For primary immunization, persons ≥7 years of age should receive three doses of the formulation of tetanus-diphtheria toxoid for adult use (Td)*. The first two doses are given 4 to 8 weeks apart and the third dose 6 to 12 months after the second. Once the primary series is started, interrupting the regular schedule or delaying subsequent doses does not require restarting a series. Two doses of Td received at intervals of at least 4 weeks may provide some protection, while a single dose is of little benefit.

A Td booster should be given whenever 10 or more years have elapsed since completion of a primary series or the last booster dose. ACIP recommendations [MMWR 1991;40 (No.RR-10)] on tetanus and diphtheria prevention should be consulted for further details.

Adverse Reactions

Local reactions (generally erythema and induration with or without tenderness) are common after the administration of vaccines containing diphtheria, tetanus, and pertussis antigens. Mild systemic reactions such as fever, drowsiness, fretfulness, and anorexia occur frequently. Moderate-to-severe systemic events, including high fever (i.e., temperature ≥40.5° C [105° F]); persistent, or inconsolable crying lasting ≥3 hours; collapse (hypotonic-hyporesponsive episode); or short-lived convulsions (usually febrile) occur infrequently. These events appear to be without sequelae. Rarely, severe neurologic events, such as a prolonged convulsion or encephalopathy, have occurred after receiving DTP. Some children who develop acute encephalopathy within 7 days of pertussis vaccination may develop permanent neurologic sequelae. In 1994, the Institute of Medicine reported that the available evidence is consistent with (but insufficient to prove) a causal relationship between DTP and chronic nervous system dysfunction in such children. The receipt of DTP is not causally related to sudden infant death syndrome (SIDS).

Rarely, anaphylactic reactions have been reported after receiving a preparation containing diphtheria, tetanus and/or pertussis. Arthus-type hypersensitivity reactions, characterized by severe local reactions, may follow receipt of tetanus and diphtheria toxoids, particularly in adults who have received frequent (e.g., annual) boosters of tetanus and/or diphtheria toxoid.

The rates of local reactions, fever, and other common systemic symptoms following receipt of DTaP are lower than those following whole-cell DTP vaccination.

Precautions and Contraindications

Neurologic conditions characterized by changing developmental findings are considered contraindications to receipt of pertussis vaccine. Such disorders include uncontrolled epilepsy, infantile spasms, and progressive encephalopathy. Children who because of perinatal complications or other phenomena are felt to be at an increased risk of latent onset of central nervous system disorders should have immunization with DTP or DT† (but not OPV) delayed until further observation and study have clarified the child's

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*Official name: Tetanus and Diphtheria Toxoids Adsorbed for Adult Use.
†Official name: Diphtheria and Tetanus Toxoids Adsorbed (for pediatric use).

neurologic status. The decision whether to commence immunization with DTP or with DT should be made no later than the child's first birthday. Infants and children with stable neurologic conditions such as cerebral palsy and developmental delay or even well-controlled seizures may be vaccinated. The occurrence of a single seizure (not temporally associated with DTP) does not contraindicate DTP vaccination, particularly if the seizures can be satisfactorily explained. Parents of infants and children with personal or family histories of convulsion should be informed of the increased risk of simple febrile seizures following immunization. Acetaminophen, 15 mg/kg, every 4 hours for 24 hours, should be given to children with such histories to reduce the possibility of postvaccination fever. Infants and children who have received ≥ one dose of DTP and who experience a neurologic disorder (e.g., a seizure) not temporally associated with the vaccination, but before the next scheduled dose, should have their neurologic status evaluated and clarified before a subsequent dose of DTP is given, or the decision made to use DT instead.

When an infant or child returns for the next dose of DTP, the parent should always be questioned about any adverse events that might have occurred following the previous dose. Further vaccination with DTP is contraindicated if an anaphylactic reaction immediately followed a DTP dose, or if an encephalopathy not due to another identifiable cause occurred within 7 days of receipt of DTP. If any of the following events occur in temporal relation to receipt of DTP, the decision to give subsequent doses of vaccine containing the pertussis component should be carefully considered. Although these events were considered absolute contraindications in previous ACIP recommendations, there may be circumstances, such as a high incidence of pertussis, in which the potential benefits outweigh possible risks, particularly because these events are not associated with permanent sequelae. The following events were previously considered contraindications and are now considered precautions:

1. Temperature of ≥40.5° C (105° F) within 48 hours not due to another identifiable cause.
2. Collapse or shock-like state (hypotonic-hyporesponsive episode) within 48 hours.
3. Persistent, inconsolable crying lasting ≥3 hours, occurring within 48 hours.
4. Convulsions with or without fever occurring within 3 days.

If the decision is to discontinue further vaccination with DTP, DT should be substituted for any remaining scheduled doses of DTP.

The only contraindication to tetanus and diphtheria toxoids is a history of a neurologic or severe hypersensitivity reaction following a previous dose.There is no evidence that tetanus and diphtheria toxoids are teratogenic.

■ ENCEPHALITIS, JAPANESE

Japanese encephalitis (JE) is a common mosquito-borne viral encephalitis in Asia. Transmission is seasonal and occurs in the summer and autumn in the temperate regions of China, Japan, Korea and eastern areas of Russia. Elsewhere, seasonal patterns of disease are more extended or vary with the rainy season and irrigation practices. Risk of JE by season, and geographic area are given in Table 9.

Most infections are asymptomatic, but among patients who develop a clinical illness, the case-fatality rate may be as high as 30%. Neuropsychiatric sequelae are reported in 50%

of survivors. In endemic areas, children are at greatest risk of infection, however, multiple factors such as occupation, recreational exposure, gender (possibly reflecting exposure), previous vaccination, and naturally acquired immunity, alter the potential for infection and illness. A higher case-fatality rate is reported in the elderly, but serious sequelae are more frequent in the very young, possibly because they are more likely to survive a severe infection.

JE virus is transmitted chiefly by the bites of mosquitoes in the *Culex vishnui* complex: the individual vector species in specific geographic areas differ. In China and many endemic areas in Asia, *Culex tritaeniorhyncus* is the principal vector. This species feeds outdoors beginning at dusk and during evening hours until dawn, and has a wide host range including domestic animals, birds, and man. Larvae are found in flooded rice fields, marshes, and small stable collections of water around cultivated fields. In temperate zones the vectors are present in greatest numbers from June through September and are inactive during winter months. Swine and certain species of wild birds function as viremic amplifying hosts in the transmission cycle. Habitats supporting the transmission cycle of JE virus are principally in rural, agricultural locations. In many areas of Asia, however, the appropriate ecological conditions for virus transmission occur near or occasionally within urban centers.

The risk to short-term travelers and persons who confine their travel to urban centers is very low. Expatriates and travelers living for prolonged periods in rural areas where JE is endemic or epidemic are at greatest risk. Travelers with extensive unprotected outdoor, evening and night time exposure in rural areas, such as bicycling, camping or certain occupational activities, may be at high risk even if their trip is brief. Travelers are advised to stay in screened or air-conditioned rooms, to use bednets when such quarters are unavailable, to use insecticidal space sprays as necessary, and mosquito repellents and protective clothing to avoid mosquito bites.

TABLE 8. Japanese Encephalitis Vaccine

Doses	Subcutaneous route		Comments
	1-2 years of age	≥3 years of age	
Primary series 1, 2, and 3	0.5 ml	1.0 ml	Days 0, 7, 30
Booster*	1.0 ml	1.0 ml	1 dose at ≥ 36 months

*In vaccinees who have completed a three-dose primary series, the full duration of protection is unknown, therefore definitive recommendations cannot be given.

Vaccination

JE vaccine licensed in the United States is manufactured by Biken, Osaka, Japan* and distributed by Connaught Laboratories,Inc. Other JE vaccines are made by several companies in Asia, but are not licensed in the U.S. Vaccination should only be considered for persons who plan to live in areas where JE is endemic or epidemic and for travelers whose activities include trips into rural, farming areas. Short-term travelers (less than 30 days), especially those whose visits are restricted to major urban areas are at a lower risk for acquiring JE and, generally, should not receive the vaccine. Evaluation of an individual travelers' risk should consider their itinerary activities, and the current level of JE activity in the country (see Table 9).

*Use of names is for identification only and does not imply endorsement by the Public Health Service or the U.S. Department of Health and Human Services.

Table 9. Risk of Japanese encephalitis by country, region, and season

Country	Affected areas/jurisdictions	Transmission season	Comments
Bangladesh	Few data, probably widespread	Possibly July–December as in northern India	Outbreak reported from Tangail district, Dacca division; sporadic cases in Rajshahi division
Bhutan	No data	No data	Not applicable
Brunei	Presumed to be sporadic — endemic as in Malaysia	Presumed year-round transmission	
Burma	Presumed to be endemic — hyperendemic countrywide	Presumed to be May–October	Repeated outbreaks in Shan State in Chiang Mai Valley
Cambodia	Presumed to be endemic — hyperendemic countrywide	Presumed to be May–October	Refugee camp cases reported from Thai border
Hong Kong	Rare cases in new territories	April–October	Vaccine not routinely recommended
India	Reported cases from all states except Arunachal, Dadra, Daman, Diu, Gujarat, Himachal, Jammu, Kashmir, Lakshadweep, Meghalaya, Nagar Haveli, Orissa, Punjab, Rajasthan and Sikkim	*South India:* May–October in Goa October–January in Tamil Nadu August–December in Karnataka; second peak (April–June in Mandya district) *Andrha Pradesh:* September–December *North India:* July–December	Outbreaks in West Bengal, Bihar, Karnataka, Tamil Nadu, Andrha Pradesh, Assam, Uttar Pradesh, Manipure and Goa Urban cases reported, e.g., Lucknow
Indonesia	Kalimantan, Bali, Nusa Tenggara, Sulawesi, Mollucas, and West Irian Java, Lombok	Probably year-round risk; varies by island; peak risks associated with rainfall, rice cultivation and presence of pigs;. Peak periods of risk, November–March; June–July in some years	Human cases recognized on Bali and Java only
Japan*	Rare-sporadic cases on all islands, except Hokkaido	June–September except Ryukyu islands (Okinawa) April–October	Vaccine not routinely recommended for travel to Tokyo and other major cities. Enzootic transmission without human cases observed on Hokkaido
Korea	No data from North Korea; South Korea sporadic — endemic with occasional outbreaks	July–October	Last major outbreaks in 1982–1983
Laos	Presumed to be endemic — hyperendemic country wide	Presumed to be May–October	No data available

Table 9. Risk of Japanese encephalitis by country, region, and season (Continued)

Country	Affected areas/jurisdictions	Transmission season	Comments
Malaysia	Sporadic — endemic in all states of Peninsula, Sarawak, and probably Sabah	No seasonal pattern; year-round transmission	Most cases from Penang, Perak, Salangor, Johore, and Sarawak
Nepal	Hyperendemic in southern lowlands (Terai)	July–December	Vaccine not recommended for travelers visiting high altitude areas only
People's Republic of China	Cases in all provinces except Xizang (Tibet), Xinjiang, Qinghai. Hyperendemic in southern China; endemic — periodically epidemic in temperate areas	*Northern China:* May–September *Southern China:* April–October (Guangshi, Yunnan, Gwangdong, and Southern Fujian, Szechuan, Guizhou, Hunan, Jiangsi provinces)	Vaccine not routinely recommended for travelers to urban areas only
Pakistan	May be transmitted in central deltas	Presummed to be June–January	Cases reported near Karachi. Endemic areas overlap those for West Nile virus
Philippines	Presumed to be endemic on all islands	Uncertain, speculations based on locations and agroecosystems: *West Luzon, Mindoro, Negro Palowan:* April–November; *Elsewhere:* year-round — greatest risk April–January	Outbreaks described in Nueva Ecija, Luzon, and in Manila
Russia	Far eastern maritime areas south of Khabarousk	Peak period July–September	First human cases in 30 years recently reported
Singapore	Rare cases	Year-round transmission — April peak	Vaccine not routinely recommended
Sri Lanka	Endemic in all but mountainous areas; periodically epidemic in northern and central provinces	October–January; secondary peak of enzootic transmission May–June	Recent outbreaks in central (Anuradhapura) and northwestern provinces
Taiwan*	Endemic, sporadic cases; island-wide	April–October, June peak	Cases reported in and around Taipei
Thailand	Hyperendemic in north; sporadic — endemic in south	May–October	Annual outbreaks in Chiang Mai Valley; sporadic cases in Bangkok suburbs
Vietnam	Endemic, hyperendemic in all provinces	May–October	Highest rates in and near Hanoi
Western Pacific & Australia	Two epidemics reported in Guam, Saipan (Northern Mariana Islands) since 1947. Localized outbreak occurred in the Torres Strait in 1995.	Uncertain, possibly September–January in the Pacific; March-April in the Torres Strait	Enzootic cycle may not be sustainable; epidemics may follow introductions of virus

*Local JE incidence rates may not accurately reflect risks to nonimmune visitors because of high immunization rates in local populations. Humans are incidental to the transmission cycle. High levels of viral transmission may occur in the absence of human disease.

Note: Assessments are based on publications, surveillance reports, and personal correspondence. Extrapolations have been made from available data. Transmission patterns may change. Tsai TF & YuYx, Japanese encephalitis vaccines, Plotkin SA & Mortimer EA, Vaccines, 2nd ed., WB Saunders, Phila., PA 1994, 671–713.

The recommended primary immunization series is three doses of 1.0 ml each, administered subcutaneously on days 0, 7, and 30. An abbreviated schedule of days 0, 7, and 14 can be used when the longer schedule is impractical because of time constraints. Two doses given a week apart may be used in unusual circumstances, but will confer short-term immunity in only 80% of vaccinees. The last dose should be administered at least 10 days before the commencement of travel to ensure an adequate immune response and access to medical care in the event of delayed adverse reactions. Immunization route and schedules for children 1 to 3 years of age is identical except that doses of 0.5 ml should be administered. No data are available on vaccine efficacy and safety in children less than 1 year of age. The full duration of protection is unknown, however, preliminary data indicate that neutralizing antibodies persist for at least 3 years after primary immunization. In children whose primary immunization series included doses of 0.5 ml, a booster dose of 1.0 ml may be administered 3 years after the primary series.

Adverse Reactions

JE vaccine is associated with local reactions and mild systemic side effects (fever, headache, myalgias, malaise) in about 20% of vaccinees. More serious allergic reactions including generalized urticaria, angioedema, respiratory distress, and anaphylaxis have occurred within minutes to as long as one week after immunization. Such hypersensitivity reactions occur in approximately 0.6% of vaccinees. Reactions have been responsive to therapy with epinephrine, antihistamines and/or steroids. Vaccinees should be observed for 30 minutes after immunization and warned about the possibility of delayed allergic reactions. The full course of immunization should be completed ≥10 days before departure and vaccinees should be advised to remain in areas with access to medical care. Persons with a past history of urticaria appear to have a greater risk for developing more serious allergic reactions and this must be considered when weighing the risks and benefits of the vaccine. A history of allergy to JE or other mouse derived vaccines is a contraindication to further immunization.

Contraindications

Persons with known hypersensitivity to the vaccine should not be vaccinated. Persons with multiple allergies, especially a history of allergic urticaria or angioedema, are at higher risk for allergic complications from JE vaccine.

Vaccination during pregnancy should be avoided unless the risk of acquiring Japanese encephalitis out weighs the theoretical risk of vaccination.

■ ENCEPHALITIS, TICKBORNE

Tickborne encephalitis (TBE) also known as spring-summer encephalitis, is a viral infection of the central nervous system transmitted by bites of certain vector ticks. The disease occurs in Scandinavia, Western and Central Europe and countries that comprise the former Soviet Union. Risk of acquiring the disease is greatest from April through August when *Ixodes ricinus*, the principal tick vector, is most active. TBE is common in Austria, the Czech Republic, Slovakia, Germany, Hungary, Poland, Switzerland, Russia, Ukraine, Belarus, and northern Yugoslavia. It occurs at a lower frequency in Bulgaria, Romania, Denmark, France, the Aland Islands and neighboring Finnish coastline, and along the coastline of southern Sweden, from Uppsala to Karlshamn.

Serologic evidence for TBE infection or sporadic cases have been reported from Albania, Greece, Italy, Norway, and Turkey. A closely related disease, Russian spring-summer encephalitis, transmitted by *Ix. persulcatus* ticks, occurs in China, Korea, Japan, and eastern areas of Russia. The severity of disease, incidence of sequelae, and case-fatality rates are higher in the Far East and eastern regions of Russia than in western and central Europe.

Human infections follow bites of infected *Ix. ricinus* ticks, usually in persons who visit or work in forests, fields or pastures. Infection also may be acquired by consuming unpasteurized dairy products from infected cows, goats, or sheep. The risk to travelers who do not visit forested areas or consume unpasteurized dairy products is low. Travelers should be advised to avoid tick infested areas and to protect themselves from tick bites by dressing appropriately and using repellents. The repellent N,N-diethyl-metatoluamide (DEET) can be applied either to clothing or directly on the skin. Compounds containing permethrin have an acaricidal and repellent effect and should be used on clothing and camping gear. Consumption of unpasteurized dairy products should be avoided. Although effective vaccines may be obtained in Europe from Immuno, Vienna, Austria, and Behring, Germany, available data do not support a recommendation for its use in travelers.

■ FILARIASIS, LYMPHATIC

Lymphatic filariasis affects an estimated 100 million persons in tropical areas of the world including subsaharan Africa, Egypt, southern Asia, the western Pacific Islands, the northeastern coast of South and Central America, and the Caribbean. The two major species of filariae which cause lymphatic disease in humans are, *Wuchereria bancrofti* and *Brugia malayi*. Clinical manifestations include asymptomatic infection, acute inflammation of the lymph nodes, ("filarial fever"), tropical pulmonary eosinophilia, lymphedema that may progress to elephantiasis, and testicular hydrocele. Disease is thought to be caused primarily by the adult worms, which live in the lymphatic vessels; the female worms release microfilariae which circulate in the peripheral blood and are ingested by mosquitoes; thus infected mosquitoes transmit the infection from person to person. Short-term travelers to endemic areas are at low risk for this infection. Persons who visit endemic areas for extended periods of time and who are intensively exposed to infected mosquitoes may become infected. Effectiveness of chemoprophylaxis has not been well-documented. Protective measures include avoidance of mosquito bites through the use of personal protection measures such as those outlined on page 131.

■ GIARDIASIS

Giardiasis occurs worldwide. Transmission occurs after ingestion of fecally contaminated water or food, from exposure to fecally contaminated environmental surfaces, and from person-to-person by the fecal-oral route. Symptoms include diarrhea, abdominal cramps, fatigue, weight loss, flatulence, anorexia, or nausea, in various combinations, and usually lasting for more than 5 days. Fever and vomiting are uncommon. There is no known chemoprophylaxis. To prevent infection, travelers to disease-endemic areas should follow the precautions included under "Health Hints for the Traveler" (p. 179).

■ HAEMOPHILUS INFLUENZAE TYPE b MENINGITIS AND INVASIVE DISEASE

Haemophilus influenzae type b causes meningitis and other severe bacterial illnesses (e.g., pneumonia, septic arthritis, epiglottitis and sepsis), primarily among children less than 5 years of age. Severe disease is most common in children 6 months to 1 year of age, but approximately 20-35 percent of severe disease occurs in children 18 months of age or older. It was the most common cause of bacterial meningitis in the United States before use of Haemophilus b conjugate vaccines (HbCV) dramatically reduced incidence of this disease. The risk of exposure to persons with the organism and the disease while traveling outside the United States is at least as high as that within the United States.

Three different HbCV are licensed for use in children—Haemophilus b conjugate vaccine (Diphtheria CRM_{197} Protein Conjugate) (HbOC), Haemophilus b conjugate vaccine (Meningococcal Protein Conjugate) (PRP-OMP), Haemophilus b conjugate vaccine (Diphtheria Toxoid Conjugate) (PRP-D) and Haemophilus b conjugate vaccine (Tetanus toxoid conjugate) (PRP-T). Two of these vaccines, HbOC and PRP-OMP, were licensed for infant use in 1990 and a third PRP-T in 1993. Two combined whole-cell DTP-HbCV are also licensed and may be used whenever both vaccines are indicated. All children should be immunized beginning at 2 months of age with one of these three vaccines as outlined in Table 10. Since limited data exist regarding the interchangeability of different vaccines, the same conjugate vaccine is preferred throughout the entire vaccination series. If, however, different vaccines are administered, a total of three doses of Hib conjugate vaccine is adequate. Any combination of Hib conjugate vaccines that is licensed for use among infants may be used to complete the primary series. PRP-D is recommended only for children 15 months of age and older. Children who have had invasive *H. influenzae* type b disease when they were less than 24 months of age should still receive HbCV following the above recommendations, since most fail to mount an immune response to the clinical disease. In contrast, children 24 months of age or older who have reliably diagnosed invasive disease do not need vaccination.

Side Effects and Adverse Reactions

HbCV is considered relatively free of side effects. Redness and/or swelling following receipt of the current HbCV occurs in less than 2 percent of recipients. About 1 out of every 100 recipients will have a fever of 101.3° F or higher. These reactions begin within 24 hours and generally subside rapidly. Severe hypersensitivity reactions have been rare.

Precautions and Contraindications

Recurrent upper respiratory diseases, including otitis media and sinusitis, are not considered indications for vaccination. HbOC or PRP-D vaccines should not be considered as an immunizing agent against diphtheria. PRP-OMP should not be considered as an immunizing agent against meningococcal disease.

TABLE 10. Recommended *Haemophilus influenzae* Type b (Hib) Routine Vaccination Schedule

Vaccine	2 months	4 months	6 months	12 months	15 months
HbOC	dose 1	dose 2	dose 3		booster
PRP-OMP	dose 1	dose 2		booster	
PRP-D*	—	—	—	—	single dose

*PRP-D is recommended only for children ≥15 months of age.

■ HEPATITIS, VIRAL, TYPE A

Hepatitis A is an enterically transmitted viral disease which is highly endemic throughout the developing world but of low endemicity in developed countries such as the United States. In developing countries, hepatitis A virus (HAV) is usually acquired during childhood, most frequently as an asymptomatic or mild infection. Transmission may occur by direct person-to-person contact; or from contaminated water, ice, or shellfish harvested from sewage-contaminated water; or from fruits, vegetables or other foods which are eaten uncooked, but which may become contaminated during handling. HAV is inactivated by boiling or cooking to 85˚C (1 minute); cooked foods cannot serve as vehicles for disease unless contaminated after cooking. Adequate chlorination of water as recommended in the United States will inactivate HAV.

The risk of acquiring HAV infection for U.S. citizens traveling abroad varies with living conditions, length of stay, and incidence of hepatitis A in the area visited. Travelers to North America except Mexico and developed countries in Europe, Japan, Australia, and New Zealand are at no greater risk of infection than in the United States. For travelers to developing countries, risk of infection increases with duration of travel, and will be highest in those who live in or visit rural areas, trek in back country areas, or frequently eat or drink in settings of poor sanitation. Nevertheless, many cases of travel-related hepatitis A occur in travelers to developing countries with "standard" tourist itineraries, accommodations, and food consumption behaviors.

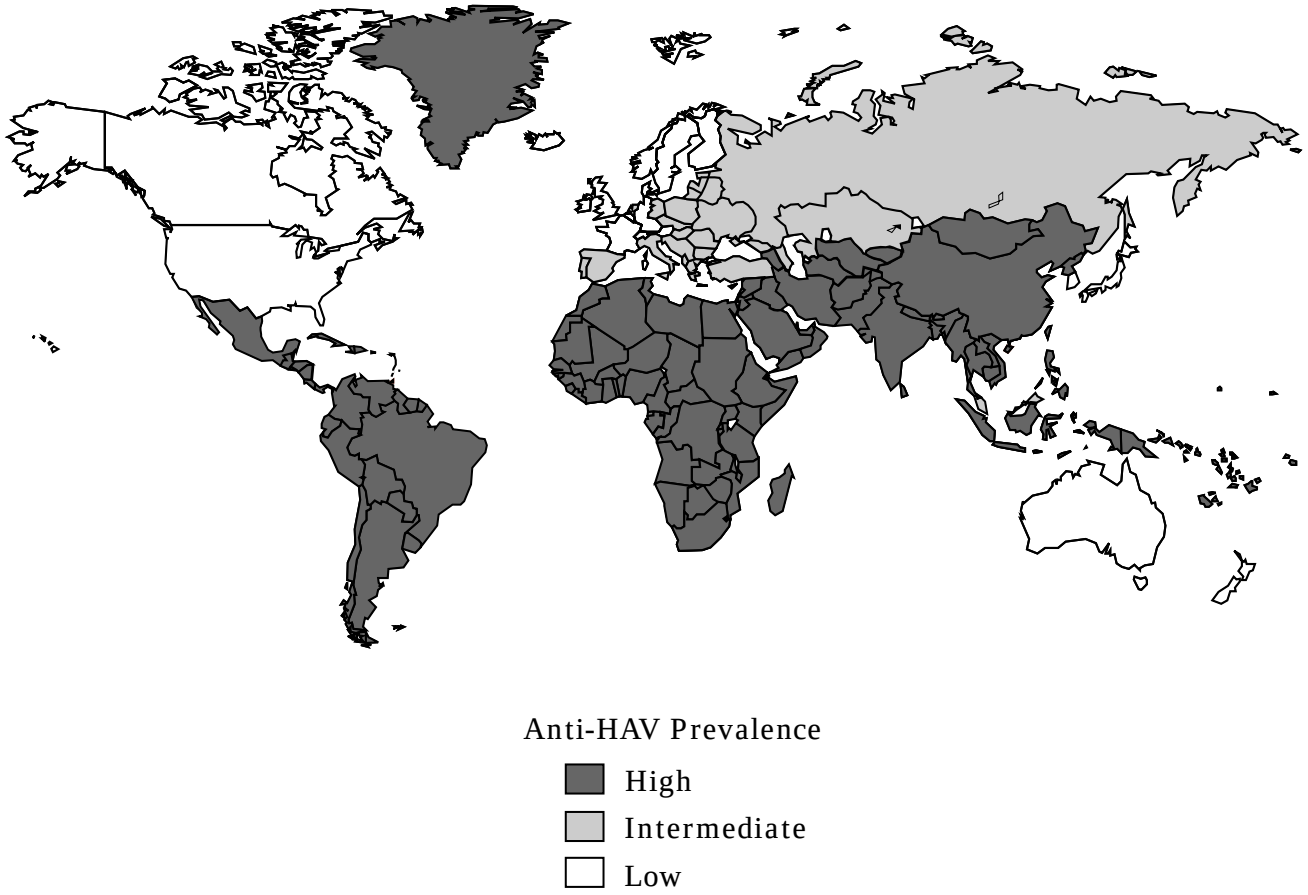
In developing countries, travelers should minimize their risk of hepatitis A and other enteric diseases by avoiding potentially contaminated water or food. Drinking water (and beverages with ice) of unknown purity, uncooked shellfish, and uncooked fruits or vegetables which are not peeled or prepared by the traveler should be avoided.

Hepatitis A vaccine or immune globulin(IG)* is recommended for all susceptible persons traveling to or working in countries with intermediate or high endemicity of infection (see map).

Vaccination of children 2 years of age and older, adolescents and adults with the age-appropriate dose (Table 12a. Recommended doses of HAVRIX®, Table 12b. Recommended doses of VAQTA®) is preferred for persons who plan to travel repeatedly or reside for long periods in these high risk areas. IG is recommended for travelers less than 2 years of age and for persons of all ages desiring only short term protection.

*Formerly called immune serum globulin and gamma globulin.

Geographic Distribution of Hepatitis A Prevalence



Note: This map generalizes available data and patterns may vary within countries.

There are two hepatitis A vaccines currently licensed in the United States: HAVRIX® (manufactured by SmithKline Beecham Pharmaceuticals) and VAQTA® (manufactured by Merck & Co., Inc.). Both are inactivated vaccines, adsorbed to aluminum hydroxide as an adjuvant and prepared with 2-phenoxyethanol as the preservative.

The vaccine should be administered by intramuscular injection in the deltoid muscle. A needle length appropriate for the persons's age and size should be used.

HAVRIX® is currently licensed in three formulations, and the formulation and number of doses vary accoring to the person's age: for children and adolescents 2-18 years of age, 360 EL.U. per dose in a three-dose schedule and 720 EL.U. per dose in a two-dose schedule; for adults >18 years of age, 1,440 EL.U. per dose in a two-dose schedule (Table 12a). VAQTA® is licensed in two formulations, and the formulation and number of doses vary according to the person's age: for children and adolescents 2-17 years of age, 25 U in a two-dose schedule and for adults >17 years of age, 50 U per dose in a two-dose schedule (Table 12b).

