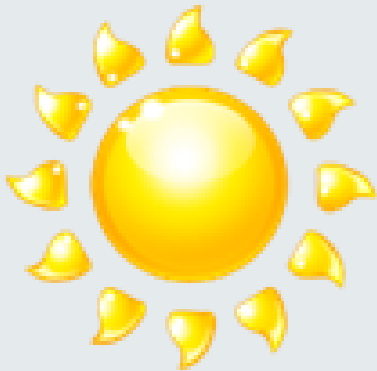


sunlight and radiation therapy



Markus Musholt-Meijer

Pflegeexperte

Dermatologie



**UniversitätsSpital
Zürich**



sunlight and radiation therapy



The sunlight and the skin



Radiation therapy and effects in the skin

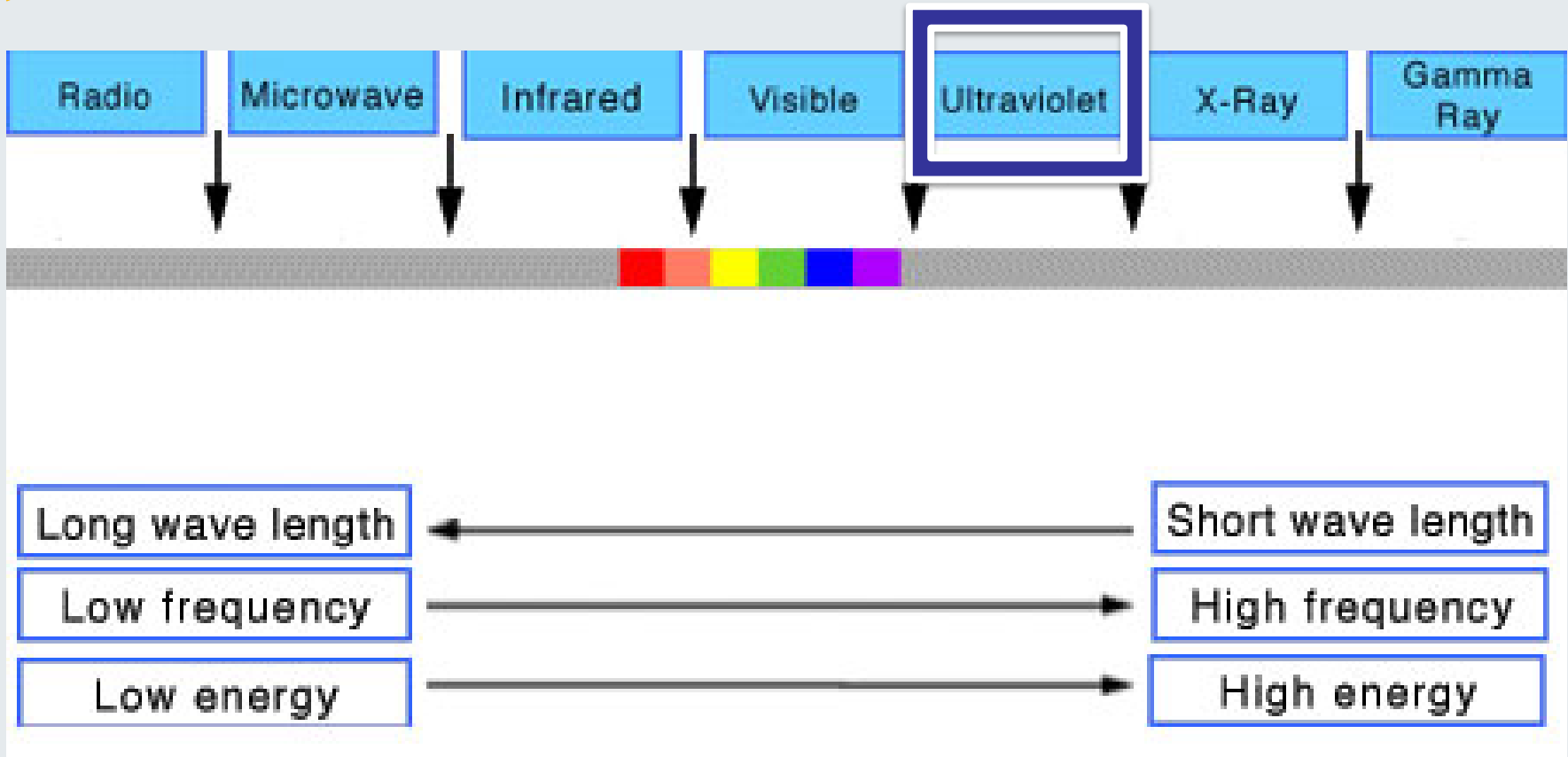


Sunscreen and misconceptions





the sunlight and the skin





the sunlight and the skin

Extrinsic aging/photoaging/UVA

Skin cancer

Vitamin D synthesis

Tanning

Immunosuppression



the sunlight and the skin



DNA repair mechanism after photo-biological damage

1. Photoreactivation repair
2. excision repair
3. Post-replication repair





the sunlight and the skin

Actinic keratoses, basal cell and squamous cell carcinomas correlate with the cumulative UV dose:





the sunlight and the skin

Malignant melanoma correlate with the number of severe sunburns (especially in childhood):



(Bild: E. Stevenson o'Connor, wikimedia)



radiation-therapy and effects in the skin

- Atrophy
- Pigment changes
- Telangiectasia
- Scars
- proliferating dermatosis
- skincancer
 - ⇒ Radiation therapy induced DNA damage in basal keratinocytes



radiation-therapy and effects in the skin

After Years: new skincancer

10 % after 30 years at the edge of the radiation field (Basal cell carcinoma and squamous-cell carcinoma)

possibility of combining damages:

sunlight-exposed skin areas
and

Cutaneous Radiation Syndrom
=>higher risk of malignant melanoma

(Braun Falco et al, 2012)



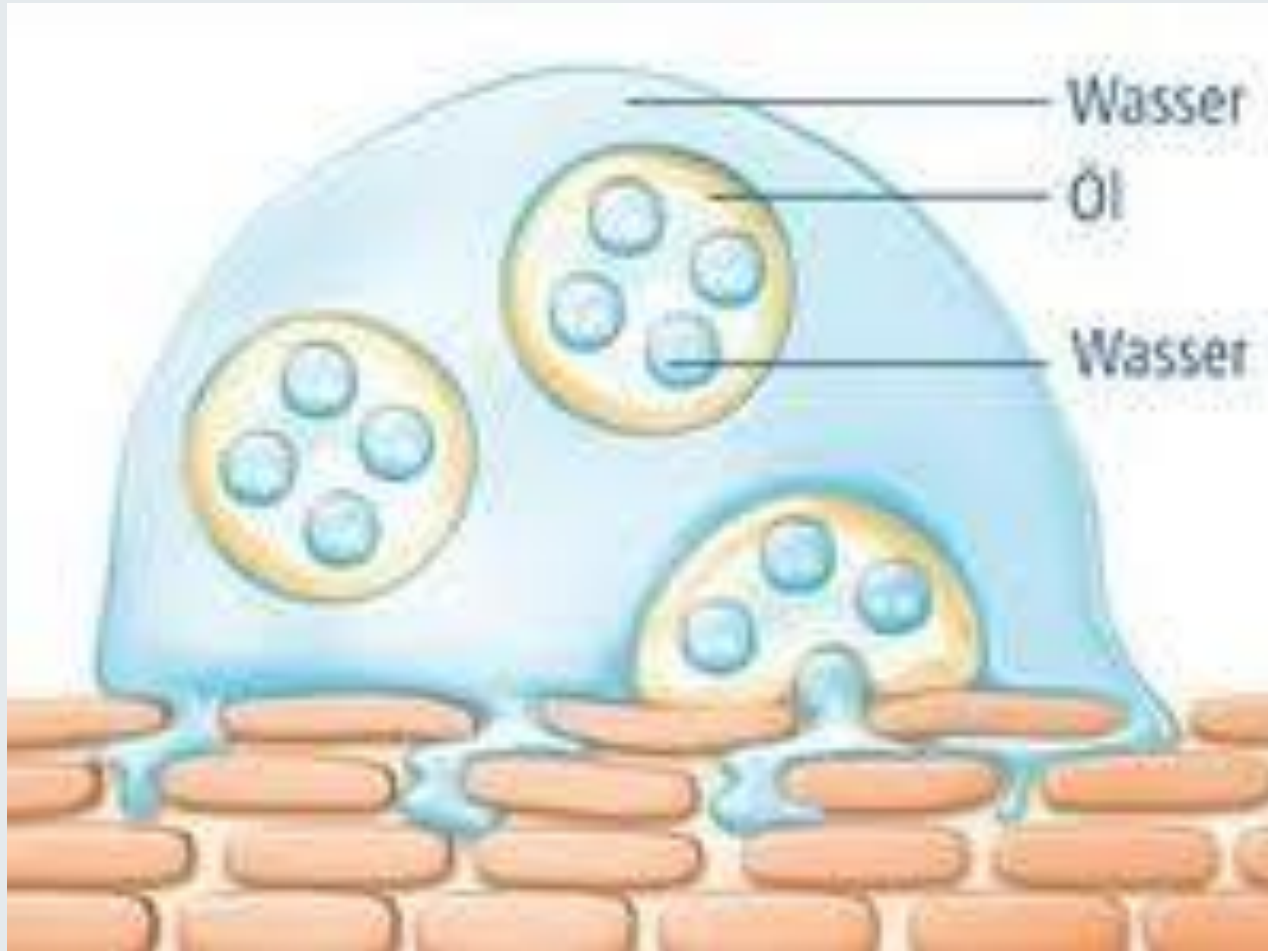
Cutaneous Radiation Syndrome (CRS)

