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TISSUE PROPERTY OF OPTICAL COHERENCE TOMOGRAPHY IN RABBIT MODEL OF ATHEROSCLEROTIC PLAQUES

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Objectives Optical coherence tomography (OCT) is a high resolution intravascular imaging modality and can distinguish detailed coronary plaque components with high specificity and sensitivity. This study aimed to investigate the tissue property of OCT images for detecting plaque components.

Methods Carotid atherosclerosis was induced in New Zealand white rabbits fed a high-cholesterol diet for 20 weeks and subjected to balloon injury. At week 20, the right common carotid arteries were scanned by OCT. OCT signal intensity (NSD) and backscatter values was determined in a region of interest drawn in the lesion. Immunostaining was performed to with following monoclonal antibodies: an anti-smooth muscle α-actin antibody (sigma) to identify smooth muscle cells and anti-CD68 antibody (DAKO) to identify macrophages. Macrophage and smooth muscle cell density were quantified by immunohistochemical staining, and compared with the NSD and backscatter values.

Results A significant positive relationship between CD68-positive macrophage density and NSD was seen ($r=0.653$, $p=0.009$). A mild positive relationship between smooth muscle cell density and NSD was seen ($r=0.179$, $p=0.03$). A significant positive correlation between CD68-positive macrophage density and backscatter was seen ($r=0.316$, $p=0.012$). There was no significant correlation between smooth muscle cell density and backscatter was seen ($p=0.41$).

Conclusions Tissue property of OCT may a useful marker to reflect the plaque inflammation and as a surrogate to dynamically evaluate the effects of anti-atherosclerotic interventions on plaque inflammation.