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MESENCHYMAL STEM CELLS—A NEW APPROACH TO INTESTINAL ISCHEMIA/REPERFUSION INJURY?

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Mesenchymal stem cells (MSCs) possess many properties that may make them suitable as transplanted therapeutic agents for ischemia/reperfusion injury (I/R). These properties include but are not limited to paracrine signaling [1], immunomodulation of the recipient environment [2,3], and possibly differentiation into the injured tissue [4]. Several studies have investigated the effects of MSCs with respect to I/R of the heart [5], brain [6] and kidney [7]. However, the role of MSCs has not been determined in the setting of intestinal I/R. In this issue, Jiang and colleagues studied this question in a rat model of I/R [8]. Using an established model, the superior mesenteric artery (SMA) was occluded for 45 minutes, and at the start of reperfusion MSCs were injected into the submucosa of the small bowel intestine. Treatment of the small bowel with MSC decreased the severity of intestinal barrier injury, bacterial translocation and serum lactate levels in this study.

Given the preponderance of evidence supporting the potential therapeutic roles for MSCs with respect to other organ systems, the authors are to be commended for pursuing this line of investigation with respect to the small bowel. In light of the observed beneficial effects of MSC treatment on the bowel, there are many questions to be answered. For instance what is the mechanism by which MSCs exert their salutary effects, and how can we clinically deliver these MSCs? What would be the effects of a pre-ischemic strategy compared to a post-ischemic strategy? Finally, what is the appropriate number of cells to deliver?

Certainly some answers may be inferred from previous studies that indicate that MSCs produce potent trophic factors that are associated with increased angiogenesis and decreased apoptosis [6]. However, the current study did not examine cytokine levels in the bowel after I/R. It is likely given the improved gut integrity in the treatment group as well as the histologic data that apoptosis is decreased in this study. Nonetheless, this supposition and other possible associations need to be more rigourously tested in future experiments.

Bowel I/R is encountered in multiple clinical scenarios such as necrotizing enterocolitis, trauma, cardiac surgery, sepsis, abdominal aortic surgery, strangulated hernias and bowel transplantation. To date, numerous pathways have been linked to the injury related to bowel

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I/R [9]. Thus it is likely that a therapeutic strategy for bowel I/R will be multi-factorial. As the understanding of MSC biology continues to evolve, the role of these cells may indeed be promising for combating the devastating effects of intestinal I/R injury.

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