

UV-Radiation and Vitamin D

- a controversial issue -

Marjam-Jeanette Barysch

Index

1. Vitamin D

- Sources and activation
- Effects and deficiency
- Recommendation
- Vitamin D receptor

2. UV radiation

- Photolysis
- Risks
- Vitamin D synthesis and DNA damage

3. Controversy: sun protection vs. sun exposure

- Pro moderation of sun exposure
- Contra moderation of sun exposure

Vitamin D

UV-Radiation

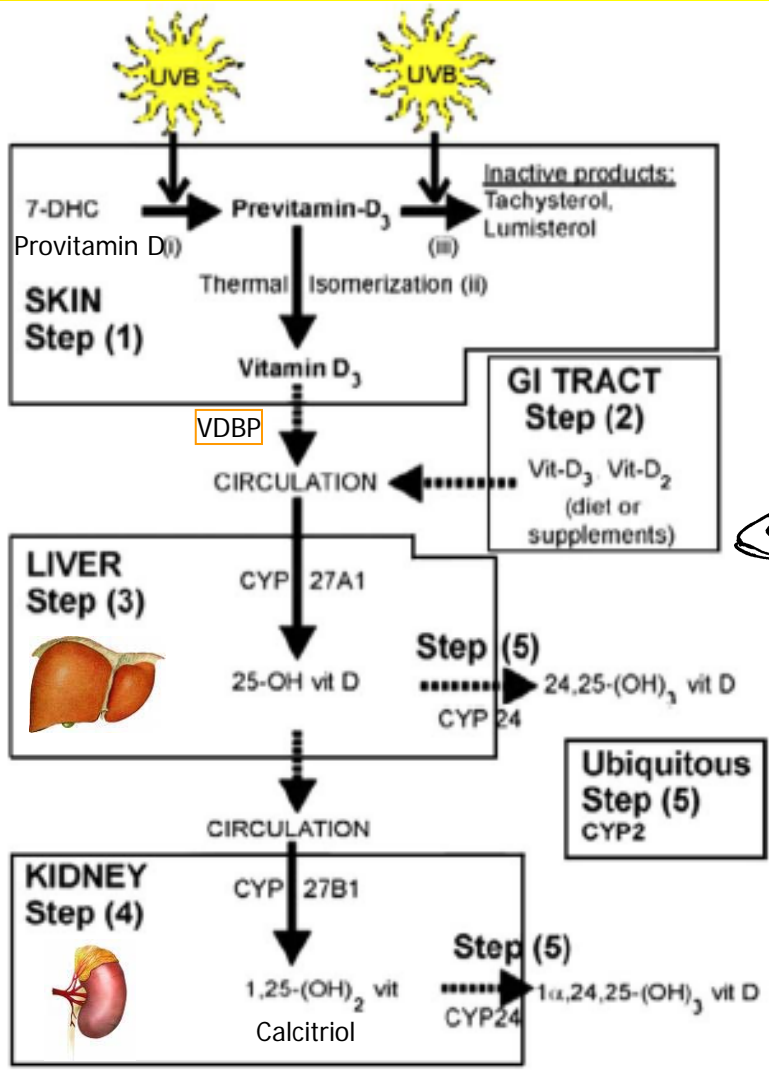
Controversy

Vitamin D₃ – Sources and activation

