**Quantification of the effect of Lipo-PGE1 on angiogenesis**

SuRak Eo, MD; Chan Kwon, MD; SangHun Cho.

**Abstract**

**Background:** Lipo-Prostaglandin E1 (PGE1) is widely used for its beneficial effects on vasodilation, platelet disaggregation, blood viscosity, fibrinolysis, and angiogenesis. Although the angiogenetic effect of Lipo-PGE1 is critical for recovering ischemic tissues, such as, flaps and composite grafts, in the microsurgery field, little research has been undertaken to quantify its effects.

**Methods:** Fifteen rabbits were used to assess the effect of Lipo-PGE1 on neovascularization. Merocel® (Tampon nasal standard) and Alloderm® (acellular human dermal matrix) of same size were implanted separatealy under the back skin flap to act as matrices for vessel growth. In the experimental group, Lipo-PGE1 was injected intravenously for two weeks at 3.0 μg/kg in eight rabbits and these animals were compared with a control group of seven untreated animals. The development of blood flow in Merocel® and Alloderm® implants was taken to represent neovascularization. Blood flow was measured using the $^{99m}TcO_4^-$ clearance technique and mean blood clearance half time (T1/2) was calculated at two weeks and compared in the two groups. Washout radioactivity from Merocel® implants was measured using a collimated gamma-scintillation camera for 30 minutes. Merocel® and Alloderm® were removed and newly formed vessels were counted by CD31 staining under a light microscope at 400X. Statistical analysis was performed using ANCOVA (Analysis of Covariance) by a specialist.

**Results:** $^{99m}TcO_4^-$ clearance rate was obtained in all rabbits. In the experimental group, mean clearance half time (T1/2) was 2,708 seconds, whereas it was 7,877 seconds in the control group. Variance in $^{99m}TcO_4^-$ clearance rate depended on matrix size; 1 X 2 X 1.5 cm ($p = 0.0352$), 2 X 2 X 1.5 cm ($p = 0.0492$). Histological examinations revealed that Merocel® and Alloderm® were infiltrated by new blood vessels. For the Merocel® matrix, the mean numbers of newly formed vessels in 10 different high power fields at 400X under light microscope in the experimental and control groups were $13 \pm 0.7$ and $7 \pm 0.4$, respectively ($p < 0.05$). However, the low numbers of newly formed vessels in Alloderm® at 2 weeks prevented analysis.

**Conclusions:** Lipo-PGE1 was found to be effective at promoting angiogenesis a rabbit matrix model. Considering the survival mechanism of composite grafts, Lipo-PGE1 appears to potentiate in inosculation process and to accelerate neovascularization, which might promote effective therapeutic

angiogenesis in composite grafts used during fingertip amputations.

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