**Endothelial Progenitor Cell (EPC) Therapy Combined with Local Antibiotics for the Treatment of Infected Nonunions in an Animal Model**

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**Purpose**: This study aimed to evaluate the efficacy of endothelial progenitor cells (EPCs) combined with local antibiotics (ABX) in the treatment of infected critical size bone defects using a rat model.

**Methods**: A 5-mm bone defect was created in the right femur of Fischer 344 rats and stabilized with a mini-plate and screws. Subsequently, control solution (Non-contaminated) or Staphylococcus epidermidis (Contaminated) was delivered at the defect site. 14 days later, animals received one of 4 different treatments: (1) Control, (2) ABX (local vancomycin and rifampin, in the contaminated group only), (3) EPC, or (4) EPC+ABX. Biweekly radiographs were taken to monitor healing progression and infection. All animals were euthanized at 10 weeks post-treatment. Samples of tissue surrounding the fracture site and implants were collected for microbiology. Radiographs were scored and assessed for union status, defect filling and infection. Bone healing was further assessed with micro-CT and biomechanics following specimen harvest.

**Results**: Non-contaminated: Both the EPC and EPC+ABX groups demonstrated significantly improved healing relative to controls with regards to union rates, radiographic scores, micro-CT (bone volume [BV] and bone volume fraction [BV/TV]), and biomechanics (torque and stiffness). There were no significant differences between the EPC and EPC+ABX groups.

Contaminated: The groups that received EPC+ABX or ABX alone demonstrated high rates of infection eradication (92% and 100%, respectively) compared to the EPC only (42%) and control (8%) groups. In addition, the EPC and EPC+ABX groups had significantly improved union rates compared to control and ABX only groups (EPC = 50%, EPC+ABX = 46%, control = 0%, ABX = 0%; see Figure 1). Bone healing was also significantly improved in the EPC and EPC+ABX groups on the basis of micro-CT and biomechanics.

**Conclusion**: In this animal model of chronically infected bone defects, the addition of either local ABX or EPC+ABX was highly effective in eradicating infection. The combination of EPC+ABX was most effective in both the treatment of infection and the stimulation of bone healing. These results support the use of EPC+ABX as a single-stage treatment for infected nonunions. However, healing was not as robust as that observed when EPCs are applied to non-infected bone defects, indicating the need for further research in this area.

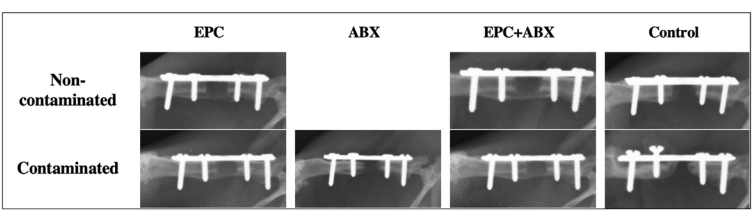


**Figure 1**: Representative 10-week radiographs of animals in both non-contaminated and contaminated groups treated with EPC, ABX, EPC+ABX and control.

See the meeting website for complete listing of authors' disclosure information. Schedule and presenters subject to change.