3D-MULTICOLOR SIM MICROSCOPY USED FOR AUTOMATED SEGMENTATION AND CHARACTERISATION OF AGE-RELATED INTRACELLULAR GRANULES

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Age related macular degeneration (AMD), the main cause for legal blindness in industrial countries, is accompanied by accumulation of lipofuscine granules inside the cells of the retinal pigment epithelium (RPE).\cite{1}

We show, that by applying “Structured Illumination Microscopy” (SIM) in combination with three excitation wavelengths (488nm, 568nm, 671nm) and up to four emission filters, we were able to clearly resolve these intracellular structures \cite{2,3}, and to identify different lipofuscine granules as well as intra-granule regions based on spectral discrimination.

Using SIM we were able to discriminate and analyse more than 100 granules inside single cells, and compare these results with those obtained using other microscopy techniques. We present statistical data of single granules gained by analysing over 250 cells on histological samples from twelve donors of different age.

All work on human tissue was done according to the Declaration of Helsinki.

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