Poster Presentation

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Building brain network in electron density map determined by micro-CT

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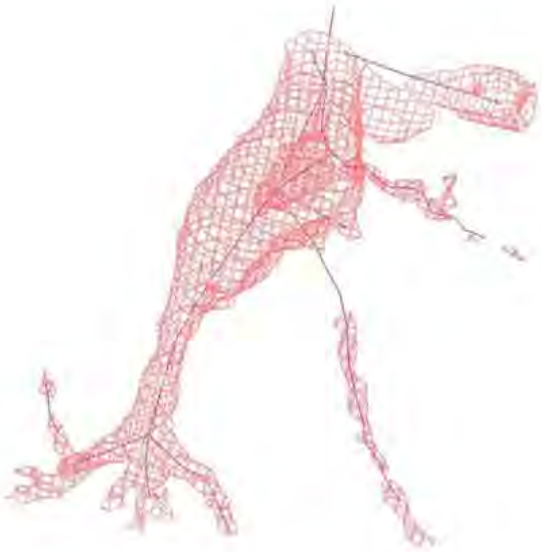
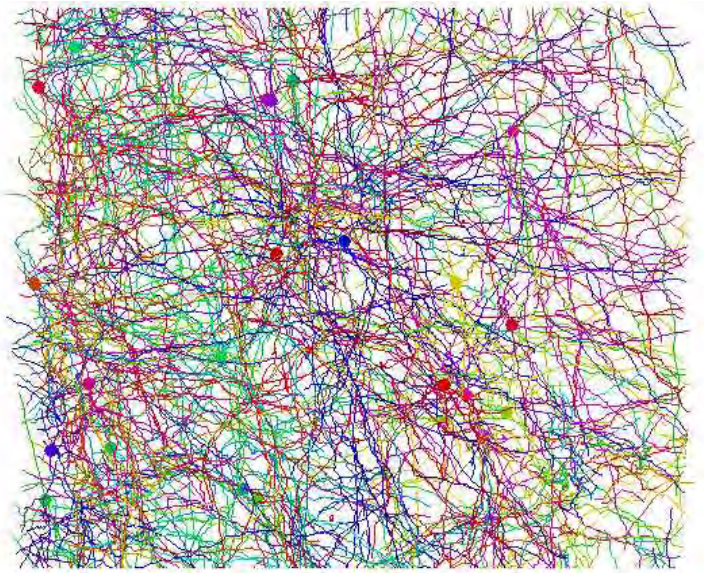
In macromolecular crystallography, an electron density distribution is traced to build a model of the target molecule. We applied this method to model building for electron density maps of a brain network. Human cerebral tissue was stained with heavy atoms [1]. The sample was then analyzed at the BL20XU beamline of SPring-8 to obtain a three-dimensional map of X-ray attenuation coefficients representing the electron density distribution. Skeletonized wire models were built by placing and connecting nodes in the map [2], as shown in the figure below. The model-building procedures were similar to those reported for crystallographic analyses of macromolecular structures, while the neuronal network was automatically traced by using a Sobel filter. Neuronal circuits were then analytically resolved from the skeletonized models. We suggest that X-ray microtomography along with model building in the electron density map has potential as a method for understanding three-dimensional microstructures relevant to biological functions.

[1] *R. Mizuani, A. Takeuchi, T. Hara, K. Uesugi, Y. Suzuki, J. Synchrotron Radiat., 2007, 14, 282-287,* ***[2]*** *R. Mizutani, R. Saiga, A. Takeuchi, K. Uesugi, Y. Suzuki, J. Struct. Biol., 2013, 184, 271-279*





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