

Periodic Graphics

A collaboration between C&EN and
Andy Brunning, author of the popular
graphics blog *Compound Interest*

More
online

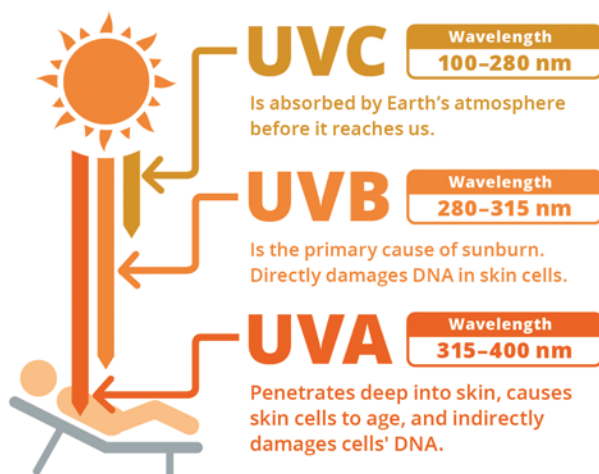
To see more of
Brunning's work, go to
compoundchem.com.
To see all of C&EN's
Periodic Graphics,
visit [cenm.ag/
periodicgraphics](http://cenm.ag/periodicgraphics).

HOW THE SUN AFFECTS OUR SKIN

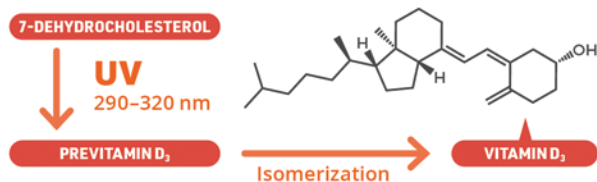
Summers are filled with sunny days to enjoy the outdoors, but you need to bring along the proper sun protection to prevent skin damage. Here we look at the chemistry the sun triggers in our skin.

THE SUN AND UV RADIATION

The sun emits both ultraviolet radiation and visible light. Ten percent of sunlight is in the UV range. Exposure to UV light is what causes some people's skin to tan and burn.

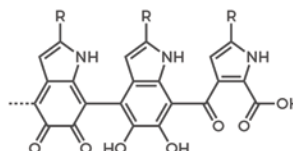


Skin damage from UV radiation can ultimately lead to skin cancer. But exposure to small amounts of UV light is important because our skin uses it to make vitamin D.

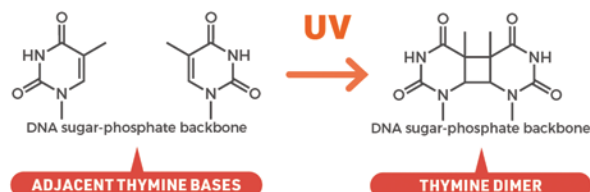


MELANIN, BURNING, AND DNA DAMAGE

Melanin is a protective, polymeric pigment that absorbs UV radiation and dissipates it as heat, preventing the light from damaging other molecules. Melanocytes, cells in the skin's epidermis, produce melanin. When people get exposed to UV light, these cells produce more melanin, leading to darkening of the skin.



UV radiation can directly damage DNA by causing DNA bases to react with each other, forming products like pyrimidine dimers, the primary cause of skin cancer in humans. The light can also damage DNA indirectly when excited melanin generates reactive oxygen species.



DNA-repair enzymes can fix damaged DNA by removing and correcting defective sections. But if cells become too damaged, they self-destruct, signaling immune cells with proteins including prostaglandins and cytokines. These proteins cause increased blood flow and inflammation, leading to the pain, and sometimes redness, of a sunburn.