Three-dimensional observation of mouse tongue muscles using microcomputed tomography

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Abstrak

The aim of this study is to obtain information about the mouse tongue muscle rendered using microcomputed tomography (μCT) at low, middle, and high magnifications. Three-dimensional (3D) μ:CT is used in various fields. Most μ:CT observations are restricted to hard tissue in biomaterial samples. Recently, with the use of osmium tetroxide, μCT has been effectively employed to observe soft tissue; it is now believed that μCT observation of soft tissue is feasible. On the other hand, the structure of the tongue muscle has been well studied, but cross-sectional imaging enhanced by 3D rendering is lacking. We chose the mouse tongue as a soft tissue case study for μCT and generated crosssectional images of the tongue enhanced by 3-D image rendering with histological resolution. During this observation, we developed new methods of low-magnification observation to show the relation between the tongue muscles and surrounding tissues. We also applied high-resolution μCT in high-magnification observation of muscle fiber fascicles. Our methodological techniques give the following results: (1) For lowmagnification observation (field of view: 12,000 μm), pretreatment with decalcification and freeze drying is suitable for observing the area between the muscle of the tongue and the bone around the tongue using μCT. (2) For middle-magnification observation (Field of view: 3,500 μm), the use of osmium tetroxide to observe the muscle arrangement of the tongue by μCT is suitable. (3) For highmagnification observation (Field of view: 450 μm), high-resolution μCT is suitable for observation of the transversus muscle fiber fascicles.