ISSN: 2348-1927

Commentary Article

Annals of Biological Sciences
2021, 9 (11):57

Anti-Aging Component Klotho Slows the Progression of Intervertebral Disc Degeneration through the Toll-Like Receptor 4-NF-B Pathway

Erica Melena*

Editorial Office, Annals of Biological Sciences iMedPub, Green Lane, London, UK

***Corresponding author:** Erica Melena Editorial Office, Annals of Biological Sciences iMedPub, Green Lane, London, UK*

E-mail: annbiolsci@journalres.com

***Received Date:** November 04, 2021; **Accepted Date:** November 11, 2021, **Published Date:** November 22, 2021*

The major cause of lumbar protrusion is intervertebral disc degeneration. The lumbar intervertebral disc is the most substantial component of the human body. It is commonly assumed that the intervertebral disc begins to degenerate after the age of 20; however it has recently been proven that the degeneration began at the age of 15. The nucleus' water content steadily decreases. In addition, the flexibility and load resistance of the intervertebral disc decrease. Recent research has discovered a number of inflammatory variables that are involved in the IDD process and are strongly connected to the onset and progression of IDD. The intervertebral disc is made up of a nucleus pulposus in the centre, an outer fibrous annulus, and endplates at the upper and lower ends. Its primary role is to preserve the proper spine structure and to bear the spine's physiologic stress. The NP tissue includes a high quantity of water and proteoglycan, which is required for the intervertebral disc's physiological function and stress. NP cells play a critical function in starting tissue formation during embryogenesis of intervertebral disc cells and may be directly responsible for the creation of the nucleus pulposus. In certain species, such as humans, NP cells may eventually be lost and replaced with chondrocyte-like cells, resulting in a disc that is entirely comprised of fibres. As a result, age is one of the risk factors for intervertebral disc degeneration. Klotho is a brand-new anti-aging gene. In animals, Klotho deficiency can result in a variety of senescence-like traits. Overexpression of Klotho, on the other hand, extends the longevity of Klotho mice. Klotho is a protein found in the kidneys that aids in mineral metabolism and kidney protection. It is also found in the heart, brain, and parathyroid gland. The Klotho gene encodes a single transmembrane protein that is secreted and regulates numerous cellular processes by influencing several cell membrane receptors and transporters as well as associated signalling pathways like as ageing, inflammation, apoptosis, oxidative stress, and so on. Polymorphisms in the human Klotho gene have been linked to pathologic bone loss in ageing, spinal illness, osteocalcin levels, and bone mineral density. Furthermore, Klotho protein expression in the intervertebral disc has been observed. Its chemical mechanism of particular activity in the intervertebral disc, however, remains unknown.

It is obvious that intervertebral disc degeneration worsens with age. Klotho protein, we believed, maintains NP homeostasis in normal intervertebral discs. Unexpectedly, we discovered that a reduction in Klotho expression in NP cells was mediated by the stimulation of inflammatory signalling during intervertebral disc degeneration. The Klotho protein is known to be composed of three domains: the extracellular domain, the transmembrane domain, and the intracellular domain. Klotho functions as a receptor that controls phosphate excretion in the kidney as well as the production of active vitamin D. Klotho secreted controls the action of many growth factors. 11. Doi et al. found that released Klotho inhibits TGF-1 signalling by directly attaching to the cell surface type II TGF-beta receptor (TGFbR2) and blocking TGF-1 from binding to the receptor [35]. In NP cells, TGF-1 is the most potent inducer of matrix production. Kuro-o discovered that Klotho has the ability to directly regulate the endocrine FGF family. As a result, Klotho's function in nucleus pulposus cells might have a variety of effects. Future research will concentrate on the human sample to identify the function of Wnt signalling and whether Klotho's control of cell proliferation and matrix formation is unique to NP cells. Furthermore, Klotho must be tested to see if it impacts the activity of numerous signalling pathways in NP cells, such as the activity of TGF, FGF, or MMP families, which may be implicated in disc degeneration.

We investigated the expression of Klotho in the intervertebral disc and NP cells, as well as the signal crosstalk between Klotho and the inflammatory signal, which is thought to be a trigger for disc degeneration. We found the reciprocal antagonism of Klotho and TLR4-NF-B inflammatory pathways by creating a nucleus pulposus inflammatory model. These findings clearly imply that inflammatory signalling reduced Klotho protein production in NP cells. Increasing Klotho expression, on the other hand, suppresses inflammatory signals in NP Cells. These findings may support the hypothesis that Klotho is not only an antagonist of TLR4-NF-B inflammatory signalling, but also of TLR4-NF-B signalling, and that Klotho forms a negative feedback loop in NP cells. Further research is needed to discover which molecules on multiple inflammatory signalling pathways interact with Klotho to control nucleus pulposus cell proliferation and matrix production in order to unravel the process that causes intervertebral disc degeneration.