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Icariin promoted cardiomyogenesis of mouse embryonic stem cells by activating metabotropic glutamate receptor 5 pathway

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cariin (ICA) has been reported to facilitate the differentiation of mouse embryonic stem (ES) cells into cardiomyocytes; however, the mechanism by which ICA induced cardiac differentiation has not been fully elucidated yet. In the present studies, an underlying signaling network including metabotropic glutamate receptor 5 (mGluR5), Homer, phosphatidylinositol 3-Kinase Enhancer (PIKE), phosphatidylinositol 3-Kinase (PI3K), reactive oxygen species (ROS) and nuclear factor-kappaB (NF-κB) was investigated in ICA induced cardiomyogenesis. Flow cytometry studies demonstrated that the co-expression of α -actinin or Troponin T together with mGluR5 in embryoid bodies (EBs) treated with ICA was elevated to 10.86% and 9.62% (P<0.01), compared with that of the control (4.04% and 3.45%, respectively). Western blot analysis revealed that exposure of EBs to ICA for 2 h remarkably increased the active, dimerized form of mGluR5, which was inhibited by small interfering RNA targeting mGluR5 (si-mGluR5). Moreover, the extracellular glutamate concentration in ICA treatment medium was elevated to 28.9±3.5 μ M. Furthermore, that mGluR5 activated by ICA resulted in enhancing the expressions of PIKE and PI3K p110 α , facilitating ROS generation and NF-KB nuclear translocation. However, knockdown of mGluR5 blocked the cardiomyogenesis induced by ICA via repressing PIKE and PI3K p110α expressions, reducing ROS level and abolishing NF-κB activation. The inducible mechanisms of ICA were related to activate mGluR5/Homer/PIKE/PI3K signaling pathway, further facilitate ROS generation and NF-κB nuclear translocation.

Biography

Danyan Zhu has completed his Ph.D at the age of 29 years from Zhejiang University of China and visiting Scholar studies from Rockefeller University of USA. She is the director of stem cell lab in College of Pharmaceutical Sciences, Zhejiang University. She has published more than 22 SCI papers.

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