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Omentum facilitates liver regeneration

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Abstract

AIM: To investigate the mechanism of liver regeneration induced by fusing the omentum to a small traumatic injury created in the liver. We studied three groups of rats. In one group the rats were omentectomized; in another group the omentum was left *in situ* and was not activated, and in the third group the omentum was activated by polydextran particles.

METHODS: We pre-activated the omentum by injecting polydextran particles and then made a small wedge wound in the rat liver to allow the omentum to fuse to the wound. We monitored the regeneration of the liver by determining the ratio of liver weight/body weight, by histological evaluation (including immune staining for cytokeratin-19, an oval cell marker), and by testing for developmental gene activation using reverse transcription polymerase chain reaction (RT-PCR).

RESULTS: There was no liver regeneration in the omentectomized rats, nor was there significant regeneration when the omentum was not activated, even though in this instance the omentum had fused with the liver. In contrast, the liver in the rats with the activated omentum expanded to a size 50% greater than the original, and there was histologically an interlying tissue between the wounded liver and the activated omentum in which bile ducts, containing cytokeratin-19 positive oval cells, extended from the wound edge. In this interlying tissue, oval cells were abundant and appeared to proliferate to form new liver tissue. In rats pre-treated with drugs that inhibited hepatocyte growth, liver proliferation was ongoing, indicating that regeneration of the liver was the result of oval cell expansion.

CONCLUSION: Activated omentum facilitates liver regeneration following injury by a mechanism that depends largely on oval cell proliferation.

Key words: Cytokeratin; Foreign body; Growth factors; Oval cell; Progenitor cells

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INTRODUCTION

The omentum has been called the "policeman of the abdomen" because after traumatic injury it migrates to the injured site, adheres to the wound, and promotes healing[1,2]. These properties have found clinical application where the omentum is surgically brought into contact with injured tissues such as ischemic heart, fractured bones, or injured spinal cord[3-6]. We have recently shown that introducing a foreign body into the peritoneal cavity further enhanced the healing power