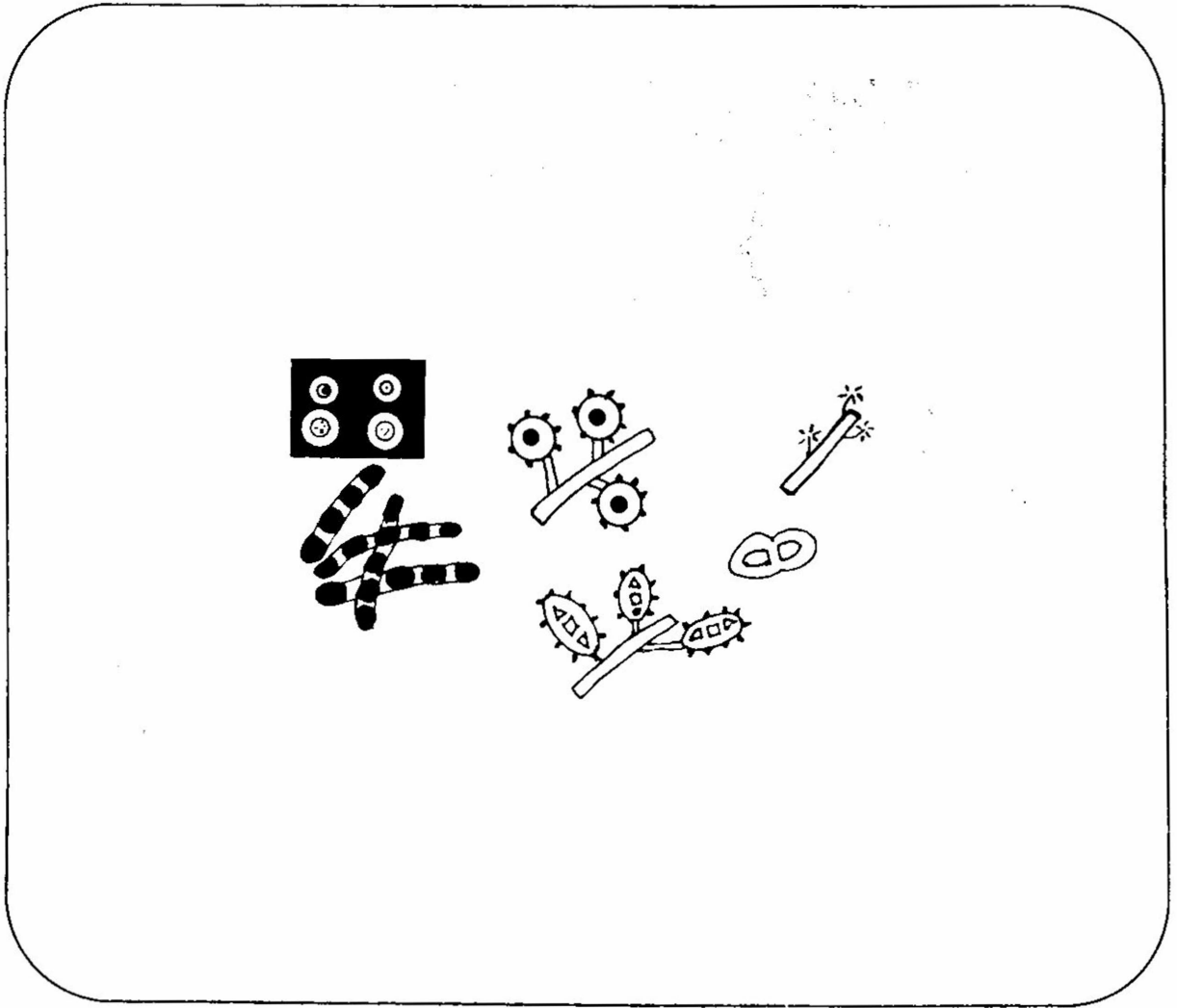


NATIONAL COMMUNICABLE DISEASE CENTER

# MYCOSES

SURVEILLANCE



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AND  
P. 11

Mycoses surveillance.

