

Three-dimensional observation of mouse tongue muscles using micro-computed tomography

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Abstrak

The aim of this study is to obtain information about the mouse tongue muscle rendered using micro-computed tomography (μ CT) 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, μ CT has been effectively employed to observe soft tissue; it is now believed that μ CT 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 μ CT and generated cross-sectional 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 μ CT in high-magnification observation of muscle fiber fascicles. Our methodological techniques give the following results: (1) For low-magnification observation (field of view: 12,000 μ m), 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 μ CT. (2) For middle-magnification observation (Field of view: 3,500 μ m), the use of osmium tetroxide to observe the muscle arrangement of the tongue by μ CT is suitable. (3) For high-magnification observation (Field of view: 450 μ m), high-resolution μ CT is suitable for observation of the transversus muscle fiber fascicles.