Title	FRS-092 A New Real-time System for Tissue Characterization of Coronary Plaques Using Integrated Backscatter Intravascular Ultrasound((Fulltext))
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signal between red and white thrombi (130 ± 18 versus 145 ± 34, p=0.12). However the half attenuation width of the signal intensity curve, which was defined as the distance from the peak intensity to its half intensity, was significantly different between red and white thrombi (324 ± 50 versus 183 ± 42 μ m, p<0.0001). Cutoff value of 250 μ m in the half width of signal intensity attenuation can differentiate white thrombi from red thrombi with the sensitivity of 90% and the specificity of 88%.CONCLUSIONS: We present the first detailed description of the characteristics of different types of coronary thrombi in OCT images. OCT may allow us not only to estimate plaque morphology but also to distinguish between red and white thrombi.

FRS-092

A New Real-time System for Tissue Characterization of Coronary Plaques Using Integrated Backscatter Intravascular Ultrasound

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Background: We previously developed the Integrated Backscatter (IB) Intravascular Ultrasound System for tissue characterization of coronary plaques. However, the previous system was off-line and diagnostic accuracies for tissue characterization have not been precisely investigated. **Methods:** A personal computer equipped with a new analyzing system was connected to an IVUS system. Rigorous signal calibrating algorithms and noise reduction algorithms were added to the previous system. Images were acquired from 244 segments of 21 coronary arteries from 13 cadavers obtained at autopsy. A total of 934 regions of interests on color-coded maps were compared with histological images. Optimal thresholds between calcification and fibrosis, and between fibrosis and lipid pools were determined from the analysis of receiver operating characteristic (ROC) curves. Color-coded maps were automatically constructed using these thresholds. **Results:** Differences in IB values of calcification (CL) (n = 194), fibrosis (n = 435) and lipid pool (LP) (n = 305) were clear (P<0.001). Each threshold was the most reliable predictor of lipid pools (sensitivity 90% and specificity 92%), fibrosis (sensitivity 94% and specificity 93%) and calcification (sensitivity 95% and specificity 99%). The overall agreement between histological and IB-IVUS diagnoses (LP(+)CL(+), LP(+)CL(-), LP(-)CL(+) or LP(-)CL(-), n=192) was high (Cohen's κ = 0.79). **Conclusion:** Our new real-time system promises to shorten the time needed for analysis as well as improves diagnostic accuracies.

FRS-093

Automatic Segmentation of IVUS Image by Self-organizing Map

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Conventional IVUS image is constructed by amplitude information of original radio-frequency (RF) signal. In order to utilize frequency information, we applied self-organizing map (SOM) classification to frequency spectrum of IVUS RF signal. The frequency spectrum was calculated by using a mathematical autoregressive model. Each spectrum was characterized by 18 shape parameters. SOM is one of neural network applications that places d-dimensional vector (d is the number of input data parameters) on a regular two-dimensional grid. The left figure is the SOM results and the right is the color-coded tissue map on a conventional IVUS image. SOM classified the RF spectra into 7 categories and those seemed to correspond as catheter, guidewire shadow, blood, fibrous plaque, calcified plaque, lipid and media. SOM provides important information for IVUS tissue characterization.
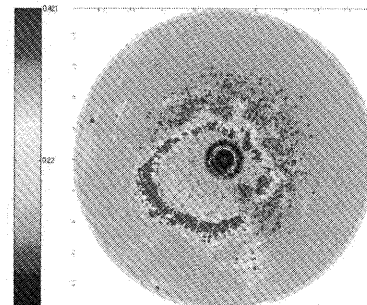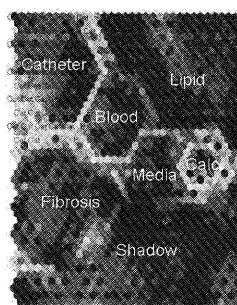
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Thin-Cap Fibroatheroma Detection by Optical Coherence Tomography: Comparison to Angioscopy and Intravascular Ultrasound In Vivo

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Postmortem studies have associated thin-cap (≤65 μm) fibroatheromas (TCFAs) with vulnerable plaques. The aim is to compare the frequencies of lipid-rich plaque (LP) and TCFA obtained by three imaging modalities including OCT, angioscopy and IVUS. **Methods** : 11 patients with acute coronary syndromes and 12 pts with stable angina were enrolled. By OCT, LP was defined as lipid occupying ≥1 quadrant of the cross-section. TCFA was defined as LP with cap thickness ≤65 μm. Angioscopic yellow appearance and predominantly echolucent plaque on IVUS were classified as LPs, respectively. **Results** : The frequency of LP was 87%, 87%, and 61% in OCT, angioscopy, and IVUS, respectively. The incidence of plaque rupture was 48%, 22%, and 17%, respectively. The incidence of thrombus was 52%, 48%, and 26% in OCT, angioscopy, and IVUS, respectively. OCT and angioscopy showed equivalent frequency of LP. However, yellow plaques had a wide range for the cap thickness, measured by OCT with the mean values (range) of 123 (40 to 300) μm. The frequency of TCFA identified by OCT was only 50% (10/20) in angioscopic yellow plaques. **Conclusions** : OCT demonstrated that angioscopic yellow plaques included LPs with a wide range of cap thickness. Our study suggests that OCT may be appropriate for the detection of vulnerable plaque such as TCFA, compared to angioscopy and IVUS.

FRS-095

Enhanced Method for Intravascular Ultrasound Evaluation of Coronary Plaque by Combining Elastography with Integrated Backscatter Tissue Analyses

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Background: Although intravascular ultrasound (IVUS) is used for examining plaque morphology, few data exist regarding simultaneous determination of plaque compostion and elasticity. We developed a new IVUS with strain power imaging (SPI) and intergrated backscatter (IB) analyses. **Method**: After conversion of radio frequency (RF) signal (40 MHz) with 12 bits, strain distribution of plaque was calculated on the same scan line. Plaque compostion was simultaneously determined by IB. **Results**: In 128 coronary sites from 21 patients, the different types of lesions such as lipid-rich (n=34), fibrous (n=52) and calcified (n=42) plaque can be distincted by SPI. Interestingly, elastography can determine tissue elasticity even in the presence of calcification (Fig). **Conclusion**: These results demonstrate that the present IVUS with SPI and IB gives possibility for determining plaque characteristics in clinical settings.