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Editorial

Klotho as a Novel Cardioprotective Protein in Aged Heart

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In recent years, researchers have been looking for genes whose products can directly affect the aging process. Among these, the anti-aging protein klotho has attracted much attention. This single transmembrane protein is expressed in the renal tissues, parathyroid gland and choroid network of the brain and acts as a co-receptor for Fibroblast Growth Factor FGF. In this way, it contributes to calcium and phosphate homeostasis, which is in fact the classical function of this protein. The second extracellular protein of this protein can be released from cell surface by ectodomain shedding and get secreted into the blood, which, in turn, as an “endocrine factor”, affects the body in many ways (1).

Interestingly, in recent years, klotho expression has been confirmed in the cardiovascular system and novel cardioprotective effects have been reported for this protein. In a study on older people, it was shown that the serum level of klotho reduced in both men and women when age increased (2). The reduction in serum klotho level is directly associated with vascular dysfunction symptoms in patients with chronic kidney disease (3).

The level of klotho protein in serum and cardiomyocytes of patients with atherosclerosis was also lower than that in normal people (4, 5). A study on 804 older people over 65 years in Italy showed that the serum klotho level is an independent predictor for all mortality causes. People with lower plasma klotho levels had a higher risk of death (6).

The exact mechanisms for the cardioprotective effects of klotho are still unknown, but it seems that strengthening the antioxidant system and suppressing apoptosis are the main pathways for the function of this protein. klotho protects cardiomyocytes against hypoxia/reoxygenation induced injury (7) and isoproterenol-induced cardiac damage (8) by activating superoxide dismutase antioxidant factor and inhibiting apoptosis. In another study, klotho suppressed isoproterenol-induced P38 activation and protected the heart from damage by reducing endoplasmic reticulum stress and apoptosis (9).

Study on the cardiovascular effects of this protein is at an early stage, but it can provide a new insight on the treatment of cardiovascular diseases in the older people or even delaying the aging process in the cardiovascular system.

References

1. Kuro-o M. Klotho and aging. Biochim Biophys Acta. 2009; 1790 (10): 1049-58.
2. Ai F, Chen M, Li W, Yang Y, Xu G, Gui F, et al. Protective role of Klotho on cardiomyocytes upon hypoxia/reoxygenation via downregulation of Akt and FOXO1 phosphorylation. Molecular Medicine Reports. 2015; 11 (3): 2013-9.
3. Corsetti G, Pasini E, Scarabelli TM, Romano C, Agrawal PR, Chen-Scarabelli C, et al. Decreased expression of Klotho in cardiac atria biopsy samples from patients at higher risk of atherosclerotic cardiovascular disease. Journal of Geriatric Cardiology. 2016; 13 (8): 701-11.
4. Keles N, Caliskan M, Dogan B, Keles NN, Kalcik M, Aksu F, et al. Low serum level of klotho is an early predictor of atherosclerosis. The Tohoku Journal of Experimental Medicine. 2015; 237(1): 17-23.
5. Song S, Si LY. Klotho ameliorated isoproterenol-induced pathological changes in cardiomyocytes via the regulation of oxidative stress. Life Sciences. 2015; 135: 118-23.
6. Song S, Gao P, Xiao H, Xu Y, Si LY. Klotho suppresses cardiomyocyte apoptosis in mice with stress-induced cardiac injury via downregulation of endoplasmic reticulum stress. PLoS One. 2013; 8(12): 1-14.
7. Xiao NM, Zhang YM, Zheng Q, Gu J. Klotho is a serum factor related to human aging. Chinese Medical Journal (Engl). 2004; 117(5): 742-7.

8. Kitagawa M, Sugiyama H, Morinaga H, Inoue T, Takiue K, Ogawa A, et al. A decreased level of serum soluble Klotho is an independent biomarker associated with arterial stiffness in patients with chronic kidney disease. PLoS One. 2013; 8(2): 1-10.

9. Semba RD, Cappola AR, Sun K, Bandinelli S, Dalal M, Crasto C, et al. Plasma klotho and mortality risk in older community-dwelling adults. The Journal Gerontology. Series A, Biological Sciences and Medical Sciences. 2011; 66(7): 794-800.