



School of Continuous  
Professional Development

7TH ANNUAL SKIN

# PRACTICAL DERMATOLOGY FOR THE GENERALIST

April 27–29, 2023





School of Continuous  
Professional Development

# DON'T GET BURNED: SUNSCREENS AND PHOTOPROTECTION

STEVEN A. NELSON, MD

- No Conflicts of Interest

# LEARNING OBJECTIVES

- Understand importance of Sun-Protection Education
- Become a sunscreen advocate and know how to answer the common questions

# EDUCATE PATIENT REGARDING SUN PROTECTION

- Among lowest topics of primary prevention<sup>1,2</sup>

## Original Investigation

### Trends in Sunscreen Recommendation Among US Physicians

Kristie L. Akamine, MD; Cheryl J. Gustafson, MD; Scott A. Davis, MA; Michelle M. Levender, MD;  
Steven R. Feldman, MD, PhD

- Surveys show that education is even low among dermatologists
  - Especially children and adolescents

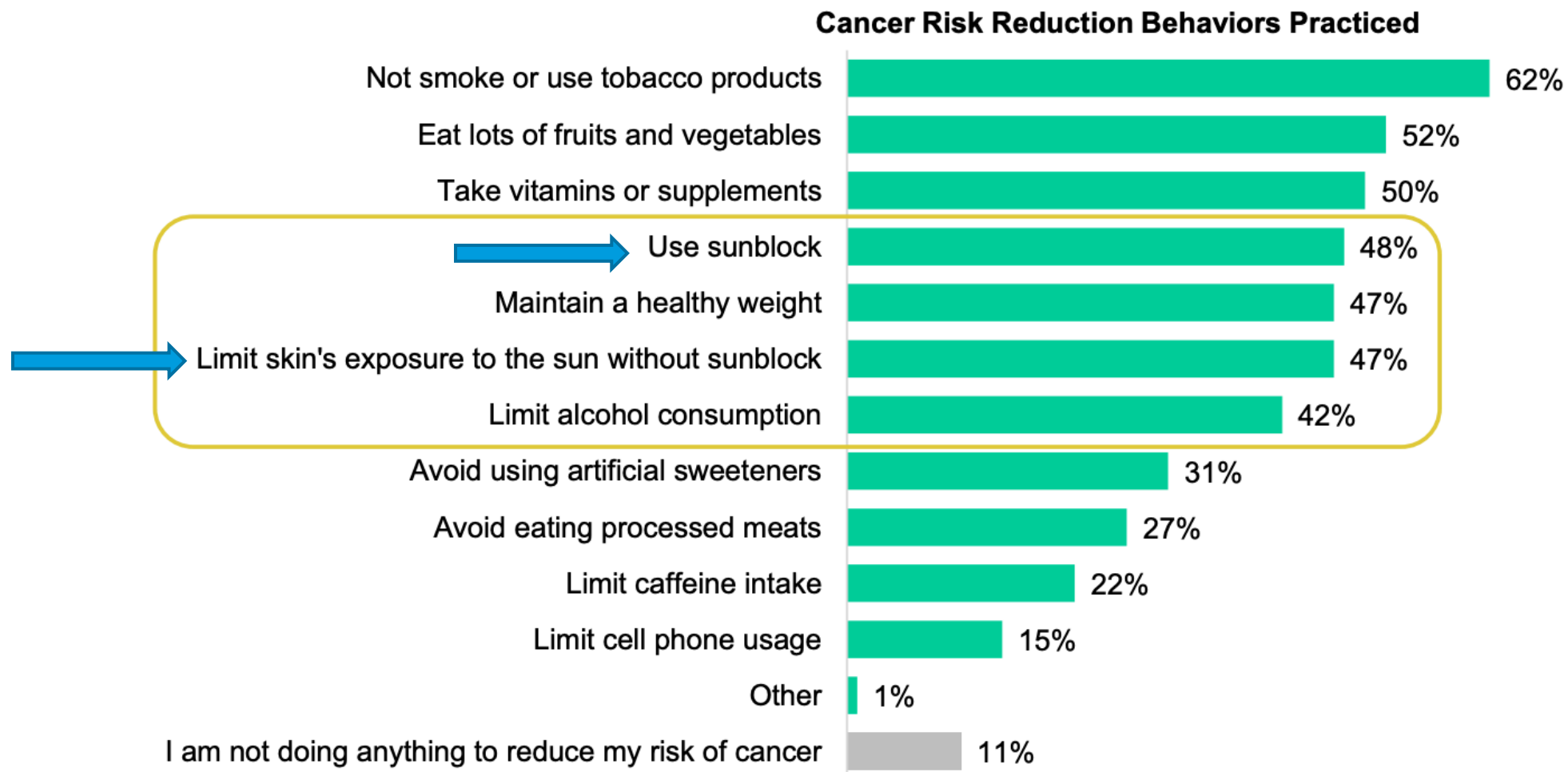
1) DePue JD, Goldstein MG, Redding CA, et al. Cancer Prevention in primary care. *Prev Med.* 2008;46(3):252-259.

