Biofouling. 2010 Apr;26(3):359-65.

# The effects of copper additives on the quantity and cell viability of adherent Staphylococcus epidermidis in silicone implants.

Gosau M, Prantl L, Feldmann M, Kokott A, Hahnel S, Burgers R.

Department of Cranio-Maxillo-Facial Surgery, University Medical Center, Regensburg, Germany.

martin.gosau@klinik.uni-regensburg.de

This in vitro study evaluated the antibacterial effect of copper additives in silicone implants. Specimens of a standard silicone material used in breast augmentation and modified copper-loaded silicone specimens were prepared and incubated in a Staphylococcus epidermidis suspension (2 h, 37 degrees C). After the quantification of adhering staphylococci using a biofluorescence assay (Resazurin), the viability of the adhering bacterial cells was quantified by live or dead cell labeling in combination with fluorescence microscopy. In the Resazurin fluorometric quantification, a higher amount of adhering S. epidermidis cells was detected on pure silicone (4612 [2319/7540] relative fluorescence units [rfu]) than on silicone with copper additives (2701 [2158/4153] rfu). Additionally, a significantly higher amount of adhering bacterial cells (5.07% [2.03%/8.93%]) was found for pure silicone than for silicone with copper additives (1.72% [1.26%/2.32%]); ($p < 0.001$). Calculations from live or dead staining showed that the percentage of dead S. epidermidis cells adhered on pure silicone (52.1%) was significantly lower than on silicone with copper additives (79.7%); ($p < 0.001$). In vitro, silicone material with copper additives showed antibacterial effects against S. epidermidis. Copper-loaded silicone may prevent bacterial colonization, resulting in lower infection rates of silicone implants.