

## Evaluation of Local Gene Expression in Response to the Presence of Antibiotics in a Polymethylmethacrylate Spacer

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**Purpose:** The Masquelet technique is a 2-stage surgical procedure utilized in the treatment of segmental bone defects. The biology of the induced membrane is critical to the success of this technique. The use of antibiotics within the PMMA (polymethylmethacrylate) spacer is controversial as their effect on the induced membrane are unknown. This study examined the effect of antibiotics in the PMMA cement on gene expression of the induced membrane in a rat model of the Masquelet technique.

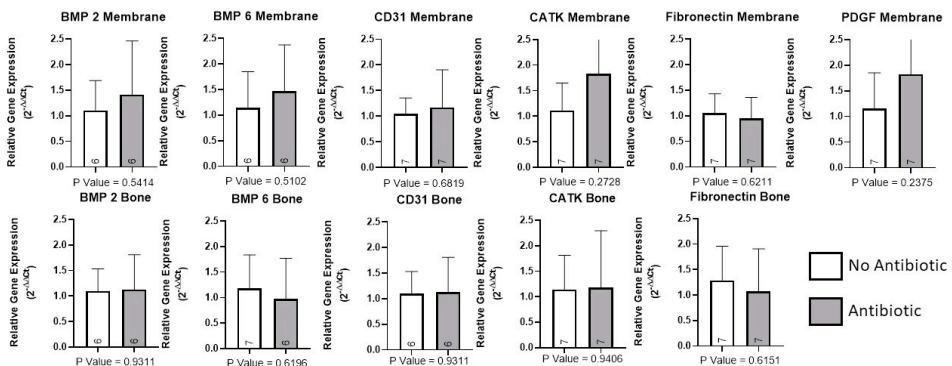
**Methods:** The femora of 18 Sprague-Dawley rats were exposed. Following the placement of a PEEK (polyetheretherketone) plate, a 5-mm defect was created. The right femur of each rat received a PMMA spacer containing vancomycin and tobramycin and left side received one without antibiotics. After 4 weeks, the rats were euthanized and tissue from the membrane and femur in contact with the PMMA spacer were collected.

Samples were morselized and RNA was isolated for quantitative real time polymerase chain reaction (qRT-PCR). Comparison of gene expression was made between membrane and bone tissue formed with and without the presence of antibiotics.

**Results:** Six rats were not included due to loss of fixation prior to the 4-week point. The expression of the tested genes was not significantly different in the membrane and bone between the samples with and without antibiotics (Fig. 1).

**Conclusion:** In this rat model, the presence of antibiotics in the PMMA spacer had no significant effect the expression of 6 genes within the induced membrane and surrounding bone. The tested genes were selected as markers of the biologic processes that we believe are modulated in the induced membrane technique and are critical to the efficacy of the Masquelet technique. While further study on the effects of antibiotics in the clinical setting is needed, these data suggest that antibiotics can be used without altering the biologic potential of the membrane.

### Average Gene Expression (Normalized to Beta-Actin)



The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.