2) Oliveria SA, Christos PJ, Marghoob AA et al. Skin cancer screening and prevention in the primary care setting. *J Gen Intern Med.* 2001;16(5):297-301.



# Less than Half of Adults Taking Important Steps for Cancer Prevention

Using sunblock, limiting exposure to sun without sunblock, maintaining a health weight, and limiting alcohol consumption are key cancer prevention steps being taken by less than half of adults





# Say YES to Sun Protection Say NO to Skin Cancer

## Skin cancer is the most common cancer in the U.S.

One in five Americans will develop skin cancer in their lifetime, and nearly 20 Americans die from melanoma, the deadliest form of skin cancer, every day.



Since exposure to the sun's harmful UV rays is the most preventable risk factor for skin cancer, protect your skin by:

- Seeking shade
- Wearing sun-protective clothing
- Applying sunscreen to all skin not covered by clothing



## There are two types of sunscreens:

### Physical Sunscreen

This sunscreen **works like a shield**; it sits on the surface of your skin, deflecting the sun's rays.

Look for the active ingredients **zinc oxide** and/or **titanium dioxide**.

Opt for this sunscreen if you have **sensitive skin**.

### Chemical Sunscreen

This sunscreen **works as a sponge**, absorbing the sun's rays.

Look for one or more of the following active ingredients: **oxybenzone**, **avobenzene**, **octisalate**, **octocrylene**, **homosalate** and **octinoxate**.

This formulation tends to be **easier to rub into** the skin without leaving a white residue.



If you have concerns about certain sunscreen ingredients, use the information above to choose an alternative that works for you. As long as it's **broad-spectrum**, **water-resistant** and has an **SPF 30 or higher**, it can effectively protect you from the sun. Make sure you reapply it every **two hours**, or after swimming or sweating.

To learn more about skin cancer prevention and detection, talk to a board-certified dermatologist or visit [SpotSkinCancer.org](https://www.spotskincancer.org).



Copyright © by the American Academy of Dermatology and the American Academy of Dermatology Association | 20-505-CMM



## Free educational resources

Download these free educational resources to help others learn how to prevent and detect skin cancer.

INFOGRAPHICS & FLYERS

FOR KIDS

VIDEOS

You can make a difference and educate others about their risk for skin cancer with these free skin cancer handouts.

- [Body mole map](#)
- [How to select a sunscreen](#)
- [How to select a sunscreen \(Español\)](#)
- [Before you tan \(PDF\)](#)
- [It is this obvious \(PDF\)](#)
- [Foam finger \(PDF\)](#)
- [SPOT sports \(PDF\)](#)
- [Protect your skin \(PDF\)](#)
- [Sports defense \(PDF\)](#)
- [Julia Mancuso - Professional alpine skier](#)
- [Julia Mancuso - Extreme sports \(PDF\)](#)
- [Chris Klug - Olympic medalist snowboarder](#)
- [Risky behavior \(PDF\)](#)
- [Is Your Skin Looking Good? \(PDF\)](#)
- [Say Yes to Sun Protection](#)
- [How to SPOT Skin Cancer™](#)
- [Check Your Partner. Check Yourself.](#)
- [Skin cancer fact sheet \(PDF\)](#)



