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FACSS 2006 abstract – invited talk at Raman imaging session

Macro- and micro-investigation of arterial tissue by optical coherence tomography and Raman spectroscopy.

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Coronary angioplasty is the clinical procedure used to clear blocked arteries and involves using small balloons guided into coronary arteries to widen the blocked area. This is incorporated with deploying a mesh stent in the artery to keep it from re-narrowing in the future. However, complications such as re-stenosis and thrombosis can occur due to arterial wall damage during the procedure. In order to reduce the likelihood of restenosis, it is beneficial to understand the interaction of the balloon, stent and arterial wall in order to minimize the vessel injury. We propose to characterize this interaction by using optical coherence tomography to obtain morphological images and Raman spectroscopy to gain biochemical information of these vessels. In preliminary studies, mechanical stretching and friction application were used as models for vessel stress to mimic the balloon inflation procedure. OCT images and Raman spectral maps were collected from control and mechanically stressed regions. Studies were focused on the intima layer of the vessel which most closely contacts the balloon during angioplasty. These results and their correlation with histological analyses to assess degree of tissue damage will be discussed.