Patients who are suffering from cutaneous radiation syndrome need a life-long treatment and skin care.





radiation-therapy and needs of the skin





Protection against sunlight



1. 11:00-15:00 shade



2.



< 100% UV protection 400nm

UPF=ultraviolet protection factor



3. sunscreen UVA **and** UVB
Sun-Protection-Factor (SPF) 30





Protection against sunlight

Kein Besuch von Solarien / no use of sunbeds
(UVA, immediate pigment darkening)

2009: The WHO classified sunbeds in the
highest category of risk for cancer, alongside
tobacco and asbestos

El Ghissassi F et al, 2009)





Protection against sunlight



Per 300 meters **↑** UV-Licht 3 – 5 %

90% reflection from snow, ice, water, sand



Sunscreen agents - mechanisms of action

Sunscreen agents

Inorganic

Organic

Common names

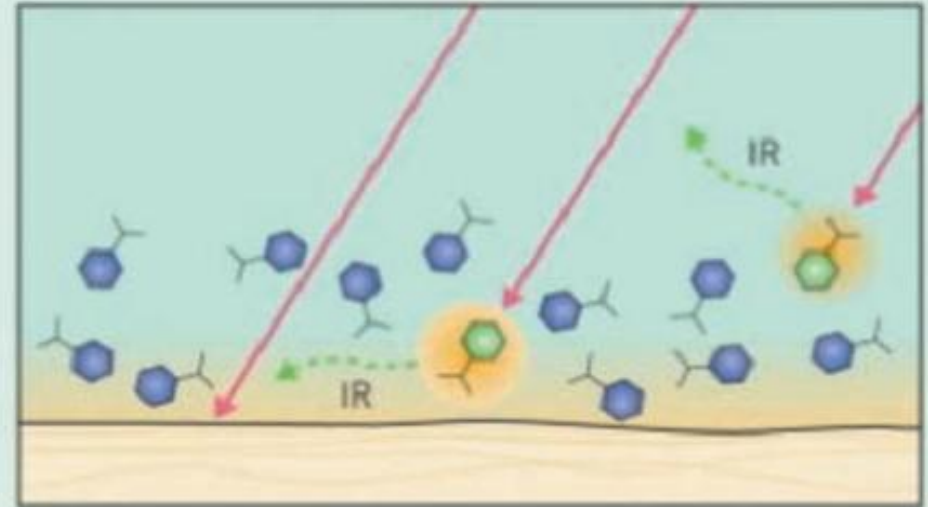
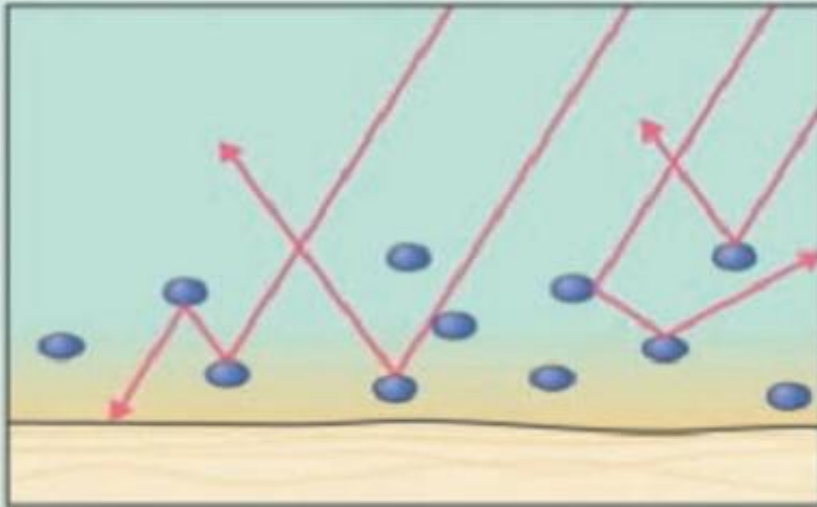
Sunblocks
Physical blockers