# TANNING BEDS

Sometimes you need cancer in a hurry



# APPROACH TO SUNSCREEN EDUCATION

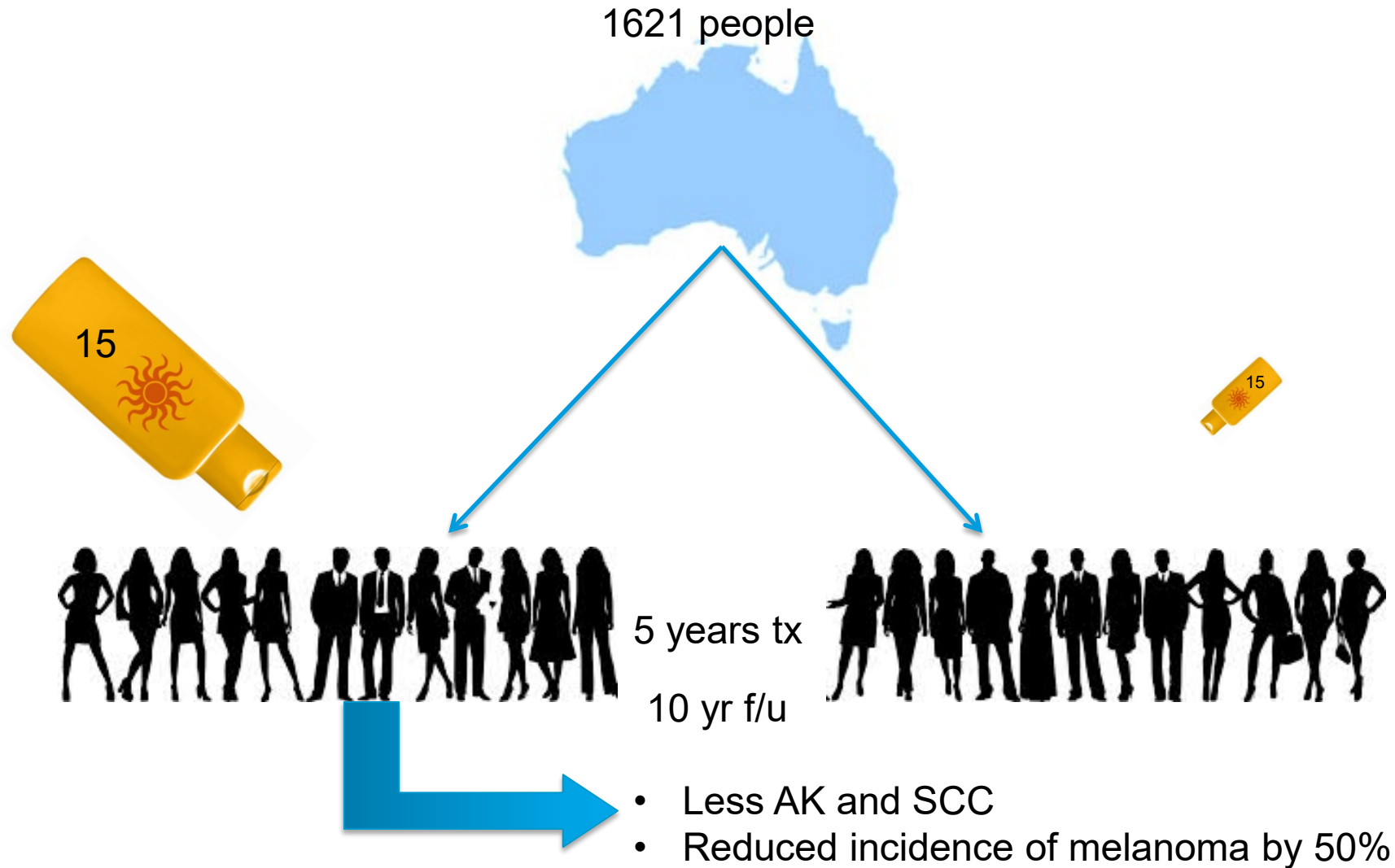
\*Photoprotection

- Cancer Awareness / Prevention
- Appealing to Vanity
- Know Controversies & Dispel Myths
- Application of Sunscreen