Travelers who are allergic to a vaccine component or otherwise elect not to receive vaccine should receive a single dose of IG (0.02 mL/kg) which provides effective protection against hepatitis A for up to 3 months. For travel longer than 3 months, an IG dose of 0.06 mL/kg should be given and must be repeated if travel is longer than 5 months. See Table 11 for approximate IG dosages.

For some travelers, screening for total antibodies to HAV (anti-HAV) before travel may be useful to determine susceptibility and eliminate unnecessary vaccination or IG prophylaxis of immune persons. Such serologic screening for susceptibility may be indicated for adult travelers who are likely to have had prior HAV infection if the cost of screening (laboratory and office visit) is less than the cost of vaccination or IG prophylaxis and if testing will not interfere with subsequent receipt of vaccine or IG. Such persons may include those older than 40 years of age and persons born in parts of the world with intermediate or high endemicity (see map). Postvaccination testing for serologic response is not indicated.

Data on long-term persistence of antibody after hepatitis A vaccination are limited because the currently available vaccines have been under evaluation for only 4-5 years. Estimates of antibody persistence derived from kinetic models of antibody decline suggest that protective levels of anti-HAV could persist for at least 20 years.

Persons can be assumed to be protected by 4 weeks after receiving the first vaccine dose, although a second dose 6 to 12 months later is necessary for long-term protection. Because protection may not be complete until 4 weeks after vaccine administration, persons traveling to high risk areas less than 4 weeks after the initial dose should also be given IG(0.02 mL/kg), but at a different injection site.

Safety

Experience to date indicates that hepatitis A vaccine has an excellent safety profile. Approximatelly 50,000 persons have received HAVRIX® in clinical studies. No serious adverse events have been attributed definitively to hepatitis A vaccine. In adults, the most frequent side effect observed within 3 days after the 1440 EL.U. dose was soreness at the injection site (56%), followed by headache (14%) and malaise (7%), the incidence of side effects generally has been similar to that of hepatitis B vaccine. In clinical studies among children, the most common side effect reported was soreness (15%), followed by feeding problems (8%), headache (4%) and injection site induration (4%). No serious adverse events have been observed among approximately 40,000 children who have received the 360 EL.U. dose of hepatitis A vaccine in the protective efficacy study.

Approximately 9,200 persons have received VAQTA® in clinical studies. No serious adverse events were observed among participants in the clinical studies. Among adults, the most frequent side effects observed within 5 days following vaccination include tenderness at the injection site (53%), pain (51%) and warmth (17.3%), and headache (16.1%). Among children, the most common side effects reported were pain at injection site (19%), tenderness at injection site (17%), and warmth (9%).

An estimated 1.3 million persons have been vaccinated with HAVRIX® since it was licensed in Europe and Asia. Postlicensure reports, without regard to causality, of serious adverse events received by the vaccine manufacturer have included anaphylaxis, Guillain-Barré syndrome, brachial plexus neuropathy, transverse myelitis, multiple sclerosis, encephalopathy, and erthema multiforme (SmithKline Beecham Biologicals, unpublished data). Most of these events have occurred among adults, and approximately one third have occurred among persons receiving other vaccines concurrently. For serious adverse events for which background incidence data are known (e.g., Guillain-Barré syndrome and brachial plexus neuropathy, the rates among vaccine recipients are not higher than would be expected among an unvaccinated population (CDC, unpublished data). In Europe, the ratio of reported adverse events to number of doses distributed is similar for the manufacturer's hepatitis A and hepatitis B vaccines (SmithKline Beecham Biologicals, unpublished data).

Because VAQTA® was just recently licensed, postmarketing data are limited. An estimated 20,000 persons have been administered VAQTA® since it was licensed in the United States and Germany, and no serious adverse events have been reported (Merck & Company, Inc., unpublished data).

Any adverse event suspected to be associated with hepatitis A vaccination should be reported to the Vaccine Adverse Event Reporting System (VAERS), VAERS forms can be obtained by calling 1-800-822-7967.

Hepatitis A vaccine should not be administered to persons with a history of hypersensitivity reactions to alum or the preservative 2-phenoxyethanol. Vaccination of an immune person is not contraindicated and does not increase the risk of adverse effects. Because the vaccine is inactivated, no special precautions need to be taken in vaccination of immunocompromised persons.

Immune globulin for intramuscular administration prepared in the United States has few side effects (primarily soreness at the injection site) and has never been shown to transmit infectious agents (hepatitis B virus [HBV], hepatitis C virus [HCV] or human immunodeficiency virus [HIV]). Specific laboratory studies have shown that immune globulins prepared by cold ethanol fractionation (the standard procedure used in U.S.-manufactured preparations) carry no risk of transmission of HIV. Pregnancy is not a contraindication to using immune globulin.

Pregnancy

The safety of hepatitis A vaccination during pregnancy has not been determined. However, because hepatitis A vaccine is produced from inactivated HAV, the theoretical risk to the developing fetus is expected to be low. The risk of vaccination should be weighted against the risk of hepatitis A in women who may be at high risk for exposure to HAV.

TABLE 11. Immune Globulin for Protection Against Viral Hepatitis A

Length of stay	Body weight		Dose volume*	Comments
	lb	kg**		
Short-term travel (<3 mos)	<50 50-100 >100	<23 23-45 >45	0.5 ml 1.0 ml 2.0 ml	Dose volume depends on body weight and length of stay
Long-term travel (3-5 months)	<22 <50 50-100 >100	<10 <23 23-45 >45	0.5 ml 1.0 ml 2.5 ml 5.0 ml	

*For intramuscular injection.
**kg = approximately 2.2 lbs.

TABLE 12a. Recommended Doses of HAVRIX® *

Group	Age (years)	Dose (EL.U.)†	Volume	No. doses	Schedule (months)§
Children and adolescents¶	2–18	720 EL.U.	0.5 mL	2	0, 6–12
Adults	>18	1,440 EL.U.	1.0 mL	2	0, 6–12

*Hepatitis A vaccine, inactivated, SmithKline Beecham Biologicals.
†EL.U = ELISA units.
§ 0 months represents timing of the initial dose; subsequent numbers represent months after the initial dose.
¶ An alternate formulation and schedule (three doses) are available for children and adolescents and consist of 360 EL.U. per 0.5 mL dose at 0, 1, and 6-12 months of age.

TABLE 12b. Recommended Doses of VAQTA® *

Group	Age (years)	Dose (U)†	Volume	No. doses	Schedule (months)§
Children and adolescents	2–17	25 U	0.5 mL	2	0, 6–18
Adults	>17	50 U	1.0 mL	2	0, 6

*Hepatitis A vaccine, inactivated, Merck & Company, Inc.
† Units
§ 0 months represents timing of the initial dose; subsequent numbers represent months after the initial dose.

■ HEPATITIS, VIRAL, TYPE B

The risk of hepatitis B virus (HBV) infection for international travelers is generally low, except for certain travelers in countries with high HBV endemicity. Factors to consider when assessing risk include: 1) the prevalence of HBV carriers in the local population, 2) the extent of direct contact with blood, or secretions, or of intimate sexual contact with potentially infected persons, and 3) the duration of travel.

The prevalence of HBV carriers is high (≥8%) in all socioeconomic groups in certain areas (see map): all of Africa, Southeast Asia including China, Korea, Indonesia, and the Philippines; the Middle East except Israel; South and Western Pacific Islands, interior Amazon Basin, and certain parts of the Caribbean, i.e., Haiti and the Dominican Republic. It is moderate (2%-7%) in South Central and Southwest Asia, Israel, Japan, Eastern and Southern Europe and Russia, and most of Middle and South America. In Northern and Western Europe, North America, Australia and New Zealand, HBV carrier prevalence is low (≤1%) in the general population.

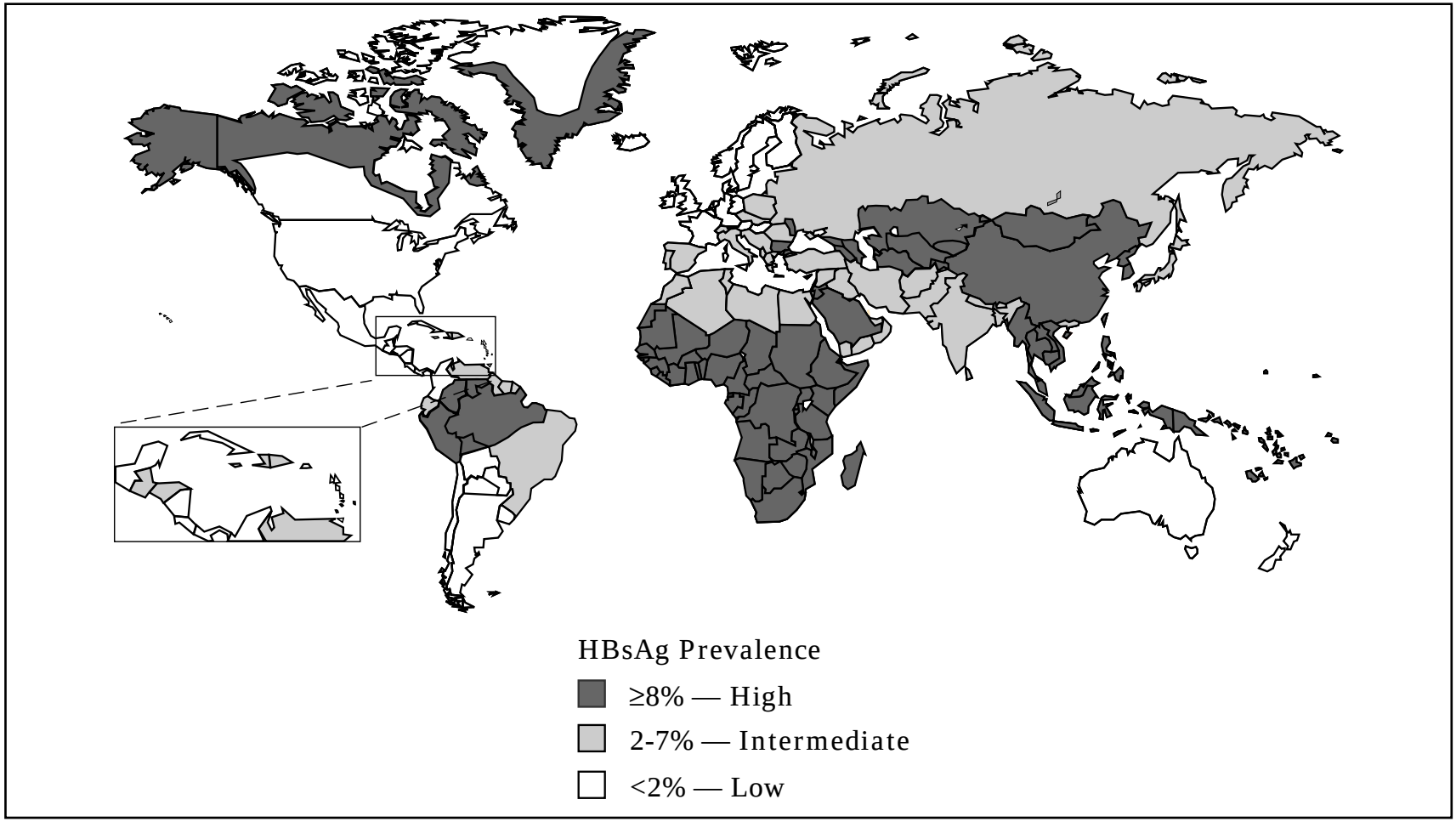
HBV is primarily transmitted through activities which result in exchange of blood or blood-derived fluids; and through sexual activity, either heterosexual or homosexual, between an infected and a susceptible person. Principal activities which may result in blood exposure include work in health care fields, i.e., medical, dental, laboratory which entail direct exposure to human blood; receipt of blood transfusions which have not been screened for HBV; and having dental, medical, or other exposure to needles (e.g., acupuncture, tattooing, or injecting drug use)which have not been appropriately sterilized. In addition, in less developed areas, open skin lesions in children or adults due to factors such as impetigo, scabies, and scratched insect bites, may play a role in disease transmission if direct exposure to wound exudates occurs.

Hepatitis B vaccination is currently recommended for all persons who work in health care fields (medical, dental, laboratory or other) which entail exposure to human blood. Previously unvaccinated persons who will work in health care fields for any duration in high or moderate HBV endemicity areas are strongly advised to receive hepatitis B vaccine prior to such travel. Hepatitis B vaccination should also be considered for persons who plan to reside for ≥6 months in areas with intermediate to high levels of endemic HBV transmission and who will have any of the previously discussed types of contact with the local population. In particular, persons who anticipate sexual contact with the local population, who will live in rural areas and/or have daily physical contact with local populations; and persons who are likely to seek medical, dental or other treatment in local facilities during their stay should receive the vaccine. Vaccination should be considered for short-term travelers (< 6 months) who will have direct contact with blood, or sexual contact with residents of areas with moderate to high levels of endemic HBV transmission.

Two types of hepatitis B vaccines have been licensed in the United States. One, which was manufactured from plasma of HBV carriers is no longer produced in the United States. The currently available vaccines are produced through recombinant DNA technology by common bakers yeast into which the gene for hepatitis B surface antigen (HBsAg) has been inserted.

Primary vaccination consists of three intramuscular doses of vaccine. The recommended dose varies by product and the recipient's age (Table 13). When the vaccine is administered as a 3-dose series, the second dose should be given 1 month after the first dose, and the third dose 6 months after the first dose. Alternatively, the vaccine produced by one manufacturer is licensed to be administered as a 4-dose schedule at 0, 1, 2, and 12 months. Vaccination should ideally begin at least 6 months before travel in order to complete the full vaccine series prior to departure. Since some protection is provided by

Geographic Distribution of Hepatitis B Prevalence



one or two doses, the vaccine series should be initiated, if indicated, even if it cannot be completed prior to departure. However, optimal protection is not conferred until after the final (3rd or 4th) vaccine dose. There is no evidence of interference between hepatitis B vaccine and other simultaneously administered vaccine(s) or with immunoglobulin.

The optimum site of injection in adults is the deltoid muscle; vaccination in the buttocks results in poorer antibody response. Long term studies of healthy adults and children indicate that immunologic memory remains intact for at least 12 years and confers protection against chronic HBV infection, even though hepatitis B surface antibody (anti-HBs) levels may become low or decline below detectable levels. For children and adults whose immune status is normal, booster doses of vaccine are not recommended, nor is serologic testing to assess antibody levels necessary. See p. 97 for discussion of hepatitis B immunization schedule for infants who will be traveling.

TABLE 13. Recommended Doses of Currently Licensed Hepatitis B Vaccines

Group	Dose (μg)	
	Recombivax HB*	Engerix-B*
Infants of HBsAg-negative mothers and children <11 years	2.5	10
Infants of HBsAg-positive mothers; prevention of perinatal infection	5	10
Children and adolescents 11-19 years	5	10
Adults ≥20 years	10	20
Dialysis patients and other immunocompromised persons	40†	40§

*Both vaccines are routinely administered in a three-dose series. Engerix-B also has been licensed for a four-dose series administered at 0, 1, 2, and 12 months.
†Special formulation (40 μg in 1.0 mL).
§Two 1.0-mL doses given at one site, in a four-dose schedule at 0, 1, 2, 6 months.

Safety

Hepatitis B vaccines have been shown to be safe when administered to both adults and children. Over 4 million adults have been vaccinated in the United States, and at least that many children have received hepatitis B vaccine worldwide. The major side-effects observed with hepatitis B vaccines have been soreness and redness at the site of injection. In the United States, surveillance of adverse reactions has shown a possible association between Guillain Barré syndrome (GBS) and receipt of the first dose of plasma-derived hepatitis B vaccine. Available data from reporting systems for adverse events do not indicate an association between receipt of recombinant vaccine and GBS.

Pregnancy

On the basis of limited data, there is no apparent risk of adverse events to the developing fetus when hepatitis B vaccine is administered to pregnant women. The vaccine contains non-infectious HBsAg particles, and should cause no risk to the fetus. HBV infection affecting a pregnant woman may result in serious disease for the mother and chronic infection for the newborn. Therefore, neither pregnancy or lactation should be considered a contraindication for vaccination.

Hepatitis E (Enterically Transmitted Non-A, Non-B Hepatitis, Epidemic Non-A, Non-B; Fecal-Oral Non-A, Non-B)

In recent years, epidemic and endemic transmission of hepatitis E virus (HEV) spread by water or close personal contact has been reported from several areas of Asia (Afghanistan, Bangladesh, China, Central Asian Republics of the former Soviet Union, Indonesia, Malaysia, Mongolia, Myanmar, Pakistan, and India), North Africa, and from rural areas of central Mexico. Such epidemics generally affect adults and cause an unusually high mortality in pregnant women. HEV has been transmitted to experimental animals and the virus has been cloned and sequenced. Several experimental assays to detect antibody to HEV (anti-HEV) have been developed; however, none are yet available for commercial use in the United States. Several imported cases of hepatitis E have been identified in American travelers; studies are in progress to determine if hepatitis E is an endemic disease in the United States.

Travelers to areas where hepatitis E occurs (see above) may be at some risk of acquiring this disease by close contact with cases or through contaminated food or water. Immune globulin (IG) prepared from plasma collected in non-HEV endemic areas has not been effective in preventing clinical disease during hepatitis E outbreaks. The efficacy of IG prepared from plasma collected in HEV endemic areas is unclear. The best prevention of infection is to avoid potentially contaminated food and water, as with hepatitis A and other enteric infections.

■ LASSA FEVER

Lassa fever is a severe, often fatal, hemorrhagic fever that occurs in rural areas of West Africa, and is caused by a virus transmitted from asymptomatically infected rodents to man. The risk of infection in international travelers is considered small. Treatment with the antiviral drug ribavirin may be life-saving. The Special Pathogens Branch, DVRD, NCID, CDC is the only national laboratory responsible for research and diagnosis on highly lethal hemorrhagic fever viruses, such as Lassa virus. These viruses do not exist naturally in the United States and there are no vaccines currently available.

■ LEISHMANIASIS

Leishmaniasis is a parasitic disease acquired in tropical and subtropical areas of the world. Persons become infected through the bite of some species of sand flies. The infection usually is acquired in rural areas but may be acquired in some urban areas as well. The disease most commonly manifests either in a cutaneous (skin) form or in a visceral (internal organ) form. Cutaneous leishmaniasis is characterized by one or more skin sores (either open or closed) that develop weeks to months after a person is bitten by infected sand flies. The manifestations of visceral leishmaniasis, such as fever, enlargement of the spleen and liver, and anemia, typically develop months, but sometimes years after a person becomes infected.

Vaccines and drugs for preventing infection are not currently available. Preventive measures for the individual traveler are aimed at reducing contact with sand flies. Outdoor activities should be avoided when sand flies are most active (dusk to dawn). Although sand flies are primarily night-time biters, infection may be acquired during the daytime if resting sand flies are disturbed. Sand fly activity in an area may easily be underestimated because sand flies are noiseless fliers, and rare bites may go unnoticed.

Protective clothing and insect repellent should be used for supplementary protection. Clothing should cover as much of the body as possible and tolerable in the climate. Repellent with DEET (N,N-diethylmethyltoluamide) (DEET) should be applied to exposed skin and under the edges of clothing, such as under the ends of sleeves and pant legs. It should be applied according to the manufacturer's instructions; repeated applications may be necessary under conditions of excessive perspiration, wiping, and washing (see Table 24, p. 182 on Precautions for Repellents). Although impregnation of clothing with permethrin may provide additional protection, it does not eliminate the need for repellent on exposed skin and should be repeated after every five washings.

Contact with sand flies can be reduced by mechanical means, such as bed nets and screening of doors and windows. Fine-mesh netting (at least 18 holes to the linear inch; some sources say even finer) is required for an effective barrier against sand flies, which are about one-third the size of mosquitoes. However, such closely woven bed nets may be difficult to tolerate in hot climates. Impregnating bed nets and window screens with permethrin aerosol may provide some protection, as may spraying dwelling with insecticides.

■ MALARIA

Malaria in humans is caused by one of four protozoan species of the genus *Plasmodium*: *P. falciparum*, *P. vivax*, *P. ovale*, and *P. malariae*. All are transmitted by the bite of an infected female *Anopheles* mosquito. Occasionally transmission occurs by blood transfusion or congenitally from mother to fetus. The disease is characterized by fever and flulike symptoms, including chills, headache, myalgias, and malaise; these symptoms may occur at intervals. Malaria may be associated with anemia and jaundice, and *P. falciparum* infections may cause kidney failure, coma, and death. Deaths due to malaria are preventable; methods to prevent malaria infection are described in this chapter.

Information on malaria risk in specific countries (pp. 17-77) is derived from various sources, including the World Health Organization. While this is the most accurate information available at the time of publication, factors that may vary from year to year, such as local weather conditions, mosquito vector density, and prevalence of infection, can have a marked effect on local malaria transmission patterns.

Risk of Acquiring Malaria

Malaria transmission occurs in large areas of Central and South America, Hispaniola, sub-Saharan Africa, the Indian subcontinent, Southeast Asia, the Middle East, and Oceania. The estimated risk of a traveler acquiring malaria varies markedly from area to area. This variability is a function of the intensity of transmission within the various regions and of the itinerary and time and type of travel. From 1980-1993, 3,005 cases of *P. falciparum* among U.S. civilians were reported to the CDC. Of these, 2,472 (82%) were acquired in sub-Saharan Africa; 219 (8%) were acquired in Asia; 163 (5%) were acquired in the Caribbean and South America; and 151 (5%) were acquired in other parts of the world. During this time period there were 53 fatal malaria infections among U.S. civilians; 51 (96%) were caused by *P. falciparum*,—of which 40 (78%) were acquired in sub-Saharan Africa.

Checklist for Travelers to Malarious Areas

The following is a checklist of key issues to be considered in advising travelers. The numbers in parentheses refer to those pages in the text where these issues are discussed in detail.

Risk of malaria (pages 17-77, 128)
Travelers should be informed about the risk of malaria infection and the presence of drug-resistant *P. falciparum* malaria in their areas of destination.

Anti-mosquito measures (page 131)
Travelers should know how to protect themselves against mosquito bites.

Chemoprophylaxis (pages 133)
Travelers should be:

— Advised to start prophylaxis before travel, and to use prophylaxis continuously while in malaria-endemic areas, and for four weeks after leaving such areas.

— Questioned about drug allergies and other contraindications for use of drugs to prevent malaria.

— Advised which drug to use for prophylaxis, and, if chloroquine is used, whether Fansidar®† should be carried for presumptive self-treatment.

— Informed that antimalarial drugs can cause side effects; if these side effects are serious, medical help should be sought promptly and use of the drug discontinued.

— Warned that they may acquire malaria even if they use malaria chemoprophylaxis.

In case of illness
Travelers should be:

— Informed that symptoms of malaria may be mild, and that they should suspect malaria if they experience unexplained fever or other symptoms such as persistent headaches, muscular aching and weakness, vomiting, or diarrhea.

— Informed that malaria may be fatal if treatment is delayed. Medical help should be sought promptly if malaria is suspected, and a blood sample should be taken and examined for malaria parasites on one or more occasions.

— Reminded that self-treatment should be taken only if prompt medical care is not available and that medical advice should still be sought as soon as possible after self-treatment.

Special categories (page 136)

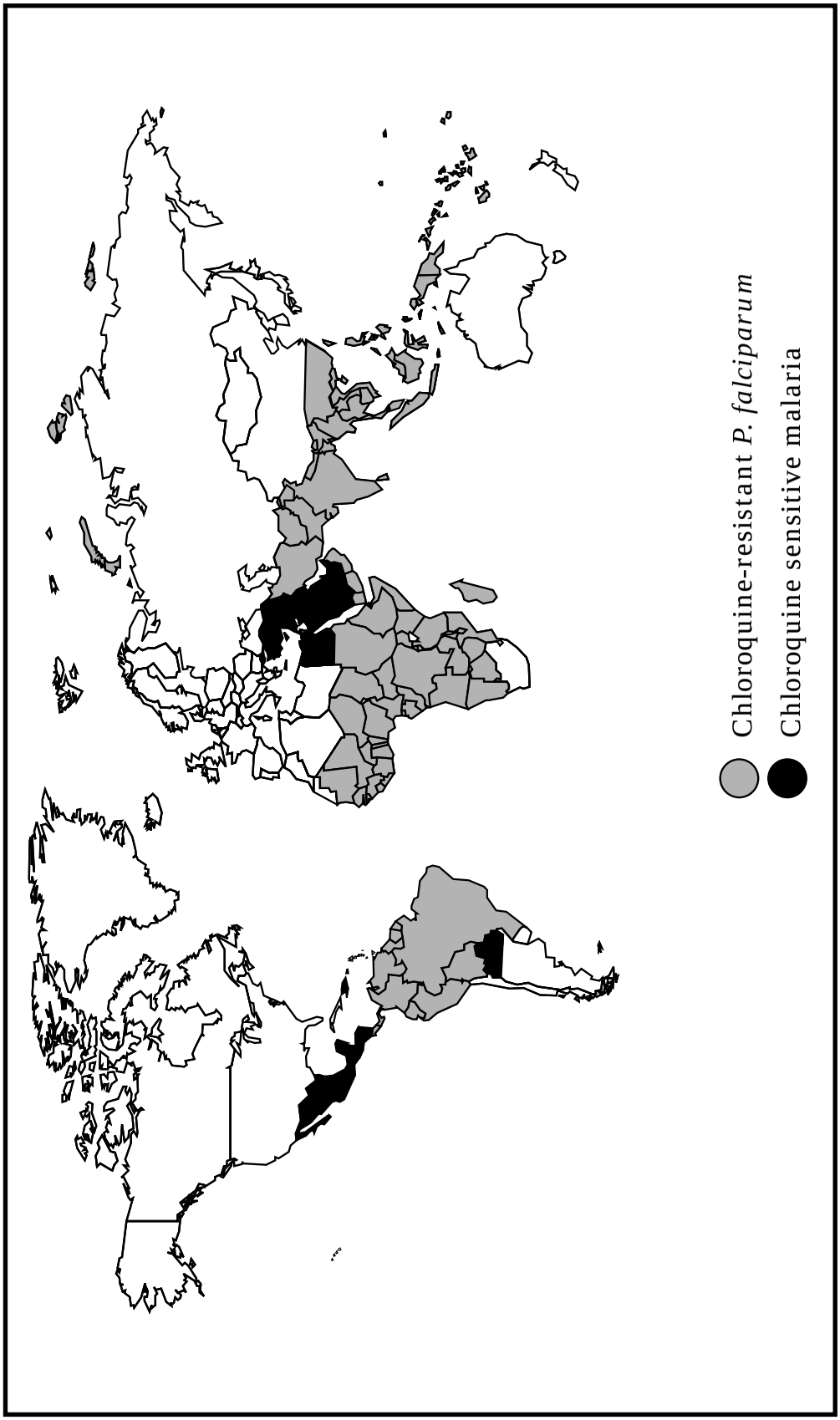
— Pregnant women and young children require special attention because of the potential effects of malaria illness and inability to use some drugs (for example, doxycycline).

* * *

(Adapted from *International Travel and Health*,
World Health Organization, Geneva, 1995)

†Use of names is for identification only and does not imply endorsement by the Public Health Service or the U.S. Department of Health and Human Services.

Distribution of Malaria and Chloroquine-resistant *Plasmodium falciparum*, 1996



Thus, most imported *P. falciparum* malaria among American travelers was acquired in Africa south of the Sahara, even though only 130,000 arrivals from the United States were reported by countries in that region in 1991. In contrast, 20 million arrivals from the United States were reported that year in other countries with malaria (including 15 million travelers to Mexico, (World Tourism Organization). This disparity in the risk of acquiring malaria reflects the fact that travelers to Africa tend to spend considerable time, including evening and nightime hours, in rural areas where malaria risk is highest. Travelers to Asia and South America, in contrast, spend most of their time in urban or resort areas where there is limited, if any, risk of exposure and travel to rural areas mainly during daytime hours when the risk of infection is limited.

Estimating the risk of infection for different categories of travelers is difficult and may be significantly different even for persons who travel or reside temporarily in the same general areas within a country. For example, tourists staying in air conditioned hotels may be at lower risk than backpackers or adventure travelers. Similarly, longer-term residents living in screened and air-conditioned housing are less likely to be exposed than are missionaries or Peace Corps volunteers.

