

Report of “Research Award of Oral Sciences”

Major: Oral Sciences

Grade: 3

Department: Stomatognathic Function and
Occlusal Reconstruction

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Title: Predictable chronic mild stress induces circadian rhythm disruption and heightened nociception

1. Aim of research and results obtained

Merely 4.3% of the world's population was free of injury, disease, or sequelae according to the Global Burden of Disease (GBD) Study which was published in Lancet. According to the data, although the mortality rate has declined, the overall burden of disease has increased significantly. The influence of these GBDs was estimated according to Years Lived with Disability (YLD) or the product of disability weighting factor and prevalence. The seven most common chronic GBDs were primarily pain in nature (i.e. migraine, low back pain, neck pain, other musculoskeletal conditions, osteoarthritis, urolithiasis, and medication overuse headache). At 146 million in 2013, chronic low back pain was the greatest cause of YLDs globally with a stable increase of 61% from 1990.

This makes pain the most debilitating disease that decreases the quality of life worldwide and billions of economic losses. This provides a definite case for the need to understand the phenomenon of pain. Presently and to our knowledge, this is the first prospective study that utilizes three variations of the predictable chronic mild stress (PCMS) in C57BL/6J mice to study their differential and temporal effect on nociception and sleep disruption. Specifically, this research intends to understand the sleep architecture through polysomnographic recordings from sub cranially implanted EEG/EMG electrodes, locomotion and body temperature deviations via an implantable radio frequency identification (RFID) telemetry device, thermal hyperalgesia through tail flick and hot plate test, mechanical allodynia by the tail pinch test, and orofacial pain assessment using an automated operant behavior assay or the orofacial pain

assessment device (OPAD). To understand the biochemical mechanism of pain and sleep, we will determine the relative expression levels of cytokines using the Proteome Profiler Mouse XL Cytokine Array Kit in both the central nervous system (CNS) and the peripheral nervous system (PNS). The target brain regions of the CNS where tissues will be harvested are the prefrontal cortex (PFC), striatum, thalamus, hypothalamus, hippocampus, amygdala, and brain stem. In the PNS, the trigeminal root ganglion (TRG) and the dorsal root ganglion (DRG) will be taken for sampling. In the future, ELISA and qRT PCR will be done to elucidate the expression levels of target pro inflammatory cytokine TNF α and pleiotropic cytokines' IL-1 β and IL-6. Blood plasma extraction will also be done for the quantitative determination of corticosterone

2. Self-evaluation of research achievement:

Currently, experiments and data have been performed to gather information on the sleep quality, nociceptive threshold, and stress levels of C57BL6/J. Information for sleep quality were gathered through EEG/EMG electrode transplant surgery, sleep recording, and offline sleep analysis. Nociceptive threshold data were collected through tail-immersion, tail-pinch, hot plate, and OPAD tests. Stress levels were measured using implanted telemetry device and corticosterone EIA tests. Cytokine levels are the only data needed to complete the research. This will be performed and completed this year. Because of the Research Award of Oral Sciences, I was able to buy materials, write articles, and attend conferences. I am very much thankful and appreciative of this opportunity, the Faculty of Dentistry, the Graduate School of Biomedical Sciences, the Department of Stomatognathic Function and Occlusal Reconstruction, the Student Affairs Office, and the council that gave this award.

3. Meeting presentation:

* Title, conference, venue, date, co-author, presentation (oral/ poster).

(Underline the speaker.)

- Orofacial thermal hyperalgesia in predictable chronic mild stress, Asian Academy of Orofacial Pain and Temporomandibular Disorders, Manila, Oct. 2019. Junhel Dalanon, Sachiko Chikahisa, Noriyuki Shimizu, Arief Waskitho, Hiroyoshi Sei and Yoshizo Matsuka
- The effect of predictable chronic mild stress on sleep quality and nociception,

- 徳島大学脳科学クラスターミニトリート, Feb. 2020. Junhel Dalanon, Sachiko Chikahisa, Noriyuki Shimizu, Waskitho Arief, Chavan Parimal, Lakshmi Swarna, Hiroyoshi Sei, Masamitsu Ohshima and Yoshizo Matsuka

4. Journal publication:

* Title, journal, volume, number, paragraph, date, co-author.

(Underline the speaker.)

- Analysis of the Filipinos' Interest in Searching Online for Oral Cancer, Asian Pacific Journal of Cancer Prevention, Vol.24, No.4, 2020. Junhel Dalanon, LM Diano and Yoshizo Matsuka
- A 10-year analysis of internet search trends of the oral health-seeking behavior of Filipinos, Poverty & Public Policy, Vol.(in press), 2020. Junhel Dalanon and Yoshizo Matsuka
- Global interest for health professions education: A geographic and temporal analyses through web search differences from 2010-2019, Internet Journal of Allied Health Sciences and Practice, Vol.(in press)., 2020. Junhel Dalanon and Yoshizo Matsuka
- Burnout is associated with amount of work and sleep quality of public-school dentists in the Caraga region, Acta Medica Philippina, Vol.(in press), 2020. Junhel Dalanon and Yoshizo Matsuka
- Spatio-temporal differences in the Filipinos search trends for toothache and milk tea,
Acta Medica Philippina, Vol.(in press), 2020. Junhel Dalanon, LM Diano and Yoshizo Matsuka
- A descriptive study of the regional and time-point changes in the Filipinos' internet search for tooth decay and toothache, Philippine Journal of Health Research and Development, Vol.24, No.1, 39-45, 2020. Junhel Dalanon and Yoshizo Matsuka