Prevention and Control of Skin Cancer

April 21, 2015
Skin Cancer Background
Public Health Burden of Skin Cancer

- Nearly 5 million cases treated each year in the US
- About 65,000 invasive melanomas diagnosed, 9,000 deaths in 2011
- Cancer registries collect info on melanomas, not basal and squamous cell skin cancers

Basal cell carcinoma
Squamous cell carcinoma
Lentigo maligna melanoma

Trends in Melanoma Incidence, SEER, 1973-2011

Male and female APC 2.9*
Male APC 3.3*
Female APC 2.5*

Rate per 100,000

Year of Diagnosis

APC=Annual Percent Change
* Denotes APC statistically significant

Age Distribution of Melanoma Incidence, United States, 2007-2011

Data are from population areas that meet United States Cancer Statistics publication criteria (www.cdc.gov/cancer/npcr/uscs/technical_notes/criteria.htm) for 2007-2011 and were reported to the National Program of Cancer Registries (CDC) and the Surveillance, Epidemiology and End Results (SEER) program (National Cancer Institute)
The Economic Burden of Skin Cancer

- Nearly 5 million people are treated for skin cancer each year at a cost of $8.1 billion
- The annual cost of skin cancer treatment increased 126% between 2002-2006 and 2007-2011

Skin Type and Other Genetic Factors Strongly Influence Risk of Skin Cancer

- Genetics has strong effect on risk
  - Light hair and eyes
  - Fair skin
  - Skin that burns or freckles
  - Certain types or a large number of moles
  - Family or personal history of skin cancer

- Those with darker skin often diagnosed with skin cancer at a later stage, making it difficult to treat
  - African-Americans, Hispanics
Populations at Greatest Risk of Melanoma, United States, 2007-2011

Data are from population areas that meet United States Cancer Statistics publication criteria (www.cdc.gov/cancer/npcr/uscs/technical_notes/criteria.htm) for 2007-2011 and were reported to the National Program of Cancer Registries (CDC) and the Surveillance, Epidemiology and End Results (SEER) program (NCI)

*Hispanic ethnicity includes persons of all races
Ultraviolet (UV) Radiation
The Most Preventable Cause

- Most skin cancers caused, at least in part, by UV radiation
  - Sunlight
  - Artificial sources (e.g. indoor tanning, occupational exposure)

- UVA penetrates more deeply than UVB due to its longer wavelength
  - Both can cause cancer

Tanning and Burning Indicate Damage to Skin’s DNA

- Tans and sunburns are the body’s response to damage from UV radiation
  - Tanning is the body’s way of attempting to protect against future damage, and tanned skin indicates damage has already occurred
  - Sunburns are often used as indicators of UV overexposure
  - Sunburn = cell death

DNA: deoxyribonucleic acid
Prevalence of Sunburn Remains High

- 37% of Americans report getting sunburned annually
  - 44% of non-Hispanic whites
  - 52% of 18-29 year olds
  - 65% of those 18-29 and non-Hispanic white

- Many report frequent sunburns
  (4 or more times in past year)
  - 12% of all sunburned in past year
  - 16% of those aged 18-29 years
  - 12% of non-Hispanic whites and 19% of blacks

- UV damage adds up over time

US Adults’ Use of Sun Protection When Outside for > 1 Hour on a Sunny Day

![Graph showing the use of sun protection measures among US adults](image)

---

SPF = Sun protection factor

CDC, National Center for Health Statistics, 2010 National Health Interview Survey, [www.cdc.gov/nchs/nhis.htm](http://www.cdc.gov/nchs/nhis.htm)
Only 10% of high school students report wearing sunscreen when outdoors on a sunny day for more than one hour.
Indoor Tanning Increases Risk for Skin Cancer

- Indoor tanning exposes users to intense UV radiation for cosmetic purposes

- More than 400,000 cases of skin cancer estimated caused by indoor tanning each year
  - 6,200 melanomas

Indoor Tanning in the United States

- **Estimated 11.6 million Americans tan indoors annually**
  - 1 in 3 non-Hispanic white women age 16-25 indoor tans each year

- **1.6 million teens under age 18 estimated to tan each year**
  - Contraindicated by FDA
  - Prohibited in 11 states

What Works to Prevent Skin Cancer?

