ENHANCING CARDIAC REGENERATIVE THERAPIES BY REMINDING THE ADULT HEART ON ITS EMBRYONIC STATE

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Our dream in defeating the processes of organ damage and aging has challenged scientists for many years. Although the goal is to successfully treat the body as a whole, steps towards regenerating individual organs such as the heart are even considered significant. We propose interconnecting our collective knowledge regarding aging and embryonic development which may lead to the discovery of molecules providing alternatives to effectively reverse cellular damage.
In our studies, we utilized Thymosin beta-4 (TB4) to support our hypothesis. We found TB4 is widely expressed in the developing heart. In vitro and in vivo animal studies demonstrated TB4 promotes myocardial cell migration and survival in embryonic tissue. In adults, the peptide enhanced myocyte survival and improved cardiac function following coronary artery ligation. Moreover, intravenous injections of TB4 altered the morphology of the adult epicardium, and the changes resembled the characteristics of the embryo as it resulted in the thickening of the epicardial monolayer. Re-activation of the embryonic program was equally reflected by the increased number of capillaries and mature cardiac vessels and by the alteration of the gene expression profile typical of the embryonic state. Strikingly, our analyses via heterozygous capsulin/LacZ animals revealed the effect is independent of hypoxic injury.
In conclusion, by observing the broad spectral capacity of TB4, we believe it is not the only molecule which nature conceals to our benefit. Thus, the discovery and postnatal administration of developmentally relevant candidate molecules such as TB4 may likely result in reversing aging processes of the human body.

Keywords: Regeneration, Aging, Heart, Thymosin beta-4

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