# APPROACH TO SUNSCREEN EDUCATION

- **Cancer Awareness / Prevention**
- Appealing to Vanity
- Know Controversies & Dispel Myths
- Application of Sunscreen

# SUNSCREEN PREVENTS SKIN CANCERS



# SUNSCREEN PREVENTS SKIN CANCER

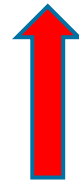
- Does regular use prevent melanoma?
  - population-based, case-control family study published in 2018
  - Australians aged 18-40 years
  - Regular users reduced risk by 40% compared to those who rarely used it.
- What about basal cell carcinoma?
  - Good evidence that UV exposure = BCC
  - Harder to demonstrate with studies



# Sunscreen Prevents Skin Cancer

## 2011 FDA “Final Rule: Labeling and Effectiveness Testing”

- Use Claims with broad spectrum 15 SPF
  - **“if used as directed with other sun protection measures, (sunscreens) decrease the risk of skin cancer and early skin aging caused by the sun.”**



- “Skin Cancer/Skin Aging Alert: Spending time in the sun increases your risk of skin cancer and early skin aging. This product has been shown only to help prevent sunburn, not skin cancer or early skin aging.”

# APPROACH TO SUNSCREEN EDUCATION

- **Cancer Awareness / Prevention**
  - Yes! Sunscreens have been shown to reduce skin cancer
    - SCC and melanoma.
- Appealing to Vanity
- Know Controversies & Dispel Myths
- Application of Sunscreen

# APPROACH TO SUNSCREEN EDUCATION

- Cancer Awareness / Prevention
  - Yes! Sunscreens have been shown to reduce skin cancer
- **Appealing to Vanity**
- Know Controversies & Dispel Myths
- Application of Sunscreen



# KNOW YOUR AUDIENCE: APPEAL TO VANITY

- Appealing to Vanity
  - Young adults respond better to anti-aging > anti-cancer messages<sup>2,3</sup>
  - Daily (not discretionary) sunscreen prevents / retards photoaging even starting in middle age<sup>3</sup>
    - Impact can be seen in as little as 4 years



1)Mahler HIM, Kulik JA, et al. Effects of Appearance-Based Interventions on Sun Protection Intentions and Self-Reported Behaviors. Health Psychology 2003, Vol 22(2):199-209.

2)Williams AJ, Grogan S. Impact of a facial-aging intervention versus a health literature intervention on women's sun protection attitudes and behavioral intentions. Psychology and Health 2013;28(9):993-1008.

3)Hughes MCB, Williams GM, et al. Sunscreen and Prevention of Skin Aging: A Randomized Trial. Ann Intern Med. 2013;158:781-790.



# APPROACH TO SUNSCREEN EDUCATION

- Cancer Awareness / Prevention
  - Yes! Sunscreens have been shown to reduce skin cancer
- **Appealing to Vanity**
  - Sunscreen prevents wrinkles and lentigenes
- Know Controversies & Dispel Myths
- Application of Sunscreen: Daily Application and Double-Coat Rule

# APPROACH TO SUNSCREEN EDUCATION

- Cancer Awareness / Prevention
  - Yes! Sunscreens have been shown to reduce skin cancer
- Appealing to Vanity
  - Sunscreen prevents wrinkles and lentigenes
- **Know Controversies & Dispel Myths**
  - **Ingredients**
  - Efficacy
  - Aerosolized
- Application of Sunscreen

# SUNSCREEN INGREDIENTS

- UVB blockers
  - Para-aminobenzoic acid (PABA)
  - Padimate O
  - Octinoxate – most potent
  - Cinoxate
  - Octisalate
  - Homosalate
  - Trolamine salicylate
  - Octocrylene
  - Ensulizole

