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Non Invasive Imaging

POLYMER IODINATION FOR IMPROVED IN VITRO TRACKING OF BIODEGRADABLE STENT DEGRADATION: SERIAL MICROCT IMAGING FOR BIOREACTOR TESTING

Poster Contributions
Hall C
Saturday, March 29, 2014, 10:00 a.m.-10:45 a.m.

Session Title: Coronary and Cardiac CT: Improving Diagnoses
Abstract Category: 18. Non Invasive Imaging: CT/Multimodality, Angiography, and Non-CT Angiography
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Background: Evaluating the in vitro degradation of a biodegradable magnesium (Mg) alloy stent by X-ray micro-computed tomography (CT) is made difficult by low attenuation of Mg and polymer coating. Addition of iodine (I) to polymer coating of Mg stents was investigated to improve segmentation of microCT images and track biodegradation.

Methods: Tri-iodinated ethylenediamine-core PAMAM dendrimers were prepared by incorporating 2,3,5-triiodobenzoic acid (TIBA) with poly-lactic acid (PLA). Bare Mg plates (0.25 cm2) were used as a preliminary testing system. Plates were dip-coated with either a solution of PLA-dendrimer or PLA and then scanned using microCT at 80 kVp, 60 µA, and an aluminum filter. MicroCT data was reconstructed and then analyzed using MicroView. Mg stents with 100-120 µm strut thickness were spray-coated with or without PLA-dendrimer solution, deployed in latex tubing, and placed in bioreactor exposed to biological solution under physiological flows for serial microCT imaging and analysis.

Results: X-ray attenuation of PLA was ~70% that of Mg. Iodinated PLA attenuation was ~130%, and was clearly visible against the background (see figure). Iodinated PLA on stents had even greater attenuation at 145% that of the Mg struts. Stent degradation was tracked with serial microCT imaging of polymer-coated stents.

Conclusions: The incorporation of iodine into the polymer coating of a PLA-coated Mg stent allowed improved visualization and segmentation for tracking degradation in a bioreactor.