

# Development of Portable Raman Spectroscopy as a Clinical Tool for Assessing Photodamage in Skin

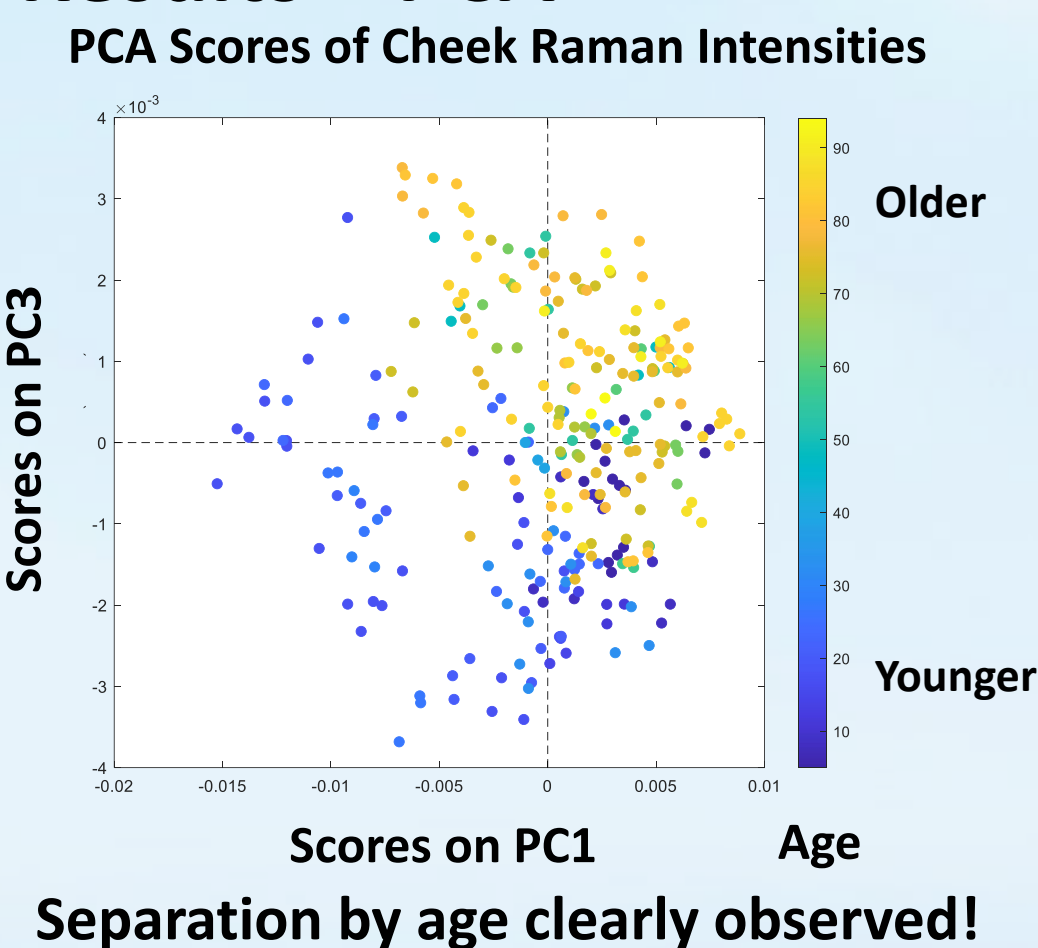
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**Look!...** at your own forearm, top and underneath. The differences in the appearance of your skin in these two places is largely due to the difference in exposure to solar UV. So we know that we are continually accumulating UV damage, but what are our actual individual levels of lifetime UV exposure and melanoma risk? Currently there is no way to know. Now **just imagine** your health provider could touch a light-pen to your forearm for 10 seconds, and then inform you that you are in the 80<sup>th</sup> percentile of lifetime UV skin damage for someone your age. **Would this affect the way that you protect and monitor your skin?** We believe it would, and that this simple motivation for a change in behaviour could save you from premature aging of the skin due to UV damage and decrease your risk for skin cancers such as melanoma.

