

**O1137 Induction heating for eradicating *Staphylococcus epidermidis* from biofilm**Bart Pijls<sup>1</sup>, Ingrid Sanders<sup>2</sup>, Ed J. Kuijper<sup>2</sup>, Rob Nelissen<sup>1</sup><sup>1</sup> Department of Orthopaedics, LUMC, Netherlands, <sup>2</sup> Department of Medical Microbiology, Section Experimental Bacteriology, LUMC, Netherlands

**Background:** Non-contact induction heating uses pulsed electromagnetic fields to induce so-called 'eddy currents' within metal objects which causes them to heat up. This heat can be used to cause thermal damage to the bacterial biofilm on the metal implant hence killing the bacteria and weakening the biofilm. The purpose of this study is to determine the effectiveness of induction heating on killing *Staphylococcus epidermidis* in a biofilm with and without antibiotics.

**Materials/methods:** *Staphylococcus epidermidis* (ATCC 14990) biofilms were grown on Titanium alloy (Ti6Al4V) coupons for 24 hours and subsequently heated with a custom build induction heater to temperatures of 50°C, 55°C, 60°C, 65°C, 70°C, 80°C and 90°C for 3.5 minutes. Temperature was controlled with an infra-red thermal sensor and micro-controller. We also included a control condition without induction heating: C1.

To study the possible synergistic effect of antibiotics and induction heating the Titanium alloy coupons were exposed to high (20 mg/l) or low (10 mg/l) concentrations of vancomycin and high (10 mg/l) or low (1 mg/l) concentrations of rifampicin for 24 hours after thermal shock by induction heating. We also included control conditions without induction heating but with high or low concentrations of antibiotics only: C-low, C-high.

Experiments were repeated at least 5 times. After the experiments were completed the coupons were sonicated and a dilution series of the supernatant was cultured for 48 hours in order to determine the Colony Forming Units (CFU) /cm<sup>2</sup>.

**Results:** In the C1 group (no induction heating), 3.8\*10<sup>7</sup> (7) CFU/cm<sup>2</sup> were present. For 50°C, 55°C, 60°C, 65°C, 70°C, 80°C and 90°C, a reduction of 1.0-log, 3.0-log, 4.5-log, 4.9-log, 5.7-log, 6.3-log, 6.8-log in CFU/cm<sup>2</sup> was observed, respectively. In the C-low and C-high 83 and 467 CFU/cm<sup>2</sup> were counted. Total eradication was observed at 65°C or higher for both high and low concentrations of antibiotics.

**Conclusions:** Induction heating of Titanium coupons is effective in reducing bacterial load *in vitro* for *Staphylococcus epidermidis* biofilms. Induction heating and antibiotics have a synergistic effect resulting in total eradication of the biofilm at 65°C or higher for both high and low concentrations of vancomycin and rifampicin.