- **Multicomponent community-wide interventions**
  - Combination of strategies across multiple settings
  - For example, a comprehensive intervention in Australia has led to a decline in skin cancer rates among young adults

- **Education and policy interventions in schools**
  - Childcare, grades K-8

- **Education and policy interventions in outdoor and recreational settings**
What Works to Prevent Skin Cancer?

- **Recommended: Provider counseling**
  - Fair-skinned patients aged 10-24 years about minimizing exposure to UV

- **Insufficient evidence: Provider screening**
  - “Screening” defined as whole-body skin examination by a primary care clinician or patient skin self-examination for the early detection of cutaneous melanoma, basal cell cancer, or squamous cell skin cancer in the adult general population
  - USPSTF currently re-reviewing
Surgeon General’s Call To Action to Prevent Skin Cancer: 5 Strategic Goals

- Increase opportunities for sun protection in outdoor settings
- Provide individuals with the information they need to make informed, healthy choices about exposure to UV radiation
- Promote policies that advance the national goal of preventing skin cancer
- Reduce harms from indoor tanning
- Strengthen research, surveillance, monitoring and evaluation related to skin cancer prevention

Preventing Skin Cancer In Arizona: A Snapshot

Sharon McKenna, BA
Arizona SunWise Skin Cancer Prevention Program Manager
Alternate Public Information Officer
Bureau of Epidemiology and Disease Control
Office of Environmental Health
Arizona Department of Health Services
Preventing Skin Cancer in Arizona: My Odyssey

- From sun-seeker and journalist to melanoma survivor and skin cancer prevention specialist
- One person – YOU can make a difference!
- Start with one step, one action

- One of many (survivors and advocates)
Why is Sun Safety Especially Important in Arizona?

- **Intense exposure to natural ultraviolet radiation**
  - More than 300 sunny days each year
  - If AZ was a country, it would be second only to Australia in skin cancer rates

- **Sun safety is an Arizona Department of Health Services priority**

National Weather Service
In 2010 in Arizona, 1,057 invasive melanoma cases reported, with a melanoma death rate of 2.9 per 100,000 compared to 2.7 per 100,000 in the US.

Melanoma reporting is a priority

- Collecting and cleaning 2000-2014 melanoma data from the state’s 531 dermatologists
- Revising the melanoma reporting form
- Creating a monthly newsletter focused on providers and reporting requirements
- Utilizing CHAAs to identify high-risk locales and target messaging

www.healthdata.az.gov/query/module/AzCR/AzCRCntyICDO2/result.html?GraphicName=GroupedHorzBar

CHAAs: Community Health Analysis Area
Arizona’s School Sun Safety Mandate

- **Arizona: first state to mandate sun safety education**
  - Affects 707,329 students in 1,100 K-8 public and charter schools
  - Partnerships with ~250 organizations including sports teams, summer camps, libraries, afterschool programs
  - Prior to the mandate, half of Arizona’s K-8 schools voluntarily using program
  - Requirement for the state’s 2,488 licensed childcare providers

- **History of mandate**
  - Passed May 2005, took effect August 2005
Initial Goals: Protect Kids and Reduce Ultraviolet Radiation Exposure

- Adapted EPA SunWise Program
  - Easy-to-use curriculum activities incorporate math, science, health, social studies, language arts and critical thinking
  - Activities average 20 minutes, categorized by grade (K-2, 3-5, 6-8)
  - Schools teach 3 to 5 activities annually
  - Modified to meet AZ standards, wrote physical education module to make curriculum physically active
Precautions and Sun Safety Messages

- Cover up
- Use sunscreen and lip balm with a Sun Protection Factor (SPF) of 15+ every day
- Wear a wide-brimmed hat
- Wear sunglasses
- Seek shade
- Limit midday exposure
- Check the UV Index
- Avoid sun lamps and tanning booths
Phase II Goals of Sun Safety Mandate: Policies and Publications