Drug Resistance

Resistance of *P. falciparum* to chloroquine has been confirmed or is probable in all countries with *P. falciparum* malaria except the Dominican Republic, Haiti, Central America west of the Panama Canal Zone, Egypt, and most countries in the Middle East. In addition, resistance to both chloroquine and Fansidar®* is widespread in Thailand, Myanmar (formerly Burma), Cambodia, and the Amazon basin area of South America, and resistance has also been reported sporadically in sub-Saharan Africa. Resistance to mefloquine has been confirmed in those areas of Thailand with malaria transmission.

General Advice for Travelers to Malaria-Endemic Areas

All travelers to malarious areas of the world are advised to use an appropriate drug regimen and personal protection measures to prevent malaria; however, travelers should be informed that regardless of methods employed, malaria still may be contracted. Malaria symptoms can develop as early as 6 days after initial exposure in a malaria-endemic area and as late as several months after departure from a malarious area, after chemoprophylaxis has been terminated. Travelers should understand that malaria can be treated effectively early in the course of the disease, but that delay of appropriate therapy can have serious or even fatal consequences. Individuals who have symptoms of malaria should seek prompt medical evaluation, including thick and thin blood smears, *as soon as possible*.

Personal Protection Measures

Because of the nocturnal feeding habits of *Anopheles* mosquitoes, malaria transmission occurs primarily between dusk and dawn. Travelers should take protective measures to reduce contact with mosquitoes especially during these hours. Such measures include remaining in well-screened areas, using mosquito nets, and wearing clothes that cover most of the body. Additionally, travelers should be advised to purchase insect repellent before travel for use on exposed skin. The most effective repellents contain N,N dieth-

*Use of names is for identification only and does not imply endorsement by the Public Health Service or the U.S. Department of Health and Human Services.

ylmethyltoluamide (DEET), an ingredient in many commercially available insect repellents. The actual concentration of DEET varies among repellents and can be as high as 95%. Repellents with DEET concentrations between 30% and 35% are quite effective and the effect should last for about 4 hours. Rarely, children exposed to DEET have had toxic encephalopathy. The possibility of adverse reactions to DEET will be minimized if the following precautions are taken: apply repellent sparingly and only to exposed skin or clothing; avoid applying high-concentration products to the skin; do not inhale or ingest repellents or get them in the eyes; avoid applying repellents to portions of children's hands that are likely to have contact with eyes or mouth; never use repellents on wounds or irritated skin; wash repellent-treated skin after coming indoors. If a reaction to insect repellent is suspected, wash treated skin and seek medical attention.

Travelers should use a pyrethroid-containing flying-insect spray in living and sleeping areas during evening and nighttime hours. In addition, persons who will not be staying in well-screened or air-conditioned rooms should take additional precaution, which include sleeping under mosquito netting, i.e., bednets. Permethrin (Permanone®) may be sprayed on clothing and bednets for additional protection against mosquitoes. Bednets are more effective if they are treated with permethrin or deltamethrin insecticides. In the United States permethrin spray or liquid can be used, while permethrin or deltamethrin liquid may be purchased overseas for the treatment of bednets.

TABLE 14a. Drugs Used in the Prophylaxis of Malaria

Drug	Adult dose	Pediatric dose
Mefloquine (Lariam®)	228 mg base (250 mg salt) orally, once/week	<15 kg: 4.6 mg (base); 5 mg (salt) 15-19 kg: 1/4 tab/wk 20-30 kg: 1/2 tab/wk 31-45 kg: 3/4 tab/wk >45 kg: 1 tab/wk
Doxycycline	100 mg orally, once/day	>8 years of age: 2 mg/kg of body weight orally/day up to adult dose of 100 mg/day
Chloroquine phosphate (Aralen®)	300 mg base (500 mg salt) orally, once/week	5 mg/kg base (8.3 mg/kg salt) orally, once/week, up to maximum adult dose of 300 mg base
Hydroxychloroquine sulfate (Plaquenil®)	310 mg base (400 mg salt) orally, once/week	5 mg/kg base (6.5 mg/kg salt) orally, once/week, up to maximum adult dose
Proguanil	200 mg orally, once/day in combination with weekly chloroquine	<2 years: 50 mg/day 2-6 years: 100 mg/day 7-10 years: 150 mg/day >10 years: 200 mg/day
Primaquine	15 mg base (26.3 mg salt) orally, once/day for 14 days	0.3 mg/kg base (0.5 mg/kg salt) orally once/day for 14 days

TABLE 14b. Drug Used in the Presumptive Treatment of Malaria

Drug	Adult dose	Pediatric dose weight (kg): tablet(s)
Pyrimethamine-sulfadoxine (Fansidar®)	3 tablets (75 mg pyrimethamine and 1,500 mg sulfadoxine), orally as a single dose	5-10: 1/2 11-20: 1 21-30: 1 1/2 31-45: 2 >45: 3

Chemoprophylaxis

In choosing an appropriate chemoprophylactic regimen before travel, persons should consider several factors. The travel itinerary should be reviewed in detail and compared with the information on areas of risk within a given country (pp. 17-77) to determine whether the traveler will actually be at risk of acquiring malaria. Whether the traveler will be at risk of acquiring drug-resistant *P. falciparum* malaria should also be determined. In addition, it should be established whether the traveler has previously experienced an allergic or other reaction to the antimalarial drug of choice and whether medical care will be readily accessible during travel.

Malaria chemoprophylaxis should preferably begin 1-2 weeks before travel to malarious areas (except for doxycycline, which can begin 1-2 days before). This allows any potential side effects to be evaluated and treated by the traveler's physician before departure. Chemoprophylaxis should continue during travel in the malarious areas and for 4 weeks after leaving the malarious areas.

Chemoprophylactic Regimens (to be used in conjunction with pp. 17-77)

Regimen A: For travel to areas of risk where chloroquine-resistant *P. falciparum* has NOT been reported, once-weekly use of chloroquine *alone* is recommended. Chloroquine is usually well tolerated. The few people who experience uncomfortable side effects may tolerate the drug better by taking it with meals, or in divided, twice-weekly doses. As an alternative, the related compound hydroxychloroquine may be better tolerated. Chloroquine prophylaxis should begin 1-2 weeks before travel to malarious areas. It should be continued weekly during travel in malarious areas and for 4 weeks after a person leaves such areas. (See Table 14a for recommended dosages.)

Regimen B: For travel to areas of risk where chloroquine-resistant *P. falciparum* exists, use of mefloquine *alone* is recommended. Mefloquine is usually well tolerated but precautions should be observed as described in the section on adverse reactions. Mefloquine prophylaxis should begin 1-2 weeks before travel to malarious areas. It should be continued weekly during travel in malarious areas and for 4 weeks after a person leaves such areas. Mefloquine can be used for long-term prophylaxis. (See Table 14a for recommended dosages.) Note: In some foreign countries a fixed combination of mefloquine and Fansidar® is marketed under the name Fansimef®. Fansimef® should not be confused with mefloquine, and it is not recommended for prophylaxis of malaria because of the potential for severe adverse reactions associated with prophylactic use of Fansidar®.

Alternatives to Mefloquine

Persons who travel to areas where drug-resistant *P. falciparum* is endemic and for whom mefloquine is not recommended may elect to use an alternative regimen, as follows:

Doxycycline *alone* taken daily is an alternative regimen for travelers who cannot tolerate mefloquine or for whom the drug is not recommended. Doxycycline is as effective as mefloquine for travel to most malarious areas. However, it is also the only available

effective prophylactic drug for prophylaxis for travelers to malaria endemic areas of Thailand bordering Myanmar and Cambodia. Travelers who use doxycycline should be cautioned about the possible side effects as described in the section on adverse reactions. Doxycycline prophylaxis should begin 1-2 days before travel to malarious areas. It should be continued daily during travel in malarious areas and for 4 weeks after the traveler leaves such areas. (See Table 14a for recommended dosages.)

Chloroquine *alone* taken weekly is only recommended for those travelers to areas with drug-resistant *P. falciparum* who cannot use mefloquine or doxycycline. Limited data suggest that the combination of chloroquine with daily proguanil (Paludrine®*) is more effective than chloroquine alone in Africa, but not in Thailand and Papua New Guinea. Therefore, travelers to Africa who use chloroquine for prophylaxis should, if possible, *also* take 200 mg *daily* (adult) of proguanil. Proguanil is not available commercially in the United States but can be obtained in Canada, Europe and many African countries.

Self-treatment

Because chloroquine (with or without proquanil) is a less effective chemoprophylaxis regimen in chloroquine-resistant areas, travelers who elect to use chloroquine either alone or with daily proguanil (except those with histories of sulfonamide intolerance) should be given a treatment dose of Fansidar® to be carried during travel. These travelers should take the Fansidar® promptly if they have a febrile illness during their travel *and if professional medical care is not available within 24 hours*; however, they should be aware that this self-treatment of a possible malarial infection is *only* a temporary measure and that prompt medical evaluation is *imperative*. They should continue their weekly chloroquine prophylaxis after presumptive treatment with Fansidar®. (See Table 14a for recommended dosages for prophylaxis and Table 14b for presumptive treatment with Fansidar.)

Mefloquine should not be used for self-treatment because of the frequency of serious side effects (e.g., hallucinations, convulsions) that have been associated with the high dosages of mefloquine used for treatment of malaria.

Halofantrine (Halfan®) is an antimalarial drug which is licensed in the United States but is not commercially available, although the drug is available in many other countries. Halofantrine is not recommended for self-treatment of malaria because of potentially serious electrocardiogram changes which have been documented following treatment doses of halofantrine: in many of these reports halofantrine was administered in the presence of other antimalarial drugs (for example, mefloquine). The safety of halofantrine for self-treatment of persons on mefloquine prophylaxis has not been established and, since halofantrine is widely available overseas, health care providers may choose to caution travelers to avoid the use of halofantrine if they are taking mefloquine.

Primaquine: Prevention of Relapses of P. vivax and P. ovale.

P. vivax and *P. ovale* parasites can persist in the liver and cause relapses for as long as 4 years after routine chemoprophylaxis is discontinued. Travelers to malarious areas should be alerted to this risk, and if they develop malaria symptoms after leaving a malarious area, they should report their travel history and the possibility of malaria to a physician as soon as possible. Primaquine decreases the risk of relapses by acting against the liver stages of *P. vivax* and *P. ovale*. Primaquine is administered after the traveler has left a malaria-endemic area, usually during the last 2 weeks of prophylaxis.

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*Use of names is for identification only and does not imply endorsement by the Public Health Service or the U.S. Department of Health and Human Services.

Since most malarious areas of the world (except Haiti and Dominican Republic) have at least one species of relapsing malaria, travelers to these areas have some risk of acquiring either *P. vivax* or *P. ovale*, although the actual risk for an individual traveler is difficult to define. Prophylaxis with primaquine is generally indicated only for persons who have had prolonged exposure in malaria-endemic areas, e.g., missionaries and Peace Corps Volunteers. Most people can tolerate the standard regimen of primaquine, with the exception of individuals deficient in glucose-6-phosphate dehydrogenase (G6PD) (see discussion of adverse reactions). (See Table 14a for recommended dosages.)

Adverse Reactions and Contraindications to Antimalarials

The frequent or serious side effects of recommended antimalarials are discussed below. In addition, physicians should review the prescribing information in standard pharmaceutical reference texts and in the manufacturers' package inserts.

Chloroquine and ***hydroxychloroquine*** rarely cause serious adverse reactions when taken at prophylactic doses for malaria. Minor side effects that may occur include gastrointestinal disturbance, headache, dizziness, blurred vision, and pruritus, but generally these effects do not require that the drug be discontinued. High doses of chloroquine, such as those used to treat rheumatoid arthritis, have been associated with retinopathy, but this serious side effect has not been associated with routine weekly malaria prophylaxis. Chloroquine and related compounds have been reported to exacerbate psoriasis. Chloroquine may interfere with the antibody response to human diploid cell rabies vaccine when the vaccine is administered intradermally.

Mefloquine has rarely been associated with serious adverse reactions (e.g., psychoses, convulsions) at prophylactic dosage; these reactions are more frequent with the higher dosages used in treatment. Minor side effects observed with prophylactic doses, such as gastrointestinal disturbance, insomnia, and dizziness, tend to be transient and self-limited.

Mefloquine is *contraindicated* for use by travelers with a known hypersensitivity to mefloquine and is not recommended for use by travelers with a history of epilepsy or severe psychiatric disorders. A review of available data suggest that mefloquine may be used in persons concurrently on beta blockers, if they have no underlying arrhythmia. However, mefloquine is not recommended for persons with cardiac conduction abnormalities until additional data are available.

All studies to date confirm that mefloquine is well tolerated when used for prophylaxis; however, monitoring the occurrence of severe adverse reactions is important because such reactions are possible. Users of mefloquine prophylaxis who experience serious adverse reactions should consult their physician, and the reactions should be reported to the Malaria Section, CDC, telephone (770) 488-7760.

Doxycycline may cause photosensitivity, usually manifested as an exaggerated sunburn reaction. The risk of such a reaction can be minimized by avoiding prolonged, direct exposure to the sun and by using sunscreens that absorb long-wave ultraviolet (UVA) radiation. In addition, doxycycline use is associated with an increased frequency of monilial vaginitis. Gastrointestinal side effects (nausea or vomiting) may be minimized by taking the drug with a meal. To reduce the risk of esophagitis, doxycycline should not be taken before going to bed. Doxycycline is contraindicated in pregnancy and in children less than 8 years of age.

Fansidar® is contraindicated in persons with a history of sulfonamide intolerance and in infants less than 2 months of age.

Proguanil rarely causes serious adverse reactions at prophylactic dosage. Reported side effects include nausea, vomiting, mouth ulcers, and hair loss.

Primaquine may cause severe hemolysis in G6PD-deficient individuals. Before primaquine is used, G6PD deficiency should be ruled out by appropriate laboratory testing.

Chemoprophylaxis for Children

Children of any age can contract malaria. Consequently, the indications for prophylaxis are identical to those described for adults. Limited data suggest that mefloquine is also well tolerated by young children (<15 kg). Mefloquine may therefore be considered for use when travel to areas with chloroquine-resistant *P. falciparum* is unavoidable. Doxycycline is contraindicated in children <8 years of age. (See recommended dosages in Table 14a.) Children who cannot take mefloquine or doxycycline can be given chloroquine (with proguanil for travel to sub-Saharan Africa) for prophylaxis.

Mefloquine and chloroquine phosphate are manufactured in the United States in tablet form only and have a very bitter taste. Pediatric doses should be calculated carefully according to body weight. Pharmacists can pulverize tablets and prepare gelatin capsules with calculated pediatric doses. Mixing the powder in food or drink may facilitate the administration of antimalarial drugs to children. Chloroquine in suspension is widely available overseas. Parents should calculate the dose and volume to be administered based on body weight, because the concentration of chloroquine base varies in different suspensions.

OVERDOSE OF ANTIMALARIAL DRUGS CAN BE FATAL. MEDICATION SHOULD BE STORED IN CHILDPROOF CONTAINERS OUT OF THE REACH OF CHILDREN.

Prophylaxis During Pregnancy

Malaria infection in pregnant women may be more severe than in nonpregnant women. Malaria may increase the risk of adverse pregnancy outcomes including prematurity, abortion, and stillbirth. For these reasons and because no chemoprophylactic regimen is completely effective, women who are pregnant or likely to become pregnant should avoid travel to areas with malaria transmission. Women traveling to areas where drug-resistant *P. falciparum* has not been reported may take chloroquine prophylaxis. Chloroquine has not been found to have any harmful effects on the fetus when used in the recommended doses for malaria prophylaxis, therefore, pregnancy is not a contraindication for malaria prophylaxis with chloroquine or hydroxychloroquine.

A review of mefloquine use in pregnancy from clinical trials and reports of inadvertent use of mefloquine during pregnancy, suggest its use during the second and third trimester of pregnancy is not associated with adverse fetal or pregnancy outcome. Limited data suggest it is also safe during the first trimester. Consequently, mefloquine may be considered for use by health care providers for prophylaxis in women who are pregnant or likely to become so, when exposure to chloroquine-resistant *P. falciparum* is unavoidable. Because information on the use of mefloquine in the first trimester is limited, women who elect to use mefloquine during the first trimester of pregnancy or their health care providers are asked to report the exposure to the Malaria Section, CDC, telephone 770-488-7760, for inclusion in a registry to assess pregnancy outcomes.

Doxycycline is contraindicated for malaria prophylaxis during pregnancy. Adverse effects of tetracyclines on the fetus include discoloration and dysplasia of the teeth and inhibition of bone growth. During pregnancy, tetracyclines are indicated only to treat life-threatening infections due to multidrug-resistant *P.falciparum*.

Proguanil has been widely used for several decades and no adverse effects on pregnancy or fetus have been established.

Primaquine should not be used during pregnancy because the drug may be passed transplacentally to a G6PD-deficient fetus and cause hemolytic anemia *in utero.* Whenever radical cure or terminal prophylaxis with primaquine is indicated during pregnancy, chloroquine should be given once a week until delivery, at which time primaquine may be given.

Prophylaxis While Breast-feeding

Very small amounts of antimalarial drugs are secreted in the breast milk of lactating women. The amount of drug transferred is not thought to be harmful to a nursing infant. Because the quantity of antimalarials transferred in breast milk is insufficient to provide adequate protection against malaria, infants who require chemoprophylaxis should receive the recommended dosages of antimalarials listed in Table 14a.

Malaria Hotline

Detailed recommendations for the prevention of malaria are available 24 hours a day by calling the CDC Malaria Hotline by phone (404) 332–4555 or by fax (404) 332–4565).

■ MEASLES (Rubeola)

Measles is often a severe disease frequently complicated by middle ear infection or bronchopneumonia. Since vaccine licensure in 1963, measles elimination efforts in the United States have resulted in record low numbers of reported measles cases. Although the number of reported measles cases increased in 1989-1991, chances remain low that individuals will be exposed to natural measles; unvaccinated persons may reach older ages still susceptible to measles. The risk of exposure to measles outside the United States may be high. Between 5 and 20 percent of measles cases reported in the United States between 1991 and 1994 were internationally imported cases. Some of these were among returning U.S. citizens exposed abroad. Although vaccination against measles is not a requirement for entry into any country, all travelers are strongly urged to be immune to measles. In general, persons can be considered immune to measles if they have documentation of physician-diagnosed measles, laboratory evidence of measles immunity, or proof of receipt of two doses of live measles vaccine on or after the first birthday. Consideration should be given to providing one-dose of measles vaccine to persons born in or after 1957 who travel abroad who have not previously received 2 doses of measles vaccine, and who do not have other evidence of measles immunity, unless there is a contraindication. Most persons born before 1957 are likely to have been infected naturally and generally need not be considered susceptible. However, measles vaccine may be given to older persons if there is reason to believe they may be susceptible.

A single dose of live, attenuated measles vaccine* administered subcutaneously in the volume specified by the manufacturer induces antibody formation in at least 95% of susceptibles vaccinated at 12-15 months of age or older. A second dose is expected to induce immunity in most vaccinees who do not respond to the first dose. The use of a combined vaccine including rubella and/or mumps vaccine should be considered to insure immunity to these viruses. See p. 95 for discussion of measles immunization schedule modifications for infants who will be traveling.

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*Official name: Measles Virus Vaccine, Live, Attenuated.

Side Effects and Adverse Reactions

Primary vaccination may be associated with mild fever and transient rash beginning 7-12 days after vaccination and usually lasting several days. About 5%-15% of vaccinees may develop fever ≥103° F (≥39.4° C). Central nervous system conditions including encephalitis and encephalopathy (less than 1 case for every million doses administered) have been reported. However, the incidence rate of these conditions following measles vaccination is lower than the observed incidence rate of encephalitis of unknown etiology suggesting the reported neurologic disorders may be caused by other factors. These adverse events should be anticipated only in susceptible vaccinees and do not appear to be age-related. After revaccination, reactions should be expected to occur only among the small proportion of persons who failed to respond to the first dose. There is no evidence of a greater risk of reaction to live measles vaccine for those who have previously received live measles vaccine or had natural measles. Although recipients of killed measles vaccine (available in the United States from 1963–1967) may be more likely to experience local and systemic reactions after revaccination with live measles vaccine, these individuals should be revaccinated to avoid the severe atypical form of disease which often occurs after their exposure to natural measles.

Precautions and Contraindications

Pregnancy

Live measles vaccine when given as a component of MR or MMR should not be given to females known to be pregnant or who might become pregnant within 3 months after vaccination. Women who are given monovalent measles vaccine should not become pregnant for at least 30 days after vaccination. This precaution is based on the theoretical risk of fetal infection.

Febrile Illness

Although vaccination of persons with severe febrile illness should be postponed until recovery, minor illnesses such as upper respiratory infections with or without low grade fever do not preclude vaccination.

Allergies

Live measles vaccine is produced in chick embryo cell culture. Hypersensitivity reactions very rarely follow the administration of live measles vaccine. Most of these reactions are considered minor and consist of wheal and flare or urticaria at the injection site. However, persons with a history of anaphylactic reactions (hives, swelling of the mouth and throat, difficulty breathing, hypotension or shock) subsequent to egg ingestion should be vaccinated only with extreme caution. Protocols have been developed for vaccinating such individuals (J. Pediatr. 1983; 102:196-199, J. Pediatr. 1988; 113:504-6). Evidence indicates that persons are not at increased risk if they have egg allergies that are not anaphylactic in nature. Such persons should be vaccinated in the usual manner. There is no evidence to indicate that persons with allergies to chickens or feathers are at increased risk of reaction to the vaccine.

Since measles vaccine contains trace amounts of neomycin (25μg), persons who have experienced anaphylactic reactions to topically or systemically administered neomycin should not receive measles vaccine. Most often, neomycin allergy is manifested as a contact dermatitis which is a delayed-type (cell-mediated) immune response rather than anaphylaxis. In such individuals, the adverse reaction, if any, to 25μg of neomycin in the vaccine would be an erythematous, pruritic nodule or papule at 48-96 hours. A history of contact dermatitis to neomycin is not a contraindication to receiving measles vaccine.

Simultaneous Administration of Measles Vaccines

Live measles-containing vaccine may be administered simultaneously (but in a different site) with any other live or inactivated vaccine. Inactivated vaccines and oral polio virus vaccine may be administered at any time before or after live measles containing vaccine. However, if live measles vaccine and live yellow fever vaccine are not administered simultaneously they should be separated by an interval of at least 30 days. See section on PHS Recommendations, or the General Recommendations on Immunization (MMWR;1994:43[RR1]) for more details.

Recent Administration of Immune Globulin (IG) or Other Antibody-Containing Blood Products*

Measles vaccine should be administered at least 14 days before the administration of antibody-containing blood products, such as IG. Because passively acquired antibodies might interfere with the response to the vaccine, MMR should be delayed following administration of blood products. The length of the delay varies from 3–11 months depending on the type of blood product received. See chapter on PHS Recommendations, and the General Recommendations on Immunizations for more details.

Tuberculosis

Tuberculosis may be exacerbated by natural measles infection. There is no evidence, however, that live measles virus vaccine has such an effect. Therefore, tuberculosis skin testing should not be a prerequisite for measles vaccination. If tuberculin skin testing is needed for other reasons, it can be performed the same day the measles vaccine is administered. Otherwise, the test should be postponed for 4-6 weeks because measles vaccination may temporarily suppress tuberculin reactivity.

Altered Immunity

Replication of live measles vaccine virus may be enhanced in patients with immune deficiency diseases and by the suppressed immune responses that occur with leukemia, lymphoma, generalized malignancy, and therapy with corticosteroids, alkylating drugs, antimetabolites and radiation. Patients with such conditions should not be given live measles virus vaccine. However, because of the risk of severe measles in symptomatic HIV-infected persons, and because limited studies of measles, mumps, and rubella (MMR) immunization in symptomatic patients have not documented serious or unusual adverse events, administration of measles vaccine alone or in combination with rubella and mumps vaccine should be considered for all susceptible HIV-infected travelers, regardless of the presence or absence of symptoms.

■ MENINGOCOCCAL DISEASE

Vaccination against meningococcal disease is not a requirement for entry into any country, but it is required for pilgrims to Mecca, Saudi Arabia, for the annual Hajj. Vaccine is indicated for travelers to countries recognized as having epidemic meningococcal disease caused by a vaccine preventable serogroup (i.e., A, C, Y, W135). In sub-Saharan Africa epidemics of serogroup A or C meningococcal disease occur frequently during the dry season (December through June) particularly in the savannah areas extending from Mali eastward to Ethiopia known as the “meningitis belt” (see map).

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*Formerly called immune serum globulin and gamma globulin.

Meningococcal disease in Americans traveling in such areas is rare. However, because of the lack of established surveillance and timely reporting from many of these countries, travelers to the meningitis belt during the dry season should receive meningococcal vaccine, especially if prolonged contact with the local populace is likely. Recent serogroup A meningococcal epidemics have also occurred outside the "meningitis belt" in Kenya, Tanzania, Burundi, and Mongolia; travelers to these countries should also receive the vaccine. Advisories for travelers to other countries will be issued when epidemics of meningococcal disease caused by vaccine preventable serogroups are recognized.

Areas with Frequent Epidemics of Meningococcal Meningitis

Serogroup A is the most common cause of epidemics outside the United States, but serogroup C and serogroup B, can also cause epidemic disease. One formulation of meningococcal polysaccharide vaccine is currently available in the United States—quadrivalent A/C/Y/W-135 vaccine.* The vaccine is available, in single and multiple dose vials, and is distributed in the United States by Connaught Laboratories. Production of the bivalent vaccine has been discontinued. No vaccine is yet available to offer protection against serogroup B. Meningococcal vaccines are chemically defined antigens consisting of purified bacterial capsular polysaccharides, each inducing serogroup-specific immunity. Serogroup A vaccine has not been shown to be effective in children less than 3 months of age, and may be less than fully effective in children 3-11 months of age. Serogroup C vaccine has not been shown to be effective in children less than 2 years of age. The group Y and W-135 polysaccharides have been shown to be safe and immunogenic in adults; the response of children to these polysaccharides is unknown.

Table 15 provides information on the use of meningococcal vaccine.

*Official name: Meningococcal Polysaccharide Vaccine. (Quadrivalent groups A/C/Y/W-135)

TABLE 15. Meningococcal Vaccine

Type of vaccine	Dose	Dose volume*	Comments
Quadrivalent A/C/Y/W-135	Primary: 1	As indicated by manufacturer	Duration of immunity is unknown, but appears to be at least 3 years in those 4 years of age or older. Revaccination after 2 or 3 years should be considered for children first vaccinated at less than 4 years of age who continue to be at high risk.

*For subcutaneous injection.

Precautions and Contraindications

Reactions

Adverse reactions to meningococcal vaccine are infrequent and mild, consisting principally of localized erythema that lasts for 1-2 days. Up to 2% of young children develop fever transiently after vaccination.

Pregnancy

The safety of meningococcal vaccines in pregnant women has not been established, although the use of the vaccine in pregnant women during an epidemic in Brazil resulted in no adverse effects. On theoretical grounds, it is prudent not to use them unless there is a substantial risk of infection.

■ MUMPS

Mumps is primarily a disease of school-age children. Vaccination against mumps is not a requirement for entry into any country. Susceptible children, adolescents, and adults should be vaccinated with a single dose of vaccine* unless vaccination is contraindicated. Combination with measles and rubella vaccines (MMR) is the vaccine of choice. Mumps vaccine is of particular value for children approaching puberty and for adolescents and adults, particularly males, who have not had mumps. Persons can be considered susceptible unless they have documentation of (1) previous vaccination on or after the first birthday, (2) physician-diagnosed mumps, or (3) laboratory evidence of immunity. Many persons in the United States will receive two doses of mumps vaccine as a result of the two dose schedule for MMR vaccination which is now recommended in the United States. Most adults born before 1957 are likely to have been infected naturally and generally may be considered immune, even if they did not have clinically recognizable disease. Because there is no evidence that persons who have previously either received the vaccine or had mumps are at any risk of local or systemic reactions from receiving live mumps vaccine, testing for susceptibility before vaccination is unnecessary. See p. 96 for discussion of mumps immunization schedule modifications for infants who will be traveling.

*Official name: Mumps Virus Vaccine, Live.

Side Effects and Adverse Reactions

Parotitis temporally related to receipt of vaccine has been reported rarely. Allergic reactions including rash, pruritus, and purpura have been associated temporally with mumps vaccination but are uncommon, usually mild and of brief duration. Very rarely, manifestations of CNS involvement, such as febrile seizures, aseptic meningitis, unilateral nerve deafness, and encephalitis within 30 days of mumps vaccination, are reported. Almost all have recovered completely.

Precautions and Contraindications

Pregnancy

Although mumps virus is capable of infecting the placenta and fetus, there is no good evidence that it causes congenital malformations in humans. However, because of a theoretical risk to the developing fetus, mumps vaccine should not be given to pregnant women, and vaccinated women should not become pregnant within 3 months of vaccination.