PREFACE

The systemic fungal diseases are not included among the reportable diseases in many states. It is, therefore, difficult to assess the true size of the mycoses problem. This report summarizes presently available information with the hope that it may stimulate more active reporting of these diseases.

Information presented here is received from state and local health departments and other pertinent sources and is intended primarily for use by those responsible for disease control activities. Much of the information is preliminary. Anyone desiring to quote this report should contact the original investigator for confirmation and interpretation.

National Communicable Disease Center.....David J. Sencer, M. D.  
Director

Ecological Investigations Program.....Tom D. Y. Chin, M. D.  
Director

Mycoses Section.....Fred E. Tosh, M. D.  
Acting Chief

Statistical and Publications Services.....Irene L. Doto, M. A.  
Chief

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE  
Public Health Service  
Health Services and Mental Health Administration  
National Communicable Disease Center  
2002 West 39th Street  
Kansas City, Kansas 66103

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V. Number of Cases by State in the Mycoses Study Conducted by NCDC in Kansas City - January 1, 1967 to December 31, 1967

## I. SUMMARY

Although systemic fungal diseases are generally not reportable, 1,134 cases of five different mycotic diseases were optionally reported from 23 states during 1967 (Table I). Coccidioidomycosis led in reported cases with 859 in 7 states, 596 in Arizona and 252 in California. Histoplasmosis was reported from 18 states with 206 cases. The central states accounted for the majority of these cases, according to the Annual 1967 Summary of the NCDC Morbidity and Mortality Report. For 1966, Cryptococcosis led the list of reported deaths due to systemic fungal diseases with a total of 90, histoplasmosis was second with 60, and coccidioidomycosis was third with 45 (Table II).

## II. MATERIALS AND METHODS

Figures on the incidence of mycotic diseases were taken from the Annual 1967 Summary of the NCDC Morbidity and Mortality Report, data on serologic tests came from the 1967 Annual Report of State and Territorial Laboratory Directors, and additional information was derived from other available sources.

## III. SEROLOGIC TESTS FOR FUNGAL INFECTIONS

Figures on fungal serology testing by state and territorial public health laboratories during fiscal year 1967 are shown in Table III. Most laboratories perform tests for several of the systemic fungi on each specimen submitted. A positive test result is usually considered to be evidence of active disease or recent infection. Data from these laboratories should provide a more accurate measure of the incidence of fungal infections than reported cases because reporting is not required by most states. Some duplication is inherent in these data since a single case may have several specimens tested during the period of the illness. Also, because of cross-reactions, some specimens may be positive to the antigens of more than one fungus.

More than 33,000 specimens were tested by the public health laboratories during the fiscal year 1967. There were 1262 specimens positive for coccidioidomycosis during this year, and 860 cases were reported during calendar year 1967. There were 5456 specimens positive to the yeast antigen of Histoplasma capsulatum but only 206 cases reported in these same years. The total number of specimens positive for histoplasmosis is much lower than the estimated number of symptomatic cases each year, but it is likely that histoplasmosis is not always considered in the differential diagnosis of moderately severe respiratory infections.

## IV. CURRENT STATUS OF INFECTION

### Histoplasmosis

There is no uniform national reporting, but estimates of the number of individuals infected with systemic fungi in the U. S. population generally run well into the millions. For example, in 1963 Edwards and Palmer published an article on histoplasmin skin test prevalence among Navy recruits. For more than 4 years, all recruits were skin tested as they came into the Navy's training centers at Great Lakes, Illinois, and San Diego, California, where all recruits receive their basic training.

There were 306,226 white, male recruits 17-21 years of age in the study, of whom 212,462 were lifetime residents of their home states. From the data, the authors prepared provisional estimates of the percentage of recruits infected with H. capsulatum among lifetime residents of the 48 contiguous states. If the percent reactors in each state are applied to the total population of that state, based on the 1963 census (191,000,000) there are 31,000,000 individuals in the United States who have experienced infection with H. capsulatum.

