Scientific Newsletter

2nd edition

An analysis of recently published research in relevant fields

August 2018

European Sunlight Association

1st study:

A brief facial morphing intervention to reduce skin cancer risk behaviors: Results from a randomized controlled trial

Blashill et al., 2018

lwill be published in "Body Image", June 2018

Abstract

The current study was designed to test the efficacy of an appearance-based **facial morphing program** to **reduce intentional UV exposure among individuals at risk for skin cancer**. A three-arm randomized controlled trial was employed (N = 219) comparing facial morphing + health information to: (1) mindfulness + health information; and (2) health information only. Participants were young adults with a history of recent intentional tanning and future intentions to tan. Primary outcomes were indoor and outdoor tanning frequency and tanning intentions, with secondary outcomes of tanning attitudes, body image, and affect. Facial morphing participants reported less frequent tanning, compared to mindfulness and control participants at 1-month follow-up. Facial morphing participants also generally reported **lower intentions to tan at immediate follow-up**, although the magnitude of **these effects weakened at 1-month follow-up**. Facial morphing programs may offer a brief, efficacious, and scalable augmentation to standard of care in reducing intentional UV exposure.

Comment

This design of this study is quite poor regarding the small amount of persons (219) that were tested and the really short follow-up time of one month only. As also written in the discussion part, this leaves a big question mark regarding the durability of the treatment effects found by the scientists. Among the participants is furthermore a high amount of women (80%) which is not very representative at all.

Additionally these programs clearly point in reducing intentional UV exposure and don't take possible health benefits into account. In my opinion, there would be a long way to go before facial morphing programs could actually be taken into account for skin cancer prevention measures.

2nd study;

The electronics in fluorescent bulbs and light emitting diodes (LED), rather than ultraviolet radiation, cause increased malignant melanoma incidence in indoor office workers and tanning bed users

Milham & Stetzer, 2018

published in: Medical Hypotheses

Abstract

The epidemiology of cutaneous malignant melanoma (CMM) has a number of facets that do not fit with sunlight and ultraviolet light as the primary etiologic agents. Indoor workers have higher incidence and mortality rates of CMM than outdoor workers; CMM occurs in body locations never exposed to sunlight; CMM incidence is in- creasing in spite of use of UV blocking agents and small changes in solar radiation.

We hypothesize that **modern electric lighting is a significant health hazard, a carcinogen**, and is causing **increasing CMM incidence in indoor office workers and tanning bed users**. These lights generate dirty electricity (high frequency voltage transients), radio frequency (RF) radiation, and increase body amperage, all of which have been shown to be carcinogenic. This could explain the failure of ultraviolet blockers to stem the malignant melanoma pandemic. Tanning beds and non-incandescent lighting could be made safe by incorporating a grounded Faraday cage which allows passage of ultraviolet and visible light frequencies and blocks other frequencies. Modern electric lighting should be fabricated to be electrically clean.

Comment

The conclusion of this study that modern electric lighting is significantly influencing humans health in a negative way seem a bit far-fetched as the main experiment only explored the effect of LED lamps on cows. Also the link of LED with melanoma is not based on an experiment but refers back to older studies. Nevertheless the study showed that there is a potential negative effect of lamps that generate high frequency voltage transients, radio freqency radiation and increase body amperage.

It is obvious that more research needs to be done in this field to evaluate the effects of fluorescent bulbs and emitting diodes on human beings.

3rd study:

Fractional sunburn threshold UVR doses generate equivalent vitamin D and DNA damage in skin types I-IV, but with epidermal DNA damage gradient correlated to skin darkness

Shih et al., 2018

Abstract

Public health guidance recommends limiting sun-exposure to sub-sunburn levels, but it's unknown whether these can gain vitamin D (for musculoskeletal health) whilst avoiding epidermal **DNA damage** (initiates skin cancer). Well-characterised healthy humans of all skin types (I-VI; lightest to darkest skin) were e**xposed to a low dose-series of solar simulated UVR of 20-80% their individual sunburn threshold dose** (minimal erythemal dose, MED). Significant UVR dose-responses were seen for serum 25(OH)D and whole epidermal CPD, with as little as 0.2 MED concurrently producing 25(OH)D and CPD. Notably, fractional MEDs generated equivalent levels of whole epidermal CPD and 25(OH)D across all skin types. Crucially, we demonstrated an epidermal gradient of CPD formation strongly correlated with skin darkness ($r=0.74$; $P<0.0001$), which reflected melanin content and revealed increasing protection across the skin types, ranging from darkest skin, where high CPD levels occurred superficially with none in the germinative basal layer, through to lightest skin where CPD were induced evenly across the epidermal depth. Darker skin people can be encouraged to utilise sub-sunburn UVR-exposure to enhance their vitamin D. In lighter skin people, basal cell damage occurs concurrent with vitamin D synthesis at exquisitely low UVR levels, providing an explanation for their high skin cancer incidence; greater caution is required.

