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The overexpression of human arginine decarboxylase (ADC) protects human mesenchymal stem cells (MSCs) against H2O2 toxicity: The potentiality of ADC to enhance MSCs survival in host tissues

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The arginine decarboxylase (ADC) is an enzyme involving the synthesis of agmatine in living organisms, where it demonstrates various effects including resistance against environmental stress, anti-cancer, and neuroprotection. In this study, we explored the potentiality of ADC to enhance the survival of mesenchymal stem cells (MSCs) against unfavorable milieu of host tissues as the low survival of MSCs is the issue in cell transplantation therapy. To address this, human MSCs where human ADC is overexpressed with the retroviral vector system, were treated with H2O2 and the resultant intracellular events were examined. First, we confirmed the overexpression of human ADC in human MSCs through western blotting and immunocytochemistry. Then, we investigated cell survival or death related events. We found that the overexpression of human ADC increases formazan production and reduces caspase 3 activation and the numbers of hoechst and propidium iodide positive cells in human MSCs exposed to H2O2. To elucidate the factors underlying these phenomena, AKT, CREB, and BDNF were examined. We found that the overexpression of human ADC increases the phosphorylation of AKT and CREB and the protein level of BDNF in human MSCs exposed to H2O2. The changes of these proteins are possibly relevant to the elevation of agmatine. Taken together, our data suggest that the overexpression of human ADC stimulates pro-survival factors to protect human MSCs against H2O2 toxicity. In conclusion, the present findings support the idea that ADC can enhance the survival of MSCs against hostile environment of host tissues

Biography

Su Kyoung Seo will be receiving her MS degree in 2012 from Yonsei University College of Medicine, Seoul, South Korea. under the guidance of Prof. Jong Eun Lee in the stem cell biology

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