Cardiac differentiation potential of bone marrow CD117+AT2R+ cell population

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Abstract

Background:

Ang II interferes with cardiac remodeling via its AT1 and AT2 receptor (R). It has been shown that the AT2R is up-regulated in fetus and following cardiovascular injury, and is involved in tissue regeneration and differentiation. We have recently identified the CD117+AT2R+ cell population in rat heart and bone marrow with the potential to enhance cardiac repair/regeneration upon AT2R stimulation. In the present study, we further characterize the cardiac differentiation potential of bone marrow CD117+AT2R+ cell population in response to myocardial infarction (MI) in mice.

Methods:

The CD117+AT2R+ cells were isolated from bone marrow samples of mice after acute MI, analyzed with FACS, Patch-Clamp technique, RT-PCR and immunostaining to assess their differentiation characteristics.

Results:

The isolated bone marrow CD117+AT2R+ cell population exhibited a distinct morphology in culture with a tendency to form cell aggregates. Whole-Cell-Patch-Clamp measurements detected an alteration of potassium channels in this cell population over a time span of 7 days. An increase in ion channel activation and potassium outward rectifier was also observed under defined in vitro conditions. In addition, the RT-PCR analysis revealed a changed gene expression profile in these cells upon AT2R stimulation. Moreover, immunostaining showed induced expression of cardiac differentiation markers including Connexin 43 and Mef-2.

Conclusion:

We demonstrate here that bone marrow CD117+AT2R+ cell population is characterized by AT2R-mediated cardiac differentiation potential, as shown by the development of ion channels and the expression of cardiac differentiation markers.