UV Dosimetry study and Vitamin D production in a group of school-adolescents in Davos

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Motivation and study design

- 'Matura Thesis’
- Relationship UV-Exposure and Vitamin D
  - Alpin climate; adolescents
  - March 2013 – August 2013
  - 7 Students aged 17-18 y
Material and Methods
UV-Dosimetry - Material

Personal UV-Dosimeter Badges: Mark II (Scienterra Ltd New Zealand; Sherman, 2010)
Material and Methods
UV-Dosimetry - Calibration

Reference: Broadband-Radiometer/QASUME
(Gröbner *et al.* 2005; Hülsen & Gröbner, 2007)
Material and Methods
UV-Dosimetry - Sampling

- Badges were worn on the wrist (Thieden et al. 2000; Knuschke et al. 2007)
- 5 sec UV-logging from 7 am to 9 pm
  > 10,000 datapoints/day
Material and Methods

Questionnaire

- Clothing data considering the 'Rules of nine' (Wallace, 1951)
- Use of sunscreen
- Dietary intake
Material and Methods

Serum Vitamin D

7 Vitamin D levels were determined (as 25(OH)D3) monthly – from the beginning of March until mid-August

- Taking of blood samples: Hochgebirgsklinik Davos Wolfgang
- Vitamin D analysis: Labormedizinisches Institut Dr Risch by UHPLC; Schaan, FL (ISO 17025; ISO 9001)
Results

UV-exposure in school

UVery of Fabio
from 23-Apr-2013 (113) to 23-Apr-2013 (113)

Exposure: 50 J/m2
GlobalUV: 4e+003 J/m2
Results

UV-exposure in school

![Graph showing ratio of exposure to global UV](image)
Results

Vitamin D

Overview: Vitamin D levels

\[ y = 0.17596x + 1.84678 \]

- Fabio
- Roman
- Oli
- Matthias G.
- Matthias P.
- Jurre
- Christoph
- Ivan
- mean

5-Mar: 11.6 +/- 8.8
20-Aug: 42.4 +/- 16.9
Results

UV-exposure versus vitamin D I
UVery of Jurre
from 16-Mar-2013 (75) to 16-Mar-2013 (75)

Exposure ery: 1170 J/m2
Exposure vtd: 49 J/m2
GlobalUV: 1.8e+003 J/m2
Results

UV-exposure versus vitamin D II
Conclusions

- Loss of data due to dosimeter problems
- Vitamin D deficiency in March
- Nearly all students build up sufficient Vit. D levels during spring/summer
- 2% of ambient UV exposure during school
  - Important: weekends, holidays
- Influence of diet seen at least with one pupil
Outlook

- Quality assurance
  - Characterisation of the badges:
    Relative spectral response, Angular response

- Thesis Submission: mid October
- Study will be extended to March 2014