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FACTORS IN THE OMENTUM THAT ENDOW IT WITH HEALING POWER

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INTRODUCTION

The unique healing power of the omentum was long realized by surgeons who observed that the omentum sensed injured sites in the peritoneal cavity and spontaneously extended itself to fuse with the injured area. Fusion of the omentum to the injured site improved its healing and prevented infections. Subsequently, the omentum was used to repair injured extraperitoneal organs such as the heart, brain, spinal cord, and limbs, either by using it as a detached piece of tissue (free omental graft) that could be sutured to an injured organ or by lengthening it in a manner that preserved its blood vessels and subsequently attaching it to the injured organ (called omentopexy or omental transposition).[1-4] The omentum is being applied in many more creative ways now that the underlying biological factors are better understood. Below, we review the studies of these special properties of omentum and their application for tissue repair and regeneration.

OMENTUM IS A HIGHLY PLASTIC TISSUE THAT RAPIDLY UNDERGOES CELLULAR CHANGES BY INJURY (ACTIVATION)

Similar to its response to injury, the omentum also reacts to foreign bodies placed in the abdominal cavity, such as in peritoneal dialysis patients when an intraperitoneal catheter is placed for dialysis access, or when surgical instruments or supplies are inadvertently left in the abdominal cavity by surgeons.[5,6] On sensing a foreign body, the omentum rapidly spreads to encapsulate it as if to protect the internal organs from direct contact with it. This phenomenon, called activation of the omentum, was used as an experimental model to study cellular and vascular changes that take place after the omentum encounters a foreign body.[7]

As the omentum gets activated by injury or by a foreign body, it changes its cellular character. While the native omentum consists of 95% fat cells and 5% nonfat cells, an activated omentum consists of 70% nonfat cells and 30% fat cells, suggesting that it is the nonfat cell compartment in the omentum (tissue commonly known as milky spots) that undergoes expansion in response to injury.[7] The extent of tissue expansion that takes place during activation is dictated by the size of the foreign body. In rats, one could expand the omentum mass 20 to 50-fold by injecting either polydextran or polyacrylamide particle slurry (particle size approximately 120 μM). Interestingly, the omentum handled each particle individually by growing a new tissue