If the prevalence figure of 31,000,000 infected individuals in the United States is to be maintained, approximately

500,000 individuals must be infected each year, because 2,000,000 deaths occur annually in the U. S. population. Furcolow estimates that 40 percent of the new infections will be symptomatic; therefore, approximately 200,000 cases of acute pulmonary histoplasmosis probably occur each year in the United States.

#### Coccidioidomycosis

Coccidioidin skin test surveys indicate that about two-thirds of the estimated 9,000,000 inhabitants of the endemic region are infected. Estimates have been made that one-third of the infected persons require a physician's services. If true, and if 6,000,000 persons are infected by age 60, then the annual number of new infections must be approximately 100,000. If one-third of these individuals develop signs and symptoms, then 33,000 clinical cases must occur each year.

Although reported morbidity and mortality figures are generally low for the mycotic diseases, there appears little doubt that high percentages of people in many areas have, or have had, mycotic infections. It is suspected that the mortality figures may have been lessened by deaths being attributed to more common diseases.

#### V. SOURCES OF INFECTION AND CONTROL MEASURES

Soil is the reservoir of the fungi causing histoplasmosis, blastomycosis, coccidioidomycosis, and cryptococcosis. Infection occurs when susceptible individuals come in contact with the fungi in nature. There is no evidence to indicate that these infections are transmitted from person to person or from lower animals to man.

In a community, histoplasmin skin test sensitivity is increased with rising proximity to bird roosts known to be harboring H. capsulatum. Although short exposure is sufficient to cause infection, evidence shows a relationship between length of exposure and prevalence of skin sensitivity. A study of 32 blackbird

roosts in Missouri and Arkansas revealed 28 percent of the roosts were contaminated with H. capsulatum. Large blackbird roosts in urban areas have been responsible for outbreaks of histoplasmosis, and accumulated information indicates that these roosts may be responsible for endemic infections as well.

Many outbreaks of histoplasmosis have been associated with cleaning old chicken houses.

Epidemics occur in areas of low endemicity with creation of proper conditions. The soil under trees which have been used as starling roosts for many years may become heavily infested with H. capsulatum. The removal of these trees or construction work on the site may result in airborne dissemination of large numbers of infectious spores. Precautionary measures consist of wetting the ground before working in the area, and sterilization measures such as treating the surface soil with formalin.

Such measures proved effective in two sites. An outbreak in 1962 was traced to a starling roost in the center of the town after heavy equipment was used to remove trees and underbrush from the contaminated area. In 1964, a second attempt to clear the site led to a second epidemic of histoplasmosis. Decontamination of the five acre site with 3 percent formalin was undertaken after laboratory and field experiments gave promising results. The formalin was applied using a fire truck and a street-washing truck. The site received three applications of the chemical so that the surface was thoroughly soaked. A total of approximately one gallon of solution was applied per square foot of surface area. After treatment, surface samples of soil were negative for H. capsulatum.

#### VI. SPECIAL MYCOSES STUDY BY NCDC

The NCDC Cooperative Mycoses Study is a joint venture by physicians and hospitals in eleven states, in cooperation with the NCDC, Kansas City, Kansas.

The NCDC began the Cooperative Mycoses Study in 1958, after collecting case reports since 1950. Each case is proved, either by culture or by pathology, and is then followed for a long period of time to ascertain the outcome of the disease. Table IV lists by state the cases entered in the study during the ten year period 1958-1967; Table V lists those entered during 1967.

The object of the study has been to evaluate chemotherapy in the treatment of systemic mycotic infections such as histoplasmosis, blastomycosis, coccidioidomycosis, cryptococcosis, aspergillosis, and others. The continuing study has given focus to the importance of mycotic diseases, and increased the recognition of them among participating sanatoria and hospitals. Annual meetings are held to interpret x-rays collected on the patients under observation and to discuss the status of the study. To date, a total of 1179 cases has been entered in the study.

