

Skin biology video 7, Physics notes

Sensing electromagnetic radiation. The point here is that exposure would be a lot easier to calibrate if there was real time sensing of exposure: we cannot do this for UVR as we do not directly sense it like we can heat or light. Things would be different if we could. Indeed our perception of sun exposure is often erroneous because we base it on heat or light, rather than UVR.

Frequency. Note physicists often tend to use frequency as their measure rather than wavelength (inversely related).

UVC is blocked by the atmosphere. It will induce erythema and DNA damage in an experimental situation although its penetration is less than that of UVB. UVC lamps are germicidal (kills bacteria).

Definitions of UVR. I have used the definition of UVB of 290-320. Sometimes 315 is used, and UVC stretches down as far as 100nm under some definitions.

Action spectrum. There are different types of action spectra. I have described the one for erythema, in normal skin. But there is one for tanning, which is very similar to that of erythema. In photosensitive disorders, erythema might have a different action spectrum because of say a phototoxic reaction to a drug. Similarly the action spectrum in solar urticaria (urticaria as the end point) is not the same as the erythematous action spectrum in normal people.

The UVR spectral power of the sun will vary by latitude and altitude (somewhat). In practice, we ignore these differences.

Phototherapy. We use different lamps with different spectra for different diseases. Usually it is the UVR that is the active agent, but in some situations (PUVA) we use UVR to activate prodrugs that when activated, have a therapeutic effect.

Phototherapy tubes. I have spiced up this story. I doubt if anybody would confuse the tubes 1 and 3 in real life. The moral stands however. Tubes lose power with age, as well, and so if they are replaced you need to recalibrate 'time in the machine'.

Solar urticaria. Erythema is a normal response, although obviously sensitivity varies, but urticaria in response to UVR is *always* abnormal.

Annual exposure to UVR. I have presented the data raw. You could add in the length of each period (summer holidays, summer weekends etc) to make the point even more forcefully. With many retired people living in Spain, and only coming back for skin cancer excisions, the issue is not trivial for any party.