Effects on Human Primary Keratinocyte Differentiation and Viability induced by THz exposure.

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Primary human keratinocytes can be driven, in vitro, to differentiate via activation of transglutaminases, by raising the culture medium calcium concentration above 1mM. This results in transglutaminase regulated cross linking of specific amino acids with resultant cornified envelope formation. The differentiation can be monitored via the incorporation of Fluorescein Cadaverine as a substitute for L-Lysine (Gray et al., 1999). This differentiation assay has been co-assayed with the keratinocytes reductive capacity for converting resazurin to resorufin, as a measure of cell activity/viability (Gray and Clothier 2001).

One primary aim of the THz Bridge project is to assess the effects of THz radiation on human beings, the effects on basal keratinocytes ability to continue growth and normal patterns of differentiation. These are relevant since medical imaging of the body through the skin is envisaged (Anone et al., 1999).

The technique involved transporting confluent human keratinocytes to the THz sources, exposing them and then returning the cells for subsequent differentiation over 7-10 days. The human keratinocytes, at passage 1 or 2 from isolation, are grown to confluence, the medium is then replaced by a buffered salt solution and the cells transported at 22°C. They were exposed to the THz source for up to 30 minutes at room temperature.

The resazurin reduction assay was then performed at 37°C. The cells were then cultured in high calcium medium with 20µM fluorescein cadaverine (Gray et al., 1999) and re-assayed at day 3, 6 and 9.

No inhibition or stimulation of cell activity, compared with non-exposed cells, was noted following exposure up to 288mJ/cm². The differentiation also occurred in a normal way, for exposed and non-exposed cells, with the FC incorporation increasing significantly between day 6 and day 9, as expected.

Assessment of exponentially growing cells is to be examined alongside confirmation of these results with exposure in the range 1 to 10THz up to 5J/cm² energy.

