Acute high altitude vision loss and ocular surface temperature

Baertschi M. (1,2), Flammer J. (1), Dayhaw-Barker P. (2)

Ophthalmology Department, University Hospital Basel, Switzerland (1) and SALUS University Philadelphia, USA (2)

Financial interests: Baertschi (none), Flammer (none), Dayhaw-Barker (none)

Background

Acute high altitude vision loss as described in several case reports is extremely dangerous due to spontaneous severe low vision or complete blindness. Beside ultraviolet radiation, cold air is assumed to be responsible resulting in so called “freezing eyes” (1-3)

Method

Ocular surface temperature (OST) of fifteen healthy voluntary mountaineers (5 women and 10 men) were measured at environmental air temperatures (AT) between +23°C and -22°C by non-contact Infrared-Thermometry (Voltacraft IR-280-4ET), in a series of high altitude expeditions to the Alps, the Andes and the Himalaya at different altitudes between 3000m and 8848m above sea level.

Results

Changes in Ocular surface temperature (OST) and air temperature (AT) correlated in a non-linear regression to each other (Pearson corr. 0.973). The OST decrease between +23°C and -22°C was statistically significant (p=0.012). A clinical view on the results proof that OST remain stable at +34°C (+/- 0.1°C) between an AT of +23°C to +14°C, slowly decreasing OST to +30.6°C at -3°C and decrease to +24.8°C at an AT of -22°C.

Conclusion

In our cohort of healthy volunteers, very cold air at high altitude reduced the ocular surface temperature significantly. The endpoint of the Ocular Surface Temperature is still high above freezing temperatures.

It can be assumed, that it is very unlikely that eyes can freeze as long as the subject is alive.

Authors Contact Information

Michael Baertschi, University Hospital Basel, Department of Ophthalmology
Mittlere Strasse 91, 4031 Basel/Switzerland
email: michael.baertschi@usb.ch

References


Supported by:

• LHW Foundation, Lichtenstein