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Characterization of intervertebral disc tissue-specific stem cells and the role of small leucine-rich proteoglycan in their niche

Sean Shishu Huang Chinese Academy of Sciences, China

The identification of skeletal progenitor cells in the degenerated intervertebral disc (IVD) raises the possibility that the IVD contains a population of stem cells capable of regenerating nucleus pulposus (NP) cells or annulus fibrosus (AF) cells. The characterization of IVD stem/progenitor cells (DSCs) proposes important clinical implications for the management of IVD diseases and injuries. However, it is still unknown about the origin of these cells, which is a tissue-specific or degeneration-induced population. We show that healthy Rhesus macaque IVD harbors stem-like cells, which are capable of generating colony-forming unit, differentiation and self-renewal, the common criteria of stem cells. We demonstrate that biglycan and decorin reduce the susceptibility of DSCs to hypoxia-induced apoptosis by promoting the expression of hypoxia inducible factors. Our findings suggest that normal IVD possess a progenitor population that may rely on unique niche comprised of small leucine-rich proteoglycans (SLRPs) for low oxygen tension survival. Since loss of SLRP in mice leads to disc degeneration, this implies disc degeneration may be associated with a deregulation of progenitor activities.

Biography

SS. Huang has completed his Ph.D at the age of 30 years from the department of Orthopaedics & Traumatology at the the University of Hong Kong and postdoctoral studies from Chinese Academy of Sciences. He is the assistant professor of Center for Human Tissues and Organs Degeneration in Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences. His research focuses on regenerative medicine of intervertebral disc in primate animal model and has published more than 6 papers in reputed journals and serving as a reviewer of a SCI journal (IF=0.407). His recent work on primate study has been in the revision in the Journal of Proc Natl Acad Sci U S A.

sshandld@gmail.com