Febrile Illness

Although vaccination of persons with serious illnesses should be postponed until recovery, minor illnesses such as upper respiratory infections with or without low grade fever do not preclude vaccination.

Allergies

Live mumps vaccine is produced in chick-embryo cell culture. Persons with a history of anaphylactic reactions (hives, swelling of the mouth and throat, difficulty breathing, hypotension, or shock) subsequent to egg ingestion should be vaccinated only with extreme caution. Several investigators have developed special protocols for vaccinating such individuals (J. Pediatr. 1983; 102:196-199, J. Pediatr. 1988; 113:504-6). Evidence indicates that persons are not at increased risk if they have egg allergies that are not anaphylactic in nature. Such persons may be vaccinated in the usual manner. There is no evidence to indicate that persons with allergies to chickens or feathers are at increased risk of reaction to the vaccine.

Since mumps vaccine contains trace amounts of neomycin (25μg), persons who have experienced anaphylactic reactions to topically or systemically administered neomycin should not receive mumps vaccine. A history of contact dermatitis to neomycin is not a contraindication to receiving mumps vaccine. Live mumps virus vaccine does not contain penicillin.

Simultaneous Administration of Mumps Vaccine

Mumps vaccine may be administered simultaneously (but in a different site) with any other live or inactivated vaccine. Inactivated vaccines and oral polio virus vaccines may be administered at any time before or after the mumps vaccine. However, if the mumps vaccine is not given simultaneously with the yellow fever vaccine, they should be administered at least 30 days apart.

Recent Administration of Immune Globulin (IG) or Other Antibody-Containing Blood Products*

Vaccine should be administered at least 14 days before administration of IG or other blood products because passively acquired antibodies might interfere with the response to the vaccine. Administration of MMR should be delayed following administration of

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*Formerly called immune serum globulin and immunoglobulin.

blood products. The length of the delay varies from 3–11 months depending on the type of blood product received. Mumps vaccination using products that do not contain measles vaccine should be deferred for at least 3 months after administration of blood products. See the chapter on PHS recommendations and the General Recommendations on Immunization (MMWR;1994:43[RR-1]) for more details.

Altered Immunity

Replication of the mumps vaccine virus may be potentiated in patients with immune deficiency diseases and by the suppressed immune responses that occur with leukemia, lymphoma, generalized malignancy, or with therapy with corticosteroids, alkylating drugs, antimetabolites, or radiation. Patients with such conditions should not be given live mumps virus vaccine. However, mumps vaccination generally given as MMR can be considered for susceptible HIV-infected travelers, regardless of symptoms. There is no contraindication to using mumps vaccine, since limited studies of measles, mumps, and rubella (MMR) immunization in symptomatic HIV-infected patients have not documented serious or unusual adverse events.

■ ONCHOCERCIASIS (River blindness)

Onchocerciasis is endemic in over 25 nations located in a broad band across the central part of Africa. Small endemic foci are also present in the Arabian peninsula, (Yemen and Saudia Arabia) and in Latin America (Southern Mexico, Guatemala, Colombia, Venezuela, Ecuador, Brazil). The disease is caused by the pre-larval (microfilaria) and adult stages of the nematode *Onchocerca volvulus* and may result in dermatitis, subcutaneous nodules, lymphadenitis, and visual impairment, including blindness. Onchocerciasis is transmitted by the bite of female *Simulium* flies (black flies) that bite by day and are found near rapidly flowing rivers and streams. Short-term travelers to onchocerciasis-endemic regions, such as most tourists, appear to be at low risk for this condition. However, temporary residents and others who visit endemic regions for 3 months or more and live or work near black fly habitats are at increased risk for infection. Infections tend to occur in expatriate groups such as missionaries and their families, field scientists, and Peace Corps volunteers. No effective chemoprophylaxis is available. Protective measures include avoidance of black fly habitats and the use of personal protection measures against biting insects such as those outlined in the section on malaria (page 131).

■ PLAGUE

Plague continues to be enzootic in rural rodent populations in several continents with occasional outbreaks among commensal rodents in villages and small towns. Urban outbreaks are rare and limited. Wild rodent plague poses a real, though limited, risk to humans. When infection spreads to domestic or peridomestic rodents in urban or populated areas, humans are at markedly increased risk of exposure. Wild rodent plague exists in the western third of the United States, in widely scattered areas of South America, in north-central, eastern, and southern Africa, Madagascar, Iranian Kurdistan, along the frontier between Yemen and Saudi Arabia, Central and Southeast Asia (Myanmar, China, India, Indonesia, Mongolia, Vietnam, Kazakstan), and portions of the Russian Federation. In recent years, human plague has been reported from Angola,

India, Kenya, Lesotho, Madagascar, Mozambique, Namibia, South Africa, Botswana, Tanzania, Uganda, Zimbabwe, Zaire, Myanmar, China, Mongolia, Vietnam, the United States, the former Soviet Union, Brazil, Bolivia, Ecuador, and Peru. Risk to travelers in any of these areas is small.

The efficacy of plague vaccine in humans has not been demonstrated in a controlled trial. Only limited indirect data are available that suggest the vaccine may offer protection against acquiring flea-borne plague.

Vaccination against plague is not required by any country as a condition for entry. There are few indications to vaccinate persons other than those who are at particularly high risk of exposure because of research laboratory activities or certain field activities in epizootic areas. In most of the countries of Africa, Asia, and Americas where plague is reported, the risk of infection exists primarily in rural mountainous or upland areas. Vaccination is rarely indicated for travelers to countries reporting cases, particularly if their travel is limited to urban areas with modern hotel accommodations.

Selective vaccination might be considered for persons who will have direct contact with wild or commensal rodents or other animals in plague-epizootic areas and for persons who will reside or work in plague-endemic rural areas where avoidance of rodents and fleas is difficult. Primary and booster vaccinations for persons 18 years of age and older are summarized in Table 16; no safety and immunogenicity data are available supporting vaccine use in persons less than 18 or greater than 61 years old. Travelers who genuinely may be at risk for acquiring plague should consider antibiotic chemoprophylaxis with tetracycline 500 mg q.i.d. during periods of exposure in an active epizootic or epidemic area. The recommendation for tetracycline chemoprophylaxis is inferred from experience with the drug in treating plague. Controlled trials that demonstrate the efficacy of tetracycline chemoprophylaxis in preventing plague have not been reported.

Reactions

Mild pain, erythema, and side effects such as induration at the vaccine injection site occur frequently. With repeated doses, fever,headache, and malaise are more common and tend to be more severe. Sterile abscesses occur rarely. No fatal or disabling complications have been reported.

TABLE 16. Plague Vaccine

Dose	Dose Volume* ≥18-61 years of age**	Comments
Primary series: 1 2 & 3	 1.0 ml 0.2 ml	Give doses 1 and 2, 1-3 months apart; dose 3 is given 5-6 months after dose 2.
Booster	0.2 ml	Give booster doses 1-3 at 6 month intervals for persons with ongoing exposure risks; give booster doses 4 and above at 1-2 year intervals after the preceding booster dose.

*For intramuscular injection.
**No recommendations are given for other age groups because of insufficient data.

■ POLIOMYELITIS [See Editor's Note at bottom of page]

Travelers to countries where poliomyelitis is epidemic or endemic are considered to be at increased risk of poliomyelitis and should be fully immunized. In general, travelers to developing countries (excluding countries in Latin America) should be considered to be at increased risk of exposure to wild poliovirus. A primary series consists of either three doses of trivalent oral poliovirus vaccine (OPV)* or enhanced-potency inactivated polio virus vaccine (IPV)†. Unvaccinated, or partially vaccinated travelers should complete a primary series with the vaccine that is appropriate to their age and previous immunization status. Persons who have previously received a primary series may need additional doses of a polio vaccine before traveling to areas with an increased risk of exposure to wild poliovirus (see Tables 17 and 18).

Children and Adolescents

Trivalent oral poliovirus vaccine (OPV) is the vaccine of choice for all infants, children, and adolescents (up to 18th birthday) if there are no contraindications to vaccination with OPV. Those who have not completed a primary series should do so (Table 17). If time is a limiting factor, at least one dose of OPV should be given. Those who have completed a primary series of OPV (or a primary series and a supplementary dose administered between 4 and 6 years of age) should be given, **once,** a single additional dose of OPV. Likewise, those who have completed a primary series of any type (or a primary series and a supplementary dose administered between 4 and 6 years of age) should be given a dose of IPV or OPV. The need for further supplementary doses of OPV or IPV has not been established. See p. 96 for discussion of polio immunization schedule modifications for infants who will be traveling.

TABLE 17. Oral Poliovirus Vaccine (OPV)

Doses	Number of Doses	Comments
Primary series	3 (OPV)	Give doses 1, 2, and 3, 6-8 weeks apart, customarily at 2, 4, and 6 months of age. (For adults see text.)
Supplementary	1 (OPV)	Give dose 4 to children 4-6 years of age.
Additional	1 (OPV)	Give a dose, **once**, to persons traveling to developing countries.

Adults

Unvaccinated or unknown immunization status

For unvaccinated adults and adults whose immunization status is unknown who are traveling to countries in which the risk of exposure to wild polio virus is increased, primary immunization with IPV is recommended whenever feasible (Table 18). IPV is preferred because the risk of vaccine-associated paralysis following OPV is slightly higher in adults than in children.

Editor's Note: ACIP released the revised recommendations for routine childhood polio immunization as this book went to press. A copy can be obtained by calling 1-800-CDC-SHOT or through the CDC, National Immunization Program homepage on the Internet at URL <http://www.cdc.gov/> .

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*Official name: Poliovirus Vaccine, Live, Oral, Trivalent.
†Official name: Poliovirus Vaccine, Inactivated.

Three doses of IPV should be given before departure according to the schedule listed in Table 18. In circumstances where time does not permit this to be done, the following alternatives are recommended:

1. If less than 3 months, but more than 2 months are available before protection is needed, 3 doses of IPV should be given at least 1 month apart.
2. If less than 8, but more than 4 weeks are available before protection is needed, 2 doses of IPV should be given at least 4 weeks apart.
3. If less than 4 weeks are available before protection is needed, a single dose of OPV or IPV is recommended.

In both #2 and #3 above, the remaining doses of vaccine should be given later, at the recommended intervals, if the person remains at increased risk.

Previously received less than a full primary series of any polio vaccine

Adults who are at increased risk of exposure to poliomyelitis and who have previously received less than a primary series of OPV and/or IPV should be given the remaining required doses with either OPV or IPV, regardless of the interval since the last dose and of the type of vaccine previously received.

Previously received complete series with any one or combination of polio vaccines

Adults who are at increased risk of exposure to poliomyelitis and who have previously completed a primary series with any one or combination of polio vaccines can be given, **once**, a dose of OPV or IPV. The need for further doses of either vaccine has not been established.

Side Effects and Adverse Reactions

In rare instances, administration of OPV has been associated with paralysis in healthy recipients and their contacts. Although this risk is extremely small for vaccinees and their susceptible, close contacts, they should be informed of this risk. No serious side effects of IPV have been documented. Since IPV may contain trace amounts of streptomycin, neomycin, and polymyxin B, persons with a history of an anaphylactic reaction following receipt of these antibiotics should not receive IPV. Persons with a history of reactions that are not anaphylactic are not at increased risk and can be vaccinated.

TABLE 18. Inactivated Poliovirus Vaccine (IPV)

Doses	Number of Doses	Dose Volume	Comments
Primary series	3 (IPV)	As indicated by manufacturer	Give doses 1 and 2, 4-8 weeks apart; give dose 3, 6-12 months after dose 2.
Booster	1 (IPV)		Give dose 4 to children 4-6 years of age.
Additional	1 (IPV)		Give a dose, **once**, to persons traveling to developing countries.

Precautions and Contraindications

Pregnancy

There is no convincing evidence of adverse effects of either OPV or IPV in pregnant women or developing fetuses; regardless, it is prudent on theoretical grounds to avoid vaccinating pregnant women. However, if immediate protection against poliomyelitis is needed, OPV, not IPV, is recommended.

Altered Immunity

Patients with a congenital immune deficiency disease, an acquired immune deficiency disease, or an altered immune state due to disease or to immunosuppressive therapy are at increased risk for paralysis associated with OPV. Therefore, if polio immunization is indicated, these persons (including asymptomatic and symptomatic HIV-infected persons) and their household members and other close contacts should receive IPV, not OPV. Although a protective immune response from receipt of IPV cannot be assured, some protection may be provided to the immunocompromised patient. Also, OPV should not be given to a member of a household in which there is a history of congenital or hereditary immunodeficiency unless the potential recipient and other household members are known to be immunocompetent. If OPV is inadvertently administered to a household or other close contact of an immunodeficient patient, close physical contact between the patient and the recipient of OPV should be avoided for approximately 1 month after vaccination. This is the period of maximum excretion of vaccine virus.

■ RABIES

Travelers to rabies endemic countries should be warned about the risk of acquiring rabies, although rabies vaccination is not a requirement for entry into any country. Rabies is almost always transmitted by bites which introduce the virus into wounds. Very rarely, rabies has been transmitted by non-bite exposures which introduce the virus into open cuts or mucous membranes. Although dogs are the main reservoir of the disease in many developing countries, the epidemiology of the disease in animals differs sufficiently from one region or country to another to warrant the evaluation of all mammal bites. Any animal bite or scratch should receive prompt local treatment by thoroughly cleansing the wound with copious amounts of soap and water; this local treatment significantly reduces the risk of rabies. Persons who may have been exposed to rabies should always contact local health authorities immediately for advice about postexposure prophylaxis and should also contact their personal physician or State health department as soon as possible thereafter.

Preexposure vaccination with human diploid cell rabies vaccine (HDCV)* or Rabies Vaccine Adsorbed (RVA) may be recommended for international travelers based upon the local incidence of rabies in the country to be visited, the availability of appropriate antirabies biologicals, and the intended activity. It may include: veterinarians, animal handlers, field biologists, spelunkers, and certain laboratory workers. For international travelers, the risk of rabies is highest in areas of the world where dog rabies remains highly endemic, including (but not limited to) parts of Mexico, El Salvador, Guatemala, Peru, Colombia, Ecuador, India, Nepal, Philippines, Sri Lanka, Thailand, and Viet Nam. The disease is also found in dogs in most of the other countries of Africa, Asia, Central and South America, except as noted in Table 19, p. 149. Preexposure prophylaxis may provide protection when there is an inapparent or unrecognized exposure to rabies and when postexposure therapy may be delayed. Preexposure prophylaxis is also of particular importance for persons at high risk of being exposed in countries where the locally

*Official name: Rabies Vaccine.

available rabies vaccines may carry a high risk of adverse reactions. Preexposure vaccination does not eliminate the need for additional therapy after a rabies exposure but simplifies postexposure treatment by eliminating the need for rabies immune globulin (RIG) and by decreasing the number of doses of vaccine required.

Table 19 lists countries which have reported no cases of rabies during the most recent two-year period for which information is available (formerly referred to as “rabies free countries”). Additional information can be obtained from local health authorities of the country, or the embassy, or local consulate general's office in the United States.

Table 20 provides information on preexposure and postexposure prophylaxis. Routine serologic testing is not necessary for persons who receive the recommended preexposure or postexposure regimen with human diploid cell rabies vaccine (HDCV) or rabies vaccine adsorbed (RVA). Persons previously vaccinated with other vaccines should receive the complete postexposure regimen with HDCV unless they developed a laboratory confirmed antibody response to the primary vaccination. Serologic testing is still recommended for persons whose immune response might be diminished by drug therapy or by diseases. Rabies preexposure prophylaxis is not indicated for travelers to the countries listed in Table 19, and postexposure treatment is rarely necessary after exposures to terrestrial animals in these countries.

Chloroquine phosphate (and possibly other structurally related antimalarials such as mefloquine, administered for malaria chemoprophylaxis) may interfere with the antibody response to HDCV. The intramuscular (IM) dose/route of preexposure prophylaxis, however, provides a sufficient margin of safety in this setting. HDCV should not be administered by the intradermal (ID) dose/route when chloroquine, mefloquine, or other drugs which may interfere with the immune response are being used. For international travelers, the ID dose/route should be initiated early, to allow the three dose series to be completed 30 days or more before departure; otherwise the IM dose/route should be used. RVA should never be administered ID.

Precautions and Contraindications

Reactions after vaccination with HDCV or RVA

Persons may experience local reactions such as pain, erythema, and swelling or itching at the injection site, or mild systemic reactions, such as headache, nausea, abdominal pain, muscle aches, and dizziness. Approximately 6% of persons receiving booster vaccinations with HDCV may experience an immune complex-like reaction characterized by urticaria, pruritis, and malaise. Once initiated, rabies postexposure prophylaxis should not be interrupted or discontinued because of local or mild systemic reactions to rabies vaccine.

Pregnancy

Pregnancy is not a contraindication to postexposure prophylaxis.

Age

In infants and children, the dose of HDCV or RVA for preexposure or postexposure prophylaxis is the same as that recommended for adults. The dose of RIG for postexposure prophylaxis is based on body weight (Table 20).

TABLE 19. Countries Reporting No Cases of Rabies*

The following countries and political units stated that rabies was not present.

Region	Countries
AFRICA	Mauritius†; Libya†; Djibouti†; Lesotho†; Seychelles†
AMERICAS	**North**: Bermuda; St. Pierre and Miquelon.
	Caribbean: Anguilla; Antigua and Barbuda; Bahamas; Barbados; Cayman Islands; Dominica; Guadeloupe; Jamaica; Martinique; Montserrat; Netherlands Antilles (Aruba, Bonaire, Curacao, Saba, St. Maarten, and St. Eustatius); St. Christopher (St. Kitts) and Nevis; St. Lucia; St. Martin; St. Vincent and Grenadines; Turks and Caicos Islands; Virgin Islands (U.K. and U.S.).
	South: Uruguay†.
ASIA	Bahrain; Hong Kong; Japan; Republic of Korea†; Kuwait; Malaysia (Malaysia-Sabah†); Maldives; Singapore; Taiwan.
EUROPE	Cyprus; Denmark; Faroe Islands; Finland; Gibraltar; Greece; Iceland; Ireland; Malta; Monaco; Norway (mainland); Portugal; Spain (except Ceuta/Melilla); Sweden; United Kingdom (Britain and Northern Ireland).
OCEANIA	American Samoa; Australia; Cook Islands; Fiji; French Polynesia; Guam; Indonesia (with exception of Java, Kalimantan, Sumatra and Sulawesi); Kiribati; New Caledonia; New Zealand; Niue; Papua New Guinea; Solomon Islands; Tonga; Vanuatu.

Most of Pacific Oceania is "rabies-free." For information on specific islands not listed above, contact the Centers for Disease Control and Prevention, Division of Quarantine.

*Bat rabies exists in some areas that are free of terrestrial rabies.
†Countries whose classifications should be considered provisional.
§Most of Pacific Oceania is free of rabies.

(1) World Health Organization: *World Survey of Rabies 28*, (for 1992); Veterinary Public Health Unit, Division of Communicable Disease, WHO, Geneva, 1994.
(2) WHO Collaborating Centre for Rabies Surveillance and Research: *Rabies Bulletin Europe*, 1994;18(2).
(3) Pan American Health Organization. *Epidemiological surveillance of rabies in the Americas*, 1992, 1993; 24(1-12).

TABLE 20. Rabies Immunization

I. PREEXPOSURE IMMUNIZATION. Preexposure immunization consists of three doses of HDCV or RVA, 1.0 ml, IM (i.e., deltoid area), one each on days 0, 7, and 21 or 28. **ONLY HDCV may be administered by the intradermal (ID) dose/route (0.1 ml ID on days 0, 7, and 21 or 28).** If the traveler will be taking chloroquine or mefloquine for malaria chemoprophylaxis, the 3-dose series must be completed before initiation of antimalarials. If this is not possible, the IM dose/route should be used. Administration of routine booster doses of vaccine depends on exposure risk category as noted below. Preexposure immunization of immunosuppressed persons is not recommended.

Criteria for Preexposure Immunization

Risk category	Nature of risk	Typical populations	Preexposure regimen
Continuous	Virus present continuously, often in high concentrations. Aerosol, mucous membrane, bite, or nonbite exposure possible. Specific exposures may go unrecognized.	Rabies research lab workers* Rabies biologics production workers.	Primary preexposure immunization course. Serology every 6 months. Booster immunization when antibody titer falls below acceptable level.*†
Frequent	Exposure usually episodic with source recognized, but exposure may also be unrecognized. Aerosol, mucous membrane, bite, or nonbite exposure.	Rabies diagnostic lab workers*, spelunkers, veterinarians, and animal control and wildlife workers in rabies epizootic areas. Certain travelers to foreign rabies epizootic areas.	Primary preexposure immunization course. Serology or booster immunization every 2 years.†
Infrequent (greater than population-at-large)	Exposure nearly always episodic with source recognized. Mucous membrane, bite, or nonbite exposure.	Veterinarians and animal control and wildlife workers in areas of low rabies endemicity. Veterinary students.	Primary preexposure immunization course. No routine booster immunization or serology.
Rare (population-at-large)	Exposure always episodic, mucous membrane, or bite with source recognized.	U.S. population-at-large, including individuals in rabies-epizootic areas.	No preexposure immunization.

II. POSTEXPOSURE IMMUNIZATION. All postexposure treatment should begin with immediate thorough cleansing of all wounds with soap and water.

Persons not previously immunized:
RIG, 20 I.U./kg body weight, one half infiltrated at bite site (if possible), remainder IM; 5 doses of HDCV or RVA, 1.0 ml IM (i.e., deltoid area), one each on days 0, 3, 7, 14 and 28.

Persons previously immunized:§
Two doses of HDCV or RVA, 1.0 ml, IM (i.e., deltoid area), one each on days 0 and 3. RIG should not be administered.

*Judgement of relative risk and extra monitoring of immunization status of laboratory workers is the responsibility of the laboratory supervisor (see U.S. Department of Health and Human Service's *Biosafety in Microbiological and Biomedical Laboratories, 1984*).

†Preexposure booster immunization consists of one dose of HDCV or RVA, 1.0 ml/dose, IM (deltoid area) or HDCV, 0.1 ml ID (deltoid). Acceptable antibody level is 1:5 titer (complete inhibition in RFFIT at 1:5 dilution). Boost if titer falls below 1:5.

§Preexposure immunization with HDCV or RVA; prior postexposure prophylaxis with HDCV or RVA; or persons previously immunized with any other type of rabies vaccine *and* a documented history of positive antibody response to the prior vaccination.

RIFT VALLEY FEVER

Rift Valley Fever (RVF) is a viral disease that affects primarily livestock and humans. It is transmitted by several means including the bites of mosquitoes and other biting insects, and percutaneous inoculation or inhalation of aerosols from contaminated blood or fluids of infected animals. The risk of RVF infection to persons who travel to endemic areas generally is low. Occasionally, outbreaks occur involving large numbers of human cases, e.g., the Nile Delta, Egypt (1978 and 1993) and the lower Senegal River Basin of Mauritania (1987). Travelers can reduce their risk of exposure by avoiding contact with livestock and minimizing their exposure to arthropod bites. No commercial human vaccine is available.

RUBELLA

Rubella infection may be associated with significant morbidity in adults and is associated with a high rate of fetal wastage or anomalies if contracted in the early months of pregnancy. The risk of exposure to rubella outside the United States may be high. Therefore, although vaccination against rubella is not a requirement for entry into any country, all travelers, particularly women of childbearing age, should be immune to rubella. Persons should be considered to be susceptible to rubella unless they have documentation of (1) previous vaccination on or after the first birthday or (2) laboratory evidence of immunity. Because many illnesses can appear similar to rubella clinically, a history of rubella illness, even if physician-diagnosed, should not be considered sufficient evidence of immunity. A single dose of rubella virus vaccine* is recommended for all susceptible children, adolescents, and adults, particularly females, unless vaccination is contraindicated. Combination with measles and mumps vaccines (MMR) is the vaccine of choice. Because there is no evidence that persons who have previously either received the vaccine or had rubella are at any risk of local or systemic reactions from receiving live rubella vaccine, testing for susceptibility before vaccination is unnecessary. See p. 96 for discussion of rubella immunization schedule modifications for infants who will be traveling.

Side Effects and Adverse Reactions

Vaccinees can develop low-grade fever, rash, and lymphadenopathy after vaccination. Adult women may have transient arthralgia and arthritis following vaccination. Arthralgias have been reported in 25% of susceptible adult women; arthritis has been reported in 10%. Arthralgia and transient arthritis occur more frequently and tend to be more severe in susceptible women than in men or children. Transient peripheral neuritic complaints, such as paresthesias and pain in the arms and legs have occurred rarely. There is no increased risk of these reactions for persons who are already immune when vaccinated. The vaccine virus is not transmitted from vaccinees to pregnant, susceptible contacts.

There have been infrequent reports that susceptible vaccinees, primarily adult women, have developed chronic or recurrent arthralgias, sometimes with arthritis or other symptoms (paresthesias, blurred vision, carpal tunnel syndrome). While one group has reported the frequency of chronic joint symptoms in susceptible adult women to be 5

*Official name: Rubella Virus Vaccine, Live.

percent, other data from the United States and other countries that use the RA 27/3 strain suggest that such phenomena are rare events. In comparative studies, the frequency of chronic joint symptoms is substantially higher following natural infection than following vaccination.

Precautions and Contraindications

Pregnancy

Rubella vaccine should not be given to women known to be pregnant, nor should a vaccinated women become pregnant within 3 months of vaccination, because of theoretical risks to the developing fetus from rubella vaccine infection. Based on studies conducted in the U.S. and abroad, the Advisory Committee on Immunization Practices of the U.S. Public Health Service believes that the risk to the fetus of vaccine-associated malformations is so small as to be negligible. If, however, a pregnant woman is vaccinated, or if she becomes pregnant within 3 months of vaccination, she should be counseled on the theoretical risks. Rubella vaccination during pregnancy should not ordinarily be a reason to recommend interruption of pregnancy, although the final decision rests with the individual patient and her physician.

Febrile Illness

Although vaccination of persons with serious illness should be postponed until recovery, minor illnesses such as upper respiratory infections with or without low grade fever do not preclude vaccination.

Allergies

Hypersensitivity reactions very rarely follow the administration of live rubella vaccine. Most of these reactions are considered minor. Live rubella vaccine is produced in human diploid cell culture. Consequently, a history of an anaphylactic reaction to egg ingestion needs to be taken into consideration only if measles or mumps antigen are to be included with rubella vaccine.

Since rubella vaccine contains trace amounts of neomycin (25μg), persons who have experienced anaphylactic reactions to topically or systemically administered neomycin should not receive rubella vaccine. A history of contact dermatitis to neomycin is not a contraindication to receiving rubella vaccine. Live rubella vaccine does not contain penicillin.

Simultaneous Administration of Rubella Vaccine

Rubella vaccination may be administered simultaneously (but in a different site) with most widely used live or inactivated vaccines. Inactivated vaccines and oral polio vaccines may be administered at any time before or after the rubella vaccination. However, if live rubella vaccine is not given simultaneously with the yellow fever vaccine, they should be administered at least 30 days apart.

Recent Administration of Immune Globulin (IG) or Other Antibody-Containing Blood Products*

Vaccination should be administered at least 14 days before administration of IG or other blood products, because passively acquired antibodies might interfere with the response to the vaccine. Administration of MMR should be delayed following administration of blood product. The length of the delay varies from 3–11 months depending on the type of blood product received. Rubella vaccination using products that do not contain measles vaccine should be deferred for at least 3 months after administration of blood products.

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*Formerly called immune serum globulin and immunoglobulin.

See the chapter on PHS Recommendations and the General Recommendations on Immunization (MMWR; 1994:43 [RR1]) for more details.

Altered Immunity

Replication of live rubella vaccine virus may be potentiated in patients with immune deficiency diseases and by the suppressed immune responses that occur with leukemia, lymphoma, generalized malignancy, and therapy with large dose corticosteroids, alkylating drugs, antimetabolites, and radiation. Patients with such conditions should not be given live rubella virus vaccine. However, rubella vaccination, generally given as MMR, can be considered for susceptible HIV-infected travelers, regardless of symptoms. There is no contraindication to using rubella vaccine, since limited studies of measles, mumps, and rubella (MMR) immunization in symptomatic HIV-infected patients have not documented serious or unusual adverse events.

