



# Non-Ionizing Radiation & Children's Health

International Joint Workshop  
18 - 20 May 2011, Ljubljana, Slovenia

PLATFORM PRESENTATION ☒

## Optical Radiation And The Eyes

Per SÖDERBERG

*Gullstrandlab., Ophthalmology*

*Dept. Of Neuroscience, Uppsala University*

*Uppsala, Sweden*

The sun is the main source for exposure of human eyes to optical radiation. Significant levels, of ground solar spectral radiance, ranges from 290 to 4 000 nm. Ocular exposure to optical radiation strongly depends on Rayleigh scattering and background reflection. Daylight intensity of visible radiation (VIR) is essential for development of vision in children. The human eye relies on the optical components of the eye for retinal image formation and is therefore relatively transparent to VIR. The intensity of optical radiation from the sun at the surface of the earth is below threshold for thermal damage. However, the photon energy of optical radiation is high enough to disturb biological function photochemically. In the human eye, molecular damage is removed by molecular repair and disposal. Excessive exposure to ultraviolet radiation (UVR), VIR and maybe near infrared radiation (IRR) may lead to accumulation of molecular damage and expression of loss of biological function. Photoinduced damage to tissues inside the eye strongly depends on the transmittance of the ocular media. Excessive exposure of either of the eye lid skin, the cornea, and the retina, to optical radiation induces short delay onset tissue damage. Epidemiological data indicate that due to low turnover of some of the ocular cells, there is a potential for accumulation of molecular damage over long periods of time. It was shown that sensitivity to cataract increases with lower age. Inappropriately used hand held laser systems are a threat for eyes in children and adults, and for vehicles. The explosive increase in use of LEDs for remote control and sensing has substantially increased the cumulated exposure of eyes in children to near infrared radiation. This requires careful investigation in order to avoid cumulated damage in the lens.