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The endothelial progenitor cells derived from Wharton's jelly of human umbilical cord elicit protective effects on ischemic acute kidney injury in mice

Yuh-Lien Chen, Chan-Jung Liang and Fu-Bin Chang
National Taiwan University, Taiwan

Acute kidney injury in humans has a high mortality and therapeutic options are limited, so the development of new potential regenerative approaches as therapeutic strategies is highly desirable. The quality and the quantity of endothelial progenitor cells (EPCs) that can be obtained from adult bone marrow and peripheral blood to treat renal diseases are limited. In this study, we examined the therapeutic potential of implantation of EPCs isolated from Wharton's jelly of human umbilical cord (WJC) in the treatment of renal I/R injury in mice. Mesenchymal cells were isolated from WJC and cultured in endothelial growth medium. Differentiation into EPCs was demonstrated by expression of the endothelial-specific markers and incorporation of acetylated low-density lipoprotein. The present study demonstrated that EPCs improved renal function by the decrease in blood urea nitrogen and creatinine levels in mice with renal I/R injury. Furthermore, EPC transplantation significantly attenuates renal apoptosis after I/R injury as assessed by the TUNEL assay. This was closely associated with the inactivation of caspase 3 and the enhancement of anti-apoptotic marker Bcl-2 expression. In addition, EPC transplantation significantly reduced reactive oxygen species production and the expression of the inflammatory cytokines (TNF-α, IL-1β) by immunohistochemistry and ELISA. Transplantation of EPCs from WJC could provide a novel therapy for ischemic acute kidney injury by inhibiting apoptosis, ROS production and inflammation.

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