- UVA blockers
  - Oxybenzone – UVB / UVA
  - Sulisobenzene
  - Dioxybenzone
  - Avobenzone
  - Ecamzule (Mexoryl SX)

## Inorganic Filters

- Zinc and Titanium Dioxide – UVB / UVA
- Inactive Ingredients
  - Retinyl Palmitate (vitamin A)

# SUNSCREEN INGREDIENTS

- UVB blockers
  - Para-aminobenzoic acid (PABA)
  - Padimate O
  - **Octinoxate** – most potent
  - Cinoxate
  - Octisalate
  - **Homosalate**
  - Trolamine salicylate
  - **Octocrylene**
  - Ensulizole

- UVA blockers
  - **Oxybenzone** – UVB / UVA
  - Sulisobenzene
  - Dioxybenzone
  - **Avobenzone**
  - Ecamzule (Mexoryl SX)

## Inorganic Filters

- **Zinc and Titanium Dioxide** – UVB / UVA
- Inactive Ingredients
  - Retinyl Palmitate (vitamin A)

# CONTROVERSIAL SUNSCREEN INGREDIENT?

- UVB blockers
  - Para-aminobenzoic acid (PABA)
  - Padimate O
  - Octinoxate – most potent
  - Cinoxate
  - Octisalate
  - Homosalate
  - Trolamine salicylate
  - Octocrylene
  - Ensulizole

- UVA blockers
  - **Oxybenzone – UVB / UVA**
  - Sulisobenzene
  - Dioxybenzone
  - Avobenzone
  - Ecamzule (Mexoryl SX)

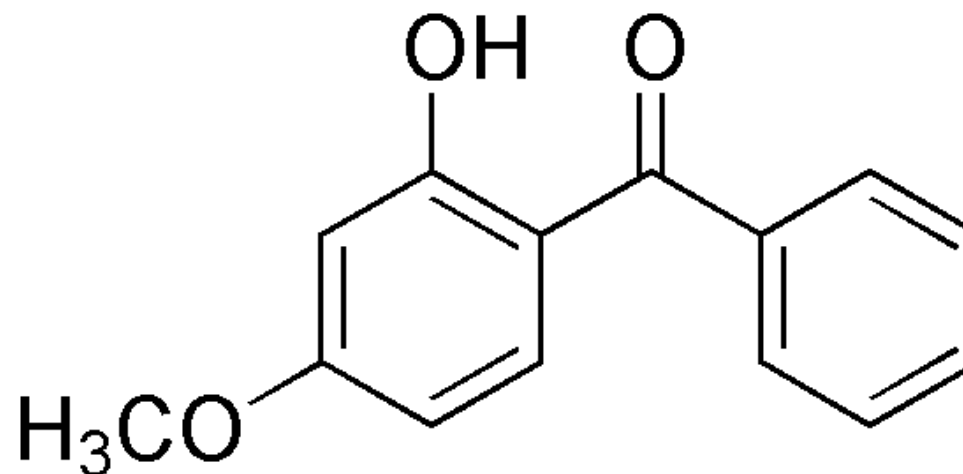
## Inorganic Filters

- Zinc and Titanium Dioxide – UVB / UVA
- Inactive Ingredients
  - Retinyl Palmitate (vitamin A)



# OXYBENZONE - HORMONE DISRUPTOR?

- One of the most widely used organic UVA filter
- Systemic absorption has been shown in various studies<sup>1,2</sup>
- Excretion mainly via urine
- Several in vitro studies demonstrated estrogenic and anti androgenic activity<sup>2</sup>



1) Calafat AM, Wong LY, et al. Concentrations of the sunscreen agent benzophenone-3 in residents of the United States: National Health and Nutrition Examination Survey 2003-2004. Environ health Perspect 2008;116:893-7.

2) Schlumpf M, Schmid P, et al. Endocrine activity and developmental toxicity of cosmetic UV filters – an update. Toxicology 2004; 205:113-22.