- Expand school commitment to sun safety with strong policies

- **School educator respondents study, 2007-2014**
  - 63 percent increase in student ability to provide examples of the harmful health effects of the sun on skin. Student ability to provide examples is up 25 percent since the question was first asked in 2007
  - 85% of educator respondents reported their source of sun safety and skin cancer prevention information is AzDHS
  - Results to be released July 2015
Sample Sun Safety Policy for Schools

- Introduction
- Rationale
- Policy and Guidelines

  - The following precautions will be taken for all outdoor activity and physical activity including but not limited to: recess, physical education classes, field trips, club meetings, after-school and before-school activities, athletic practices and competitions. Students and staff are encouraged to protect skin with sunscreen SPF 15+, lip balm, hats, sunglasses, clothing, shade, and to limit exposure during peak midday UV.

  - [www.azdhs.gov/phs/sunwise](http://www.azdhs.gov/phs/sunwise)

- Sun safety policies in K-8 schools recommended by The Community Guide

Phase II Goals of Sun Safety Mandate: Using Partnerships to Proliferate

- Skin cancer prevention listed as a top 5 priority of Arizona’s State Improvement Plan to accredit the state health department.
- Increasing the number of reported melanoma cases is also a top 5 objective of reducing skin cancer under the Arizona Comprehensive Cancer Control Plan.
- Expanding to Empower Schools, a new program for K-12 schools receiving USDA National Lunch Program Services.
Conclusions: Lessons from Arizona’s Leadership in Skin Cancer Prevention

- Measure processes and outcomes of skin cancer prevention efforts
- Use data and policy tools in a coordinated way
- Promote sun-safety policies at different levels
  - Statewide and school-specific efforts
- Target groups at high risk, such as children, for focused prevention efforts
- Partner widely outside of the public health and healthcare sectors
- Communicate with others working on sun safety
Melanoma Moon Shot: MD Anderson’s Comprehensive Approach to Melanoma

Jeffrey E. Gershenwald, MD
Professor, Department of Surgical Oncology
Professor, Department of Cancer Biology
Center Medical Director, Melanoma and Skin Cancer
Co-Leader, Melanoma Moon Shot
The University of Texas MD Anderson Cancer Center
Dramatically accelerate the pace of converting scientific discoveries into clinical advances that reduce cancer deaths

Melanoma Moon Shot Co-Leaders
- Jeffrey E. Gershenwald, MD
- Michael A. Davies, MD, PhD

Why Melanoma?
- Very large clinical and research programs
- Clear vision and leadership
- Potential for maximal clinical impact
Scope of the Problem - Introduction

- **Early-stage disease**
  - Treatable, often curable
  - Outcomes vary

- **Advanced disease**
  - Historically poor long-term survival
  - Scientific advances provide new treatment options

- **Evidence that UV radiation contributes to melanoma risk**
  - Sources of UV radiation can be solar or indoor tanning
  - Genetic sequencing data also support role of UV exposure in increasing risk for melanoma

www.surgeongeneral.gov/library/calls/prevent-skin-cancer/
Hodis et al., Cell. 2012 Jul 20;150(2):251-63
Melanoma TCGA (in revision)
The Cancer Genome Atlas (TCGA) Program
Melanoma Has the Highest Mutation Rate

Somatic mutation frequencies observed in exomes, 3,083 tumor–normal pairs

MS Lawrence et al. Nature 000, 1-5 (2013) doi:10.1038/nature12213
MD Anderson Melanoma Moon Shot Program Goals

- Reduce incidence and increase the proportion of patients diagnosed with early-stage melanoma
- Personalize management strategies
- Improve long-term disease control and survival in advanced melanoma

THE TIME IS NOW
Together we will end cancer
MD Anderson Melanoma Moon Shot
Initial Flagship Projects

Primary prevention of melanoma by protecting youth from UV radiation

Increasing long-term survival in melanoma by targeting of cancer genes and the anti-tumor immune response

