Fatty streak assessed by optical coherence tomography: early atherosclerosis detection

Manabu Kashiwagi, Hironori Kitabata*, Yuichi Ozaki, Toshio Imanishi, and Takashi Akasaka

Department of Cardiovascular Medicine, Wakayama Medical University, 811-1, Kimiidera, Wakayama 641-8509, Japan

* Corresponding author. Tel: +81 73 447 2300; Fax: +81 73 446 0631, Email: hkitaba@wakayama-med.ac.jp

Macrophage plays a crucial role for atherosclerotic plaque and its measurement is important. Fatty streak consists of macrophage foam cells, but its assessment by optical coherence tomography (OCT) has not been established in vivo. These images were derived from an aorta of Watanabe heritable hyperlipidaemia rabbit ex vivo. OCT cross-sectional image shows a linear high-brightness region (arrows) with rapid signal attenuation at 8–11 o'clock position (Panel A). Panels B, C, and D are corresponding histology. Tissue was stained with Masson’s trichrome for the evaluation. The accumulation of foam cells just below the endothelium is observed, causing fatty streaks (×400, Panel D). The histological classification of atherosclerosis on the basis of Stary’s definition is divided into early lesions (Type I, II, and III), which are always small and clinically silent, or advanced atherosclerotic lesions (Type IV–VIII). Type II lesion, which is known as fatty streaks and sometimes seen on the surface of the artery, represent the earliest grossly visible atherosclerotic lesion. Those lesions consist mainly of macrophage foam cells, which have taken massive amounts of cholesterol, stratified in layers rather than isolated groups of a few cells. Microscopically, Type II lesions are more distinctly defined as lesions than Type I with initial, minimal changes (small, isolated groups of macrophages, T-cells, and foam cells). Although the fatty streak cannot always be clearly differentiated from a plaque with superficial macrophages, this OCT finding might represent the accumulation of lipid-laden macrophage foam cells and provide us a novel insight for the detection of early-stage atherosclerosis.

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