MCB, vol.16, supplemental 2, pp.77, 2019

LOX Alleviates Rat Intervertebral Disc Degeneration Through ECM Improvement and Anti-Apoptotic Protection in Nucleus Pulposus Cells

Runze Zhao[1], Tingting Xia[1], Mengyue Wang[1], Fan Feng[1], Wanqian Liu[1,*] and Li Yang[1,*]

[1]Key Laboratory of Biorheological and Technology of Ministry of Education, Bioengineering College of Chongqing University, Chongqing 400030, China.

*Corresponding Authors: Wanqian Liu. Email: wqliu@cqu.edu.cn; Li Yang. Email: yanglibme@cqu.edu.cn.

Abstract: This study was focus on the exploring the therapeutic function of lysyl oxidase (LOX) in rat nucleus pulposus (NP) cells in intervertebral disc degeneration (IVDD). To do this, a Sprague-Dawley (SD) rat caudal spine degeneration model was established by puncturing the $Co_{5\text{-}6}$ disc. NP cells apoptosis and extracellular matrix (ECM) degeneration in IVDD were evaluated by real-time quantitative reverse transcription-polymerase chain reaction (RT-qPCR), Hematoxylin-Eosin (H&E) and immunofluorescence. Then, the therapeutic effect of LOX on IVDD was evaluated by histological staining. *In vitro*, the regulator effect of LOX on degenerate rat NP cell was explored. ECM relate proteins and cytokines were measured by RT-qPCR and immunofluorescence. NP cell apoptosis was measured by CCK-8, EdU and Live/Dead assay. Subsequently, molecular mechanism of LOX in NP cell apoptosis was investigated by using western blot, qPCR and immunofluorescence. Our results showed a time-dependent degeneration of NP. In detail, the ECM of NP was gradually decreased and massive NP cells were apoptotic death which was regulated by Fas/FasL cell signaling pathway, however LOX significantly delayed the process of IVDD. Our results revealed LOX was a protector to delay the IVDD process *in vivo*. *In vitro* study, we found that LOX significantly increased the synthesis of ECM. In addition, LOX protected NP cell against to apoptosis through down regulating the expression of Fas and phosphorylation of p53. Our results demonstrated that LOX alleviated IVDD through improving the synthesis of ECM and protecting NP cells against apoptosis. This study indicate that LOX is a potential therapeutic agent to IVDD, which may provide a new sight of IVDD therapy.

Keywords: Intervertebral disc degeneration; ECM; NP cellular apoptosis; lysyl oxidase; Fas/FasL; phosphorylated p53

Acknowledgement: This work was funded by National Natural Science Foundation of China (31270990, 11532004) and Innovation and Attracting Talents Program for College and University ("111" Project) (B06023).