#### Therapy

At present, only two available drugs are effective in treating systemic fungal infections. Amphotericin B is effective against histoplasmosis,

coccidioidomycosis, blastomycosis, and cryptococcosis; while 2-hydroxystilbamidine is effective only against blastomycosis. Although the latter is used in blastomycosis, the infection responds more rapidly and relapses are less common when amphotericin B is used. It may require 16 weeks or more to reach the recommended total dosage of amphotericin used in treating systemic mycoses. The amount required varies slightly from disease to disease, but the usual recommended dosage is approximately 2 grams given over a period of 4 months or so. The drug must be given intravenously; it produces certain side effects and toxic reactions that require close observation of the patient. The most undesirable reaction is renal toxicity, a partially reversible process in most instances unless excessive amounts of the drug must be given. Although very slight permanent renal damage may occur with the usual total dose of amphotericin B, severe renal damage is not likely unless a total dosage of 5 grams is exceeded.

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TABLE I. MYCOTIC DISEASES OPTIONALLY REPORTED TO THE PUBLIC HEALTH SERVICE  
1967

	Actino- mycosis	Blasto- mycosis	Coccidio- idomycosis	Crypto- coccosis	Histo- plasmosis
No. Cases Reported	10	41	859	18	206
No. States Reporting	5	10	7	7	18
Ariz.	...	...	596	...	...
Ark.	...	20	3	...	27
Cal.	...	...	252	...	...
Conn.	...	...	...	...	1
D. C.	...	...	...	...	1
Fla.	...	...	...	...	2
Ill.*	3	1	5	...	47
Ind.	2	1	...	...	13
Iowa	1	...	...	...	41
Kans.	...	1	1	...	12
Ky.	...	...	...	...	2
La.	3	7	...	3	5
Md.	...	...	...	2	2
Minn.	...	1	1	...	7
Miss.	1	4	...	4	16
Mo.	...	...	...	...	2
N. H.	...	1	...	...	...
Ohio	...	4	...	1	15
Okla.	...	1	...	...	...
Ore.	...	...	...	2	...
Va.	...	...	...	1	4
Wash.	...	...	1	5	7
Wisc.	...	...	...	...	2

\*Unspecified 7

TABLE II. DEATHS FROM SYSTEMIC FUNGAL DISEASES: UNITED STATES,  
1962-66\*

Disease	1966	1965	1964	1963	1962
Actinomycosis	21	26	31	35	17
Blastomycosis	12	29	21	24	17
Coccidioidomycosis	45	52	46	71	55
Cryptococcosis	90	62	74	73	90
Histoplasmosis	60	74	77	70	82

\*From NCDC Morbidity and Mortality Weekly Report 16: #53, p.6, Ann. Suppl., Summary 1967.



TABLE III. FUNGAL SEROLOGY TESTING BY STATE AND TERRITORIAL PUBLIC HEALTH LABORATORIES  
DURING FISCAL YEAR 1967, COMPLEMENT FIXATION TESTS ONLY\*