# OXYBENZONE - HORMONE DISRUPTOR?

- In vivo study on rats<sup>1</sup>
  - Schlumpf et al (2001) uterotrophic assay in rats
  - Fed oxybenzone (>1500mg/kg/day)
  - 23% increase in the uterine weight of exposed rats



1) Schlumpf M, Cotton B, et al. In vitro and in vivo estrogenicity of UV screens. Environ Health Perspect. 2001 Mar; 109(3):239-44

# OXYBENZONE - HORMONE DISRUPTOR?

- Human studies<sup>1</sup>
  - Janjua et al (2004) single blinded study
    - Whole body (2mg/cm<sup>2</sup>) application of 10% oxybenzone
    - Systemic absorption was observed
    - BUT no statistically significant differences with the endogenous levels of reproductive hormones measured.
- Detectable levels of oxybenzone and octinoxate have been found in human urine, serum, and breast milk<sup>2</sup>

1) Janjua NR, Mogensen B, et al. Systemic absorption of the sunscreens benzophenone-3, octyl-methoxycinnamate, and 3-(4-methyl-benzylidene) camphor after whole-body topical application and reproductive hormone levels in humans. J Invest Dermatol. 2004 Jul; 123(1):57-61

2) Ruzkiewicz, J. A., Pinkas, A., Ferrer, B., Peres, T. V., Tsatsakis, A., & Aschner, M. (2017). Neurotoxic effect of active ingredients in sunscreen products, a contemporary review. Toxicology Reports, 4, 245–259.

# OXYBENZONE - HORMONE DISRUPTOR?

Bottom line – Still controversial

- The sunscreen ingredient oxybenzone has been in use in the US since early 1970s with no clinical evidence of estrogenic side effects and has not resulted in clinically significant changes in baseline hormonal levels in humans.
- We have sunscreens with physical blockers!

# SUNSCREEN INGREDIENTS

- **AAD statement on the safety of sunscreen**
  - Current scientific data does not support claims that sunscreen ingredients are toxic or a hazard to human health. Rather, evidence supports the benefits of applying sunscreen to minimize short- and long-term damage to the skin from UV radiation.



# SUNSCREEN INGREDIENTS AND REEFS

- In vitro, oxybenzone has been implicated in bleaching of coral reefs.
- Oxybenzone and octinoxate are banned in Hawaii in 2018
- Recent reviews = ingredients don't collect at sufficient levels to actually harm coral
- Ocean warming may be the main factor for the coral damage





# BENZENE!!!

- Known human carcinogen
- 78 U.S. sun-care products were found to contain benzene
- Likely a contaminant



# APPROACH TO SUNSCREEN EDUCATION

- Cancer Awareness / Prevention
  - Yes! Sunscreens have been shown to reduce skin cancer
- Appealing to Vanity
  - Sunscreen prevents wrinkles and lentigenes
- **Know Controversies & Dispel Myths**
  - Ingredients – safe / have not been shown to be harmful to human health
  - Efficacy
  - Aerosolized
- Application of Sunscreen

# APPROACH TO SUNSCREEN EDUCATION

- Cancer Awareness / Prevention
  - Yes! Sunscreens have been shown to reduce skin cancer
- Appealing to Vanity
  - Sunscreen prevents wrinkles and lentigenes
- **Know Controversies & Dispel Myths**
  - Ingredients – safe / have not been shown to be harmful to human health
  - Efficacy
  - Aerosolized
- Application of Sunscreen