■ SCHISTOSOMIASIS

Schistosomiasis, an infection estimated to occur worldwide among some 200 million people, is caused by flukes whose complex life cycles utilize specific fresh water snail species as intermediate hosts. Infected snails release large numbers of minute free-swimming larvae (cercariae) which are capable of penetrating the unbroken skin of the human host. Even brief exposures to contaminated water can result in infection. Exposure to schistosomiasis is a health hazard for U.S. citizens who travel to endemic areas of the Caribbean, South America, Africa, and Asia. Outbreaks of schistosomiasis have occurred among adventure travelers participating in river trips in Africa as well as resident expatriates and Peace Corps volunteers. The countries where schistosomiasis is most prevalent include Brazil; Egypt and most of sub-Saharan Africa; and southern China, the Philippines, and Southeast Asia. Those at greatest risk are travelers who engage in wading or swimming in fresh water in areas where poor sanitation and appropriate snail hosts are present. Bathing with contaminated fresh water can also transmit infection. Human schistosomiasis cannot be acquired by wading or swimming in salt water (oceans or seas).

Clinical manifestations of acute infection can occur within 2-3 weeks of exposure to cercariae-infected water, but most acute infections are asymptomatic. The most common acute symptoms are: fever, lack of appetite, weight loss, abdominal pain, weakness, headaches, joint and muscle pain, diarrhea, nausea, and cough. Rarely, the central nervous system can be involved to produce seizures or transverse myelitis as a result of mass lesions of the brain or spinal cord. Chronic infections can cause disease of the lung, liver, intestines, and/or bladder. Many people who develop chronic infections can recall no symptoms of acute infection. Diagnosis of infection is usually confirmed by serologic studies or by finding schistosome eggs on microscopic examination of stool and urine. Schistosome eggs may be found as soon as 6-8 weeks after exposure but are not invariably present. Safe and effective oral drugs are available for the treatment of schistosomiasis.

Since there is no practical way for the traveler to distinguish infested from noninfested water, fresh water swimming in rural areas of endemic countries should be avoided. In such areas heating bathing water to 50° C (122° F) for 5 minutes or treating it with iodine or chlorine in a manner similar to the precautions recommended for preparing drinking water will destroy cercariae and make the water safe. Thus, swimming in adequately chlorinated swimming pools is virtually always safe, even in endemic countries. Filtering water with paper coffee filters may also be effective in removing cercariae from bathing water. If these measures are not feasible, allowing bathing water to stand

for 3 days is advisable since cercariae rarely survive longer than 48 hours. Vigorous towel drying after accidental water exposure has been suggested as a way to remove cercariae in the process of skin penetration. Although such toweling may prevent some infections, to recommend this to travelers might give them a false sense of security; it is far safer to recommend avoiding contact with contaminated water. At this time there are no available drugs which are known to be effective as chemoprophylactic agents.

Upon return from foreign travel, if you think you may have been exposed to schistosome-infected fresh water, be sure to see a physician to undergo screening tests.

■ SEXUALLY TRANSMITTED DISEASES

International travelers are at risk of contracting sexually transmitted diseases (STDs) including human immunodeficiency virus (HIV, the cause of AIDS) if they have sex with partners who have these diseases. Travelers should be aware that the risk of STDs is high in some parts of the world. AIDS has become a global health problem and the prevalence of HIV infection in many populations continues to escalate (see page 78). Also of concern are the antibiotic-resistant STD agents, particularly penicillin-, tetracycline-, and quinolone-resistant strains of *Neisseria gonorrhoeae*.

To avoid acquiring STDs, travelers should not have sexual contact with persons who may be infected. Persons most likely to be infected are those with numerous sex partners. In many places, persons who make themselves available for sex with travelers are likely to be persons, such as prostitutes, with many partners. In addition, injecting drug users are at high risk of being infected with HIV, regardless of the number of their sex partners.

Since determing whether a person has an STD is impossible, travelers who wish to absolutely protect themselves from acquiring an STD should refrain from sexual contact. If, however, they choose not to do this, travelers can reduce their risk of acquiring infection by consistently and correctly using a latex condom during sexual contact, whether vaginal, oral or anal. The condom should be placed on before any genital contact and, following ejaculation held firmly against the base of the penis during withdrawal, which should be done while the penis is still erect to prevent slippage. If lubricants are used during sex, only water-based lubricants (e.g., K-Y Jelly or glycerine) should be used with latex condoms, as oil-based lubricants (e.g., petroleum jelly, shortening, mineral oil, massage oils) can weaken latex.

Anyone who may have been exposed to an STD who develops either a vaginal or urethral discharge, an unexplained rash or genital lesion, or genital or pelvic pain should cease sexual activity and promptly seek competent medical care. Because STDs are often asymptomatic, especially in women, anyone who believes that they may have been exposed to an STD should consult their physician regarding the advisability of screening for STD.

■ SMALLPOX

In May 1980, the World Health Organization (WHO) declared the global eradication of smallpox. There is no evidence of smallpox transmission anywhere in the world. The last reported case of endemic smallpox occurred in Somalia in October 1977, and the last reported case of laboratory-acquired smallpox occurred in the United Kingdom in 1978. WHO amended the International Health Regulations January 1, 1982, deleting smallpox from the diseases subject to the Regulations.

Smallpox vaccination should not be given for international travel. The risk from smallpox vaccination, although very small, now exceeds the risk of smallpox; consequently, smallpox vaccination of civilians is indicated ***only for laboratory workers directly involved with smallpox or closely related orthopox viruses, e.g., monkeypox, vaccinia, and others.*** Health-care workers whose contact to these viruses is limited to contaminated materials (e.g., dressings) are at lower risk of inadvertent infection than laboratory workers, but may be considered for vaccination.

Misuse of Smallpox Vaccine

Smallpox vaccine should never be used therapeutically. There is no evidence that vaccination has therapeutic value in the treatment of recurrent herpes simplex infection, warts, or any other disease.

■ TETANUS (See Diphtheria, Tetanus, and Pertussis)

■ TUBERCULOSIS

In many countries tuberculosis is much more common than in the United States, and it is an increasingly serious public health problem. To become infected, a person usually would have to spend a long time in a closed environment where the air was contaminated by a person with untreated tuberculosis who is coughing and has numerous *Mycobacterium tuberculosis* organisms (or tubercle bacilli) in secretions from the lungs. Tuberculosis infection is generally transmitted through the air; therefore, there is virtually no danger of its being spread by dishes, linens, and items that are touched, or by food. However, it can be transmitted through unpasteurized milk or milk products.

Travelers who anticipate possible prolonged exposure to tuberculosis should have a tuberculin skin test before leaving. If the reaction is negative, they should have a repeat test after returning to the United States. Because persons with HIV infection are more likely to have an impaired response to the tuberculin skin test, travelers with HIV infection should inform their physician about their HIV status. Physicians can then determine whether to perform anergy testing. Except for travelers with impaired immunity (e.g., HIV infection), travelers who already have a positive tuberculin reaction are unlikely to be reinfected. All persons who are infected or who become infected with *Mycobacterium tuberculosis* can be treated to prevent tuberculosis disease. Travelers who suspect that they have been exposed to tuberculosis should inform their physician of the possible exposure and receive an appropriate medical evaluation. Tuberculosis disease can be treated successfully with multiple medications.

■ TYPHOID FEVER

Typhoid vaccination is not required for international travel, but it is recommended for travelers to areas where there is a recognized risk of exposure to *Salmonella typhi*. Risk is greatest for travelers to developing countries (e.g., countries in Asia, and Africa and Latin America) who will have prolonged exposure to potentially contaminated food and drink. Vaccination is particularly recommended for those who will be traveling in smaller

cities, villages and rural areas off the usual tourist itineraries. Travelers should be cautioned that typhoid vaccination is not 100% effective and is not a substitute for careful selection of food and drink.

Three typhoid vaccines are currently available for use in the United States: a) an oral live-attenuated vaccine (Vivotif Berna^{TM} vaccine, manufactured from the Ty21a strain of *Salmonella typhi* (*2*) by the Swiss Serum and Vaccine Institute); b) a parenteral heat-phenol-inactivated vaccine that has been widely used for many years (manufactured by Wyeth-Ayerst); and c) a newly licensed capsular polysaccharide vaccine (ViCPS) for parenteral use (Typhim Vi, manufactured by Pasteur Mérieux). All three vaccines have been shown to protect 50%-80% of recipients, depending in part on the degree of subsequent exposure.

Table 21 provides information on vaccine dosage and administration. The time required for primary vaccination differs for each of the three vaccines, and each has a different lower age limit for use among children. The parenteral inactivated vaccine causes significantly more adverse reactions but is no more effective than Ty21a or ViCPS. When not contraindicated (see below), either oral Ty21a or parenteral ViCPS is preferable.

Vaccine Administration

Primary vaccination with oral Ty21a vaccine consists of one capsule taken on alternate days for a total of four capsules. The capsules must be kept refrigerated (not frozen), and all four doses must be taken to achieve maximum efficacy. Each capsule should be taken with cool liquid no warmer than 37° C (98.6° F), approximately 1 hour before a meal. The vaccine manufacturer recommends that Ty21a *not* be administered to children <6 years of age.

Primary vaccination with ViCPS consists of one 0.5-mL (25-µg) dose administered intramuscularly. The vaccine manufacturer does not recommend the vaccine for children <2 years of age.

Primary vaccination with parenteral inactivated vaccine consists of two 0.5-mL subcutaneous injections separated by ≥4 weeks. The vaccine manufacturer does not recommend the vaccine for use among children <6 months of age. If the two doses cannot be separated by ≥4 weeks, common practice has been to administer three doses of the vaccine at weekly intervals. Vaccines administered according to this schedule may be less effective.

Booster Doses

Current recommendations for revaccination are provided in Table 21. For travelers who have received one or more doses of parenteral vaccine in the past, a single parenteral booster dose is adequate, even if more than 3 years have elapsed since the last immunization. As a reasonable, although unproven alternative, an oral vaccine booster series can be given. When the heat-phenol-inactivated vaccine is used for booster vaccination, the intradermal route causes less reaction than the subcutaneous route.

Contraindications

Theoretical concerns have been raised regarding the immunogenicity of live-attenuated Ty21a vaccine in persons concurrently receiving antibiotics, immunoglobulin, antimalarials, or viral vaccines. The growth of the live Ty21a strain is inhibited by various

antibacterial agents and by the antimalarial prophylactic agent mefloquine. Vaccination with Ty21a should be delayed for ≥24 hours after the administration of any of these agents. Chloroquine does not significantly inhibit the growth of Ty21a and may be given concurrently. No data exist on the immunogenicity of Ty21a when administered concurrently or within 30 days of viral vaccines (e.g., oral polio,measles/mumps/rubella, or yellow fever vaccines). In the absence of such data, if typhoid vaccination is warranted, it should not be delayed because of the administration of viral vaccines. Simultaneous administration of Ty21a and immunoglobulin does not appear to pose a problem.

Information is not available on the safety of any of the three vaccines when used during pregnancy; it is prudent on theoretical grounds to avoid vaccinating pregnant women. Live-attenuated Ty21a vaccine should not be given to immunocompromised persons, including those infected with human immunodeficiency virus. The two available parenteral vaccines present theoretically safer alternatives for this group. The only contraindication to vaccination with either ViCPS or with parenteral inactivated vaccine is a history of severe local or systemic reactions following a previous dose. None of the three available vaccines should be given to persons with an acute febrile illness.

TABLE 21. Dosage and Schedules for Typhoid Fever Vaccination

		Dosage			
Vaccination	**Age**	**Dose/mode of administration**	**Number of Doses**	**Interval Between Doses**	**Boosting Interval**
Oral live-attenuated Ty21a vaccine					
Primary series	≥6 yrs	1 capsule*	4	48 hours	–
Booster	≥6 yrs	1 capsule*	4	48 hours	every 5 yrs
Vi capsular polysaccharide vaccine					
Primary series	≥2 yrs	0.50 mL†	1	–	–
Booster	≥2 yrs	0.50 mL†	1	–	every 2 yrs
Heat-phenol-inactivated parenteral vaccine					
Primary series	6 mos-10 yrs	0.25 mL§	2	≥4 weeks	–
	≥10 yrs	0.50 mL§	2	≥4 weeks	–
Booster	6 mos-10 yrs	0.25 mL§	1	–	every 3 yrs
	≥10 yrs	0.50 mL§	1	–	every 3 yrs
	≥6 mos	0.10 mL¶	1	–	every 3 yrs

*Administer with cool liquid no warmer than 37° C (98.6° F).
†Intramuscularly.
§Subcutaneously.
¶Intradermally.
– Not applicable.

See page 98 for discussion of typhoid immunization for infants who will be traveling.

Reactions

Information on adverse reactions is presented in Table 22.

TABLE 22. Common Adverse Reactions of Typhoid Fever Vaccines

	Reactions		
Vaccine	**Fever**	**Headache**	**Local Reactions**
Ty21a*	0%-5%	0%-5%	Not applicable
ViCPS	0%-1%	1.5%-3%	Erythema or induration ≥1 cm: 7%
Parenteral inactivated	6.7%-24%	9%-10%	Severe local pain or swelling: 3%-35%

*The side effects of Ty21a are rare and mainly consist of abdominal discomfort, nausea, vomiting, and rash or urticaria.

Typhoid and Paratyphoid A and B Vaccines

The effectiveness of paratyphoid A vaccine has never been established, and field trials have shown that the usually small amounts of paratyphoid B antigens contained in vaccines combining typhoid and paratyphoid A and B antigens ("TAB" vaccines) are not effective. Knowing this and recognizing that combining paratyphoid A and B antigens with typhoid vaccine increases the risk of vaccine reaction, typhoid vaccine should be used alone.

■ TYPHUS FEVER

Vaccination against typhus is not required by any country as a condition for entry. Several distinct rickettsiae cause a disease known as typhus in humans. Each agent has a distinct epidemiology but all cause disease with similarities of fever, headache and rash. Treatment of all forms of typhus is similar. Chloramphenicol, doxycycline or other forms of tetracycline result in rapid resolution of fever and relapses are infrequent. Murine typhus is relatively common throughout the world and is transmitted by fleas. Highest incidence of cases occurs during the summer months when rats and their fleas are most active and abundant. Epidemic typhus is rare except during periods when municipal services are disrupted as in war or natural disaster. The disease is passed from human to human by the body louse. Incidence of epidemic typhus occurs during the winter months when laundering of louse-infested clothing is absent and person-to-person spread of lice is common. Endemic foci of epidemic typhus exist in highland populations in Africa and South America, but tourists are at minimal risk of acquiring lice and disease. Scrub typhus is a common cause of fever among susceptible persons who engage in occupational or recreational behavior that bring them in contact with larval mite infested scrub brush habitats. Incidence is highest during the spring and summer when the activity of humans brings them in contact with mites seeking animal hosts. The disease is limited to Pacific islands and southeast and east Asia. Tick typhus, actually a form of spotted fever, is not uncommon in travelers who spend time trekking or on safari in Africa or the Indian subcontinent. Prompt removal of attached ticks and use of repellents to prevent tick attachment provide the best preventions against disease. Production of typhus vaccine in the United States has been discontinued and there are no plans for commercial production of a new vaccine.

■ YELLOW FEVER

Yellow fever, is a mosquito-borne viral disease that occurs only in parts of Africa and South America. Illness varies in severity from a flu-like syndrome to severe hepatitis and hemorrhagic fever. Yellow fever has rarely occurred in travelers, but it is preventable by a safe and effective vaccine and international regulations require proof of vaccination for travel to and from certain countries. In addition to vaccination, travelers should take precautions against exposure to mosquitoes when traveling in areas with yellow fever transmission (see Prevention of Mosquito Bites).

Vaccination

For purposes of international travel, yellow fever vaccine* produced by different manufacturers worldwide must be approved by WHO and administered at an approved Yellow Fever Vaccination Center. State and territorial health departments have the authority to designate nonfederal vaccination centers; these can be identified by contacting state or local health departments (CDC does not maintain a list of the designated centers). Vaccinees should receive an International Certificate of Vaccination completed, signed, and validated with the center's stamp where the vaccine is given.

A number of countries require a certificate from travelers arriving from infected areas or from countries with infected areas. Some countries in Africa require evidence of vaccination from all entering travelers; others may waive the requirements for travelers coming from noninfected areas and staying less than 2 weeks.

Vaccination is also recommended for travel outside the urban areas of countries that do not officially report the disease, but which lie in the yellow fever endemic zone (see maps, pp. 163-164). Practitioners should note that the actual areas of yellow fever virus activity may extend beyond the officially reported infected zones. Fatal cases of yellow fever have occurred in unvaccinated tourists visiting rural areas within the yellow fever endemic zone. (See countries with asterisks in "Vaccinations Required and Information on Malaria Risk and Prophylaxis, By Country", pp. 17-77.)

Some countries require an individual, even if only in transit, to have a valid International Certificate of Vaccination if he or she has been in countries either known or thought to harbor yellow fever virus. Such requirements may be strictly enforced, particularly for persons traveling from Africa or South America to Asia. Travelers with a specific contraindication to the yellow fever vaccine should obtain a waiver before traveling to countries requiring vaccination (see Precautions and Contraindications).

Table 23 provides information on dosage.

TABLE 23. Yellow Fever Vaccine

Doses	Dose Volume	Comments
	>9 months of age	
Primary: 1	0.5 ml	
Booster:	0.5 ml	1 dose every 10 years

*Official Name: Yellow Fever Vaccine.

Precautions and Contraindications

Age

Infants under 4 months of age are more susceptible to serious adverse reactions (encephalitis) than older children and should never be immunized. The risk of this complication appears to be age-related. Immunization should be delayed until age 9 months except when the risk of infection is high. See p. 98 for discussion of yellow fever immunization for infants.

Pregnancy

A small study showed that yellow fever vaccine virus given in pregnancy can infect the developing fetus, but the potential risk of adverse events associated with congenital infection is unknown. Therefore, it is prudent to avoid vaccinating pregnant women and for non-immunized pregnant women to postpone travel to epidemic areas until after delivery. If the travel itinerary of a pregnant woman does not present a substantial risk of exposure and immunization is contemplated solely to comply with an international travel requirement, then efforts should be made to obtain a waiver letter from the traveler's physician. Pregnant women who must travel to areas with active ongoing transmission should be vaccinated. It is believed that under these circumstances, the small theoretical risk for mother and fetus from vaccination is far outweighed by the risk of yellow fever infection.

Altered immune states

Infection with yellow fever vaccine virus poses a theoretical risk to patients with immunosuppression in association with acquired immunodeficiency syndrome (AIDS) or other manifestations of human immunodeficiency virus (HIV) infection; leukemia; lymphoma; generalized malignancy or with administration of corticosteroids, alkylating drugs, antimetabolites, or radiation. There are no anecdotal reports or systematically collected data, however, linking an immunosuppressed state with adverse events in a yellow fever vaccine recipient. The decision to immunize immunocompromised patients with yellow fever vaccine should be based on a physician's evaluation of the patient's state of immunosuppression weighed against the risk of exposure to the virus. If travel to a yellow fever infected zone is necessary and immunization is contraindicated, patients should be advised of the risk, instructed in methods to avoid bites of vector mosquitoes, and a vaccination waiver letter should be supplied by the traveler's physician. Anecdotal experience suggests that low dose (10 mg prednisone or equivalent daily) or short-term (less than 2 weeks) corticosteroid therapy or intra-articular, bursal, or tendon injections with corticosteroid do not pose a risk to recipients of yellow fever vaccine. Persons with asymptomatic HIV infections who cannot avoid potential exposure to yellow fever virus should be offered the choice of immunization. Vaccinees should be monitored for possible adverse effects. Because immunization of these individuals may be less effective than for uninfected persons, it may be desirable to measure the neutralizing antibody response following vaccination prior to travel (consult State health department or CDC, Fort Collins,Colorado (970) 221-6400).

Family members of immunosuppressed persons, who themselves have no contraindications, may receive yellow fever vaccine.

Hypersensitivity

Live yellow fever vaccine is produced in chick embryos and should not be given to persons clearly hypersensitive to eggs; generally persons who are able to eat eggs or egg products may receive the vaccine.

If vaccination of an individual with a questionable history of egg hypersensitivity is considered essential because of a high risk of exposure, an intradermal test dose may be administered under close medical supervision. Specific directions for skin testing are found in the package insert. In some instances, small test doses of vaccine administered intradermally have led to an antibody response.

If international travel regulations are the only reason to vaccinate a patient hypersensitive to eggs, efforts should be made to obtain a waiver. A physician's letter clearly stating the contraindication to vaccination has been acceptable to some governments. (Ideally, it should be written on letterhead stationery and bear the stamp used by health department and official immunization centers to validate the International Certificate of Vaccination.) Under these conditions, it is also useful for the traveler to obtain specific and authoritative advice from the embassy or consulate of the country or countries he or she plans to visit. Waivers of requirements obtained from embassies or consulates should be documented by appropriate letters and retained for presentation with the International Certificate of Vaccination.

Reactions

Reactions to yellow fever vaccine are generally mild. Two percent to 5% of vaccinees have mild headaches, myalgia, low-grade fevers, or other minor symptoms 5-10 days after vaccination. Fewer than 0.2% of vaccinees find it necessary to curtail regular activities. Immediate hypersensitivity reactions, characterized by rash, urticaria, and/or asthma, are extremely uncommon (incidence less than 1/1,000,000) and occur principally in persons with histories of egg allergy.

Simultaneous Administration of Other Vaccines and Drugs

Studies have shown that the seroimmune response to yellow fever vaccine is not inhibited by administration of certain other vaccines concurrently or at various intervals of a few days to 1 month. Measles and yellow fever vaccines, and BCG and yellow fever vaccines have been administered in combination without interference. Additionally, severity of reactions to vaccination was not amplified by concurrent administration of yellow fever and measles vaccines. Hepatitis B and yellow fever vaccine may be given concurrently. If live virus vaccines are not given concurrently, 4 weeks should be allowed to elapse between sequential vaccinations.

Some data have indicated that persons given yellow fever and cholera vaccines simultaneously or 1-3 weeks apart had lower-than-normal antibody responses to both vaccines. Unless there are time constraints, cholera and yellow fever vaccines should be administered at a minimal interval of 3 weeks. If the vaccines cannot be administered at least 3 weeks apart, then the vaccines can be given simultaneously or at any time within the 3-week interval.

There are no data on possible interference between yellow fever and typhoid, paratyphoid, typhus, plague, rabies, or Japanese encephalitis vaccines.

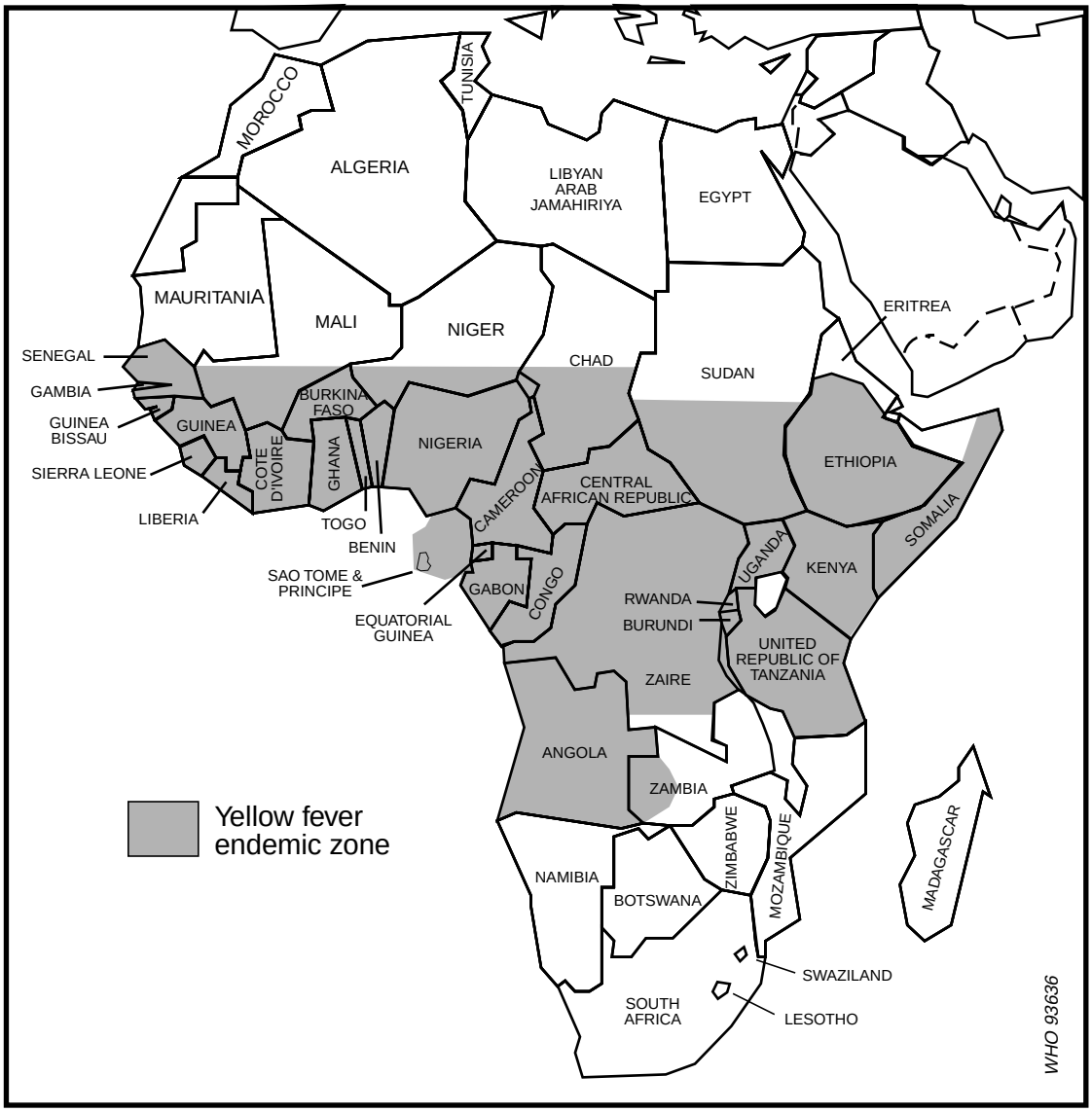
A prospective study of persons given yellow fever vaccine and 5 cc of commercially available immune globulin revealed no alteration of the immunologic response to yellow fever vaccine when compared to controls. Although chloroquine inhibits replication of yellow fever virus *in vitro*, it does not adversely affect antibody responses to yellow fever vaccine in humans receiving the drug as antimalarial prophylaxis.

Prevention Of Mosquito Bites

Yellow fever is rarely transmitted in urban areas except in the context of an epidemic. Travelers to rural areas of Africa and South America, however, may be exposed sporadically to mosquitoes transmitting yellow fever and other mosquito-borne diseases. Mosquitoes that transmit urban yellow fever generally feed during the day both indoors and outdoors. Staying in air-conditioned or well-screened quarters and wearing long-sleeved shirts and long pants will help to prevent mosquito bites. Insect repellents containing N,N-diethyl-metatoluamide (DEET) should be used on exposed skin only. Permethrin containing repellents should be applied to clothing. Travelers to rural areas should bring mosquito nets and insecticidal space sprays. (For further prevention information see section entitled "Protection Against Mosquitoes and other Arthropod vectors" p. 180.)

