

# Nestin expression in the myocardium of normotensive and spontaneously hypertensive rats during aging

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## Background incl. aims

Nestin, an interesting intermediate filament protein, is expressed in several tissues in the stem cells or within a certain period of development and reoccurs in the newly formed cells in adulthood. It is a proven marker of skeletal muscle regeneration and angiogenesis. Nestin is shortly expressed during the development of the heart and in some cell types in the adult myocardium, particularly in pathological conditions such as myocardial infarction or fibrosis. In this work we described expression and distribution pattern of nestin and its copolymerizing tissue-specific proteins desmin and vimentin in the intact and hypertrophic, adult and aged rat myocardium with the aim to contribute to understanding the reappearance of nestin in the diseased heart.

## Methods

Nestin was detected by enzyme indirect two-step immunohistochemical method in the left ventricle myocardium of normotensive Wistar Kyoto (WKY) rats and in the hypertrophic left ventricle myocardium of spontaneously hypertensive (SHR) rats, both at the age of 1 and 1.5 year. Nestin expression in all samples of the myocardium was quantified by image analysis and statistically evaluated. For double immunofluorescent detections a novel method was introduced to enhance intensity of nestin signal based on application of Dako EnVision+ System-HRP Labelled Polymer.

## Results

In the intact myocardium of normotensive rats nestin was expressed only in the endothelial cells of some blood vessels in 1.5-year-old animals, whereas in the 1-year-old WKY rats no nestin immunoreactivity was noticed. In the hypertrophic myocardium of SHR rats of both ages nestin was rarely detected in desmin+ vimentin- cardiomyocytes and in some vimentin+ interstitial cells that were usually accumulated forming the clusters and differing in intensity of desmin immunoreactivity. In addition, nestin was sparsely expressed in myocardial capillaries and in the endothelium of larger blood vessels in one-year-old SHR rats.

Quantitative image analysis of nestin expression in the myocardial samples confirmed significant increase in 1.5-year-old WKY rats and in SHR rats of both ages compared to the intact 1-year-old WKY rats.

## Conclusion

This work firstly describes re-occurrence of intermediate filament nestin in some cardiomyocytes and in certain interstitial cells in the hypertrophic myocardium of adult and aged spontaneously hypertensive rats. Nestin re-appearance in the endothelial cells of the blood vessels documents important role of angiogenesis during aging in the intact and early hypertrophic myocardium. Nestin re-expression during cytoskeletal remodelling in the different cell types accompanies complex changes in the chronically pressure over-loaded

heart and is related not only to myocardial hypertrophy and aging, but also likely to cardiac regeneration.

**Keywords:**

nestin, hypertension, myocardial hypertrophy, rat