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Analysis of the thermal field in femoral quadriceps phantom of small domestic animals using three different brands of therapeutic ultrasound

Luis Eduardo Maggi, Andressa de Castro Souza, Luiza Catharina Martins da Silva, Gloria Diniz Pires de Contreira, Leticia Lins Lima and **Samara da Silva Pinheiro**
Universidade Federal do Acre, Brazil

The aim of this work was to perform the comparative analysis of the thermal effect of therapeutic ultrasound (TU) on the femoral quadriceps phantom of small domestic animals. Firstly, canine femoral quadriceps model (phantom) was made, and to mimic the bone, a PVC pipe was placed inside it. Firstly, the phantom was placed in a water bath to resemble the normal temperature of the animal (37°C to 39°C), which was submitted to three different brands of TU (Sonomed IV, Sonic and Sonopulse Ibramed) with 3 MHz frequency of intensity of 1 W/cm2 for 5 minutes. In order to identify the overheating in the applied region, the thermal images were captured by an infrared camera (Flir Systems AB model), which were analyzed by Flir Tools software. After the analysis, it was verified that no overheating (above 45°C) occurred in any applications. With Sonopulse Ibramed apparatus, the maximum temperature with the closed state phantom was 44.1°C and opened state was 42.27°C. With the sonic, the maximum temperature reached was 44.3°C with closed phantom, it was the highest temperature between brands, and with the phantom opened the temperature reach 40.3°C. Finally, the sonomed IV apparatus the maximum closed temperature was 40.73°C and 39.8°C opened. It was proved that there is no risk to apply therapeutic ultrasound with this intensity, but the phantom should be improved to reach the acoustic and thermal properties of the body.

Biography

Luis Eduardo Maggi has Bachelor's degree in Biological Sciences from the Federal University of Goiás (1995), a Master's Degree in Biomedical Engineering from the Federal University of Rio de Janeiro (1999) and a PhD in Biomedical Engineering from the Federal University of Rio de Janeiro (2011). He is currently a class A-level Adjunct Professor at the Federal University of Acre.

luis.maggi@gmail.com

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