YELLOW FEVER ENDEMIC ZONES

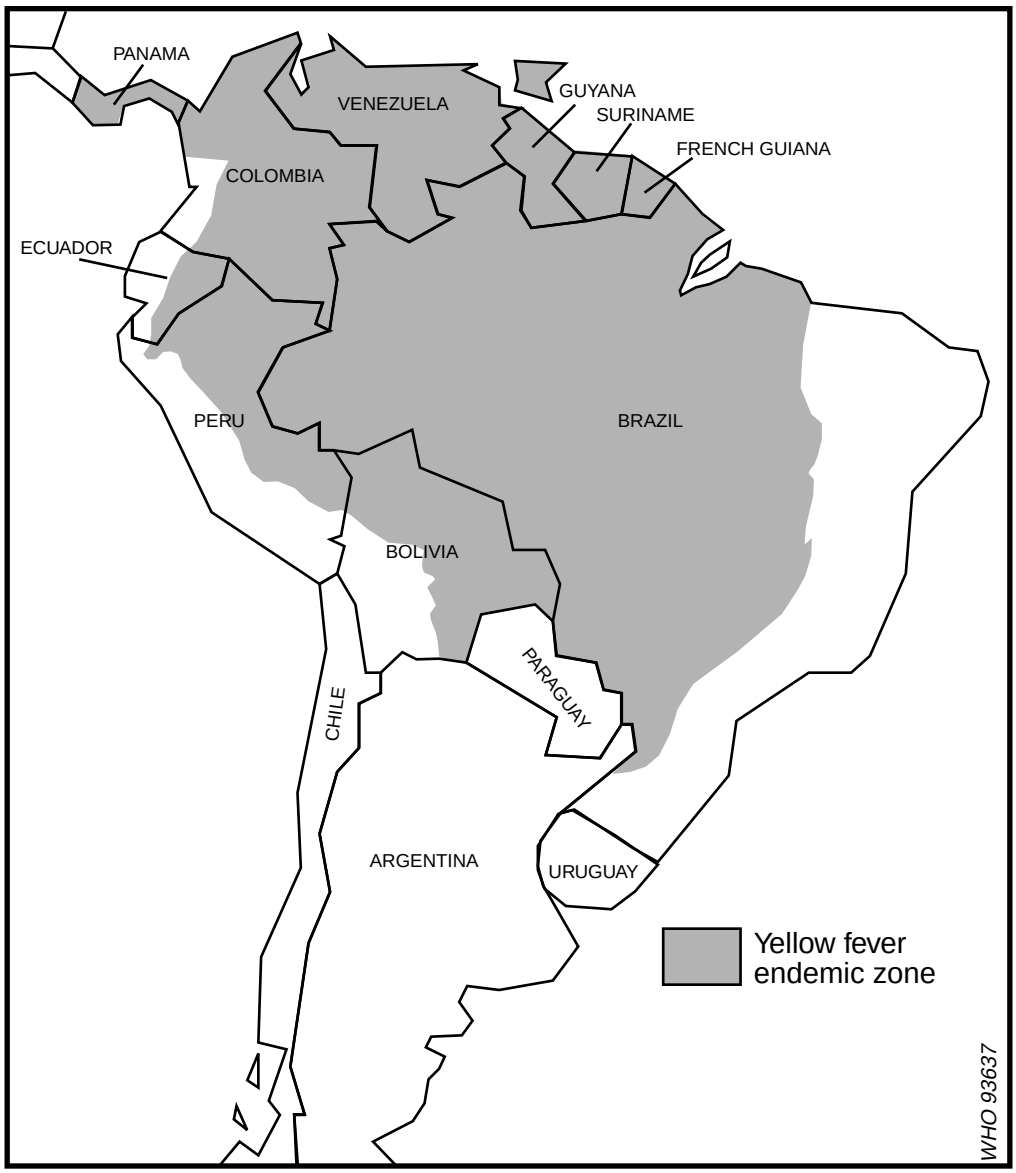
IN AFRICA



NOTE: Although the “yellow fever endemic zones” are no longer included in the International Health Regulation, a number of countries (most of them being not bound by the Regulations or bound with reservations) consider these zones as infected areas and require an International Certificate of Vaccination against Yellow Fever from travelers arriving from those areas. The above map based on information from WHO is therefore included in this publication for practical reasons.

YELLOW FEVER ENDEMIC ZONES

IN THE AMERICAS



NOTE: Although the "yellow fever endemic zones" are no longer included in the International Health Regulations, a number of countries (most of them being not bound by the Regulations or bound with reservations) consider these zones as infected areas and require an International Certificate of Vaccination against Yellow Fever from travelers arriving from those areas. The above map based on information from WHO is therefore included in this publication for practical reasons.

GEOGRAPHICAL DISTRIBUTION OF POTENTIAL HEALTH HAZARDS TO TRAVELERS

GEOGRAPHICAL DISTRIBUTION OF POTENTIAL HEALTH HAZARDS TO TRAVELERS*

This section is intended to give a *broad* indication of the health risks to which travelers may be exposed in various areas of the world and which they may not encounter in their usual place of residence.

In practice, to identify areas accurately and define the degree of risk likely in each of them is extremely difficult, if not impossible. For example, viral hepatitis A is ubiquitous but the risk of infection varies not only according to area but also according to eating habits; hence, there may be more risk from communal eating in an area of low incidence than from eating in a private home in an area of high incidence. Generalizations may therefore be misleading.

Another factor is that tourism is an important source of income for many countries and to label specific areas as being of high risk for a disease may be misinterpreted. However, this does not absolve national health administrations from their responsibility to provide an accurate picture of the risks from communicable diseases that may be encountered in various parts of their countries.

AFRICA

Northern Africa (Algeria, Egypt, Libyan Arab Jamahiriya, Morocco, and Tunisia) is characterized by a generally fertile coastal area and a desert hinterland with oases that are often foci of infections.

Arthropod-borne diseases are unlikely to be a major problem to the traveler, although dengue fever, filariasis (focally in the Nile Delta), leishmaniasis, malaria, relapsing fever, Rift Valley fever, sandfly fever, typhus, and West Nile fever do occur.

Foodborne and waterborne diseases are endemic; the dysenteries and other diarrheal diseases are particularly common. Hepatitis A and E occur throughout the area. Typhoid fever is common in some areas. Schistosomiasis (bilharziasis) is very prevalent in the Nile Delta area in Egypt and in the Nile valley; it occurs focally in other countries in the area. Alimentary helminthic infections, brucellosis, and giardiasis are common. Echinococcosis (hydatid disease) may occur. Sporadic cases of cholera occur.

Other hazards include poliomyelitis (also a food-borne or water-borne disease). However, no cases of poliomyelitis have been reported from Algeria since 1990, from Libyan Arab Jamahiriya since 1991, from Morocco since 1989, or from Tunisia since 1992. Trachoma, rabies, snakes, and scorpions are hazards in certain areas.

Sub-Saharan Africa (Angola, Benin, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, Côte d'Ivoire, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Niger, Nigeria, Réunion, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, Sudan, Togo, Uganda, United Republic of Tanzania, Zaire, Zambia, and Zimbabwe). In this area, entirely within the tropics, the vegetation varies from the tropical rain forests of the west and center to the wooded steppes of the east, and from the desert of the north through the Sahel and Sudan savannas to the moist orchard savanna and woodlands north and south of the equator.

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*This chapter has been reprinted from *International Travel and Health: Vaccination Requirements and Health Advice—Situation as on 1 January 1996*, published by World Health Organization.

Many of the diseases listed below occur in localized rural foci and are confined to rural areas. They are mentioned so that the international traveler and the medical practitioner concerned may be aware of the diseases that may occur.

Arthropod-borne diseases are a major cause of morbidity. Malaria in the severe falciparum (malignant) form occurs throughout the area, except at over 2,600 meters altitude and in the islands of Réunion, and Seychelles. Various forms of filariasis are widespread; endemic foci of onchocerciasis (river blindness) exist in all the countries listed except in the greater part of Kenya and in Djibouti, Gambia, Mauritania, Mozambique, Somalia, Zambia, Zimbabwe, and the island countries of the Atlantic and Indian Oceans. However, onchocerciasis exists in the island of Bioko, Equatorial Guinea. Both cutaneous and visceral leishmaniasis may be found, particularly in the drier areas. Visceral leishmaniasis is epidemic in eastern and southern Sudan. Human trypanosomiasis (sleeping-sickness), mainly in small isolated foci, is reported from all countries except Djibouti, Gambia, Mauritania, Somalia, and the island countries of the Atlantic and Indian Oceans. In Angola and Zaire the transmission of human trypanosomiasis is very high, and there is significant risk of infection for travelers visiting or working in rural areas. Relapsing fever and louse-, flea-, and tick-borne typhus occur. Natural foci of plague* have been reported from Angola, Kenya, Madagascar, Mozambique, Uganda, the United Republic of Tanzania, Zaire, and Zimbabwe. Tungiasis is widespread. Many viral diseases, some presenting as severe hemorrhagic fevers, are transmitted by mosquitos, ticks, sandflies, etc., which are found throughout this region. Large outbreaks of yellow fever occur periodically in the unvaccinated population.

Foodborne and waterborne diseases are highly endemic. Schistosomiasis (bilharziasis) is present throughout the area except in Cape Verde, Comoros, Djibouti, Réunion, and the Seychelles. Alimentary helminthic infections, the dysenteries and diarrheal diseases, including giardiasis, typhoid fever, and hepatitis A and E are widespread. Cholera is actively transmitted in many countries in this area. Dracunculiasis (Guinea-worm) infection occurs in isolated foci. Paragonimiasis (oriental lung fluke) has been reported from Cameroon, Gabon, Liberia and most recently from Equatorial Guinea. Echinococcosis (hydatid disease) is widespread in animal-breeding areas.

Other diseases. Hepatitis B is hyperendemic. Poliomyelitis (also a food-borne and waterborne disease) is endemic in most countries except in Cape Verde, Comoros, Mauritius, Réunion, and the Seychelles. Trachoma is widespread. Among other diseases, certain, frequently fatal, arenavirus haemorrhagic fevers have attained notoriety. Lassa fever has a virus reservoir in a commonly found multimammate rat. Studies have shown that an appreciable reservoir exists in some rural areas of West Africa; people visiting these areas should take particular care to avoid rat-contaminated food or food containers, but the extent of the disease should not be exaggerated. The Ebola and Marburg hemorrhagic fevers are present but reported only infrequently.

Epidemics of meningococcal meningitis may occur throughout tropical Africa, particularly in the savanna areas during the dry season.

Other hazards include rabies and snake bites.

Southern Africa (Botswana, Lesotho, Namibia, St. Helena, South Africa, and Swaziland) varies physically from the Namib and Kalahari deserts to fertile plateaux and plains and to the more temperate climate of the southern coast.

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*A natural focus of plague is a strictly delimited area where ecological conditions ensure the persistence of plague in wild rodents (and occasionally other animals) for long periods of time, and where epizootics and periods of quiescence may alternate.

Arthropod-borne diseases such as Crimean-Congo hemorrhagic fever, malaria, plague, relapsing fever, Rift Valley fever, tick-bite fever, and typhus—mainly tick-borne—have been reported from most of this area except St. Helena, but except for malaria in certain areas, they are not likely to be a major health problem for the traveler. Trypanosomiasis (sleeping sickness) may occur in Botswana and Namibia.

Foodborne and waterborne diseases are common in some areas, particularly amebiasis and typhoid fever. Hepatitis A occurs in this area. Schistosomiasis (bilharziasis) is endemic in Botswana, Namibia, Swaziland and South Africa.

Other hazards. With the exception of an epidemic in Namibia in 1993, few cases of poliomyelitis have been reported from these countries. Hepatitis B is hyperendemic.

Snakes [and rabies*] may be a hazard in some areas.

THE AMERICAS

Available data suggest that transmission of the poliomyelitis virus in the Region of the Americas has been interruped since 1991. Wild poliovirus type 3 was imported in 1992 from the Netherlands into a religious community in Canada which refuses immunization. There is no evidence to suggest that the virus spread outside this community.

North America (Bermuda, Canada, Greenland, St. Pierre and Miquelon, and the United States of America [with Hawaii]) extends from the Arctic to the subtropical cays of the southern USA.

The incidence of communicable diseases is such that they are unlikely to prove a hazard for international travelers greater than that found in their own country. There are, of course, health risks but in general, the precautions required are minimal. Certain diseases occasionally occur, such as plague, rabies in wildlife including bats, Rocky Mountain spotted fever, tularemia, and arthropod-borne encephalitis. Recently, rodent-borne hantavirus has been identified, predominantly in the western states of the U.S.A. Lyme disease is endemic in the northeastern United States and the upper Midwest. During recent years, the incidence of certain food-borne diseases, e.g., salmonellosis, has increased in some regions. Other hazards include poisonous snakes, poison ivy, and poison oak. In the north, a serious hazard is the very low temperature in the winter.

In the USA, proof of immunization against diphtheria, measles, poliomyelitis, and rubella is now universally required for entry into school. In addition, the school entry requirements of most states include immunization against tetanus (50 states), pertussis (44 states), and mumps (42 states).

Mainland Middle America (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, and Panama) ranges from the deserts of the north to the tropical rain forests of the southeast.

Of the *arthropod-borne* diseases, malaria and cutaneous and mucocutaneous leishmaniasis occur in all eight countries. Visceral leishmaniasis occurs in El Salvador, Guatemala, Honduras and Mexico. Onchocerciasis (river blindness) is found in two small foci in the south of Mexico and four dispersed foci in Guatemala. American trypanosomiasis (Chagas' disease) has been reported to occur in localized foci in rural areas in all eight countries. Bancroftian filariasis is present in Costa Rica. Dengue fever and Venezuelan equine encephalitis may occur in all countries.

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*Editor's note: CDC addition.

The *foodborne and waterborne* diseases, including amebic and bacillary dysenteries and other diarrheal diseases, and typhoid fever are very common throughout the area. All countries except Panama have reported cases of cholera in 1994. Hepatitis A occurs throughout the area. Helminthic infections are common. Paragonimiasis (oriental lung fluke) has been reported in Costa Rica, Honduras and Panama. Brucellosis occurs in the northern part of the area. Many *Salmonella typhi* infections from Mexico and *Shigella dysenteriae* type 1 infections from mainland Middle America as a whole have been caused by drug-resistant enterobacteria.

Other diseases. Rabies in animals (usually dogs and bats) is widespread throughout the area. Snakes may be a hazard in some areas.

Caribbean Middle America (Antigua and Barbuda, Aruba, Bahamas, Barbados, British Virgin Islands, Cayman Islands, Cuba, Dominica, Dominican Republic, Grenada, Guadeloupe, Haiti, Jamaica, Martinique, Montserrat, Netherlands Antilles, Puerto Rico, St. Christopher and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago, Turks and Caicos Islands, and the Virgin Islands (USA)). The islands, a number of them mountainous with peaks 1000-2500 m high, have an equable tropical climate with heavy rain storms and high winds at certain times of the year.

Of the *arthropod-borne* diseases, malaria occurs in endemic form only in Haiti and in parts of the Dominican Republic. Diffuse cutaneous leishmaniasis was recently discovered in the Dominican Republic. Bancroftian filariasis occurs in Haiti and some other islands and other filariases may occasionally be found. Human fascioliasis due to *Fasciola hepatica* is endemic in Cuba. Outbreaks of dengue fever occur in the area, and dengue hemorrhagic fever has also occurred. Tularemia has been reported from Haiti.

Of the *foodborne and waterborne* diseases, bacillary and amebic dysenteries are common and hepatitis A is reported, particularly in the northern islands. No cases of cholera had been reported in the Caribbean at the time of printing. Schistosomiasis (bilharziasis) is endemic in the Dominican Republic, Guadeloupe, Martinique, Puerto Rico, and Saint Lucia, in each of which control operations are in progress, and it may also occur sporadically in other islands.

Other diseases. Other hazards may occur from spiny sea urchins and coelenterates (coral and jellyfish) and snakes. Animal rabies, particularly in the mongoose, is reported from several islands (see pp. 149).

Tropical South America (Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Paraguay, Peru, Suriname, and Venezuela) covers the narrow coastal strip on the Pacific Ocean, the high Andean range with numerous peaks 5000-7000 m high, and the tropical rain forests of the Amazon basin, bordered to the north and south by savanna zones and dry tropical forest or scrub.

Arthropod-borne diseases are an important cause of ill health in rural areas. Malaria (in the falciparum, malariae and vivax forms) occurs in all ten countries or areas, as do American trypanosomiasis (Chagas disease), and cutaneous and mucocutaneous leishmaniasis. There has been an increase of the latter in Brazil and Paraguay. Visceral leishmaniasis is endemic in north-east Brazil, with foci in other parts of Brazil, less frequent in Colombia and Venezuela, rare in Bolivia and Paraguay, and unknown in Peru. Endemic onchocerciasis occurs in isolated foci in rural areas in Ecuador, Venezuela, and northern Brazil. The bites of blackflies may cause unpleasant reactions. Bancroftian filariasis is endemic in parts of Brazil, Guyana and Suriname. Plague has been reported in natural foci in Bolivia, Brazil, Ecuador, and Peru. Among the arthropod-borne viral diseases, jungle yellow fever may be found in forest areas in all countries except Paraguay and areas east of the Andes; in Brazil it is confined to the northern and western states.

Epidemics of viral encephalitis and dengue fever occur in some countries of this area. Bartonellosis, or Oroya fever, a sandfly-borne disease, occurs in arid river valleys on the western slopes of the Andes up to 3,000 meters. Louse-borne typhus is often found in mountain areas of Colombia and Peru.

Foodborne and waterborne diseases are common and include amebiasis, diarrheal diseases, helminthic infections, and hepatitis A. The intestinal form of schistosomiasis (bilharziasis) is found in Brazil, Suriname, and north-central Venezuela. Paragonimiasis (oriental lung fluke) has been reported from Ecuador, Peru and Venezuela. Brucellosis is common and echinococcosis (hydatid disease) occurs, particularly in Peru. Bolivia, Brazil, Colombia, Ecuador and Peru all reported autochthonous cases of cholera in 1994.

Other diseases include rodent-borne arenavirus hemorrhagic fever in Bolivia. Hepatitis B and D (delta hepatitis) are highly endemic in the Amazon basin. Rabies has been reported from many of the countries in this area. Meningococcal meningitis occurs in epidemic outbreaks in Brazil.

Snakes and leeches may be a hazard in some areas.

Temperate South America (Argentina, Chile, Falkland Islands (Malvinas), and Uruguay). The mainland ranges from the Mediterranean climatic area of the western coastal strip over the Andes divide on to the steppes and desert of Patagonia in the south and to the prairies of the northeast.

The *arthropod-borne* diseases are relatively unimportant except for the widespread occurrence of American trypanosomiasis (Chagas disease). Outbreaks of malaria occur in northwestern Argentina, and cutaneous leishmaniasis is also reported from the northeastern part of the country.

Of the *foodborne and waterborne* diseases, gastroenteritis (mainly salmonellosis) is relatively common in Argentina, especially in suburban areas and among children under 5 years of age. Cholera has been reported in Argentina and Chile. Typhoid fever is not very common in Argentina but hepatitis A and intestinal parasitosis are widespread, the latter especially in the coastal region. Taeniasis (tapeworm), typhoid fever, viral hepatitis, and echinococcosis (hydatid disease) are reported from the other countries.

Other diseases. Anthrax is an occupational hazard in the three mainland countries. Animal rabies is endemic in Argentina [and Chile]*. Meningococcal meningitis occurs in the form of epidemic outbreaks in Chile. Rodent-borne hemorrhagic fever is endemic in a limited zone of the pampas and in the center of the country.

ASIA

East Asia (China, the Democratic People's Republic of Korea, Hong Kong, Japan, Macao, Mongolia, and the Republic of Korea). The area includes the high mountain complexes, the desert and the steppes of the west, the various forest zones of the east, down to the subtropical forests of the southeast.

Among the *arthropod-borne* diseases, malaria now occurs only in China. Although reduced in distribution and prevalence, bancroftian and brugian filariasis are still reported in southern China. A resurgence of visceral leishmaniasis is occurring in China and plague may be found in China and Mongolia. Cutaneous leishmaniasis has been recently reported from Xinjiang, Uygur Autonomous Region. Hemorrhagic fever with renal syndrome—rodent-borne, Korean hemorrhagic fever—is endemic except in Mongolia, and epidemics of dengue fever and Japanese encephalitis may occur in this area.

*Editor's note: CDC addition.

Mite-borne or scrub typhus may be found in scrub areas in southern China, certain river valleys in Japan, and in the Republic of Korea.

Foodborne and waterborne diseases such as diarrheal diseases and hepatitis A are common in most countries. Hepatitis E is prevalent in northwestern and northeastern China. The present endemic area of schistosomiasis (bilharziasis) is in the central Chang Jiang (Yangtze) river basin; active foci no longer occur in Japan. Clonorchiasis (oriental liver fluke) and paragonimiasis (oriental lung fluke) are reported in China, Japan, Macao and the Republic of Korea, and fasciolopsiasis (giant intestinal fluke) in China. Brucellosis occurs in China.

Other diseases. Hepatitis B is highly endemic. Low levels of poliomyelitis morbidity are reported from China and Mongolia. Trachoma, and leptospirosis occur in China. Outbreaks of meningococcal meningitis occur in Mongolia. [Rabies is endemic in China and Korea.]*

Eastern South Asia (Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar (formerly Burma), the Philippines, Singapore, Thailand, and Viet Nam). From the tropical rain and monsoon forests of the north-west, the area extends through the savanna and the dry tropical forests of the Indochina peninsula, returning to the tropical rain and monsoon forests of the islands bordering the South China Sea.

The *arthropod-borne* diseases are an important cause of morbidity throughout the area. Malaria and filariasis are endemic in many parts of the rural areas of all the countries or areas-except for malaria in Brunei Darussalam, and Singapore, where normally only imported cases occur. Foci of plague exist in Myanmar. Plague also occurs in Viet Nam. Japanese encephalitis, dengue and dengue hemorrhagic fever can occur in epidemics in both urban and rural areas. Mite-borne typhus has been reported in deforested areas in most countries.

Foodborne and waterborne diseases are common. Cholera and other watery diarrheas, amebic and bacillary dysentery, typhoid fever, and hepatitis A and E may occur in all countries in the area. Schistosomiasis (bilharziasis) is endemic in the Southern Philippines and in central Sulawesi (Indonesia) and occurs in small foci in the Mekong delta. Among helminthic infections, fasciolopsiasis (giant intestinal fluke) may be acquired in most countries in the area; clonorchiasis (oriental liver fluke) in the Indochina peninsula; opisthorchiasis (cat liver fluke) in the Indochina peninsula, the Philippines, and Thailand; and paragonimiasis in most countries. Melioidosis can occur sporadically throughout the area.

Other diseases. Hepatitis B is highly endemic. Cases of poliomyelitis (also a food-borne and water-borne disease) continue to be reported from Cambodia, Indonesia, the Lao's Democratic Republic, Myanmar, and Vietnam. The incidence of poliomyelitis is low in Malaysia, the Philippines, and Thailand. Trachoma exists in Indonesia, Myanmar, Thailand, and Viet Nam.

Other hazards include rabies, snake bites, and leeches.

Middle South Asia (Afghanistan, Armenia, Azerbaijan, Bangladesh, Bhutan, India, Islamic Republic of Iran, Kazakstan, Kyrgyzstan, Maldives, Nepal, Pakistan, and Sri Lanka, Tajikistan, Turkmenistan and Uzbekistan). Bordered for the most part by high mountain ranges in the north, the area extends from steppes and desert in the west to monsoon and tropical rain forests in the east and south.

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*Editor's note: CDC addition.

Arthropod-borne diseases are endemic in all these countries except for malaria in Georgia, Kazakstan, Krygyzstan, Turkmenistan and Ubekistan. There are small foci of malaria in Azerbaijan, Tajikistan and for Turkmenistan. In some of the other countries, malaria occurs in urban as well as rural areas. Filariasis is common in Bangladesh, India, and the southwestern coastal belt of Sri Lanka. Sand fly fever is on the increase. A sharp rise in the incidence of visceral leishmaniasis has been observed in Bangladesh, India and Nepal. In Pakistan, it is mainly reported from the north (Baltisan). Cutaneous leishmaniasis occurs in Afghanistan, India (Rajasthan), the Islamic Republic of Iran, and Pakistan. There are very small foci of cutaneous and visceral leishmaniasis in Azerbaijan and Tajikistan. There is evidence that natural foci of plague exist in India and Kazakstan. An outbreak of plague occurred in India in 1994. Tick-borne relapsing fever is reported from Afghanistan, India, and the Islamic Republic of Iran, and typhus occurs in Afghanistan and India. Outbreaks of dengue fever may occur in Bangladesh, India, Pakistan, and Sri Lanka and the hemorrhagic form has been reported from eastern India and Sri Lanka. Japanese encephalitis has been reported from the eastern part of the area and Crimean-Congo hemorrhagic fever from the western part. Another tick-borne hemorrhagic fever has been reported in forest areas of Karnataka State in India and in a rural area of Rawalpindi District in Pakistan.

Foodborne and waterborne diseases are common throughout the area, in particular cholera and other watery diarrheas, the dysenteries, typhoid fever, hepatitis A and E, and helminthic infections. Large epidemics of hepatitis E can occur. Giardiasis is common in the area. A very limited focus of urinary schistosomiasis (bilharziasis) persists in the southwest of the Islamic Republic of Iran. Foci of dracunculiasis (guinea worm) infection occur in India. Brucellosis and echinococcosis (hydatid disease) are found in many countries in the area.

Other diseases. Hepatitis B is endemic. Outbreaks of meningococcal meningitis have been reported in India and Nepal. Poliomyelitis (also a food-borne and water-borne disease) is widespread except in Bhutan and the Maldives. Diphtheria outbreaks are reported from Azerbaijan, Georgia, Kazakstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. Trachoma is common in Afghanistan, in parts of India, the Islamic Republic of Iran, Nepal, and Pakistan. Snakes and the presence of rabies in animals are hazards in most of the countries in the area.

Western South Asia—Bahrain, Cyprus, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, Turkey, the United Arab Emirates, and Yemen). The area ranges from the mountains and steppes of the north-west to the large deserts and dry tropical scrub of the south.

The *arthropod-borne* diseases, except for malaria in certain areas, are not a major hazard for the traveler. Malaria does not exist in Kuwait and no longer occurs in Bahrain, Cyprus, Israel, Jordan, Lebanon, or Qatar. Its incidence in the Syrian Arab Republic is low, but elsewhere is endemic in certain rural areas. Cutaneous leishmaniasis is reported throughout the area; visceral leishmaniasis, although rare throughout most of the area, is common in central Iraq, in the southwest of Saudi Arabia, in the northwest of the Syrian Arab Republic, in Turkey (southeast Anatolia only) and in the west of Yemen. Murine and tick-borne typhus can occur in most countries. Tick-borne relapsing fever may occur. Crimean-Congo hemorrhagic fever has been reported from Iraq. Limited foci of onchoceriasis are reported in Yemen.

The *foodborne and waterborne* diseases are a major hazard in most countries. The typhoid fevers and hepatitis A exist in all countries. Schistosomiasis (bilharziasis) occurs in Iraq, Saudi Arabia, the Syrian Arab Republic, and Yemen. Dracunculiasis (guinea worm)

infection is found in some of these countries. Taeniasis (tapeworm) is reported from many of the countries. Brucellosis is widespread and there are foci of echinococcosis (hydatid disease).

Other diseases. Hepatitis B is endemic. The incidence of poliomyelitis (also a food-borne and water-borne disease) is low in most countries of the area, with the exception of Turkey and Yemen. Trachoma and animal rabies are found in many countries in the area.

The greatest hazards to pilgrims to Mecca and Medina are heat and water depletion if the period of the Hajj coincides with the hot season.

EUROPE

Northern Europe (Belarus, Belgium, Czech Republic, Denmark (with the Faroe Islands), Estonia, Finland, Germany, Iceland, Ireland, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Republic of Moldova, Russian Federation, Slovakia, Sweden, Ukraine and the United Kingdom (with the Channel Islands and the Isle of Man). The area encompassed by these countries extends from the broadleaf forests and the plains of the west to the boreal and mixed forest to be found as far east as the Pacific Ocean.

The incidence of communicable diseases in most countries is such that they are unlikely to prove a hazard to international travelers greater than that found in their own country. There are, of course, health risks but in most areas very few precautions are required.

Of the *arthropod-borne* diseases, there are very small foci of tick-borne typhus in east and central Siberia. Tick-borne encephalitis, for which a vaccine exists, Lyme disease, and Crimean-Congo hemorrhagic fever may occur throughout northern Europe. Rodent-borne hemorrhaghic fever with renal syndrome is now recognized as occurring at low endemic levels in this area.

The *foodborne and waterborne* diseases reported, other than the ubiquitous diarrheal diseases are taeniasis (tapeworm) and trichinellosis in parts of northern Europe, diphyllobothriasis (fish tapeworm) from the freshwater fish around the Baltic Sea area. *Fasciola hepatica* infection can occur. Hepatitis A occurs in the Eastern European countries. Cases of cholera have been reported from some countries in the area. The incidence of certain food-borne diseases, e.g., salmonellosis and campylobacteriosis, is increasing significantly in some of these countries.

Other diseases. Poliomyelitis (also a food-borne and water-borne disease) continues to be reported from Belarus, the Republic of Moldova, the Russian Federation and the Ukraine. An outbreak of poliomyelitis in the Netherlands in 1992–93 was confined to a religious group that refuses vaccination. Rabies is endemic in wild animals (particularly foxes) in rural areas of northern Europe except Finland, Iceland, Ireland, Norway, Sweden, and the United Kingdom. In recent years, Belarus, the Russian Federation, and Ukraine have experienced extensive epidemics of diphtheria. Diphtheria cases, mostly imported from these three countries, have also been reported from neighboring countries: Estonia, Finland, Latvia, Lithuania, Poland, and the Republic of Moldova.

A climatic hazard in part of northern Europe is the extreme cold in winter.