Comment

This small study where participants with different skin types were exposed to a number of sub-sunburn UVR doses of their individual MED indicates that DNA damage already occurs at low doses of UVR exposure. The results also underline that there can't be a "one-fit-for-all" solution in public health messages as darker skin types have a decreased risk of DNA damage compared to lighter skin types. Providing consumers with information on moderate tanning in a responsible way remains of significant importance.

Please find the full version of the study here:

https://www.jidonline.org/article/S0022-202X(18)31950-X/fulltext

4th study;

Genome-wide association study in 176.678 Europeans reveals genetic loci for tanning response to sun exposure

Visconti et al., 2018

published in: Nature Communications

Abstract

The skin's tendency to **sunburn rather than tan is a major risk factor for skin cancer**. Here we report a large **genome-wide association study** of ease of skin tanning in 176,678 subjects of European ancestry. We identify **significant association with tanning ability at 20 loci**. We confirm previously identified associations at six of these loci, and report 14 novel loci, of which ten have never been associated with pigmentation-related phenotypes. Our results also suggest that variants at the AHR/AGR3 locus, previously associated with cutaneous malignant melanoma the underlying mechanism of which is poorly understood, might act on disease risk through modulation of tanning ability.

Comment

By identifying ten new loci associated with skin tanning or pigmentation-related phenotypes, this research clearly shows the importance of genes whether a person is getting a tan or a sunburn in response to solar UV radiation. Translated, this means there is a certain pre-disposition if people develop Non-Melanoma Skin Cancer or Malignant Melanoma. This risk of course is influenced by factors such as UV radiation or smoking.

This study in general is a very important step in order to better understand the underlying genetic mechanisms in the development of skin cancer and to find possible methods or treatments for it's cure in the future.

Please find the full version of the study here:

https://www.nature.com/articles/s41467-018-04086-y

5th study;

Moderate UV exposure enhances learning and memory by promoting a novel glutamate biosynthethic pathway in the brain

Zhu et al., 2018

published in: Cell

Abstract

Sunlight exposure is known to affect **mood, learning, and cognition**. However, the **molecular and cellular mechanisms remain elusive**. Here, we show that moderate UV exposure elevated blood urocanic acid (UCA), which then crossed the blood-brain barrier. Single-cell mass spectrometry and isotopic labeling revealed a **novel intra-neuronal metabolic pathway** converting UCA to glutamate (GLU) after UV exposure. This UV-triggered GLU synthesis promoted its packaging into synaptic vesicles and its release at glutamatergic terminals in the motor cortex and hippocampus. Related behaviors, like rotarod learning and object recognition memory, were enhanced after UV exposure. All UV-induced meta- bolic, electrophysiological, and behavioral effects could be reproduced by the intravenous injection of UCA and diminished by the application of inhibitor or short hairpin RNA (shRNA) against urocanase, an enzyme critical for the conversion of UCA to GLU. These findings reveal a new GLU biosynthetic pathway, which could contribute to some of the sunlight-induced neurobehavioral changes.

Comment

Discovering new metabolic pathways (even though it was in an animal model) contributes to an even better understanding of the various effects of UV exposure. Furthermore this study proves that there are a number of other beneficial health effects of UV exposure other than vitamin D that the general public should be aware of as well.

Despite there is some evidence available that UV exposure is enhancing mood and memory, further research is needed to learn more about the underlying molecular mechanisms.

6th study;

Sunscreen Use and Melanoma Risk Among Young Australian Adults

Watts et al., 2018

published in: JAMA Dermatology

Importance There are limited data among **young adults on sunscreen use** during childhood and adulthood and on the association of sunscreen use with **melanoma risk**.

Objective To assess correlates of early-life sunscreen use and the association between sunscreen use and risk of cutaneous melanoma before age 40 years.

Design, Setting, and Participants This population-based, case-control family study analyzed Australian Melanoma Family Study data for persons with questionnaire data on sunscreen use collected by interview from 2001 to 2005 across 3 states in Australia, representing two-thirds of the country's population. Case participants (aged 18-39 years) had confirmed first primary melanoma. Siblings of case participants were included, and case participants without a sibling control were excluded. Unrelated controls (aged 18-44 years) were recruited from the electoral roll or were a spouse, partner, or friend nominated by case participants. Data analyses were conducted from October 2017 to February 2018.

Comment

The study is only a population-based and case-control one, getting the results from a questionnaire. As mentioned in the limitations by the authors themselves, there might be the chance that participants overreported sunscreen use owing to social desirability bias. Furthermore, I would not have been able to remember how much sunscreen my parents provided when I was a child.

What about the rising incidence in melanoma despite a growing number in sunscreen sales year in, year out? On top of this, the question remains whether results from an australian environment are applicable to Europe with its complete different climate conditions.

The study was funded by the Australian Melanoma Family Study and received fundings from various Cancer Councils.