Type of presentation: Poster

IT-3-P-2060 Sub resolution spectral discrimination of Lipufuscin-granules inside human RPE cells

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In the last decades, a variety of new microscopy methods has been developed to circumvent the classical resolution-limit[1]. Furthermore, combinations of confocal-microscopes and spectrometers have proven useful and are already commercially available. However, presently no existing device is used to combine spectrometry with superresolution.

Here we present a first attempt to analyze the emission spectrum of super resolution images in a clinically important field of application. We used a custom-made Structured Illumination Microscope (SIM) equipped for multicolor imaging[2]. At an excitation wavelength of 488 nm, this instrument provides an optical resolution down to about 120 nm in the object plane and 350 nm along the optical axis. To obtain spectral information we used different emission filters and calculated the resulting spectral bands.

We used this method on human retinal pigment epithelial (RPE) tissue sections and present first superresolution images on spectral information. We also present that this method is able to separate the intracellular autofluorescent Lipufuscin-granule-types that are connected to age related maculadegeneration. All work on human tissue was done according to the Declaration of Helsinki.

[1] Christoph Cremer and Barry R. Masters; Resolution enhancement techniques in microscopy; The European Physical Journal H; 2013

[2] Sabrina Rossberger, Thomas Ach, Gerrit Best, Christoph Cremer, Rainer Heintzmann, Stefan Dithmar; High-resolution imaging of autofluorescent particles within drusen using structured illumination microscopy; Br J Opthalmol 2013, 97, 518-523