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Cardiac telocytes in regeneration of myocardium after myocardial infarction

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Recent research progress has revealed that a novel type of interstitial cell termed cardiac telocytes (CTs) is found in the interstitium of the heart. We demonstrated that CTs are distributed both longitudinally and within the cross network in the myocardium and that the density of CTs in the atrium-atria and base of the myocardium is higher than that in the middle of the myocardium, while the density of CTs in the epicardium is higher than that in the endocardium. In addition, we documented for the first time, that the network of CTs in the infarct zone of the myocardium is destroyed during myocardial infarction (MI). This fact shows that, in addition to the death of cardiac myocytes, the previously unrecognized death of CTs is an important mechanism that contributes to the structural damage and poor healing and regeneration observed in the infarcted myocardium. Furthermore, we demonstrated for the first time, that transplantation of CTs in cases of MI decreases the infarct size and improves myocardial function. The mechanisms behind the beneficial effects of CT transplantation are increased angiogenesis at the infarct site and the border zone, decreased fibrosis in the infarct and non-infarct zones, improved pathological reconstruction of the left ventricle and increased regeneration of CTs in the infarct zone. Our findings reveal that CTs can be specifically identified by the following characteristics: very small cell bodies, extreme prolongation with some dilation, predisposition to cell death under ischemia and expression of molecular markers such as c-Kit, CD34, Vimentin and PDGFR-β. CTs act as a structural and functional niche microenvironment in the myocardium and play an essential role in maintaining the integrity of the myocardium and in the regeneration of damaged myocardium.

Biography

Zhaofu Liao has completed his PhD from Jinan University. His scientific interests are aging and microenvironment in regeneration of myocardial infarction (MI) and stem cell therapy for MI.

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