Mary K. Tripp, Susan K. Peterson, and Ellen R. Gritz

Jeffrey E. Gershenwald and Michael A. Davies
Goal: To reduce the incidence of melanoma by
- Increasing protection from UV radiation in youth
- Decreasing youth sun exposure
- Decreasing youth tanning behavior

Activities
- Support, facilitate and evaluate legislative activities
- Maximize reach and impact of evidence-based interventions
Melanoma Prevention: Opportunities Across the Age Continuum

- Evidence-based preschool curriculum
- Sun safety curriculum
- UV photography protocol
- Indoor tanning facility legislation compliance and research
- Skin Cancer Prevention Toolkit for higher education

Pre-K | K-2 | Middle school | High school | Colleges/Universities
Preschool Curriculum:
Ray and the Sunbeatablestm
MD Anderson/CATCH
Global Foundation Partnership

- Programs
  - Early childhood
  - Elementary school
  - Middle school
  - After school

- Components
  - Nutrition
  - Physical education
  - Classroom
  - Community and family outreach

CATCH, in conjunction with The University of Texas MD Anderson Cancer Center, now provides evidence-based sun protection curriculum to pre-K and early childhood programs.

CATCH: Coordinated Approach to Child Health
catchinfo.org/modules/uv-protection/
catchinfo.org/md-anderson-joins-catch-global-foundation/
Promote Policies that Advance the National Goal of Preventing Skin Cancer

- **Texas Senate Bill 329**
  - Collaborative effort with MD Anderson Cancer Prevention and Control Platform and Governmental Relations, multiple medical societies, foundations and patients
  - Law became effective September 2013
  - 4th state in US to prohibit tanning bed use for persons under 18

www.legis.state.tx.us/BillLookup/History.aspx?LegSess=82R&Bill=SB329
MD Anderson has reached out to share lessons learned and directly assist efforts in CO, KS, SC, WA, IA, MD, MS, OK, and AZ.
Goal is to determine the proportion of Texas tanning facilities that comply with SB 329

- Over 1,100 licensed free-standing tanning facilities and spas with tanning devices
- Examine how compliance is associated with tanning facility factors
FDA Classification of Medical Devices Prior to 2014

<table>
<thead>
<tr>
<th>FDA Class</th>
<th>Examples</th>
</tr>
</thead>
</table>
| I         | Tongue depressors  
            Elastic bandages  
            **Indoor tanning devices** |
| II        | X-ray machines  
            UV lamps used for dermatologic disorders  
            Laser equipment used in surgery and dermatology |
| III       | Replacement heart valves  
            Silicone gel-filled breast implants  
            Implantable cerebellar stimulators |

www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm399222.htm  
Also adapted from Balk, Fisher, Geller. Pediatrics 2013;131;772
# FDA Classification of Medical Devices

Current as of May 2014

<table>
<thead>
<tr>
<th>FDA Class</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Tongue depressors&lt;br&gt;Elastic bandages</td>
</tr>
<tr>
<td>II</td>
<td>X-ray machines&lt;br&gt;UV lamps used for dermatologic disorders&lt;br&gt;Laser equipment used in surgery and dermatology&lt;br&gt;&lt;b&gt;Indoor tanning devices&lt;/b&gt;</td>
</tr>
<tr>
<td>III</td>
<td>Replacement heart valves&lt;br&gt;Silicone gel-filled breast implants&lt;br&gt;Implantable cerebellar stimulators</td>
</tr>
</tbody>
</table>

**FDA Black-box warning**

Attention: This sunlamp product should not be used on persons under the age of 18 years.