Southern Europe (Albania, Andorra, Austria, Bosnia and Herzegovina, Bulgaria, Croatia, France, Gibraltar, Greece, Hungary, Italy, Liechtenstein, Malta, Monaco, Portugal (with the Azores and Madeira), Romania, San Marino, Slovenia, Spain (with the Canary Islands), Switzerland, and the Former Yugoslav Republic of Macedonia, and Yugoslavia. The area extends from the broadleaf forests in the north-west and the

mountains of the Alps to the prairies and, in the south and south-east, the scrub vegetation of the Mediterranean.

Among the *arthropod-borne* diseases, sporadic cases of murine and tick-borne typhus and mosquito-borne West Nile fever occur in some countries bordering the Mediterranean littoral. Both cutaneous and visceral leishmaniasis and sandfly fever are also reported from this area. Recently an increasing number of Leishmania/HIV co-infections have been notified from France, Italy, Portugal and Spain. Tickborne encephalitis, for which a vaccine exists, Lyme disease, and rodent-borne hemorrhagic fever with renal syndrome may occur in the eastern and southern parts of the area.

The *foodborne and waterborne* diseases-bacillary dysentery and other diarrheas, and typhoid fever-are more common in the summer and autumn months, with a high incidence in the southeastern and southwestern parts of the area. Brucellosis can occur in the extreme southwest and southeast and echinococcosis (hydatid disease) in the southeast. *Fasciola hepatica* infection has been reported from different countries in the area. Cases of cholera have been reported from some countries in the area. The incidence of certain food-borne diseases, e.g., salmonellosis and campylobacteriosis, is increasing significantly in some of these countries.

Other diseases. Poliomyelitis (also a food-borne and water-borne disease) remains endemic in Romania and Yugoslavia. Hepatitis B is endemic in the southern part of eastern Europe (Albania, Bulgaria and Romania). [Rabies in animals exists in most countries of southern Europe except Gibraltar, Greece, Malta, Monaco, mainland Spain]* and Portugal.

OCEANIA

Australia, New Zealand and the Antarctic. In Australia the mainland has tropical monsoon forests in the north and east, dry tropical forests, savanna and deserts in the center, and Mediterranean scrub and subtropical forests in the south. New Zealand has a temperate climate with the North Island characterized by subtropical forests and the South Island by steppe vegetation and hardwood forests.

International travelers to Australia and New Zealand will, in general, not be subjected to the hazards of communicable diseases to an extent greater than that found in their own country.

Arthropod-borne diseases (mosquito-borne epidemic polyarthritis and viral encephalitis) may occur in some rural areas of Australia. Occasional outbreaks of dengue have occurred in northern Australia in recent years.

Other hazards. Coelenterates (corals and jellyfish) may prove a hazard to the sea-bather, and heat is a hazard in the northern and central parts of Australia.

Melanesia and Micronesia-Polynesia (American Samoa, Cook Islands, Easter Island, Federated States of Micronesia, Fiji, French Polynesia, Guam, Kiribati, Marshall Islands, Nauru, New Caledonia, Niue, Palau, Papua New Guinea, Pitcairn, Samoa, Solomon Islands, Tokelau, Tonga, Trust Territory of the Pacific Islands, Tuvalu, Vanuatu, Wake Island [U.S.] and the Wallis and Futuna Islands). The area covers an enormous expanse of ocean with the larger, mountainous, tropical and monsoon rainforest-covered islands of the west giving way to the smaller, originally volcanic peaks and coral islands of the east.

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*Editor's note: CDC addition.

Arthropod-borne diseases occur in the majority of the islands. Malaria is endemic in Papua New Guinea, Solomon Islands and Vanuatu. Filariais is widespread but its prevalence varies. Mite-borne typhus has been reported from Papua New Guinea. Dengue fever, including its hemorrhagic form, can occur in epidemics in most islands.

Foodborne and waterborne diseases such as the diarrheal diseases, typhoid fever and helminthic infections are commonly reported. Biointoxication may occur from raw or cooked fish and shellfish. Hepatitis A occurs in this area.

Other diseases. Hepatitis B is endemic. No cases of poliomyelitis have been reported from any of these islands for more than three years. Trachoma occurs in parts of Melanesia.

Hazards to bathers are coelenterates, poisonous fish, and sea snakes.

HEALTH HINTS FOR THE INTERNATIONAL TRAVELER

HEALTH HINTS FOR THE INTERNATIONAL TRAVELER

INTRODUCTION

This section includes practical information on how to avoid potential health problems. Some of these recommendations are common-sense precautions; others have been scientifically documented.

Personal and specific preventive measures against certain diseases may require advance planning and advice from a physician concerning immunization and prophylaxis. If more specific information is needed, travelers should contact their local health department or physician.

Travelers who take prescription medications should carry an adequate supply accompanied by a signed and dated statement from a physician; the statement should indicate the major health problems and dosage of such medications, to provide information for medical authorities in case of emergency. The traveler should take an extra pair of glasses or lens prescription, and a card, tag, or bracelet that identifies any physical condition that may require emergency care.

IF MEDICAL CARE IS NEEDED ABROAD

If medical care is needed abroad, travel agents or the American Embassy or Consulate can usually provide names of hospitals, physicians, or emergency medical service agencies. Prior to departure, travelers should contact their own insurance companies concerning their coverage.

WHO Blood Transfusion Guidelines for International Travelers

There is a growing public awareness of the AIDS epidemic, and a resulting concern about acquiring the AIDS virus through blood transfusion. Systematic screening of blood donations is not yet feasible in all developing countries. Requests have been made by persons planning international travels, to have their own blood, or blood from their home country, available to them in case of urgent need. These requests raise logistic, technical and ethical issues which are not easy to resolve. Ultimately, the safety of blood for such persons will depend upon the quality of blood transfusion services in the host country. The strengthening of these services is of the highest priority. While efforts are being made to achieve this end, other approaches are also needed.

Basic Principles:

1. Unexpected, emergency blood transfusion is rarely required. It is needed only in situations of massive hemorrhage like severe trauma, gynecologic and obstetric emergency, or gastrointestinal bleeding.
2. In many cases, resuscitation can be achieved by use of colloid or crystalloid plasma expanders* instead of blood.
3. Blood transfusion is not free of risk, even in the best of conditions. In most developing countries, the risk is increased by limited technical resources for screening blood donors for HIV infection and other diseases transmissible by blood.

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*See World Health Organization documents LAB/81.5: “Use of plasma volume substitutes and plasma in developing countries,” for further details, and WHO GPA/INF/88.5 “Guidelines for Treatment of Acute Blood Loss,” or standard medical or surgical textbooks.

4. The international shipment of blood for transfusion is practical only when handled by agreement between two responsible organizations, such as national blood transfusion services. This mechanism is not useful for emergency needs of individual patients and should not be attempted by private individuals or organizations not operating recognized blood programs.

Therefore:

1. There are no medical indications for travelers to take blood with them from their home country.
2. The limited storage period of blood and the need for special equipment negate the feasibility of independent blood banking for individual travelers or small groups.
3. Blood should be transfused only when absolutely indicated. This applies even more forcefully in those countries where screening of blood for transmissible diseases is not yet widely performed.

Proposed Options:

1. When urgent resuscitiation is necessary, the use of plasma expanders rather than blood should always be considered.
2. In case of emergency need of blood, use of plasma expanders and urgent evacuation home may be the actions of choice.
3. When blood transfusion cannot be avoided, the attending physician should make every effort to ensure that the blood has been screened for transmissible diseases, including HIV.
4. International travelers should:
   a. take active steps to minimize the risk of injury;
   b. establish a plan for dealing with medical emergencies;
   c. support the development within countries of safe and adequate blood supplies.

This information is taken from the WHO publication “World Health Organization Global Programme on AIDS: Blood Transfusion Guidelines for International Travelers.”

MOTION SICKNESS

Travelers with a history of motion sickness or sea sickness can attempt to avoid symptoms by taking anti-motion-sickness pills or antihistaminics before departure.

PROTECTION AGAINST MOSQUITOES AND OTHER ARTHROPOD VECTORS

Although vaccines or chemoprophylactic drugs are available against important vector-borne diseases such as yellow fever and malaria, there are none for most other mosquito-borne diseases such as dengue, and travelers still should avail themselves of repellents and other general protective measures against arthropods. The effectiveness of malaria chemoprophylaxis is variable, depending on patterns of resistance and compliance with medication, and for many vector-borne diseases, no specific preventatives are available.

General preventative measures

The principal approach to prevention of vector-borne diseases is avoidance. Tick- and mite-borne infections characteristically are diseases of “place”; whenever possible, known

foci of disease transmission should be avoided. Although many vector-borne infections can be prevented by avoiding rural locations, certain mosquito- and midge-borne arboviral and parasitic infections are transmitted around human residences and in urban locations. Most vector-borne infections are transmitted seasonally and simple changes in itinerary may greatly reduce risk for acquiring certain infections.

Exposure to arthropod bites can be minimized by modifying patterns of activity or behavior. Some vector mosquitoes are most active in twilight periods at dawn and dusk or in the evening. Avoidance of outdoor activity during these periods may reduce risk of exposure. Wearing long-sleeved shirts, long pants and hats will minimize areas of exposed skin. Shirts should be tucked in. Repellents applied to clothing, shoes, tents, mosquito nets and other gear will enhance protection.

When exposure to ticks or mites are a possibility, pants should be tucked into socks and boots should be worn; sandals should be avoided. Permethrin-based repellents applied as directed (see below) will enhance protection. During outdoor activity and at the end of the day, travelers should inspect themselves and their clothing for ticks. Ticks are detected more easily on light colored or white clothing. Prompt removal of attached ticks may prevent infection.

When accommodations are not adequately screened or air-conditioned, bednets are essential to provide protection and comfort. Bednets should be tucked under mattresses and can be sprayed with repellent. Aerosol insecticides and mosquito coils may help to clear rooms of mosquitoes; however, some coils contain DDT and should be used with caution.

Repellents

Permethrin-containing repellents (Permanone)* are recommended for use on clothing, shoes, bednets and camping gear. Permethrin is highly effective as an insecticide/acaricide and as a repellent. Permethrin-treated clothing repels and kills ticks, mosquitoes and other arthropods and retains this effect after repeated laundering. There appears to be little potential for toxicity from permethrin-treated clothing.

Permethrin-containing shampoo (Nix)* and cream (Elimite)*, marketed for use against head lice and scabies infestations, potentially could be extremely effective as repellents when applied on the hair and skin. However, they are approved only to treat existing conditions. Most authorities recommend repellents containing deet (N,N-diethylmetatoluamide) as an active ingredient. Deet repels mosquitoes, ticks, and other arthropods when applied to skin or clothing. Formulations containing <30% deet are recommended because the additional gain in repellent effect with higher concentrations is not significant when weighed against the potential for toxicity. A microencapsulated formulation (Skeedadle)* may have a longer period of activity than liquid formulations.

Deet is toxic when ingested. High concentrations applied to skin may cause blistering. Rare cases of encephalopathy in children, some fatal, have been reported after cutaneous exposure. Other neurologic side effects also have been reported. Toxicity did not appear to be dose-related in many cases and these may have been idiosyncratic reactions in predisposed individuals. However, a dose-related effect leading to irritability and impaired concentration and memory has been reported. Recommendations and precautions on the use of repellents are given in Table 24.

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*Use of trade names is for identification only and does not imply endorsement by the Public Health Service or the U.S. Department of Health and Human Services.

TABLE 24. Precautions to Minimize Potential for Adverse Reactions from Repellents

- Apply repellent sparingly only to exposed skin or clothing.
- Avoid applying high-concentration (>30% DEET) products to the skin, particularly of children.
- Do not inhale or ingest repellents or get them into the eyes.
- Wear long sleeves and long pants, when possible, and apply repellents (e.g., permethrin) to clothing to reduce cutaneous exposure.
- Avoid applying repellents to portions of children's hands that are likely to have contact with eyes or mouth.
- Pregnant and nursing women should minimize use of repellents.
- Never use repellents on wounds or irritated skin.
- Use repellent sparingly; one application will last approximately 4 hours. Saturation does not increase efficacy.
- Wash repellent-treated skin after coming indoors.
- If a suspected reaction to insect repellents occurs, wash treated skin, and call a physician. Take the repellent container to the physician.

PREGNANT WOMEN TRAVELING ABROAD

The problems that a pregnant woman might encounter during international travel are basically the same problems that other international travelers have. These have to do with exposure to infectious diseases and availability of good medical care. There is the additional potential problem that air travel late in pregnancy might precipitate labor.

Information on vaccination and malaria prophylaxis during pregnancy may be found in each disease section and also p. 92.

Potential health problems vary from country to country; therefore, if the traveler has specific questions, she should be advised to check with the embassy or local consulate general's office of the country in question before traveling.

DISABLED TRAVELERS

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RISKS FROM FOOD AND DRINK

Contaminated food and drink are common sources for the introduction of infection into the body. Among the more common infections that travelers may acquire from contaminated food and drink are *Escherichia coli* infections, shigellosis or bacillary dysentery, giardiasis, cryptosporidiosis, and hepatitis A. Other less common infectious disease risks for travelers include typhoid fever and other salmonelloses, cholera, infections caused by rotaviruses and Norwalk-like viruses, and a variety of protozoan and helminth parasites (other than those that cause giardiasis and cryptosporidiosis). Many of the infectious diseases transmitted in food and water can also be acquired directly through the fecal-oral route.

Water

Water that has been adequately chlorinated, using minimum recommended water-works standards as practiced in the United States, will afford significant protection against viral and bacterial waterborne diseases. However, chlorine treatment alone, as used in the routine disinfection of water, may not kill some enteric viruses and the parasitic organisms that cause giardiasis, amebiasis and cryptosporidiosis. In areas where chlorinated tap water is not available, or where hygiene and sanitation are poor, travelers should be advised that only the following may be safe to drink:

1. Beverages, such as tea and coffee, made with boiled water
2. Canned or bottled *carbonated* beverages, including *carbonated* bottled water and soft drinks
3. Beer and wine

Where water may be contaminated, ice should also be considered contaminated and should not be used in beverages. If ice has been in contact with containers used for drinking, the containers should be thoroughly cleaned, preferably with soap and hot water, after the ice has been discarded.

It is safer to drink directly from a can or bottle of a beverage than from a questionable container. However, water on the outside of beverage cans or bottles might be contaminated. Therefore, wet cans or bottles should be dried before being opened, and surfaces which are contacted directly by the mouth in drinking should first be wiped clean. Where water may be contaminated, travelers should avoid brushing their teeth with tap water.

Treatment of water

Boiling is by far the most reliable method to make water of uncertain purity safe for drinking. Water should be brought to a vigorous rolling boil for one minute and allowed to cool to room temperature—do not add ice. At altitudes above 6,562 feet (2 km), for an extra margin of safety, boil for three minutes or use chemical disinfection. Adding a pinch of salt to each quart, or pouring the water several times from one container to another will improve the taste.

Chemical disinfection with iodine is an alternative method of water treatment when it is not feasible to boil water. Two well-tested methods for disinfection with iodine are the use of tincture of iodine (Table 25), and the use of tetraglycine hydroperiodide tablets (Globaline, Potable-Agua, Coghlan's*, etc.). The tablets are available from pharmacies and sporting goods stores. The manufacturer's instructions should be followed. If water is cloudy, the number of tablets should be doubled; if water is extremely cold, an attempt

*Use of tradenames is for identification only and does not imply endorsement by the Public Health Service or the U.S. Department of Health and Human Services.

should be made to warm the water, and the recommended contact time should be increased to achieve reliable disinfection. Cloudy water should be strained through a clean cloth into a container to remove any sediment or floating matter, and then the water should be boiled or treated with iodine. Chlorine, in various forms, has also been used for chemical disinfection. However, its germicidal activity varies greatly with pH, temperature, and organic content of the water to be purified, and is less reliable than iodine.

There are a variety of portable filters currently on the market which according to the manufacturers' data will provide safe drinking water. Although the iodide-impregnated resins and the microstrainer type filters will kill and/or remove many micoorganisms, very few published reports in the scientific literature deal both with the methods used and the results of the tests employed to evaluate the efficacy of these filters against pathogens. Until there is sufficient independent verification of the efficacy of these filters, CDC makes no recommendation regarding their use in the general population.

As a last resort, if no source of safe drinking water is available or can be obtained, tap water that is uncomfortably hot to touch may be safer than cold tap water; however, proper disinfection or boiling is still advised.

TABLE 25. Treatment of Water with Tincture of Iodine

Tincture of iodine (from medicine chest or first aid kit)	Drops* to be added per quart or liter	
	Clear water	Cold or cloudy water†
2%	5	10

*1 drop = 0.05 ml
Let stand for 30 minutes.
Water is safe to use.
†Very turbid or very cold water may require prolonged contact time; let stand up to several hours prior to use, if possible.

Food

To avoid illness, food should be selected with care. All raw food is subject to contamination. Particularly in areas where hygiene and sanitation are inadequate, the traveler should be advised to avoid salads, uncooked vegetables, unpasteurized milk and milk products such as cheese, and to eat only food that has been cooked and is still hot, or fruit that has been peeled by the traveler. Undercooked and raw meat, fish, and shellfish may carry various intestinal pathogens. Cooked food that has been allowed to stand for several hours at ambient temperature may provide a fertile medium for bacterial growth and should be thoroughly reheated before serving. Consumption of food and beverages obtained from street food vendors has been associated with increased risk of illness. The easiest way to guarantee a safe food source for an infant less than 6 months of age is to have the child breast-feed. If the infant has already been weaned from the breast, formula prepared from commercial powder and boiled water is the safest and most practical food.

Some species of fish and shellfish can contain poisonous biotoxins, even when well cooked. The most common type of fish poisoning in travelers is ciguatera fish poisoning. Barracuda is the most toxic fish and should always be avoided. Red snapper, grouper, amberjack, sea bass, and a wide range of tropical reef fish contain the toxin at unpredictable times. The potential for ciguatera poisoning exists in all subtropical and

tropical insular areas of the West Indies, Pacific and Indian Oceans where the implicated fish species are consumed.

Cholera cases have occurred among persons who ate crab brought back from Latin America by travelers. Travelers should not bring perishable seafoods with them when they return.

TRAVELERS' DIARRHEA

Epidemiology

Travelers' diarrhea (TD) is a syndrome characterized by a twofold or greater increase in the frequency of unformed bowel movements. Commonly associated symptoms include abdominal cramps, nausea, bloating, urgency, fever, and malaise. Episodes of TD usually begin abruptly, occur during travel or soon after returning home, and are generally self-limited. The most important determinant of risk is the destination of the traveler. Attack rates in the range of 20 to 50 percent are commonly reported. High-risk destinations include most of the developing countries of Latin America, Africa, the Middle East, and Asia. Intermediate risk destinations include most of the Southern European countries and a few Caribbean islands. Low risk destinations include Canada, Northern Europe, Australia, New Zealand, the United States and a number of the Caribbean islands.

TD is slightly more common in young adults than in older people. The reasons for this difference are unclear, but may include a lack of acquired immunity, more adventurous travel styles, and different eating habits. Attack rates are similar in men and women. The onset of TD is usually within the first week, but may occur at any time during the visit, and even after returning home.

TD is acquired through ingestion of fecally contaminated food and/or water. Both cooked and uncooked foods may be implicated if improperly handled. Especially risky foods include raw or undercooked meat and seafood, and raw fruits and vegetables. Tap water, ice, and unpasteurized milk and dairy products may be associated with increased risk of TD; safe beverages include bottled carbonated beverages (especially flavored beverages), beer, wine, hot coffee or tea, or water boiled or appropriately treated with iodine or chlorine.

The place food is prepared appears to be an important variable; with private homes, restaurants, and street vendors listed in order of increasing risk.

TD typically results in four to five loose or watery stools per day. The median duration of diarrhea is 3 to 4 days. Ten percent of the cases persist longer than 1 week, approximately 2 percent longer than 1 month, and less than 1 percent longer than 3 months. Persistent diarrhea is thus quite uncommon and may differ considerably from acute TD with respect to etiology and risk factors. Approximately 15 percent of cases experience vomiting, and 2 to 10 percent may have diarrhea accompanied by fever or bloody stools, or both. Travelers may experience more than one attack of TD during a single trip. Rarely is TD life-threatening.

Etiology

Infectious agents are the primary cause of TD. Travelers from industrialized countries to developing countries frequently develop a rapid, dramatic change in the type of organisms in their gastrointestinal tract. These new organisms often include potential enteric pathogens. Those who develop diarrhea have ingested an inoculum of virulent organisms sufficiently large to overcome individual defense mechanisms, resulting in symptoms.

Enteric Bacterial Pathogens

Enterotoxigenic *Escherichia coli* (ETEC) are the most common causative agents of TD in all countries where surveys have been conducted. ETEC produce a watery diarrhea associated with cramps and a low-grade or no fever.

Salmonella gastroenteritis is a well-known disease that occurs throughout the world. In the industrialized nations, this large group of organisms is the most common cause of outbreaks of food-associated diarrhea. In the developing countries, the proportion of cases of TD caused by non-typhoidal salmonellae varies but is not high. Salmonellae also can cause dysentery characterized by bloody mucus-containing small-volume stools.

Shigellae are well known as the cause of bacillary dysentery. The shigellae are the cause of TD in from 0 to about 20 percent of travelers to developing countries.

Campylobacter jejuni is a common cause of diarrhea throughout the world, and is responsible for a small percentage of the reported cases of TD, some with bloody diarrhea. Additional studies are needed to determine how frequently it causes TD.

Vibrio parahaemolyticus is associated with ingestion of raw or poorly cooked seafood and has caused TD in passengers on Caribbean cruise ships and in Japanese people traveling in Asia. How frequently it causes disease in other areas of the world is unknown.

Other less common bacterial pathogens include *E. coli, Yersinia enterocolitica, Vibrio cholerae* O1 O139, and other non-O1, *Vibrio fluvialis* , and possibly *Aeromonas hydrophila* and *Plesiomonas shigelloides.*

Viral Enteric Pathogens--Rotavirus and Norwalk-like Virus

Along with the newly acquired bacteria, the traveler may also acquire many viruses. In six studies, for example, 0 to 36 percent of diarrheal illnesses in travelers (median 22 percent) were associated with rotaviruses in the stools. However, a comparable number of asymptomatic travelers also had rotaviruses, and up to 50 percent of symptomatic persons with rotavirus infections also had nonviral pathogens. Ten to fifteen percent of travelers develop serologic evidence of infection with Norwalk-like viruses. The roles of adenoviruses, astroviruses, coronaviruses, enteroviruses, or other viral agents in causing TD are even less clear. Although viruses are commonly acquired by travelers, they do not appear to be frequent causes of TD in adults.

Parasitic Enteric Pathogens

The few studies that have included an examination for parasites reveal that 0 to 6 percent of persons with travelers' diarrhea have *Giardia lamblia* and 0 to 6 percent have *Entamoeba histolytica. Cryptosporidium* has recently been recognized in sporadic cases of TD.

Dientamoeba fragilis, Isospora belli, Balantidium coli, Cyclospora (previously known as cyanobacterium-like bodies), or *Strongyloides stercoralis* may cause occasional cases of TD. While not major causes of acute TD, these parasites should be sought in persisting, unexplained cases.

Unknown Causes

No data have been presented to support noninfectious causes of TD such as changes in diet, jet lag, altitude, and fatigue. Current evidence indicates that in all but a few instances, e.g., drug-induced or preexisting gastrointestinal disorders, an infectious agent or agents cause diarrhea in tourists. However, even with the application of the best current methods for detecting bacteria, viruses, and parasites, 20 to 50 percent of cases of TD remain without recognized etiologies.

Prevention

There are four possible approaches to prevention of TD. They include instruction regarding food and beverage consumption, immunization, use of nonantimicrobial medications, and prophylactic antimicrobial drugs.

Data indicate that meticulous attention to food and beverage consumption, as mentioned above, can decrease the likelihood of developing TD. Most travelers, however, encounter difficulty in observing the requisite dietary restrictions.

No available vaccines and none that are expected to be available in the next 5 years are effective against TD.

Several nonantimicrobial agents have been advocated for prevention of TD. Available controlled studies indicate that prophylactic use of difenoxine, the active metabolite of diphenoxylate (Lomotil*), actually increases the incidence of TD in addition to producing other undesirable side effects. Antiperistaltic agents e.g., Lomotil* and Imodium* are not effective in preventing TD. No data support the prophylactic use of activated charcoal.

Bismuth subsalicylate, taken as the active ingredient of Pepto-Bismol* (2 oz. 4 times daily, or 2 tablets 4 times daily), has decreased the incidence of diarrhea by about 60 percent in several placebo-controlled studies. Side effects include temporary blackening of tongue and stools, occasional nausea and constipation, and rarely, tinnitus. Available data are not extensive enough to exclude a risk to the traveler from the use of such large doses of bismuth subsalicylate for a period of more than three weeks. Bismuth subsalicylate should be avoided by persons with aspirin-allergy, renal insufficiency, gout, and by those who are taking anticoagulants, probenecid, or methotrexate. In patients already taking salicylates for arthritis, large concurrent doses of bismuth subsalicylate can produce toxic serum concentrations of salicylate. Caution should be used in giving bismuth subsalicylate to adolescents and children with chicken pox or flu because of a potential risk of Reye's syndrome. Bismuth subsalicylate has not been approved for children under three years old. Bismuth subsalicylate appears to be an effective prophylactic agent for TD, but is not recommended for prophylaxis of TD for periods of more than three weeks. Further studies of the efficacy and side effects of lower dose regimens are needed.

Controlled data are available on the prophylactic value of several other nonantimicrobial drugs. Enterovioform* and related halogenated hydroxyquinoline derivatives e.g., clioquinol, iodoquinol, Mexaform*, Intestopan*, and others, are not helpful in preventing TD, may have serious neurological side effects, and should never be used for prophylaxis of TD.

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*Use of tradenames is for identification only and does not imply endorsement by the Public Health Service or the U.S. Department of Health and Human Services

Controlled studies have indicated that a variety of antibiotics, including doxycycline, trimethoprim/sulfamethoxazole (TMP/SMX), trimethoprim alone, and the fluoroquinolone agents ciprofloxacin and norfloxacin, when taken prophylactically have been 52-95% effective in preventing traveler's diarrhea in several areas of the developing world. The effectiveness of these agents, however, depends upon the antibiotic resistance patterns of the pathogenic bacteria in each area of travel, and such information is seldom available. Resistance to the fluoroquinolones is the least common, but this may change as the use of these agents increases worldwide.

While effective in preventing some bacterial causes of diarrhea, antibiotics have no effect on the acquisition of various viral and parasitic diseases. Prophylactic antibiotics may give travelers a false sense of security about the risk associated with consuming certain local foods and beverages.

The benefits of widespread prophylactic use of doxycycline, quinolones, TMP/SMX or TMP alone in several million travelers must be weighed against the potential drawbacks. The known risks include allergic and other side effects (such as common skin rashes, photosensitivity of the skin, blood disorders, Stevens-Johnson syndrome and staining of the teeth in children) as well as other infections that may be induced by antimicrobial therapy (such as antibiotic-associated colitis, *Candida* vaginitis, and *Salmonella* enteritis). Because of the uncertain risk of widespread administration of these antimicrobial agents, their prophylactic use is not recommended. While it seems reasonable to use prophylactic antibiotics in certain high risk groups, such as travelers with immunosuppression or immunodeficiency, there are no data which directly support this practice. There is little evidence that other disease entities are worsened sufficiently by an episode of TD to risk the rare undesirable side effects of prophylactic antimicrobial drugs. **Therefore, prophylactic antimicrobial agents are not recommended for travelers.** Instead, available data support the recommendation that travelers be instructed in sensible dietary practices as a prophylactic measure. This recommendation is justified by the excellent results of early treatment of TD as outlined below. Some travelers may wish to consult with their physician and may elect to use prophylactic antimicrobial agents for travel under special circumstances, once the risks and benefits are clearly understood.

Treatment

Individuals with TD have two major complaints for which they desire relief--abdominal cramps and diarrhea. Many agents have been proposed to control these symptoms, but few have been demonstrated to be effective by rigorous clinical trials.

Nonspecific Agents

A variety of "adsorbents" have been used in treating diarrhea. For example, activated charcoal has been found to be ineffective in the treatment of diarrhea. Kaolin and pectin have been widely used for diarrhea. The combination appears to give the stools more consistency but has not been shown to decrease cramps and frequency of stools nor to shorten the course of infectious diarrhea.

Lactobacillus preparations and yogurt have also been advocated, but no evidence supports use of these treatments for TD.

Bismuth subsalicylate preparation (1 oz of liquid or 2 262.5 mg tablets every 30 minutes for eight doses) decreased the rate of stooling and shortened the duration of illness in several placebo-controlled studies. Treatment was limited to 48 hours at most, with, no more than 8 doses in a 24-hour period. There is concern about taking, without

supervision, large amounts of bismuth and salicylate, especially in individuals who may be intolerant to salicylates, who have renal insufficiency, or who take salicylates for other reasons.

