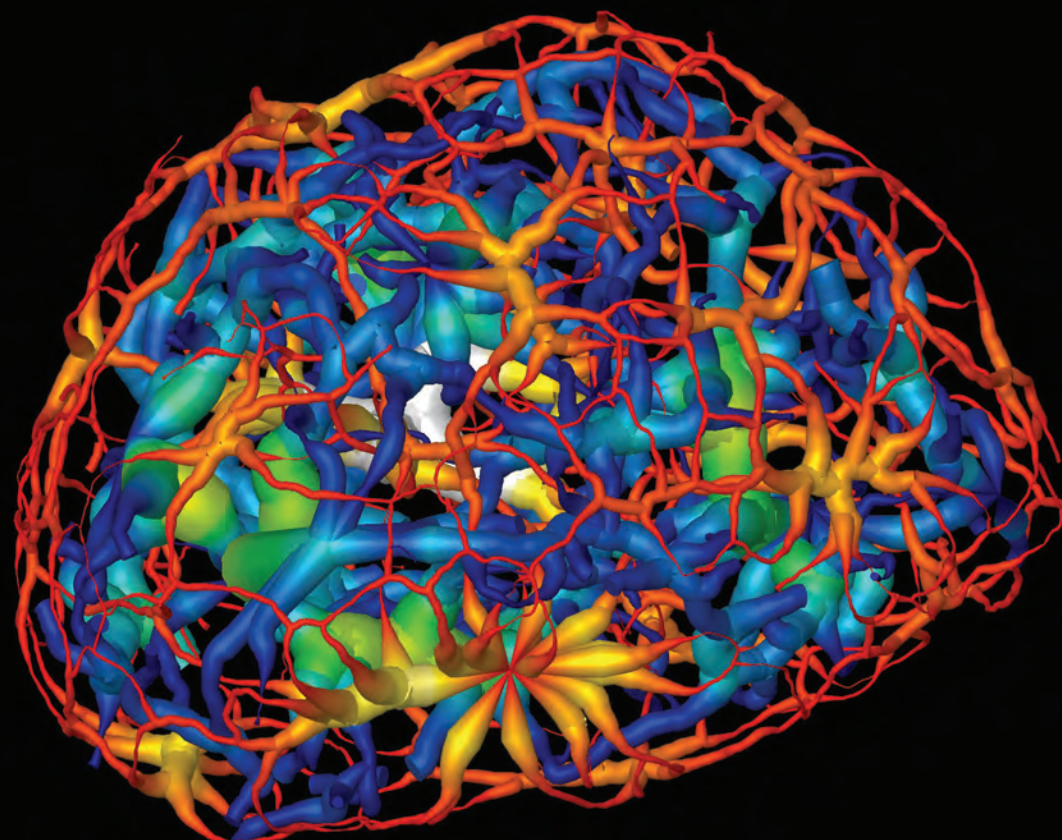


# Carolyn Larabell

## Biological Soft X-ray Tomography



Much like medical computed tomography scans reveal anatomical structures in the body, soft x-ray tomography (SXT) visualizes and quantifies the organization of sub-cellular structures within a cell. In SXT, the specimen is illuminated with x-ray photons from within a region of the spectrum known as the 'water window' (284 eV-543 eV). Water window x-ray photons are absorbed an order of magnitude more strongly by carbon- and nitrogen-containing organic material than by water. Consequently, variation in biomolecule composition and concentration gives rise to quantitative, high-contrast images of intact, fully hydrated cells. Attenuation of soft x-rays as they pass through the specimen adheres to the Beer-Lambert Law and is, therefore, a function of chemical composition and concentration of organic material, yielding unique quantitative linear absorption coefficient measurements for cellular components. To localize molecules without perturbing cell structures, we use correlated cryogenic fluorescence tomography (CFT). This multi-modal approach — imaging the same cell using both CFT and SXT — allows localization of labeled molecules directly in the context of a high-resolution three-dimensional tomographic reconstruction of the cell in the near-native state.

Carolyn Larabell is Professor and Vice-Chair in the Department of Anatomy at the University of California, San Francisco, School of Medicine, and Advanced Light Source Professor at Lawrence Berkeley National Laboratory. She is also the Founding Director of the National Center for X-ray Tomography (NCXT), a NIGMS-NIH Biomedical Technology Research Resource, established to develop soft x-ray microscopy for imaging biological cells. Dr. Larabell received her Ph.D. from Arizona State University and did postdoctoral training at Stanford University and the University of California, Davis.

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