Three-dimensional non-destructive soft-tissue visualization with X-ray staining micro-tomography.

Low inherent contrast in soft tissues has been limiting the use of X-ray absorption micro-computed tomography (micro-CT) to access high-resolution structural information of animal organs. The staining agents used in micro-CT to improve the contrast fail in providing high-quality images of whole organs of animals due to diffusion problems of the staining agent into the sample. We demonstrate a staining protocol that incorporates a biochemical conditioning step prior to exposure to the staining agent that succeeds in overcoming the diffusion problems, thus quickly providing high-quality micro-CT images of whole organs of mammals. Besides of yielding non-distorted three-dimensional information at the same spatial resolution accessible in histological sections, micro-CT images of whole organs stained by our method enable easy screening of slices along any direction of the volume thus demonstrating new possibilities of structural analysis in biomedical science.