Vitamin D

UV-Radiation

Controversy



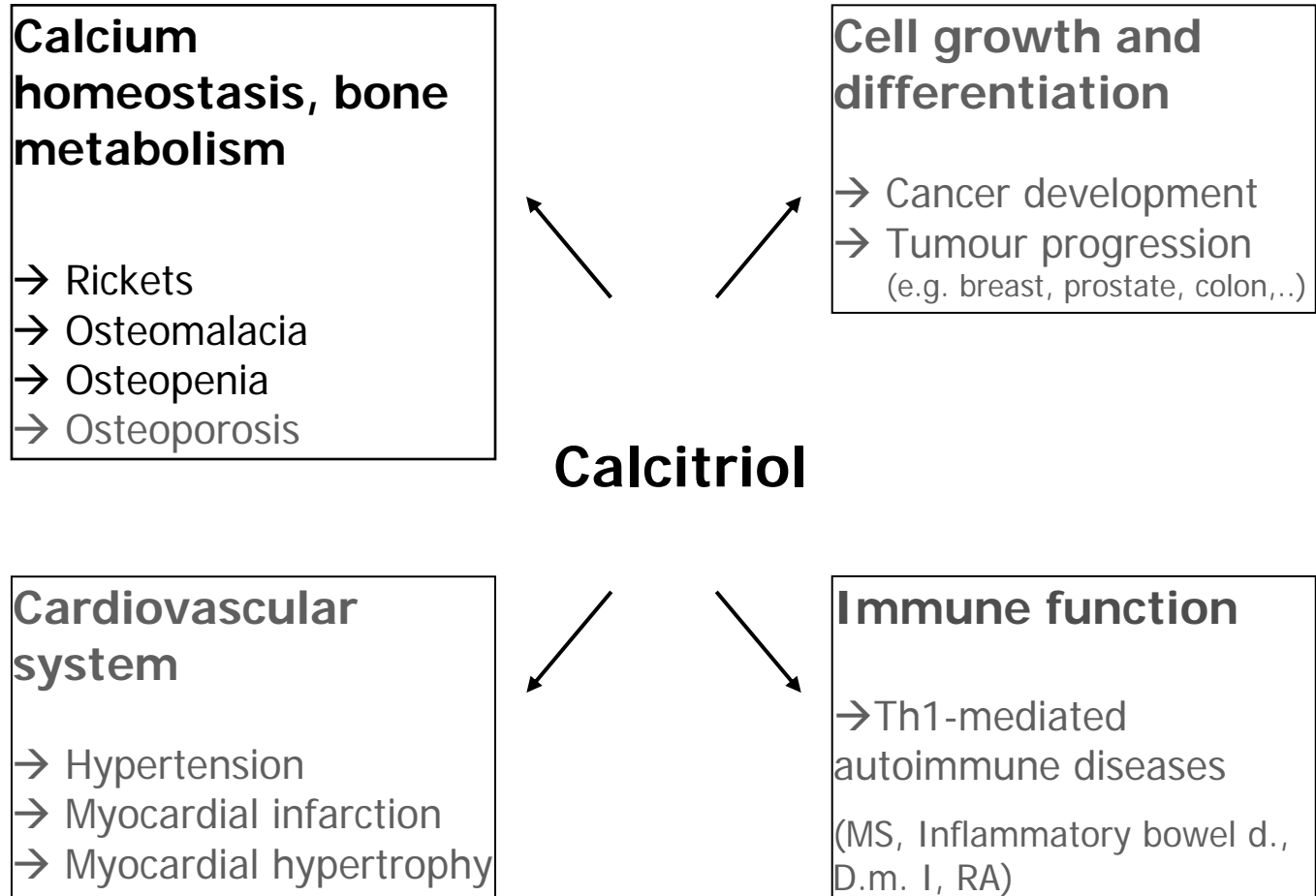
Wolpowitz 2006

Vitamin D₃ – Effects and results of deficiency

Vitamin D

UV-Radiation

Controversy



Vitamin D₃ – Recommendation

No agreement about physiological serum level and daily needs

- Physiologic blood level 30 - 125 nmol/l?
- Daily recommendation 500 - 5000 IU?



How much vitamin D do we really need?

- Intoxication most likely not until 40.000 IU daily intake
- No intoxication risk via UV-radiation