State	Total Fungal Spec.	Blastomycosis		Coccidioidomycosis		Histoplasmosis			
		Yeast Exams	Pos.	Coccidioidin Exams	Pos.	Yeast Exams	Pos.	Histoplasmin Exams	Pos.
Ala.	1,130	1,130	29	1,130	...	1,130	118	1,130	67
Ariz.	5,690	...	...	5,637a	1,084	99	25	99	24
Ga.	532	532	...	532	...	532	14	532	9
Ill.	3,187	1,436	204	1,410	14	3,187	740	3,187	160
Ind.	1,191	1,191	93	88	4	1,191	428	1,191	78
Iowa	959	1,115	116	1,113	12	1,113	286	1,113	104
Kans.	444	444	42	444	2	444	23	444	4
Ky.	1,104	1,268	76	1,134	4	1,579	288	1,283	79
La.	**	489	59	...	...	981	81	981	81
		489b	59	500c	7				
Md.	872	746	...	746	...	858	...	858	...
Mich.	1,427	1,427	28	1,427	14	1,427	413	1,427	77
Minn.	**	687	5	708	5	1,049	214	1,049	58
Miss.	1,546	1,546	163	77	4	1,546	394	1,546	...
Mo.	1,074	943	117	943	6	943	203	943	72
Mont.	12	...	...	...	...	...	...	...	...
N. Y.	1,704	1,078	**	...	...	1,078	294	...	...
				170c	**				
N. C.	**	283	30	96	1	293	40	285	13
		180b	24						
Ohio	3,016	833	156	833	45	3,016	1,494	3,016	418
Tenn.	5,270	...	...	...	...	4,897	151	5,270	210
Tex.	2,251	2,170	191	2,173	52	2,168	166	2,170	102
Va.	757	756	52	756	2	756	57	757	26
Wash.	283	...	...	...	...	...	...	...	...
Wisc.	727	412	43	412	6	727	27	727	25
Totals	33,176	19,155	1,487	20,329	1,262	29,014	5,456	28,008	1,607

\*From Consolidated Annual Report on State and Territorial Public Health Laboratories, Fiscal Year 1967.

\*\*No information was reported

...No activity on report.

a 5,426 microtiter precipitations were also performed.

b Complement Fixation Blastomycin

c Agargel precipitation

States reporting no fungal serology activity were: Alaska, Colo., Conn., Del., Fla., Hawaii, Idaho, Me., Nebr., Nev., N. H., N. J., N. M., N. D., Ore., Pa., R. I., S. C., Utah, Vt., W. Va., and Wyo.

States not reporting were: Ark., Cal., D. C., Mass., Okla., and S. D.

TABLE IV. NUMBER OF CASES BY STATE IN THE MYCOSES STUDY CONDUCTED BY NCDC  
IN KANSAS CITY - - January 1, 1958 to December 31, 1967.

STATE	NUMBER OF CASES				
	Blasto.	Cocci.	Crypto.	Histo.	Sporo.
Arizona	...	2	...	...	...
Arkansas	12	3	2	87	1
California	...	...	1	2	...
Delaware	...	...	3	4	...
Georgia	...	...	...	2	...
Illinois	4	...	3	25	...
Indiana	2	2	3	39	...
Iowa	2	1	1	5	...
Kansas	6	3	11	40	10
Kentucky	20	...	1	130	...
Louisiana	...	...	...	5	...
Missouri	15	5	11	251	5
Nebraska	...	1	...	1	...
New York	...	...	...	1	...
North Carolina	2	...	1	...	...
Ohio	3	...	...	49	1
Oklahoma	...	1	2	1	...
Pennsylvania	1	...	1	...	...
South Dakota	1	...	...	...	...
Tennessee	12	...	6	63	...
Texas	3	75	7	49	...
Vermont	...	...	...	2	6
Virginia	3	...	1	10	...
West Virginia	...	...	...	1	...
Wisconsin	1	...	...	...	...
Canada	...	1	...	3	...
TOTAL	87	94	54	770	23

TABLE V. NUMBER OF CASES BY STATE IN THE MYCOSES STUDY CONDUCTED BY NCDC  
IN KANSAS CITY - - January 1, 1967 to December 31, 1967.

STATE	NUMBER OF CASES				
	Blasto	Cocci	Crypto	Histo	Sporo
Arkansas	1	2	...	5	...
Illinois	...	...	...	1	...
Indiana	...	...	...	2	...
Kansas	...	...	2	1	...
Kentucky	2	...	...	9	...
Missouri	...	...	1	22	...
Ohio	...	...	...	1	...
South Dakota	1	...	...	...	...
Tennessee	2	...	3	1	...
Texas	...	7	1	4	...
Virginia	1	...	...	...	...
TOTAL	7	9	7	46	...