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STEM CELLS

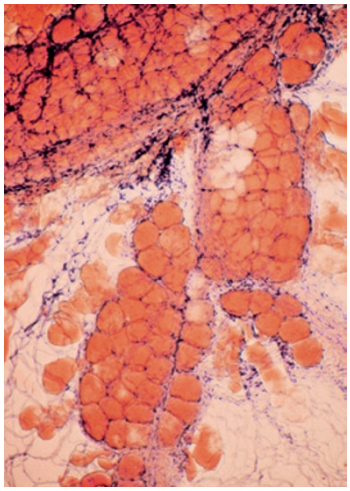
Repair of renal injury gains omentum

Using the 5/6 nephrectomy rat model of renal injury, researchers have shown that fusing the omentum to the remnant kidney can slow the progression of chronic kidney disease (CKD). As the omentum is a source of stem cells, this technique might provide a functional intrinsic supply of cells to facilitate renal repair.

"Although mesenchymal stem cells (from bone marrow or fatty tissues) hold the promise of treating chronic diseases, it has been difficult to confirm this theory," explains investigator Ashok Singh. Previously, his team showed that intraperitoneal injection of polydextran particles into rats 'activated' the omentum—demonstrated by increased vascularity, progenitor cell numbers and expression of various chemokines. Whether such a response could be used to repair organ injury was untested.

Compared with controls (5/6 nephrectomized rats that underwent omentectomy or that were not given polydextran), omentum-activated rats that underwent 5/6 nephrectomy had improved serum creatinine levels, interstitial fibrosis (less accumulation of collagen and α-smooth muscle actin) and glomerulosclerosis. These experimental animals also had almost twofold higher levels of WT1-positive podocytes than controls, which suggests higher levels of glomerular repair. Indeed, control omentectomized rats developed CKD within 6 weeks of nephrectomy whereas the experimental rats did not. Histologically, the control rats demonstrated a lack of perfusion and increased scarring compared with experimental rats. However, the average body weight, urine production and proteinuria did not differ between these animals.

"We believe the omentum works in three ways: it fuses with the kidney to form a continuum of tissue, it conveys paracrine tissue growth factors to the affected kidney and it provides a reservoir of mesenchymal stem cells in direct contact with the diseased kidney to continue to produce these factors," states Singh.



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Whether or not this technique has any clinical promise remains unclear. Given the nature of the injury model used, a benefit to patients undergoing partial nephrectomy for renal cancer can be envisioned. However, fusing the omentum to the remnant kidney might be difficult to achieve depending on the site of resection.

"We are currently evaluating the factors secreted by mesenchymal stem cells—plausibly, injecting these 'healing proteins' from stem cells could do the job as well," explains Singh. Given that stem-cell treatments have met with difficulty, such as the need for repeat administration, the simple injections that Singh is proposing warrants investigation. "I firmly believe this will be possible in the near future," he concludes.

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Original article Garcia-Gomez, I. *et al.* Activated omentum slows progression of CKD. *J. Am. Soc. Nephrol.* doi:10.1681/ASN.2013040387