Redefinition: deficiency vs. insufficiency

- More people are defined to be deficient

Vitamin D

UV-Radiation

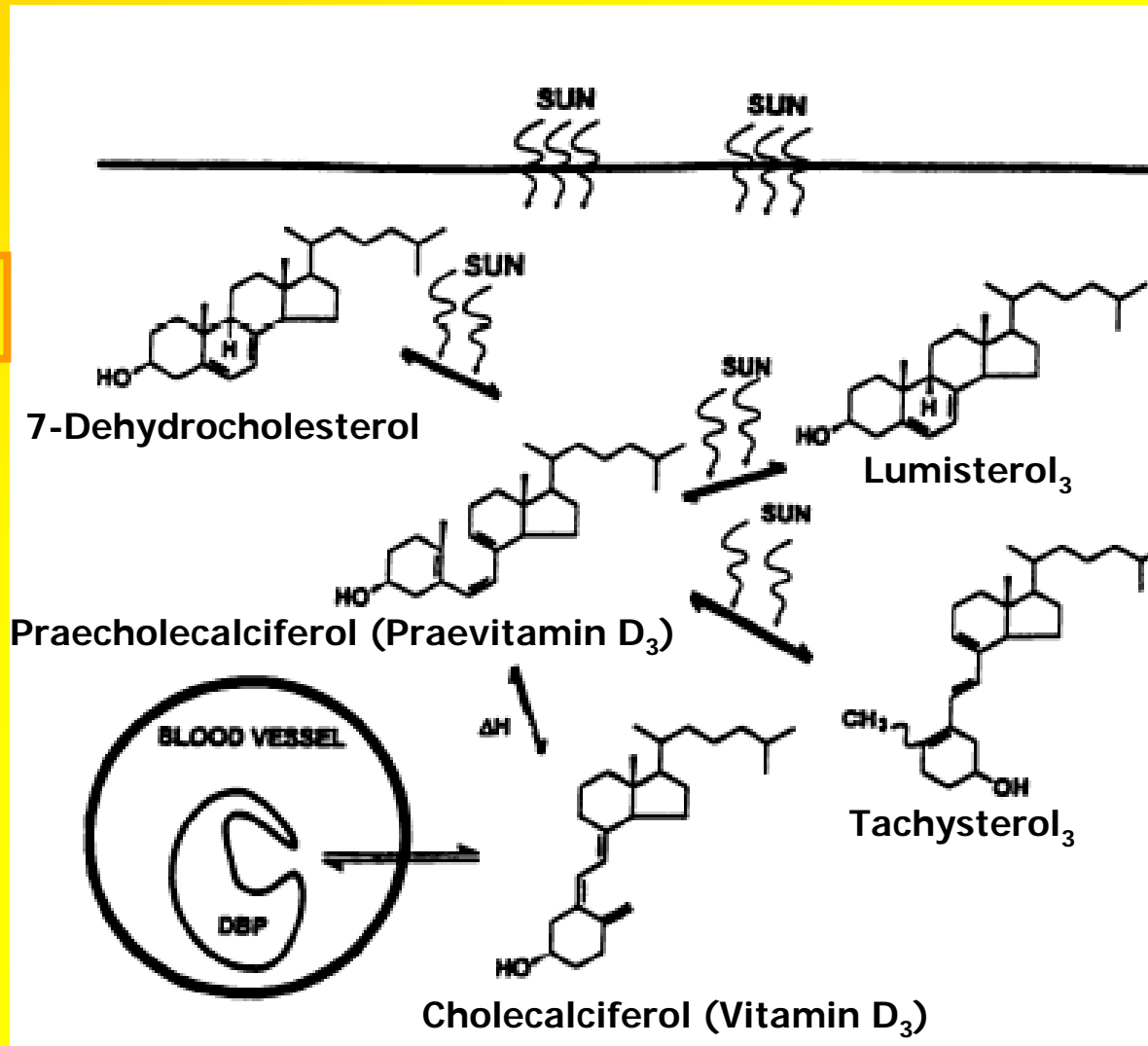
Controversy

Vitamin D₃ – Photolysis

Vitamin D

UV-Radiation

Controversy



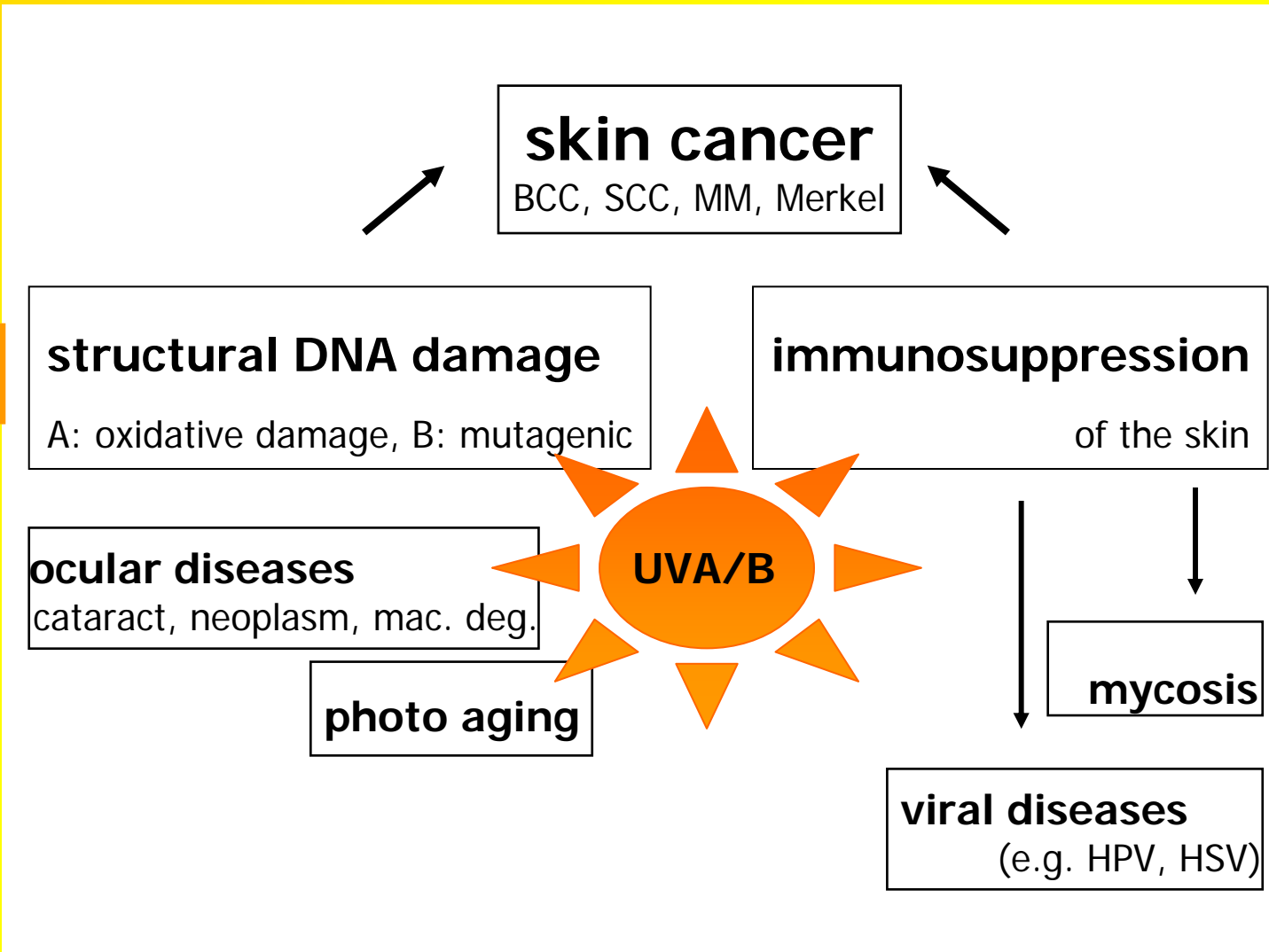
Holick 1994

UV radiation- Risks

Vitamin D

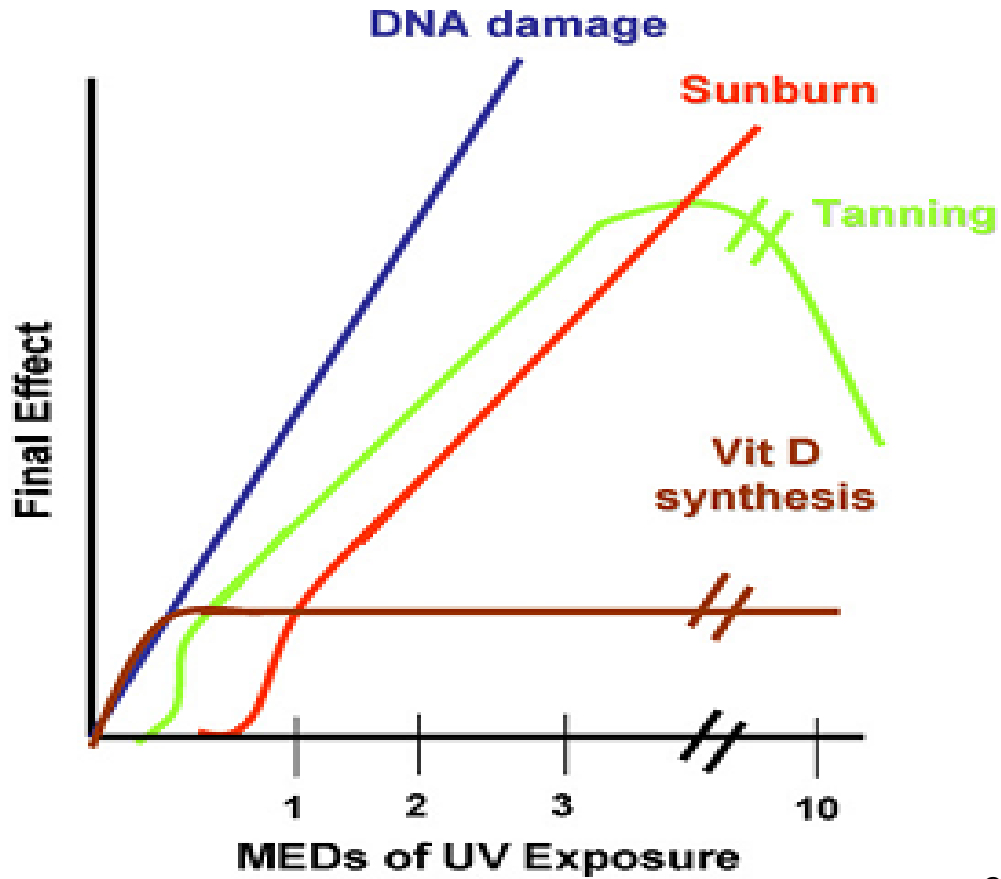
UV-Radiation

Controversy



UV radiation, vitamin D synthesis & DNA damage

Maximal vitamin D synthesis below MED threshold



Gilchrest 2007

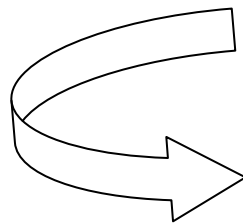
Vitamin D

UV-Radiation

Controversy

Pro moderation of sun protection

- *'Vitamin D deficiency: pandemic of the 21st century'*
- *'Strict sun protection induces severe health risk'*
- *'Exposure to sun light and sun tanning beds ... [as] an effective way of obtaining healthy blood levels'*
