SPATIOTEMPORAL RESOLUTION ANALYSIS OF COMMERCIALIZED LIGHT SHEET MICROSCOPY IN LARGE VOLUME CLEARED BRAIN

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Although a state-of-the-art confocal microscopy have been developed as fast imaging tool which allows relatively large volume imaging, light sheet fluorescent microscopy(LSFM) has been still prefered in three-dimentional imaging because of its abilities which can be illuminated to only observed plane results in optical sectioning capability, low fluorophore bleaching and low phototoxicity. Advanced LSFM with adaptive optics system or digital scan improved spatiotemporal resolution but these are only for small specimen such as cell or embryo[1]. LSFM can be faced with physical limitation such as scan range when implementing to large volume specimens at several millimeter to centimeter unit. We employed two different type light sheet microscopy(Lavision Ultramicroscope Ⅱ(5x) and Zeiss Lightsheet Z.1(2x)) which are representative as commercialized LSFM targets individual specimen size. Proper standard for selection in both LSFM considering for target volume and dimeter of sample is ambiguous because these two types LSFM were known as tool having a capability of just large volume imaging. We need to figure out individual properties of two types LSFM regarding resolution, imaging time and so on. Volume imaging must have taken long processing time. Moreover, post processing time is longer than imaging time. Published papers regarding LSFM have little review for practical time to acquire volume image and proper tool selection in accordance with target specimen volume and resolution. Light sheet Z.1 has better xy pixel resolution(4 times) but it has huge longer post process time(about 96 times) than Ultramicroscope Ⅱ because of file size and tiling process in same field of view. In terms of resolution, Ultramicroscope Ⅱ is possible to resolve mouse brain axon(1-2 μm) [2]. We have to chose strategically the LSFM which proper our target. We try to offer the image quality analysis and quantitative information of both LSFM to researcher who especially has to do imaging in three-dimentional with large volume specimen.

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