

## Orthopaedic Surgery

### **The Effects of High Fat Diet, Bone Healing, and BMP-2 Treatment on Endothelial Cell Growth and Function**

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**Background:** Angiogenesis is a vital process during regeneration of bone tissue. The aim of this study was to investigate the angiogenic and proliferation potential of endothelial cells (ECs) isolated from lungs (LECs) and bone marrow (BMECs) from obesity-induced type 2 diabetic mice that were treated with bone morphogenetic protein-2 (BMP-2, local administration at the time of surgery) to heal a femoral segmental bone defect (SBD).

**Methods:** Mice were fed a high fat diet (HFD) to induce a type 2 diabetic-like phenotype while low fat diet (LFD) animals served as controls. The HFD and LFD groups were treated with either saline or BMP-2 at the time of surgery. LECs and BMECs were isolated three weeks post-surgery and were characterized by CD31 expression. Proliferation was examined by DAPI stain or crystal violet assay. Angiogenic potential was evaluated by tube formation and cell migration.

**Results:** The proliferation of LECs and BMECs was not altered by diet or BMP-2 treatment. HFD increased the tube formation ability of LECs. Interestingly, BMP-2 treatment at the time of surgery reduced tube formation in LECs and humeri BMECs. However, migration of BMECs from HFD mice treated with BMP-2 was increased compared to BMECs from HFD mice treated with saline. Gene expression of CD31, FLT-1, ANGPT1, and ANGPT2 were similar between humeri BMECs and LECs.

**Conclusion:** To date, this is the first study that depicts the systemic influence of fracture surgery and local BMP-2 treatment on the proliferation and angiogenic potential of ECs derived from the bone marrow and lungs.