- *'...protective effect of [...] solar radiation outweighs its mutagenic effect'*



Claim for a '...moderation of sun protection recommendation, which are necessary to protect us against [...] cancer and other diseases'

(Reichrath 2006, Holick 2006, Plehwe 2003)

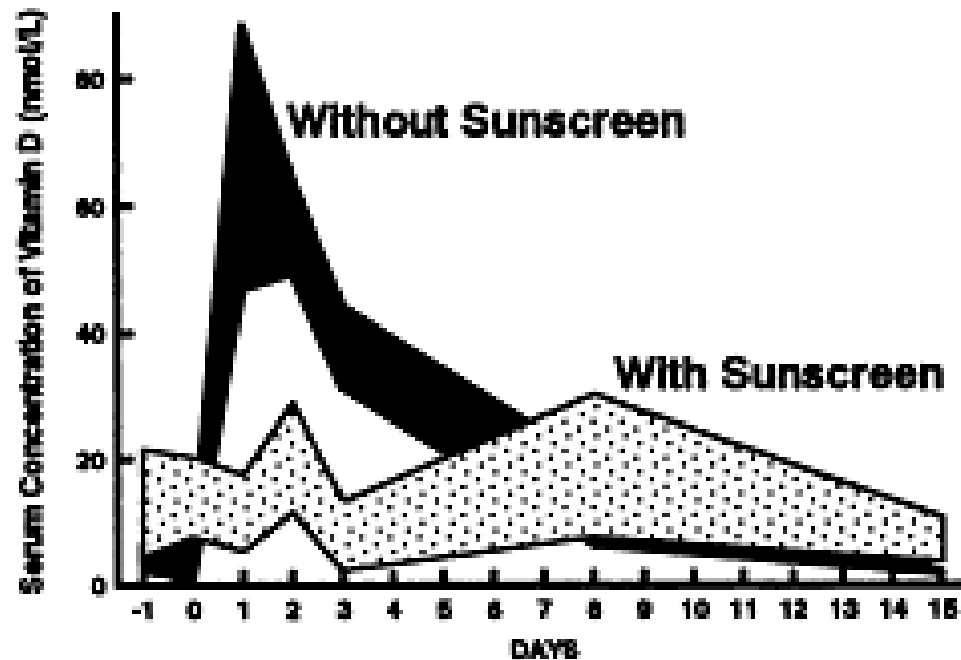
Vitamin D

UV-Radiation

Controversy

Pro moderation of sun protection?

'SPF15 diminishes the Vitamin D blood level 85 %'



But:

After 3rd day in non-sunscreen users: decline of vitamin D level

After 7th day even lower than in group with sunscreen use.

Consequence of this study: Recommendation for a sunburn every 3rd day for obtaining a higher vitamin D level???

Matsuoka et al. 1988

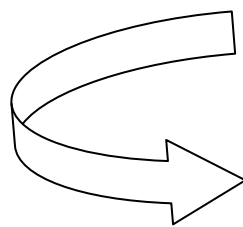
Vitamin D

UV-Radiation

Controversy

Contra moderation of sun protection

- UV radiation lowers capacity for vitamin D production
- Incidental sun exposure presumably sufficient for max. vitamin D synthesis, even though applying sunscreen
- Skin cancer more than 50% of all cancers
- UV exposure: the most important & proven risk factor for developing skin cancer!
- Simple methods for achieving an adequate vitamin D level without raising skin cancer risk



Regarding to the proven harms, recommendation for sun-exposure in order to prevent diseases would be unjustifiable.

Vitamin D

UV-Radiation

Controversy

Acknowledgements



Prof. R. Dummer

Prof. L. E. French

and his team: Dr. M. Urosevic, Dr. K. Hoek, Dr. M. Karpova, Dr. M. Zipser, Dr. N. Schlegl, D. Widmer)

Histology-Lab Team