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## Far infrared emitted by ceramic materials increases paw temperature and reduces mechanical hypersensitivity and knee edema in a rat model of monoiodoacetate-induced Osteoarthritis

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**Objective:** This study investigated the effect of far infrared emitted by ceramic materials on skin temperature, paw mechanical hypersensitivity and knee edema in a rat model of monoiodoacetate (MIA)-induced osteoarthritis.

**Methods:** Experiments were conducted with male Winsar rats (200-250 g) anesthetized with a mixture of ketamine and xylazine (50 and 10 mg/kg, respectively, i.p.). Joint damage was induced by a single intra-articular injection of MIA (1 mg/50  $\mu$ l; Sigma UK - which disrupts glycolysis resulting in chondrocyte death) through the infrapatellar ligament of the right knee. Control animals received a single injection of saline (50  $\mu$ l). Three separate measures were assessed: (1) Thermal analyses of the central areas of the front paws of the animals (with a portableThermaCAM® E320 infrared camera - Flir, Sweden - with a 320x240 pixels resolution, thermal sensitivity of <0.10°C at 25°C and accuracy of  $\pm$ 2°C - positioned 0.5 m away from the animals paws. The infrared images were analyzed with the FLIR QuickReport 1.2 software); (2) hindpaw mechanical withdrawal thresholds (using von Frey monofilaments - Semmes-Weinstein monofilaments of bending forces 1-15 g), which provide an index of central sensitisation; and (3) edema formation (measured with a digital caliper - Pantec, Brazil), which is directly associated with the localized inflammatory response. For treatment a Biopower™ ceramics Pad (80% BioCorn PVC - 20% ceramic materials) was placed inside the animals box; control animals were placed on a Sham Pad (100% BioCorn PVC without ceramics) and underwent the same experimental protocol.

**Results:** On day 3 post-MIA injection acute exposure (2 hours) to the BioPower™ ceramics Pad increased paw temperature ( $\pm$ 4°C), although only chronic exposure to the treatment (Day 7 and 10 post-MIA) reduced mechanical hypersensitivity ( $p$ <0.001) and knee edema ( $p$ <0.001).

**Conclusion:** Far infrared emitted by ceramic materials increased paw temperature (after acute exposure) whereas only prolonged treatment reduced mechanical hypersensitivity and knee edema in a rat model of MIA-induced osteoarthritis.

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