## Objective and the project so far

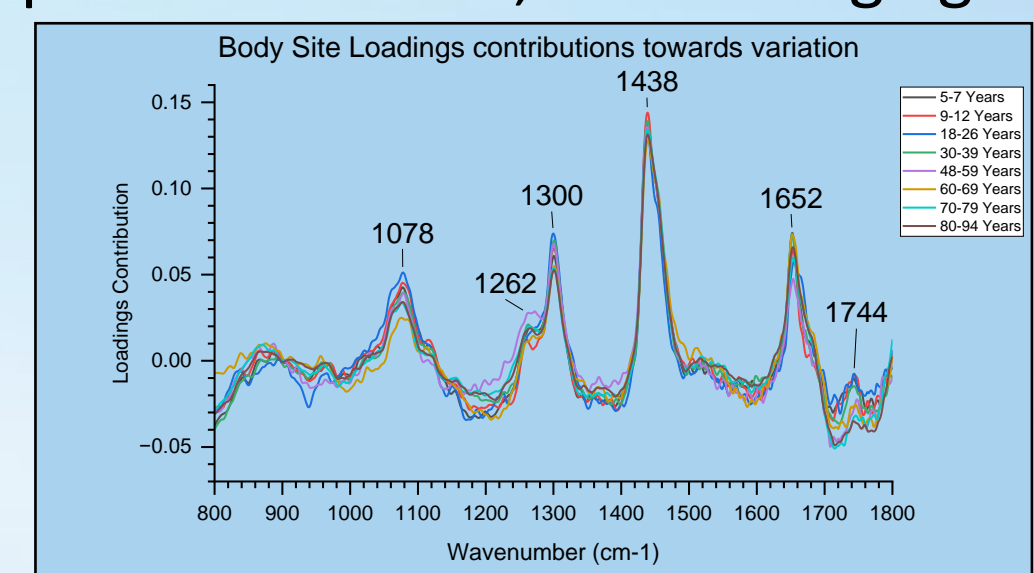
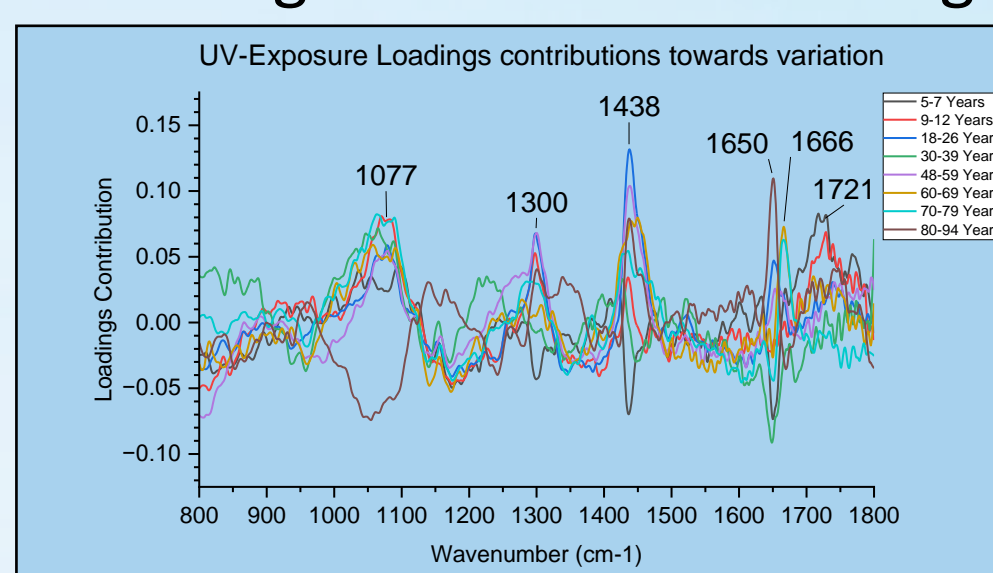
Our objective is to find spectral regions, resolvable with the portable Raman system, which only change with age in UV-exposed skin. Raman spectra from both UV-exposed and UV-protected skin regions were measured in 119 participants aged four to ninety-four years old. Principal Component Analysis (PCA), ANOVA Simultaneous Component Analysis (ASCA) and 2-Dimensional Correlation Spectroscopy Analysis (2D-COS) were performed on the data to identify these potential markers of UV damage.

