## Application of synchrotron x-ray microscopy to detect vascular lesions in hyperlipidemic mice

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Atherosclerosis is a disease of arterial wall, in which atheromatous plaques of various stages exist. Traditionally, the fine structure of atheromatous plaques can be detailed at the microscopic level using scanning electron microscopy (SEM) by viewing from the luminal side or using thin-section electron microscopy (TEM) with section views. However, both techniques require a long list of preparation steps and one sample can not be shared by both techniques. In addition, for TEM, once the samples are embedded in resin, the following procedures of sectioning, staining, and viewing are time-consuming.

We recently reported that synchrotron x-ray can be used to visualize the structure of vascular wall. To explore the potential application of synchrotron x-ray in detection of atherosclerotic change, the great vessels of mice made hyperlipidemic by either deletion of ApoE gene or feeding cholesterol-enriched diet were studied. The arterial samples were prepared following standard procedures of TEM. After synchrotron x-ray imaging, the 3-D information of arterial wall were reconstructed, which showed detailed topology of the luminal surface, comparable to those obtained by the SEM, as well as intramural change, equivalent to the section views of TEM. Currently we are testing the resolution limit of synchrotron x-ray microscopy in this specific application. Our preliminary results suggest that synchrotron x-ray microscopy, with the merit of both SEM and TEM, is fully capable to detect vessel disease from lesions down to cell level and make it a suitable technique in studies of atherosclerosis.

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