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Induction of Chemical Pain in Capsaicin Injections Compared to Formalin in Male Rats

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Background and Aim: Pain induction models have been established in search of causes and treatment of pain. Stimulation of peripheral pain receptors by chemical and inflammatory agents leads to pain. Injection of formalin as a model of chemical pain causes pain in two stages: neurogenic (direct stimulation of receptors) and inflammatory (due to release of inflammatory agents), capsaicin Red pepper also directly stimulates peripheral pain receptors but may not induce inflammatory pain processes. This study compares the effect of injecting the foot with different concentrations of capsaicin with formalin.

Methods: Male 200 to 250 g Wistar rats (n = 7) were used. Foot injections of 0.5% formalin and also in three groups of concentrations of 0.20 mg / lit, 0.10 and 0.5 capsaicin were performed to induce chemical pain and changes in pain sensation were recorded within one hour after injection.

Results: Plantar injection of concentrations higher than 0.20 mg / lit capsaicin could lead to death of mice, so concentrations of 0.20, 0.10 and 0.5 mg/l were used, all of which were pain-dependent, but compared with formalin in the stage. Neurogenic had less analgesia ($P < 0.05$). Also in the inflammatory phase, not only was the pain intensity lower for all three concentrations of capsaicin ($P < 0.001$) but, unlike formalin, it decreased to zero from 30 minutes.

Conclusion: Injections of capsaicin 0.20 mg/l may be recommended as a pain model to study the physiology and factors associated with neurogenic mechanisms of pain, especially in the inflammatory phase leading to slight and short-term inflammatory pain, perhaps due to minor cell damage. Discharge of substance P from the peripheral and central terminals of pain neurons and thus reducing its inflammatory effects and metabolism and tissue removal of capsaicin.

Keywords: Formalin test, capsaicin, chemical pain, neurogenic stage, inflammatory stage