Abstract 156

A NOVEL APPROACH TO ESTIMATING CHOROIDAL LESION THICKNESS USING 2D ULTRA-WIDEFIELD OPTOMAP IMAGES

Poster

Yu M.*, Ghoraba H., Mruthyunjaya P.

Stanford University ~ Palo Alto, CA ~ United States of America

Purpose:

Tumor thickness is an established risk factor for transformation of choroidal nevus (CN) into choroidal melanoma (CM) and plays an important role in risk stratification of melanocytic choroidal lesions (MCL). We describe a novel technique for estimating tumor thickness from 2D ultra-widefield (UWF) Optomap images (Optos PLC, Dunfermline, Scotland, UK).

Methods:

Patients seen by the Ocular Oncology Service (Byers Eye Institute, Stanford University) with clinically-diagnosed MCL underwent clinical examination, UWF imaging, and standardized B-scan ultrasonography (Eye Cubed, Australia). UWF images were post-processed to isolate the green-wavelength-only image. Using ImageJ (National Institutes of Health, USA), average pixel intensities within the lesion and of the adjacent retina were obtained, and the difference between both values calculated ("pixel intensity difference"; average lesion intensity minus average adjacent retina intensity). Pixel intensity difference was plotted against tumor thickness as measured by ultrasonography. The significance of the relationship between both variables was assessed by linear regression analysis.

Results:

A total of 153 MCL (28 CM and 125 CN) of 153 patients were evaluated. Mean ultrasonographic thickness was 1.2 mm (median: 0.9, range: 0.5-5.5). Mean pixel intensity difference was 2.8 (median: 3.8, range: -11.1–39.6). The linear correlation coefficient for tumor thickness to intensity difference was 0.918 (p<0.001), indicating a strong positive correlation between tumor thickness and tumor brightness on green-wavelength imaging. Coefficient of determination (R^2) was 0.844. A pixel intensity difference threshold of >5.0 conferred a 100.0% sensitivity and 85% specificity for detection of tumors with thickness >2.0 mm.

Conclusions:

Lesion hyperintensity (brightness) on Optos green-channel correlates with tumor thickness. Choroidal tumor thickness can be rapidly and reliably estimated using 2D UWF images. With additional validation, this method could augment future high-throughput screening and risk stratification of MCL with UWF images alone.

Pixel Intensity Difference vs.
Thickness by Ultrasound/OCT

$R^2 = 0.844$