Sunscreens
Chemical absorbers

Mechanism of action

Scatter photons

Absorb photons



Sunblock particle
 Sunscreen molecules
 UV photons
 IR photons

(Quatrano & Dinulos, 2013)



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Protection against sunlight

Sunscreen:

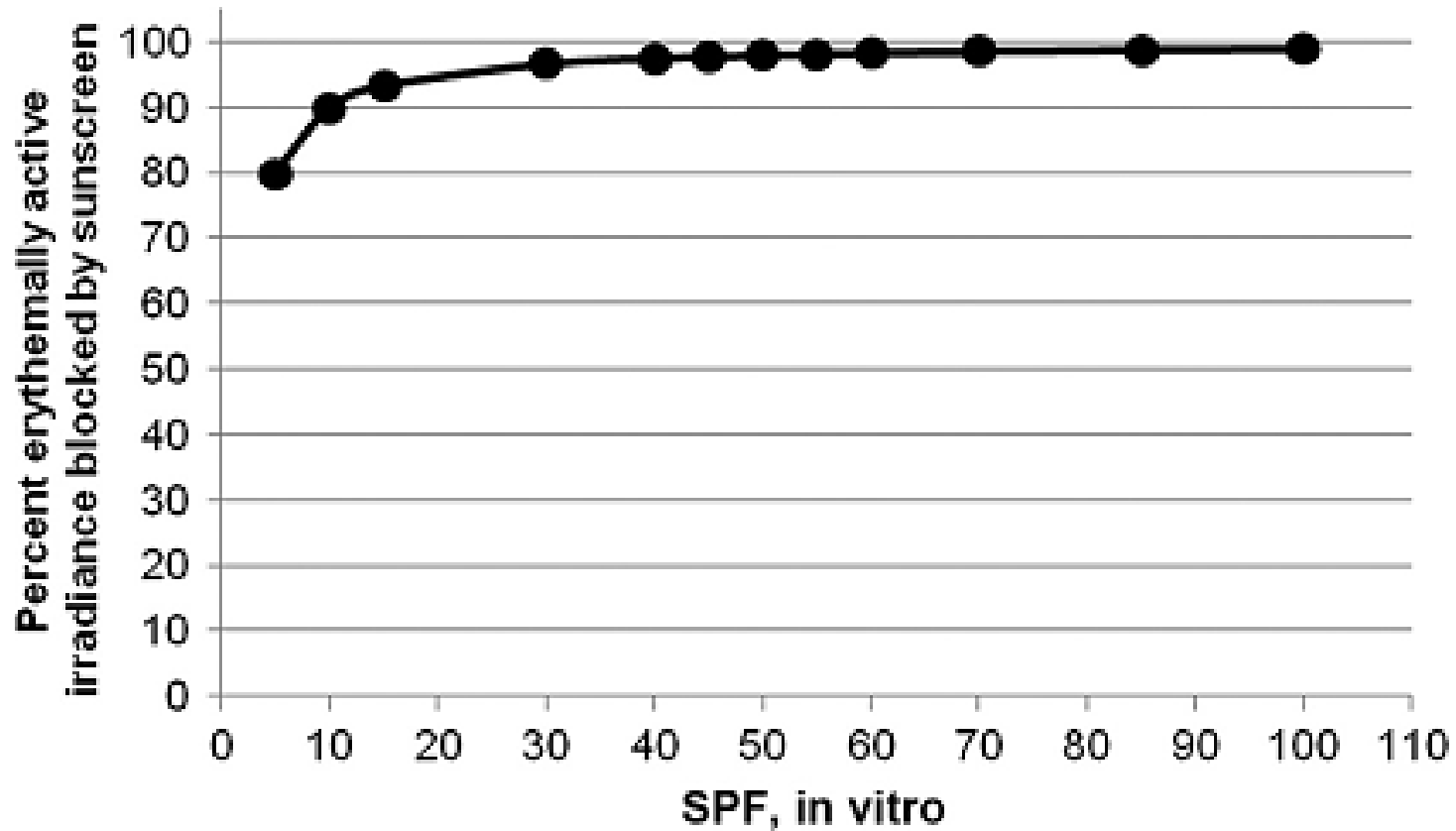
Lichtschutzfaktor (Sun Protection Factor = SPF)