---

www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm399222.htm

Also adapted from Balk, Fisher, Geller. Pediatrics 2013;131,772
Reaching Out to the Medical Community

Teens and Indoor Tanning: Time to Act on the US Food and Drug Administration’s Black-Box Warning

Mark Gottlieb, Sophie J. Balk, Alan C. Geller & Jeffrey E. Gershenwald

Ann Surg Oncol
ISSN 1068-9265
Ann Surg Oncol
DOI 10.1245/s10434-014-4257-6

http://link.springer.com/article/10.1245%2Fs10434-014-4257-6
Can We Improve Sun Protection Behavior in Adolescents?
UV Photography Study

- Intervention study using camera with UV filter
- Represents first opportunity to examine these important outcomes in a controlled setting in adolescents

Areas of brown or red skin (e.g., freckles and hyperpigmentation)

Areas of “UV spots” indicating sun damage

www.canfieldsci.com/imaging-systems/visia-complexion-analysis/
Skin Cancer Prevention Toolkit for College and University Campuses

- Evolving partnership with the American Cancer Society – Cancer Action Network
  - Promote adoption of a skin cancer prevention policy
  - Promote commitment to eliminating students’ use of indoor tanning devices
  - Designed to increase awareness of college and university administrators about health risks associated with indoor tanning
## Melanoma Moon Shot Team Roster

### Jeffrey E. Gershenwald & Michael A. Davies – Co-leaders

<table>
<thead>
<tr>
<th>Mary K. Tripp</th>
<th>Lauren Haydu</th>
<th>Carla Warneke</th>
</tr>
</thead>
<tbody>
<tr>
<td>Susan K. Peterson</td>
<td>Zachary Cooper</td>
<td>Catherine Roca</td>
</tr>
<tr>
<td>Ellen R. Gritz</td>
<td>Tiffany Calderone</td>
<td>Charuta Kale</td>
</tr>
<tr>
<td>Elizabeth Burton</td>
<td>Sheila Duncan</td>
<td></td>
</tr>
<tr>
<td>Irma Wintle</td>
<td>Paula Orban</td>
<td></td>
</tr>
<tr>
<td>Jennifer Wargo</td>
<td>Chantale Bernatchez</td>
<td></td>
</tr>
<tr>
<td>Rodabe Amaria</td>
<td>Marie Forget</td>
<td></td>
</tr>
<tr>
<td>Victor Prieto</td>
<td>Shruti Malu</td>
<td></td>
</tr>
<tr>
<td>Michael Tetzlaff</td>
<td>Julie Gardner</td>
<td></td>
</tr>
<tr>
<td>Jonathan Curry</td>
<td>Silva Frankian</td>
<td></td>
</tr>
<tr>
<td>Veera Balandayuthapani</td>
<td>Emily Casey</td>
<td></td>
</tr>
<tr>
<td>Francesco Stingo</td>
<td>Rhiannon Dodge</td>
<td></td>
</tr>
<tr>
<td>Patrick Hwu</td>
<td>Elizabeth Sirman</td>
<td></td>
</tr>
<tr>
<td>Elizabeth Grimm</td>
<td>Kody Milburn</td>
<td></td>
</tr>
<tr>
<td>Merrick Ross</td>
<td>Sakara Waller</td>
<td></td>
</tr>
<tr>
<td>Jeff Lee</td>
<td>Christine Spencer</td>
<td></td>
</tr>
<tr>
<td><strong>Ernie Hawk</strong></td>
<td>Kerri Fernandes</td>
<td></td>
</tr>
<tr>
<td><strong>Mark Moreno</strong></td>
<td>Brenna Matejka</td>
<td></td>
</tr>
</tbody>
</table>

| Payal Pandit Talati   |                     |                     |
| Mandy Jo Euresti      | Elizabeth Winters  |                     |
| Carmen Galvan         | Andy Futreal       |                     |
| Victor Prieto         | Guilio Draetta     |                     |
| Shruti Malu           | Lynda Chin         |                     |
| Michael Tetzlaff      | James Allison      |                     |
| Patrick Hwu           | Pam Sharma         |                     |
| Elizabeth Grimm       | Carlo Toniatti     |                     |
| Merrick Ross          | Tim Heffernan      |                     |
| Jeff Lee              | Sam Hanash         |                     |
| **Ernie Hawk**        | Keith Perry        |                     |
| **Mark Moreno**       | Gordon Mills       |                     |
|                       | Kenna Shaw         |                     |
A Comprehensive Approach to Skin Cancer Prevention

