Functional Imaging Progress for Clinical Use

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Abstract. Fluorescence lifetime imaging (FLIM) has proved to be ideal for non-invasive and very sensitive investigations in clinical applications. In contrast to pure intensity-based imaging, the usage of the timing information lifts FLIM on another level enabling functional imaging. The most salient example is metabolic imaging e.g. to investigate melanoma lesions (Fig.1). This method utilizes FLIM on cells and tissue to determine the ratio of the fractions of the free and protein-bound forms of the intracellular autofluorescent metabolic co-enzyme nicotinamide adenine dinucleotide (NADH) [1,2,3,4]. Here we show the capability of metabolic FLIM of monitoring melanoma growth in a very early stage. We also present the results of a multiphoton FLIM study on tracing nanoparticles after topical application on human skin *in vivo* for safety aspects of cosmetics [5]. Recently, FLIM technique progressed significantly by improvement of the data analysis software. By employing a better fitting algorithm and the power of GPU the user gets a much quicker and more precise result, and thus gains huge benefit particularly when using FLIM as a diagnostic tool.

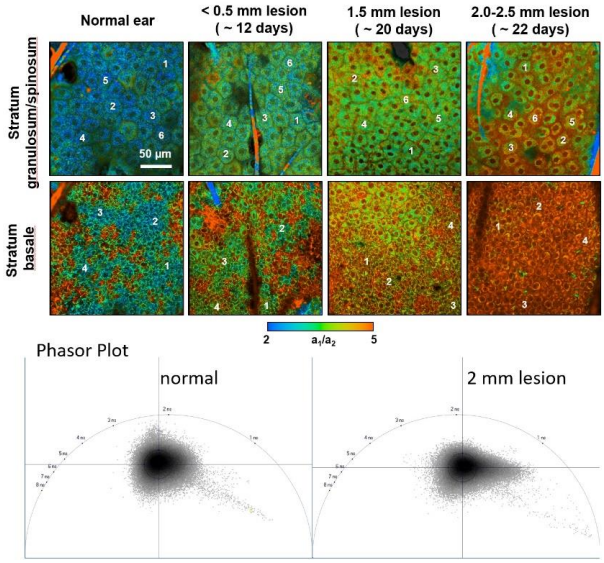

Fig.1: Multiphoton fluorescence lifetime imaging (FLIM) on freshly excised mouse ear skin for different stages of melanoma progression. Color code represents the ratio of the fractions of the fast and the slow decay components assigned to the free and protein-bound form of NADH, respectively.

References

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