

Analysis of SOD3 and Akt in ascending aortic aneurysm

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Ascending aortic aneurysm (AsAA) is divided into three different forms: syndromic, familial non-syndromic, and degenerative. Bicuspid aortic valve (BAV), occurring in 2% of the population, is the most frequent cardiac congenital abnormality, associated to AsAA. All the different forms of AsAAs are a consequence of cystic medial necrosis (CMN), characterized by apoptotic loss of smooth muscle cells (SMCs), fragmentation of elastic and collagen fibers and increased accumulation of mucoid material.

The extracellular superoxide dismutase (SOD3) is a Cu/Zn enzyme, affecting redox state and homeostasis of extracellular matrix (ECM) (1). Moreover, the outside-in signalling from ECM modulates intracellular pathways regulating many cellular functions. The multifunctional Akt pathway affects survival and cellular proliferation and has important effects on the cardiovascular function.

In this study we examined the relevance of SOD3 and Akt in AsAA pathogenesis. To this aim, the SOD3 and Akt protein levels were evaluated in normal ascending aortic tissues (n=6) and in tissues from AsAAs associated both to tricuspid aortic valve (TAV) (n=6) and BAV (n=6); moreover, we measured SOD3 activity in sera from healthy donors and patients with AsAA. Our data showed a reduction of SOD3 and phospho-Akt (pAkt) protein levels in AsAAs from BAV patients compared to normal donors; on the other hand, no differences emerged in SOD3 activity. Furthermore, immunohistochemical analysis performed on normal and pathological ascending aortic tissues showed a SOD3 immunostaining in both extracellular space and tunica media cells from normal ascending aortic tissues; conversely, no SOD3 immunostaining was detected in AsAAs tissues from both TAV and BAV patients. Our data show that SOD3 and pAkt could be associated to AsAA pathogenesis and suggest a link between ECM homeostasis and Akt survival pathway.

References

[1] Arcucci A et al. (2011) *J Biol Regul Homeost Agents* 25: 647-54.

Key words

Ascending aortic aneurysm, bicuspid aortic valve, tricuspid aortic valve, extracellular superoxide dismutase.