Spring 2017

# Postnatal Development of the Murine Notochord Structure Quantified by High-Resolution Contrast-Enhanced Microct

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The notochord is essential during the development of the nucleus pulposus of the intervertebral disc (IVD), yet its structure during postnatal maturation remains relatively unknown. The notochord serves as a renewable cell source for the IVD, and the deterioration of the notochord structure has been associated with IVD degeneration and nerve infiltration associated with low back pain. Since the IVD is a fibrocartilaginous joint responsible for load transmission and mobility of the spine, defining the quantitative structure of the notochord during aging is critical for mechanobiological investigations relating to IVD function and homeostasis. Despite its importance, the imaging of the notochord has classically relied on histological techniques, which can introduce artifacts during preparation and spatial bias during sectioning. Magnetic resonance imaging (MRI) does not offer sufficient resolution to discriminate the nucleus pulposus that surrounds the notochord, especially in murine models. X-ray based computed tomography systems offer resolutions down to single- to sub-micron scales, and when coupled with contrast agents, can provide high-resolution three-dimensional imaging of relatively small features such as the notochord. Coupled with the unique characteristic of phosphomolybdic acid to preferentially bind to collagen cationic domains, we utilize a novel technique to quantitatively describe the structure of the notochord with aging in lumbar IVDs of BALB/c mice. These results provide a highly quantitative and sensitive approach to monitoring the notochord, and they reveal a more accurate picture of the IVD during postnatal development.