

Effect of erythropoietin on vascular regeneration of myocardial infarction assessed by synchrotron radiation coronary angiography

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Introduction

Erythropoietin (Epo) is known as hematopoietic cytokine to stimulate the production of red blood cells in bone marrow. Recently role of Epo on vascular regeneration has been suggested. Functional and effective vascular regeneration depends on whether organic link between angiogenesis and arteriogenesis is established. Angiogenesis, which is new generation of capillary network, is not shown as vascular image in synchrotron radiation (SR) angiography. However, arteriogenesis, which is remodeling of arteriole ranging from 50 to 400 micrometers, are expected to visualize entirely as vascular image, since our SR angiography reached to identify small vessels down to 50 micrometers in diameter. The purpose of this study is to investigate whether Epo is a useful angiogenic agent to bring about both angiogenesis and arteriogenesis using SR angiography and histological examination.

Manuscript preparation

Left anterior descending (LAD) coronary arteries of heart in Male Wistar rats were ligated to induce myocardial infarction. Immediately after ligation, 1,000 IU/kg of Epo was injected intraperitoneally. Four weeks after treatment, hearts were removed and hanged in Langendorff apparatus. Coronary angiography were performed with contrast material consists of 32% iodine at rates of 1 ml/sec for one second. Vascular density with HE staining was also evaluated.

Results

Epo enhanced collateral formation (arteriogenesis) from intact arteries to ischemic area as compared with control (Fig.1, 2). Length of collateral flow was almost double from control. Angiogenesis increased by 20% compared with control by means of vascular density.

Conclusion

It is proved that Epo is a potent angiogenic drug especially in arteriogenesis. Entire evaluation of arteriogenesis can be possible only under the condition of SR angiography.

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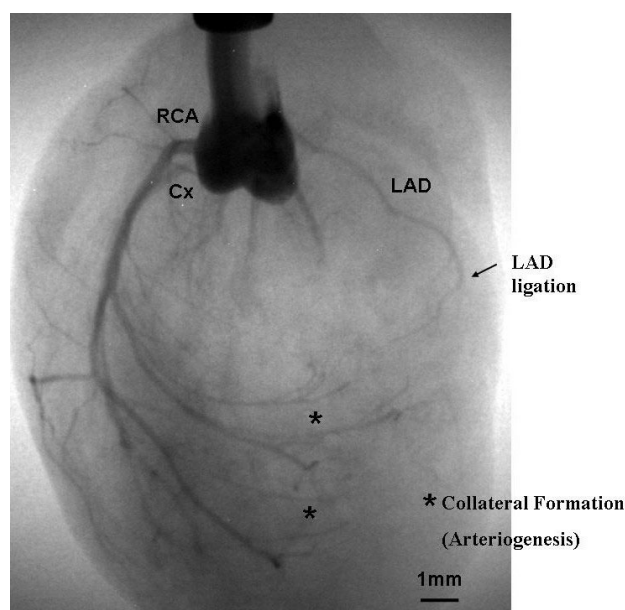


Fig-1. Collateral formation of Epo-treated heart

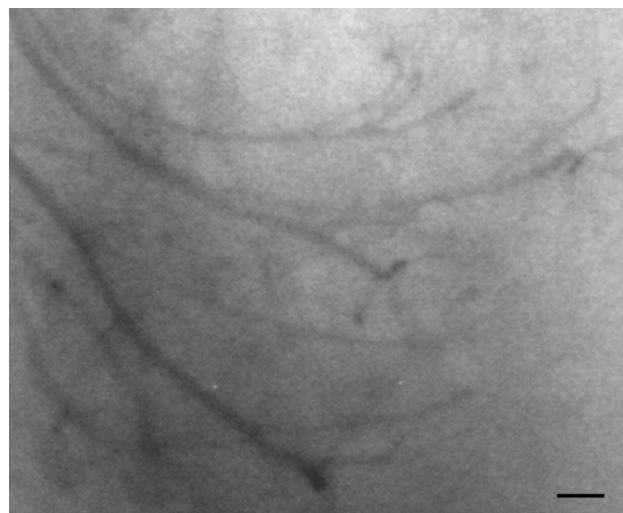


Fig-2. Enlarged view of collateral formation