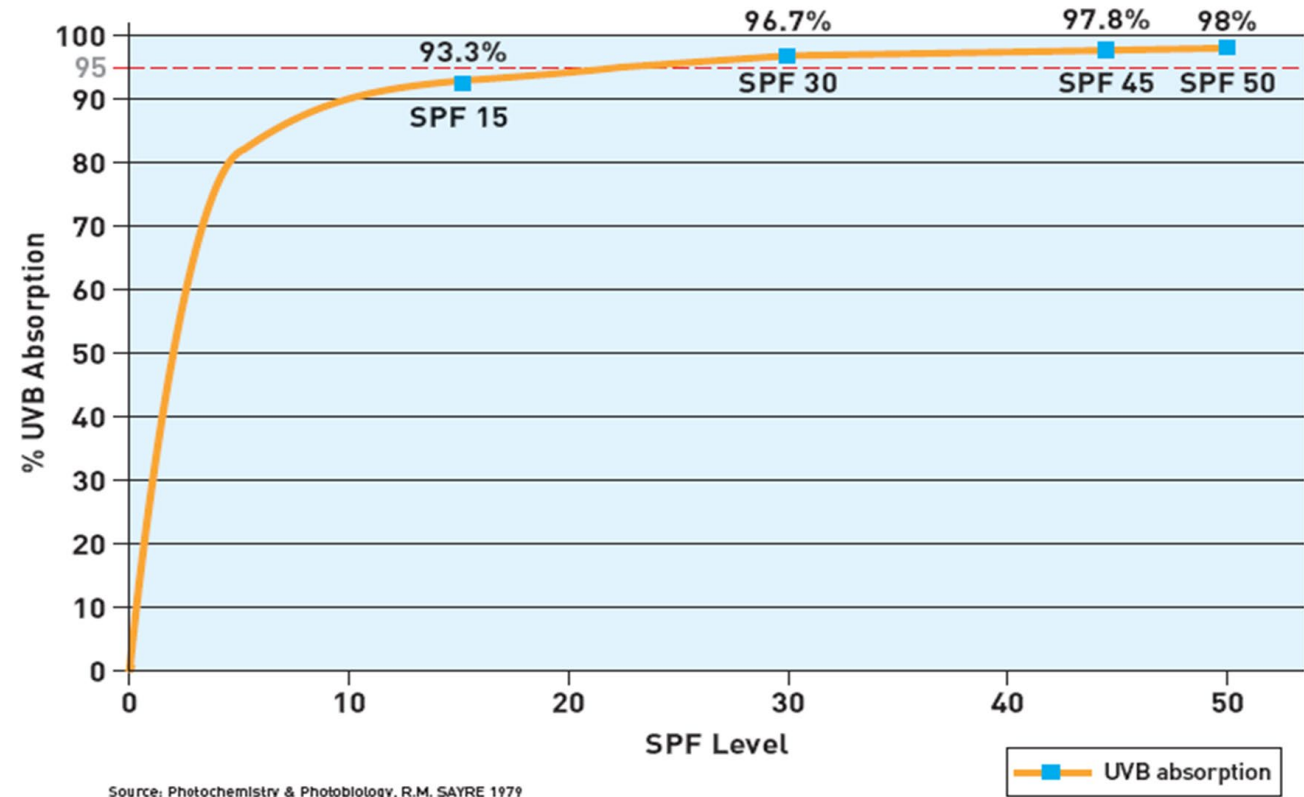


# SUNSCREEN EFFICACY

- Consumer Reports Annual Report
  - A “standard amount” of was placed on 6 areas on back
  - Soak in tub (time unknown)
  - UVB exposure – 6 different intensities
  - UVA tested on in vitro
- Results
  - 24 of 75 sunscreens tested less than half the SPF number advertised.
  - Titanium dioxide and zinc oxide (mineral) tested poorly

# SUNSCREEN RECOMMENDATION

- At least SPF 30 broad spectrum
- SPF = sun protection factor
  - 30 SPF allows 30 times as much time in sun
- Broad spectrum = UVB and UVA
- Find one that you like!



# APPROACH TO SUNSCREEN EDUCATION

- Cancer Awareness / Prevention
  - Yes! Sunscreens have been shown to reduce skin cancer
- Appealing to Vanity
  - Sunscreen prevents wrinkles and lentigenes
- **Know Controversies & Dispel Myths**
  - Ingredients – safe / have not been shown to be harmful to human health
  - Efficacy – not all sunscreens are created equal / find 30 SPF broad spectrum
  - Aerosolized
- Application of Sunscreen