Antimotility Agents

Antimotility agents are widely used in treating diarrhea of all types. Natural opiates (paregoric, tincture of opium, and codeine) have long been used to control diarrhea and cramps. Synthetic agents, diphenoxylate and loperamide, come in convenient dosage forms and provide prompt symptomatic but temporary relief of uncomplicated TD. However, they should not be used in patients with high fever or with blood in the stool. These drugs should be discontinued if symptoms persist beyond 48 hours. Diphenoxylate and loperamide should not be used in children under the age of 2.

Antimicrobial Treatment

Travelers who develop diarrhea with three or more loose stools in an 8-hour period, especially if associated with nausea, vomiting, abdominal cramps, fever, or blood in the stools, may benefit from antimicrobial treatment. A typical 3- to 5-day illness can often be shortened to 1 to 1 1/2 days by effective antimicrobial agents. The effectiveness of antibiotic therapy will depend on the etiologic agent and its antibiotic sensitivity. Antibiotic regimens most likely to be effective are TMP/SMX (160 mg TMP and 800 mg SMX) or ciprofloxacin (500 mg) taken twice daily. Other fluoroquinolones such as norfloxacin and ofloxacin may be equally effective as ciprofloxacin. Fewer side effects and less widespread resistance has been reported with the fluoroquinolones than with TMP/SMX. Three days of treatment is recommended, although 2 days or fewer may be sufficient. Nausea and vomiting without diarrhea should not be treated with antimicrobial drugs.

Travelers should consult a physician, rather than attempt self-medication, if the diarrhea is severe or does not resolve within several days; if there is blood and/or mucus in the stool; if fever occurs with shaking chills; or if there is dehydration with persistent diarrhea.

Oral fluids

Most cases of diarrhea are self-limited and require only simple replacement of fluids and salts lost in diarrheal stools. This is best achieved by use of an oral rehydration solution such as World Health Organization Oral Rehydration Salts (ORS) solution (Table 26). This solution is appropriate for treating as well as preventing dehydration. ORS packets are available at stores or pharmacies in almost all developing countries. ORS is prepared by adding one packet to boiled or treated water. Packet instructions should be checked carefully to ensure that the salts are added to the correct volume of water. ORS solution should be consumed or discarded within 12 hours if held at room temperature, or 24 hours if held refrigerated.

Iced drinks and noncarbonated bottled fluids made from water of uncertain quality should be avoided. Dairy products aggravate diarrhea in some people and should be avoided.

TABLE 26. Composition of World Health Organization Oral Rehydration Solution (ORS) for Diarrheal Illness

Ingredient	Amount
Sodium chloride	3.5 grams/liter
Potassium chloride	1.5 grams/liter
Glucose	20.0 grams/liter
Trisodium citrate*	2.9 grams/liter

*An earlier formulation used sodium bicarbonate 2.5 grams/liter had a shorter shelf-life, but was physiologically equivalent, and may still be produced in some countries.

Infants with Diarrhea

Children aged 0-2 years are at high risk of acquiring traveler's diarrhea. The greatest risk to the infant with diarrhea is dehydration. Dehydration is best prevented by use of WHO ORS solution in addition to the infant's usual food. ORS packets are available at stores or pharmacies in almost all developing countries. ORS is prepared by adding one packet to boiled or treated water. Packet instructions should be checked carefully to ensure that the salts are added to the correct volume of water. ORS solution should be consumed or discarded within 12 hours if held at room temperature, or 24 hours if held refrigerated. The dehydrated child will drink ORS avidly; ORS is given to the child as long as the dehydration persists. The infant who vomits the ORS will usually keep it down if it is offered by spoon in frequent small sips. Breast-fed infants should continue nursing on demand. For bottle-fed infants, full-strength lactose-free, or lactose-reduced formulas should be administered. Older children receiving semi-solid or solid foods should continue to receive their usual diet during the illness. Recommended foods include starches, cereals, yogurt, fruits, and vegetables.

Immediate medical attention is required for the infant with diarrhea who develops signs of moderate to severe dehydration (Table 27), bloody diarrhea, fever of greater than 102^{o}F, or persistent vomiting. While medical attention is being obtained, the infant should be offered ORS.

More information is available from CDC in a publication entitled, "The management of acute diarrhea in children: oral rehydration, maintenance, and nutritional therapy." (MMWR No. RR-16, October 16, 1992). ORS packets are available in the United States from Jianas Brothers Packaging Company, Kansas City, Missouri (telephone:(816)421-2880).

Precautions in Children and Pregnant Women

Although children do not make up a large proportion of travelers to high-risk areas, some children do accompany their families. Teenagers should follow the advice given to adults, with possible adjustment of doses of medication. Physicians should be aware of the risks of tetracyclines to children under 8 years of age. There are few data available about usage of antidiarrheal drugs in children. Drugs should be prescribed with caution for pregnant women and nursing mothers.

TABLE 27. Assessment of the Dehydration Levels in Infants

	Signs		
	Mild	**Moderate**	**Severe**
General Condition	Thirsty, restless, agitated	Thirsty, Restless, irritable	Withdrawn, somnolent, or comatose
Pulse	Normal	Rapid and weak	Rapid and weak
Anterior fontanelle	Normal	Sunken	Very sunken
Eyes	Normal	Sunken	Very sunken
Tears	Present	Absent	Absent
Urine	Normal	Reduced and concentrated	None for several hours
Weight loss	4-5%	6-9%	10% or more

CRUISE SHIP SANITATION

In 1975, because of several major disease outbreaks on cruise vessels, the Centers for Disease Control and Prevention (CDC) established the Vessel Sanitation Program (VSP) as a cooperative activity with the cruise ship industry. This joint program strives to achieve and maintain a level of sanitation on passenger vessels that will lower the risk of gastrointestinal disease outbreaks and provide a healthful environment for ships' passengers and crew. The program goals are addressed through encouraging industry to establish and maintain a comprehensive sanitation program and oversight of its success through an inspections process. Every vessel with a foreign itinerary that carries 13 or more passengers is subject to twice yearly inspections and when necessary reinspection. Inspections are only conducted at those ports under U.S. control and cover such environmental aspects as:

1. Water supply, storage, distribution, backflow protection and disinfection.
2. Food preparation during storage, preparation, and service and product temperature control.
3. Potential contamination of food, water, and ice.
4. Employee practices and personal hygiene.
5. General cleanliness, facility repair, and vector control.
6. The ship's training programs in general environmental and public health practices.

A score of 86 or higher at the time of the inspection indicates that the ship is providing an accepted standard of sanitation. In general, the lower the score the lower the level of sanitation; however, a low score does not necessarily imply an imminent risk of an outbreak of gastrointestinal disease or other illness related to environmental sanitation. Each ship is required to document a plan for corrective action following each inspection.

Inspectors will recommend a ship not sail if they detect an imminent health hazard aboard ship (e.g., inadequate facilities for maintaining safe food temperatures or a contaminated drinking-water system.) Full information on inspection criteria can be obtained by writing to the VSP office at the address listed at the end of this section. At any time, the Director of CDC may determine that failure to implement corrective actions presents a threat of communicable disease being introduced into the United States and may take additional action including detention of the ship in port.

The scores for each ship are published every 2 weeks in the *Summary of Sanitation Inspections of International Cruise Ships*, commonly referred to as the *green sheet*. This sheet is widely distributed to travel-related services around the world and is a way to communicate a ship's compliance with VSP recommendations to both the cruise ship industry and the consumer. The *green sheet* is available to the public via INTERNET, FTP.CDC. GOV//PUB/SHIP_INSPECTIONS/SHIPSCORE.TXT; or by the CDC fax-back service by dialing (404) 332-4565 and requesting Document Number 510051. Interested parties can also obtain the *green sheet* or a copy of the complete inspection for a specific ship by writing to the Vessel Sanitation Program, National Center for Environmental Health, Centers for Disease Control and Prevention, 1015 North America Way, Room 107, Miami, Florida 33132.

DISINSECTION OF AIRCRAFT

International travelers should be aware that some countries require disinsection of certain passenger aircraft in order to prevent the importation of insects such as mosquitoes. Disinsection procedures may include the spraying of the aircraft passenger compartment with insecticide while passengers are present. While the recommended disinsection procedures have been determined to be safe by the World Health Organization, they may aggravate certain health conditions (i.e., allergies). Travelers with such conditions or who are otherwise interested in determining what disinsection procedures may be performed on a particular flight should contact their travel agent or airline.

TUBERCULOSIS RISK IN AIRCRAFT

The Centers for Disease Control and Prevention (CDC) and state and local health departments have conducted six investigations of possible tuberculosis (TB) transmission on commercial aircraft. In all six instances, a passenger or a member of the flight crew traveled on commercial airplanes while infectious with TB. In none of the six instances were the airlines aware of the TB in their passengers. In two of the instances, CDC concluded that TB was probably transmitted to others on the airplane.

TB is spread from person to person through the air. When a person with infectious TB coughs or sneezes, tiny droplets containing TB bacteria may be released into the air. Other people may inhale these droplets and become infected.

The CDC found that the risk of TB transmission from an infectious person to others on an airplane was greater on long flights (i.e., 8 hours or longer). The risk of exposure to TB was higher for passengers and flight crew sitting or working near an infectious person. These persons may inhale droplets containing TB bacteria.

The risk of TB transmission on a airplane does not appear to be greater than in any other enclosed space. To prevent the possibility of exposure to TB on airplanes, CDC recommends that persons known to have infectious TB travel by private transportation (i.e., not by commercial airplanes or other commercial carriers), if travel is required. CDC has issued guidelines for notifying passengers who may have been exposed to TB

aboard airplanes. Passengers concerned about a possible exposure to TB should see their primary health care provider for a TB skin test. TB is a treatable and preventable disease.

ENVIRONMENTAL EFFECTS

International travelers may be subject to certain stresses that may lower resistance to disease, such as crowding, disruption of usual eating and drinking habits, and time changes with “jet lag” contributing to a disturbed pattern of the sleep and wakefulness cycle. These conditions of stress can lead to nausea, indigestion, fatigue, or insomnia. Complete adaptation depends on the number of time zones crossed but may take a week or more.

Heat and cold can be directly or indirectly responsible for some diseases and can give rise to serious skin conditions. Dermatophytoses such as athlete's foot are often made worse by warm, humid conditions.

Excessive heat and humidity alone, or immoderate activity under those conditions, may lead to heat exhaustion due to salt and water deficiency and to the more serious heat stroke or hyperthermia. The ultraviolet rays of the sun can cause severe and very debilitating sunburn in lighter-skinned persons.

Excessive cold affects persons who may be inadequately dressed and particularly the elderly; it can lead to hypothermia and to frost-bite of exposed parts of the body.

Breathing and swallowing dust when traveling on unpaved roads or in arid areas may be followed by nausea and malaise, and may cause increased susceptibility to infections of the upper respiratory tract.

Traveling in high altitudes may lead to insomnia, headache, nausea, and altitude sickness, even in young and healthy persons, and can cause distress to those with cardiac or pulmonary conditions. Individual susceptibility to acute mountain sickness is highly variable. Travelers who are at greatest risk are those who ascend rapidly to tourist sites in the Andes and the Himalayas. Acetazolamide has been shown, under both simulated and actual climbing conditions, to hasten the process of acclimatization to high altitudes. The recommended dosage to prevent acute mountain sickness is 250 mg every 8–12 hours, with medication initiated 24–48 hours before, and continued during ascent. Acetazolamide should not be taken by individuals who are allergic to sulfonamides.

CHERNOBYL

Effects of the radiological release at Chernobyl

The Chernobyl Nuclear Power station, located in the Ukraine Republic about 100 kilometers (62 miles) north-west of Kiev and 310 kilometers (193 miles) south-east of Minsk (in Belarus), experienced an uncontrolled release of radioactive material in April, 1986. This event seems to have resulted in the largest short term release of radioactive materials to the atmosphere ever recorded. The radiological contamination primarily affected three Republics: the Ukraine, Belarus, and Russia. The highest areas of radioactive ground contamination occurred within 30 km (19 miles) of Chernobyl.

Area Considerations

Short term international travelers to the republics of Ukraine, Belarus, and Russia (i.e., those who plan to stay in the region less than a few months) should not be concerned about residing in areas that are not controlled (i.e., marked with signs or fenced). However, we do caution longer term visitors that there are some non-controlled areas where an individual could receive a radiation dose from the radio-active ground contamination in excess of the international radiological health standards recommended for most members of the public. Long term visitors should investigate the local conditions prior to choosing a long-term residence. (For example, ground contamination that exceeds 5 curies per square kilometer (5 Ci/km^2) of cesium-137 could result in a radiation dose greater than the recommended standards.)

Food and Water Considerations

Officials of the three republics attempt to monitor all food stuffs sold in the public markets for levels of radioactivity. Radioactive concentration limits have been established for various classes of food, e.g., milk, meat, and vegetables. These limits are comparable to standards used by many western nations including the European Economic Community. Food with contamination levels in excess of these limits is not allowed to be sold in the market. Private farmers regularly make food available for sale outside the official market system. This food is not monitored for radioactivity and it is recommended that travelers not consume this food. Likewise, it is recommended that travelers not consume any wild berries, wild mushrooms or wild game from these regions. And, it is also recommended that travelers drink only bottled water.

Age and Health Considerations

Young children, unborn babies, and nursing infants are potentially at greater risk from exposure to radiation than adults. Pregnant or nursing mothers should pay extra attention to acquiring and consuming food from reliable well-monitored sources.

INJURIES

The major causes of serious disability or loss of life are not infectious. Trauma caused by injuries, principally that suffered in motor vehicle crashes, is the leading cause of death and disability in both developed and developing countries worldwide. The risk of motor vehicle related death may be from 7 to 13 times higher in developing countries than the United States. Motor vehicle crashes result from a variety of factors, including inadequate roadway design, hazardous conditions, lack of appropriate vehicles and vehicle maintenance, unskilled or inexperienced drivers, inattention to pedestrians and pedalcyclists, or impairment due to alcohol or drug use; all these factors are preventable or can be abated. Defensive driving is an important preventive measure. When driving or riding, insist on a vehicle equipped with safety belts, and where available, use them. Cars should be carefully inspected to assure that tires and brakes are in good condition and that all lights are in good working order. Where available, also request a vehicle equipped with airbags and when renting a large truck, request a vehicle equipped with anti-lock brakes. As a high proportion of crashes occur at night when returning from “social events,” avoid non-essential night driving, alcohol, and riding with persons who are under the influence of alcohol or drugs. Pedestrian, bicycle, and motorcycle travel are often dangerous, and helmet use is imperative for bicycle and motorcycle travel.

Fire injuries are also a significant cause of injuries and death—do not smoke in bed, and inquire about whether hotels have smoke detectors and sprinkler systems. Travelers may wish to bring their own smoke detectors with them. Always look for a primary and alternate escape route from rooms in which you are meeting or staying. Look for improperly vented heating devices which may cause carbon monoxide poisoning. Remember to escape a fire by crawling low under smoke.

Other major causes of injury trauma include drowning (see swimming precautions p. 196) and injuries to water skiers and divers due to boat propellers. Boats equipped with propeller guards should be used whenever possible. Protection against potentially hazardous drugs is nonexistent in some countries increasing the risk of adverse reactions. Do not buy medications “over the counter” unless you are familiar with the product.

Travelers should also be aware of the potential for violence-related injuries. Risk for assault or terrorist attack varies from country to country; heed advice from residents and tour guides about areas to be avoided, going out at night, and going out alone. Do not fight attackers. If confronted, give up your valuables. For more information, contact the U.S. Department of State, Overseas Citizens Emergency Center, at (202) 647-5225.

ANIMAL-ASSOCIATED HAZARDS

Animals in general tend to avoid human beings, but they can attack, particularly if they are with young. In areas of endemic rabies, domestic dogs, cats, or other animals should not be petted. Wild animals should be avoided.

The bites, stings, and contact of some insects cause unpleasant reactions. Medical attention should be sought if an insect bite or sting causes redness, swelling, bruising, or persistent pain. Many insects also transmit communicable diseases. Some insects can bite and transmit disease without the person being aware of the bite, particularly when camping or staying in rustic or primitive accommodations. Insect repellents, protective clothing, and mosquito netting are advisable in many parts of the world (See p. 180, Protection Against Mosquitoes and Other Arthropod Vectors).

Poisonous snakes are hazards in many parts of the world, although deaths from snake bites are relatively rare. The Australian brown snake, Russell's viper and cobras in southern Asia, carpet vipers in the Middle East, and coral and rattlesnakes in the Americas are particularly dangerous. Most snakebites are the direct result of handling or harassing snakes, which bite as a defensive reaction. Attempts to kill snakes are dangerous, often leading to bites on the fingers. The venom of a small or immature snake may be even more concentrated than that of a larger individual, therefore all snakes should be left strictly alone.

Less than half of all snake bite wounds actually contain venom, but medical attention should be sought anytime a bite wound breaks the skin. A pressure bandage, ice (if available), and immobilization of the affected limb are recommended first aid measures while the victim is moved as quickly as possible to a medical facility. Specific therapy for snakebite is controversial, and should be left to the judgement of local emergency medical personnel. Snakes tend to be active at night and in warm weather. As a precaution, boots and long pants may be worn when walking outdoors at night in snake-infested regions. Bites from scorpions may be painful but seldom are dangerous except possibly in infants. In general, exposure to bites can be avoided by sleeping under mosquito nets and by shaking clothing and shoes before putting them on, particularly in the morning. Snakes and scorpions tend to rest in shoes and clothing.

ANTHRAX-CONTAMINATED GOATSKIN HANDICRAFTS

Anthrax is a disease caused by a bacterial organism that produces spores that are highly resistant to disinfection. These infectious spores may persist on a contaminated item for many years. Anthrax spores have been found on goatskin handicrafts from Haiti.

Travelers to Caribbean countries are advised not to purchase Haitian goatskin handicrafts. Because of the risk, importation of goatskin handicrafts from Haiti will not be permitted at U.S. ports of entry; they will be confiscated and destroyed.

SWIMMING PRECAUTIONS

Swimming in contaminated water may result in skin, eye, ear, and certain intestinal infections, particularly if the swimmer's head is submerged. Generally for infectious disease prevention, only pools that contain chlorinated water can be considered safe places to swim. In certain areas, fatal primary amebic meningoencephalitis has occurred following swimming in warm dirty water. Swimmers should avoid beaches that might be contaminated with human sewage, or with dog feces. Wading or swimming should be avoided in freshwater streams, canals, and lakes liable to be infested with the snail hosts of schistosomiasis (bilharziasis) or contaminated with urine from animals infected with *Leptospira*. Biting and stinging fish and corals and jelly fish may provide a hazard to the swimmer. Never swim alone or when under the influence of alcohol or drugs, and never dive head first into an unfamiliar body of water.

THE POST-TRAVEL PERIOD

Some diseases may not manifest themselves immediately. If travelers become ill after they return home, they should tell their physician where they have traveled.

Most persons who acquire viral, bacterial, or parasitic infections abroad become ill within 6 weeks after returning from international travel. However, some diseases may not manifest themselves immediately, e.g., malaria may not cause symptoms for as long as 6 months to a year after the traveler returns to the United States. It is recommended that a traveler always advise a physician of the countries visited within the 12 months preceding onset of illness. Knowledge of such travel and the possibility the patient may be ill with a disease the physician rarely encounters will help the physician arrive at a correct diagnosis.

IMPORTATION OR EXPORTATION OF HUMAN REMAINS

There are no federal restrictions on the importation of human remains unless the death was the result of one of the following communicable diseases: cholera or suspected cholera, diphtheria, infectious tuberculosis, plague, suspected smallpox, yellow fever, suspected viral hemorrhagic fevers (Lassa, Marburg, Ebola, Congo-Crimean, and others not yet isolated or named). If the death was the result of one of these diseases, the remains must be cremated or properly embalmed and placed in a hermetically sealed casket, and be accompanied by a death certificate, translated into English, which states the cause of death. Following importation, the local mortician will be subject to the regulations of the State and local health authorities for interstate or intrastate shipment.

The United States has no requirements for the exportation of human remains; however, the requirements of the country of destination must be met. Information regarding these requirements may be obtained from the appropriate embassy or local consulate general.

IMPORTATION OR REENTRY OF PETS

Pets which are transported internationally should be free of communicable diseases that may be transmissible to humans. U.S. Public Health Service regulations place the following restrictions on the importation of dogs, cats, nonhuman primates and turtles:

DOGS—Dogs older than 3 months presented for importation from countries where rabies is known to occur (See Table 19), must be accompanied by a valid rabies vaccination certificate which includes the following information:

1. The breed, sex, age, color, markings, and other identifying information,
2. Vaccination date at least 30 days prior to importation (See below)
3. Vaccination expiration date. If not shown, the date of vaccination must be within 12 months prior to the importation, and
4. Signature of a licensed veterinarian.

Dogs not accompanied by the above described certificate may be admitted, provided the importer completes a confinement agreement. Such dogs must be kept in confinement during transit to, and be vaccinated within 4 days after arrival at, the U.S. destination. Such dogs must remain in confinement for at least 30 days after the date of vaccination.

Dogs less than 3 months of age may be admitted, provided the importer completes a confinement agreement. Such dogs must be kept in confinement during transit and at the U.S. destination until vaccinated at 3 months of age and for at least 30 days after vaccination.

Routine rabies vaccination of dogs is recommended in the U.S. and is required by most State and local health authorities.

CATS—While proof of rabies vaccination is not required for cats, routine rabies vaccination of cats is recommended in the U.S. and is required by most State and local health authorities.

TURTLES—Turtles may transmit salmonellosis to humans, and because small turtles are often kept as pets, restrictions apply to their importation. Live turtles with a carapace (shell) length of less than 4 inches and viable turtle eggs may be imported into the United States if the importation is not for commercial purposes. The Public Health Service has no restrictions on the importation of live turtles with a carapace length of more than 4 inches.

MONKEYS AND OTHER NONHUMAN PRIMATES—Nonhuman primates may transmit a variety of serious diseases to humans. Live monkeys and other nonhuman primates may be imported into the United States only by importers registered with CDC and only for scientific, educational, or exhibition purposes. Monkeys and other nonhuman primates may not be imported for use as pets.

MEASURES AT PORT OF ENTRY

U.S. Public Health Service regulations provide for the examination of admissible dogs, cats, nonhuman primates and turtles presented for importation into the U.S. Animals with evidence of disease that may be transmissible to humans may be subject to additional disease control measures.

GENERAL

For additional information regarding importation of these animals, contact the Centers for Disease Control and Prevention, Attention: National Center for Infectious Diseases, Division of Quarantine, Mailstop E03, Atlanta, Georgia 30333, Telephone (404) 639-8107.

Persons planning to import horses, ruminants, swine, poultry, birds, and dogs used in handling livestock should contact the U.S. Department of Agriculture regarding additional requirements, Telephone (301) 436-8170.

Persons planning to import fish, reptiles, spiders, wild birds, rabbits, bears, wild members of the cat family, or other wild or endangered animals should contact the U.S. Department of the Interior, Fish and Wildlife Service, Telephone (202) 342-9242.

Travelers planning to take a pet to a foreign country are advised to meet entry requirements of the country of destination. To obtain this information write to or call the country's embassy in Washington, D.C. or to the consulate nearest you.

EMERGING INFECTIOUS DISEASES

Emerging infectious diseases are diseases of infectious origin whose incidence in humans has increased within the past two decades or threatens to increase in the near future. Many factors, or combinations of factors, can contribute to disease emergence. New infectious diseases may emerge from genetic changes in existing organisms; known diseases may spread to new geographic areas and populations; and previously unknown infections may appear in humans living or working in changing ecologic conditions that increase their exposure to insect vectors, animal reservoirs, or environmental sources of novel pathogens. Reemergence may occur because of the development of antimicrobial resistance in existing infections (e.g., gonorrhea, malaria, pneumococcal disease) or breakdowns in public health measures for previously controlled infections (e.g., cholera, tuberculosis [TB], pertussis). For current outbreak bulletins on diseases of concern for international travelers one may call the CDC Travelers' Health hotline at (404) 332–4559.

DEFINITIONS

Active immunization—The production of immunity in response to the administration of a vaccine or a toxoid.

Antigen(s)—Substances inducing the formation of an immune response.

Antitoxin—A solution of antibodies derived from the serum of animals immunized with specific antigens used to achieve passive immunity or to effect a treatment.

"Blue Sheet"—Summary of Health Information for International Travel, published biweekly by CDC.

CDC—Centers for Disease Control and Prevention.

DEET—N.N.,diethylmetatoluamide—the principal ingredient of most insect repellents.

Direct transit area—A special area established in an airport, approved and supervised directly by the health administration concerned, for segregating passengers and crews breaking their air voyage without leaving the airport. Diseases subject to International Health Regulations—Cholera, yellow fever, and plague.

Endemic—The usual frequency of occurrence of a disease, including possible seasonal variations, in a human population.

Enteric—Pertaining to the small intestine.

Enzootic—The usual frequency of occurrence of a disease, including possible seasonal variations, in an animal population.

Epidemic—More than the expected number of cases of disease which would occur in a community or region during a given time period.

Epizootic—The occurrence of a disease in a defined animal population at a higher than expected rate.

Etiology—The study of the factors that cause disease.

Immune globulin (IG)—A sterile solution containing antibody from human blood. It is primarily indicated for routine maintenance of certain immunodeficient persons, and for passive immunization against measles and hepatitis A.

Immunization—The process of inducing or providing immunity artificially by administering an immunobiologic. Immunization can be active or passive.

Imported case—A person who acquired an infection outside of a specified area.

Infected area—An area which harbors a particular agent of infection and which because of population characteristics, density, and mobility, and/or vector and animal reservoir potential could support transmission of disease(s) identified there. It is defined on epidemiologic principles by the health administration reporting the disease and need not correspond to administrative boundaries.

International Certificate of Vaccination—The official certificate used to document the vaccinations a traveler has received, when and where received, and who administered them.

Isolation—The separation of a person or group of persons from others (except the health staff on duty) to prevent the spread of infection.

Motion sickness—A functional disorder thought to be brought on by repetitive motion and characterized by nausea or vomiting.

MMWR—Morbidity and Mortality Weekly Report, published by CDC.

Parasitic disease—A disease caused by an organism that lives in or on another organism.

Passive immunization—The provision of temporary immunity by the administration of preformed antitoxin or antibodies.

Pathogen—Any disease-producing microorganism or material.

Quarantine—That state or condition during which measures are applied by a health administration to a ship, an aircraft, a train, road vehicle, other means of transport or container, or individuals to prevent the spread of disease from the object of quarantine to reservoirs, vectors of disease, or other individuals.

Quarantinable diseases—The diseases designated by International Health Regulations as quarantinable are: cholera, yellow fever, and plague.

Recommended vaccination—Vaccination not required by International Health Regulations but suggested for travelers visiting or living in certain countries.

Required vaccination—Vaccination the traveler must have for entry into or exit from a country. The traveler must present a validated International Certificate of Vaccination which documents the vaccination(s) received.

Specific immune globulin—Special preparations obtained from donor pools preselected for a high antibody content against a specific disease.

Toxoid—A modified bacterial toxin that has been rendered nontoxic but that retains the ability to stimulate the formation of antitoxin.

Travelers' diarrhea—A syndrome characterized by a twofold or greater increase in the frequency of unformed bowel movements. Commonly associated symptoms include abdominal cramps, nausea, bloating, urgency, fever, and malaise. Episodes of travelers' diarrhea usually begin abruptly, occur during travel or soon after returning home, and are generally self-limited.

Uniform Stamp—An official validation stamp which may be issued in the United States by the State health departments to local health departments and physicians licensed by the State.

Vaccination—The administration of any vaccine or toxoid without regard to whether the recipient is successfully made immune.

Vaccine—A suspension of attentuated live or killed microorganisms, or fractions thereof administered to induce immunity and thereby prevent infectious disease.

Validation—Application of an official stamp or seal to the International Certificate of Vaccination by the health department or other appropriate agency. Approved validation stamps and seals in the United States are: (1) The Department of Defense Stamp, (2) the Department of State Seal, (3) the Public Health Service Seal, (4) the National Aeronautics and Space Administration Stamp, and (5) the Uniform Stamp.

Valid certificate—An International Certificate of Vaccination that has been fully completed, signed, and validated with an official stamp or seal. A model of a correctly completed certificate appears on p. 10.

WHO—World Health Organization.

Yellow Fever Vaccination Center—A center designated under the authority of the health administration of a country to administer yellow fever vaccine.

SUBJECT INDEX

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