Boris D. Lushniak, MD, MPH
RADM, United States Public Health Service
Deputy U.S. Surgeon General
Skin Cancer is a Major Public Health Problem

- Increasing disease burden and costs
- Rates of skin cancer in the United States are increasing, creating a public health concern we cannot ignore
- Now is the time for a comprehensive approach to prevent skin cancer
- Community partners, business leaders, government agencies, and individuals are uniting around a common cause
The Surgeon General’s Call to Action to Prevent Skin Cancer

A science-based document to stimulate action nationwide to solve a major public health problem

- Raises the issue of skin cancer prevention to a higher level of priority and attention
- Provides clear action steps to move the issue forward

Development of the Call to Action
Partners in Prevention

American Academy of Dermatology

NEW MEXICO
RAYS Skin Cancer Prevention Program

50th Anniversary
National Recreation and Park Association

MELANOMA RESEARCH FOUNDATION

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN™

Comprehensive Cancer Control
Collaborating to Conquer Cancer

National Council on Skin Cancer Prevention

Melanoma Research Alliance

THE OFFICIAL SPONSOR OF BIRTHDAYS®

LiveSunSmart®
Prevention in Action

RADM Lushniak visits Bandelier Elementary School in Albuquerque, NM
Calls To Action: Key Strategies

- Incorporate sun safety education and policies in schools
- Support shade planning in land use development
- Protect outdoor workers from overexposure
- Enforce existing indoor tanning laws and consider adopting additional restrictions
- Providers can counsel patients according to USPSTF guidelines, and report cases of melanoma

USPSTF: United States Preventive Services Task Force
Indoor Tanning Among Youth

- Millions of teens are exposing themselves, unprotected, to intense levels of UV radiation via indoor tanning

- Policy change can help change social norms to discourage intentional tanning
  - WHO classified indoor tanning devices as carcinogenic to humans in 2009
  - FDA has clearly stated indoor tanning is contraindicated for minors, requiring warning labels on the devices
  - Members of congress have written letters to universities asking them to stop allowing students to use school debit cards to pay for tanning services


Prevention in Action

UNC student brings tanning beds under fire at Chapel Hill Town Council
A UNC junior presented a petition on tanning beds to the council.
BY ERIN KOLSTAD | PUBLISHED 01/13/15 12:51AM

26% of Chapel Hill, NC apartment complexes provide indoor tanning to renters
Indoor Tanning Among US High School Youth

CDC. 1991-2013 High School Youth Risk Behavior Survey Data
Available at nccd.cdc.gov/youthonline/
Indoor Tanning Restrictions for Under Age 18, 2009

- **Some age restriction**
- **Parental permission only**
- **No restrictions for minors**

States with some age restriction:
- Texas (TX)

States requiring parental permission only:
- Maine (ME)

States with no restrictions for minors:
- All other states

*National Conference of State Legislatures*
Indoor Tanning Restrictions for Minors, 2014-2015

- **Prohibits all minors under 18 from tanning**
- **Prohibits some minors from tanning**
- **Parental permission only**
- **No restrictions for minors**

National Conference of State Legislatures
In states with multiple youth access restrictions, the odds of indoor tanning among teen girls were 42% less.
Skin Cancer Prevention: Progress and Room for Improvement

- More than 1 in 3 Americans reports getting sunburned each year
- **Indoor tanning**
  - Rates declining, but still common among some groups
  - CDC estimates 1.6 million persons under age 18 use indoor tanning each year – more than the population of 11 U.S. states and the District of Columbia
  - Although contraindicated by FDA, 39 states still permit indoor tanning by minors under age 18
- **Rates of sun protection still low**

Next Steps

- *Comprehensive, community wide* efforts to prevent skin cancer can work, with adequate support and a unified approach.

Photo courtesy of Queensland Department of Health
SunSmart Australia: www.sunsmart.com.au