# APPROACH TO SUNSCREEN EDUCATION

- Cancer Awareness / Prevention
  - Yes! Sunscreens have been shown to reduce skin cancer
- Appealing to Vanity
  - Sunscreen prevents wrinkles and lentigenes
- **Know Controversies & Dispel Myths**
  - Ingredients – safe / have not been shown to be harmful to human health
  - Efficacy – not all sunscreens are created equal / find 30 SPF broad spectrum
  - **Aerosolized**
- Application of Sunscreen

# SUNSCREEN – AEROSOL FORMULA

- 2011 FDA announced plans to investigate potentially harmful effects of inhaling sunscreen...ongoing.
- American Academy of Dermatology advises not to inhale spray sunscreen, and never spray sunscreen around or near your face or mouth. Instead, spray the sunscreen on your hands first and then apply it to your face.
- Unknown - so don't inhale. Spray onto hands if you want to use on face/neck and apply outdoors in well ventilated area.

# APPROACH TO SUNSCREEN EDUCATION

- Cancer Awareness / Prevention
  - Yes! Sunscreens have been shown to reduce skin cancer
- Appealing to Vanity
  - Sunscreen prevents wrinkles and lentigenes
- **Know Controversies & Dispel Myths**
  - Ingredients – safe / have not been shown to be harmful to human health
  - Efficacy – not all sunscreens are created equal / find 30 SPF broad spectrum
  - **Aerosolized – don't inhale**
- Application of Sunscreen

# APPROACH TO SUNSCREEN EDUCATION

- Cancer Awareness / Prevention
- Appealing to Vanity
- Know Controversies & Dispel Myths
- **Application of Sunscreen**









**GO TUBING DOWN THE  
SALT RIVER THEY SAID**



**IT WILL BE FUN THEY SAID**



**SUNSCREEN**  
You're doing it wrong

# APPLICATION OF SUNSCREEN

- Rule #1 – Regular or daily use is best
- Rule #2 – Double coat
  - Most people apply only  $\frac{1}{4}$  to  $\frac{1}{2}$  of the amount needed to achieve the advertised SPF
  - Higher SPF
- Rule #3 – Earlier and more often
  - 20 min before and every 2 hrs or after swimming / sweating
- Don't use on infants < 6 months

# APPROACH TO SUNSCREEN EDUCATION

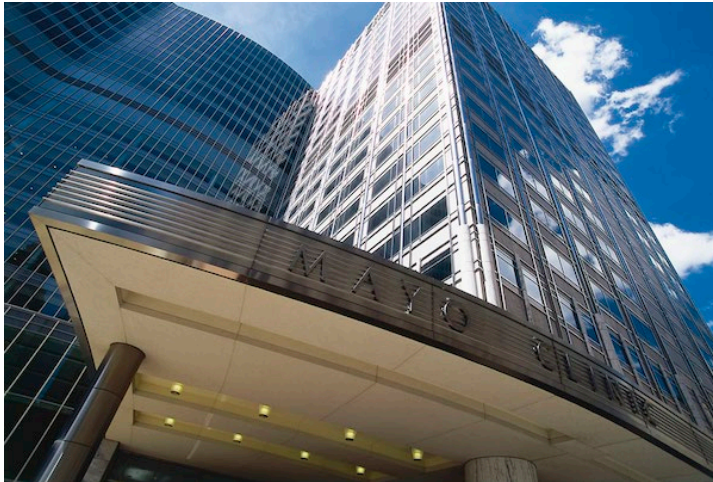
- Cancer Awareness / Prevention
  - Yes! Sunscreens have been shown to reduce skin cancer
- Appealing to Vanity
  - Sunscreen prevents wrinkles and lentigenes
- Know Controversies & Dispel Myths
  - Ingredients – safe / have not been shown to be harmful to human health
  - Efficacy – not all sunscreens are created equal / find 30 SPF broad spectrum
  - Aerosolized – don't inhale
- **Application of Sunscreen**
  - **Daily, Double-coat, Earlier and More Often**





School of Continuous  
Professional Development

# THANK YOU FOR JOINING US IN THIS COURSE



Rochester, Minnesota



Phoenix, Arizona



Jacksonville, Florida