- UVB radiation: 1000 times more erythemogenic than UVA
- so SPF primarily measure UVB protection
- SPF = the ratio of the least amount of UV radiation required to produce minimal erythema on sunscreen-protected skin to that required to produce the same erythema on unprotected skin.





Sun Protection Factor



(Stanfield , Osterwalder & Herzog 2010)





Protection against sunlight

Sunscreen:

- The relationship between SPF and UVB protection is not linear
- check sunscreen to protect UVB and UVA
- no use of terms «sunblock, water proof, sweat proof»
- Instead: water-resistant (40 min) (80 min)
- Sunscreens cannot claim to provide sun protection for more than 2h without reapplication



sunscreens and misconceptions



There is no "healthy tan". The pigmentation of human skin is a protective mechanism that is triggered by a previously induced cell damage.





Sunscreen and misconceptions

- sunscreen toxicity: routinely rigorous safety assessments (sensitization, irritation, phototoxicity and carcinogenicity) (Nohynek et al, 2010)
- potential systemic influences:
 - inorganic filters: not penetrate the skin
 - organic filters: penetration of small amounts: 0.1 – 5 % (Sadrieh et al, 2010)
- Nanoparticles: limited to the stratum corneum, their in-vitro toxicity profiles are of no consequence to human health (Burnett & Wang, 2011)





Sunscreen and misconceptions

- Vitamin D:

«long-term sunscreen use has minimal to no effect on vitamin D levels and function» (Linos et al, 2012)

“The overall health benefit of an improved vitamin D status may be more important than the possibly increased CMM risk resulting from carefully increasing UV exposure.” (moan et al, 2011)





Sunscreen use and misuse

- no use of sunscreen to extend sun exposure for tan acquisition
- When: every day and year around
- 15 min before going outdoor
- Reapply every 2h especially after swimming or heavy perspiration
- Apply generously and uniformly, **use enough ca. 40g**





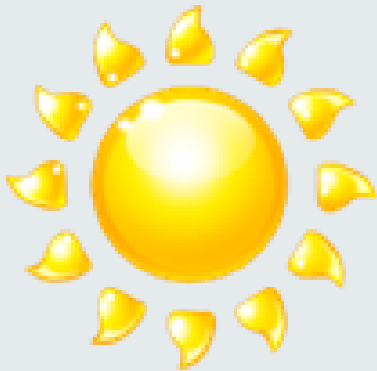
Sunscreen and children

- ⇒ Up to 80% of total lifetime sun exposure takes place before the age of 18 Years (Pustisek et al, 2010)
- ⇒ skin is thinner, less concentrated with melanin, immunologically immature, UV radiation penetrate the skin more deeply, less of an immune response against UV damage, higher risk of cumulative UV damage and skin cancer
- ⇒ less than 6 months old: Keep out of direct sunlight
- ⇒ more than 6 months old:
protect skin with clothing ore shade, use sunscreen to cover exposed skin, choose a broad-spectrum, water-resistant sunscreen with a minimum SPF of 30

(Quantrano & Dinulos, 2013)



**Thank you for your attention,
Questions?**



Markus Musholt-Meijer

Pflegeexperte

Dermatologie



**UniversitätsSpital
Zürich**



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