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IN-STENT LIPID-RICH PLAQUE IN HIGH CHOLESTEROL DIET RABBIT VALIDATED BY INTRAVASCULAR OPTICAL COHERENCE TOMOGRAPHY AND HISTOLOGY

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Yan Fang, Jian Shi, Zulong Xie, Linna Zhang, Jingbo Hou, Bo Yu. *Department of Cardiology, Second Affiliated Hospital of Harbin Medical University, Harbin, China*

Objectives In-stent lipid-rich plaque had been found frequently in patients underwent stent implantation by optical coherence tomography (OCT) and intravascular ultrasound (IVUS). The paucity of a reliable animal model limits the further research of lipid-rich plaque development and treatment. The present study aims to develop an animal model of lipid-rich plaque.

Methods Four New Zealand White Rabbits were fed a high cholesterol diet (HCD) until euthanasia. Eight bare metal stents were randomly implanted into iliac arteries after 1 week HCD. The rabbits underwent OCT and IVUS imaging at 8 weeks after stent implantation. Then the stents were harvested and processed for light microscopy. On OCT imaging, in-stent lipid-rich plaques were identified by diffusely bordered, signal-poor regions. In-stent plaques were defined as peri-strut fomay macrophage clusters with or without calcification, fibroatheroma, and ruptures with thrombosis in in-stent neointima.

Results All stents underwent OCT and histology examination. With OCT, total 127cross-sections and 962 struts were analysed. The 99.75% struts were covered well at 8 weeks after implantation. In-stent lipid-rich plaques with diffusely bordered, signal-poor regions were identified in 23.40% of cross-sections and 87.50% of stents. The histology examination of corresponding images further confirmed the components of in-stent lipid-rich plaque. In-stent lipid-rich plaques were characterised by peri-strut fomay macrophage clusters with lipid-rich necrotic core in in-stent neointima.

Conclusions In-stent lipid-rich plaque model was developed successfully in high cholesterol diet rabbit. OCT is a useful tool to detect in-stent lipid-rich plaque features in vivo. The combination of in vivo OCT and the in-stent lipid-rich plaque model may be an important research tool in furthering our understanding and treatment of in-stent plaque in patients underwent stent implantation.