Weber, et al. 2004. Experimental Pulsed Magnetic Fields Applied to a Transferred Arterial Loop Support the Rat Groin Composite Flap. (Plast. Reconstr.Surg. 114: 1185)

Pulsed magnetic fields have been shown to stimulate neovascularization in the authors' laboratory. The rat groin composite flap was used to create a prospective randomized trial to test the effectiveness of these pulsed magnetic fields. The skin paddle to this flap is highly consistent, and the authors proposed using the flap to study how pulsed magnetic fields affect composite flap survival when the dominant vessel to the flap is divided and flap survival becomes dependent on a transferred vessel loop. Forty-three rats had the tail artery microsurgically anastomosed to the femoral artery and placed between the groin musculature and the abdominal skin. Pulsed magnetic energy of 1 gauss was applied for 8 (n = 14) or 12 (n = 8) weeks to the experimental groups.Control groups were treated in a comparable manner for 8 (n = 16) or 12 (n = 5) weeks. After the 8 or 12 weeks, all groups had an 8 x 4-cm skin flap raised, and the superficial epigastric artery, the main feeding vessel, was ligated. After 5 days, the total area of the flap and the area of necrosis were traced onto velum paper for each rat. The percent survival was calculated per rat, and a mean survival percentage was calculated per group. The experimental animals treated with pulsed magnetic fields for 8 weeks had statistically significant improved flap survival over the control animals. The study provides evidence that pulsed magnetic energy stimulates angiogenesis and suggests a possible use of this modality to create island vascular flaps in otherwise random vascular vascular territories