

AB016. A standardized approach to correlating OCT images to histopathology using paraffin embedded specimens: clarification of the ellipsoid zone and new opportunities

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Background: The aim of this project is to develop a new standardized and cost-efficient method to compare optical coherence tomography (OCT) scans to their corresponding paraffin embedded histopathology sections in post-mortem eyes. This correlation will clarify the interpretation of OCT images, and it will also enable direct immunohistochemical characterization of features observed on OCT.

Methods: Study design: donor eyes were obtained from two separate eye banks. In order to minimize post-mortem change like retinal detachment and vitreous opacification, the eyes were fixed in a previously tested fixative solution. Time between death and fixation has been kept under 6 hours. Methods: Using a customized imaging device, nine post-mortem eyes were imaged with a SD-OCT machine. Subsequently, an 8mm trephine was used to isolate a portion of the posterior pole including the macular area and the optic nerve head for histopathological analysis. Paraffin embedded cross sections of the retina were obtained and visually compared to each OCT image (b-scans).

Results: To facilitate the correlation of OCT images to their histopathological sections, three principle aspects were controlled during tissue processing: rotation, tilt and location. Using markings as well as anatomical landmarks, serial histopathological sections in an orientation comparable to OCT b-scans were obtained, thereby facilitating image pairing.

Conclusions: Compared to other well-established methods using resin and electron microscopy, our standardized Methods allowed us to successfully compare OCT b-scans to serial retinal cross sections of a wider macular area at a lower cost. Our novel approach allows us to translate features observed on OCT images into well-established histopathological images, providing the clinician with additional tools to obtain difficult diagnoses with more confidence.

Keywords: Optical coherence tomography (OCT); retina; histopathology

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