

Cues for Cure; From within

Nature's innate ability to effect the process of healing after any type of injury, is a phenomena known to be existing across phylogeny. However, the processes, mechanisms and the outcome differ between organisms, organs, tissues and other relevant biological and environmental factors. The maintenance and repair of adult tissues are dependent on tissue-resident stem cells^[1]. Studies now reveal that the regeneration of damaged or dysfunctional or lost tissues and cells which occur after transplantation of exogenous stem cells and adult cells are mainly due to paracrine effects of these transplanted cells stimulating the tissue resident stem cells^[2]. Thus, based on the available evidence, it is the body's natural endogenous regenerative mechanisms which gain more significance in regenerative biology. This could be enhanced by the exogenously applied cells for the best outcome.

Two studies presented in this issue have reiterated this faith. Takeuchi *et al*^[1] have tested the hypothesis that electro-resection of bladder tissue induces resident stem cells to participate in tissue repair. They have studied the levels of stem cell markers such as Oct4, CD90, and CD73 after bladder electro-resection. They have concluded that CD90 and CD73, which are markers of mesenchymal stromal cells (MSCs), are upregulated and thus, these MSCs participate in the tissue repair process^[3]. The other study by Jones and Connor has authenticated the transient recruitment of migratory neuroblasts and oligodendrocyte precursor cells (OPC) from the subventricular zone (SVZ) during endogenous repair in a rodent model and the interaction that occurs between signals released from the environment of the lesion and gene expression in the recruited cells following excitotoxic brain Injury^[4].

The common theme to both the studies is the recruitment of tissue resident stem cells or precursors for contribution to regeneration after tissue injury. Clinical applications using transplantation of exogenous stem cells, adult cells or precursors, though forms the main stream approach in regenerative medicine, *in vivo* stimulation

of tissue resident stem cells has been postulated as a promising regenerative approach^[5], probably owing to its safety compared to transplantation of exogenous cells, especially pluripotent stem cells. Further, even if exogenous cells are administered in cell-based therapies, it is the tissue resident cells with regenerative capability which actually contribute to the regeneration. Hence, unless the local niche/environment and other factors contributing to the maintenance of tissue resident stem cells or progenitor cells are studied and steps to recapitulate their contribution in moulding the function of exogenous stem cells to contribute to regeneration are performed *in vitro*, translational approaches in regeneration may not realize their expected outcome. The studies by Takeuchi *et al* and Jones and Connor in the current issue fall in line with this ideology and more such studies need to be encouraged for developing better therapies for the future.

References:

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3. Takeuchi T, Tonooka A, Okuno Y, Hattori-Kato M, Mikami K. Oct4B, CD90, and CD73 are upregulated in bladder tissue following electro-resection of the bladder. *J Stem Cells Regen Med* 2016; 12(1):10-15.
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