## Results – PCA

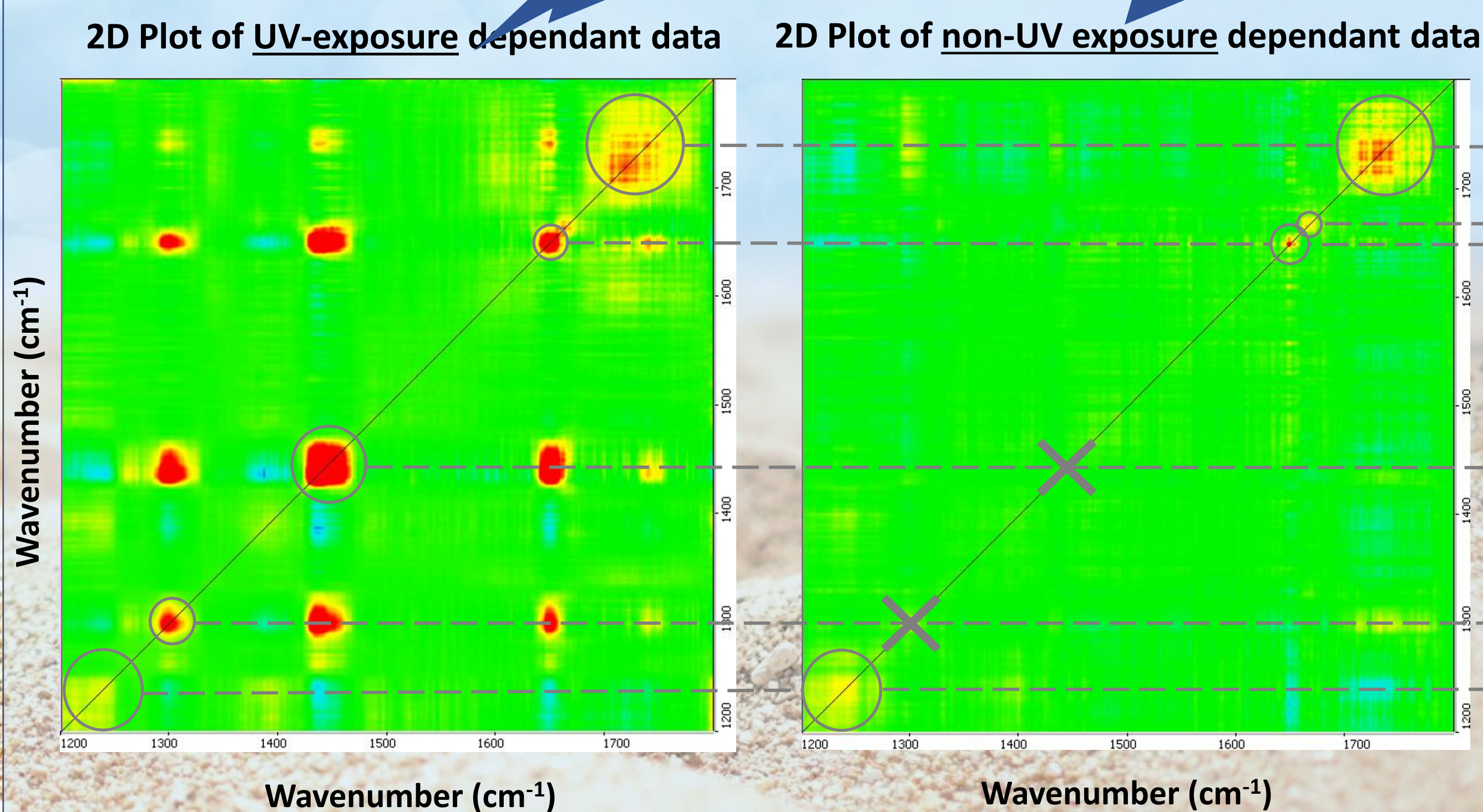


## Results – ASCA

ASCA on different age groups allows us to separate the variation due to UV-exposure from other sources of variation. A PCA analysis then gives loadings which tell us which wavenumber regions contribute strongly to UV-exposure variation, for each age group.



## Results – 2D-COS



Regions showing variations with age for UV-exposure dependant data, non-UV exposure dependant data, or both:

- Both – so not useful as marker of UV-damage ❌
- Only non-UV – so not useful as marker of UV-damage ❌
- Both – so not useful as marker of UV-damage ❌
- Only UV – so potentially useful as marker of UV-damage ✅
- Only UV – so potentially useful as marker of UV-damage ✅
- Both – so not useful as marker of UV-damage ❌

2D-COS allows us to visualise differences between age groups in the ASCA loadings (on-diagonal peaks) as well as correlations between them (cross-peaks), to suggest potentially useful markers of UV-damage

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