UNIVERSITI TEKNOLOGI MARA

VALIDATION OF ANIMAL MODEL FOR MOLECULAR STUDY OF POST-SURGICAL PAIN

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Thesis submitted in fulfilment
of the requirements for the degree of
Master of Dental Science

Faculty of Dentistry

April 2013

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulation of Universiti Technologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This topic has not been submitted to any other academic institution or non-academic institution of any other degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of mu study and research.

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ABSTRACT

Introduction: Molecular mechanism of postoperative pain is unknown. Opioids have been found to be effective in reducing post-operative pain but with possible complications. Gabapentin has proven to be effective in reducing both postoperative pain and reverse the antinociceptive opioids tolerance including reducing opiate withdrawal symptoms. In dentistry postoperative pain is a common complain that needs to be alleviated or well controlled. Furthermore, there is no established dental post-surgical animal pain model to study post-surgical dental pain. Therefore we will use gabapentin as a tool, in rat molar extraction model to identify the neuro-anatomical circuit of post-operative dental pain and compare this model with an established post-operative pain model.

Hypothesis: Identifying the novel neural circuitry on which gabapentin act to regulate post-operative dental pain may reveal the neuro-anatomical and neuro-modulatory circuit of post-surgical dental pain and also comparing this model at molecular level with established post-surgical pain may allow us to validate dental post-surgical pain model. Objectives: 1.To study the validity of rat molar extraction to use as an animal model for the post-operative dental pain. 2. To identify neuro- anatomical sites of post – surgical dental pain. 3. To identify neuro-modulatory site of post- surgical dental pain. Materials and Methods: We will use a rat (Sprague dawly rats-250g-300g) model of molar extraction to study post-surgical dental pain. Using c-Fos immunohistochemistry we will localize the gabapentin induced neuro-modulatory sites to block the postoperative activation of rat CNS by means of c-Fos expression. Results and Conclusion: 1. The results of the present study have demonstrated that the rat molar extraction shows same behaviour as the established post-surgical pain model at molecular level. Therefore molar extraction on rat can be used as an animal model to study post-operative dental pain. 2. Our results also have suggested that further study is essential to identify the underlying molecular circuit through which gabapentin neutralized the rat molar extraction induced activation of hypothalamus. In future, identifying the molecule(s) responsible to modify the activation of hypothalamus may allow us to reveal the molecular mechanism and neuro-modulatory circuit of post-operative dental pain system.

Keywords: c-Fos, gabapentin, rat, post- surgical dental pain, central nervous system

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