UNIVERSITI TEKNOLOGI MARA

HOMO AND HETEROTYPIC STRESSOR INDUCED IMMUNOMODULATORY CHANGES IN THE LYMPHOID ORGANS OF THE RATS AT DIFFERENT STAGES OF EARLY POSTNATAL DEVELOPMENT

AZHAR BIN AHMAD

MSc

August 2017

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any 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 my study and research.

Name of Student	:	Azhar Bin Ahmad
Student I.D. No.	:	2012860658
Programme	:	Master of Science (Medicine) - MD 780
Faculty	:	Medicine
Thesis Title	:	Homo- And Heterotypic Stressor Induced Immunomodulatory Changes In The Lymphoid Organs Of The Rats At Different Stages Of The Early Postnatal Development.
Signature of Student	:	……
Date	:	August 2017

ABSTRACT

Stress is a part of modern life. It causes serious alterations in the nervous, endocrine, immune, cardiovascular, reproductive and digestive systems. Different types of stress with different types of stressors induce diverse changes in the body. Heterotypic stress with variable stressors triggers an activation pattern in the neuroendocrine system which is different from the homotypic stressor with comparable characteristics (intensity, duration, etc). Immune system is the one most sensitive to stress. Research on the effect of heterotypic stress on the immune system is scarce. Data regarding effect of heterotypic stress on the immune system during prepubertal period of postnatal development are few, mainly involving weight of the lymphoid organs. These data might help to develop addressed measures of prophylaxis of post-stress immunosuppression in children. The objectives of this research are to evaluate immunomodulatory effect of heterotypic vs. homotypic stress on the morphology of the lymphoid organs in the prepubertal experimental animals of different age groups. Sprague Dawley rats aged 15, 30 and 60 days were chronically exposed to homo- or heterotypic stress. Thymus, spleen and lymph nodes were evaluated using immunohistochemical morphometry of cells expressing markers of immunocytes, stromal cells, proliferation and apoptosis respectively. Chronic heterotypic stress exposure showed more significant immunosuppressive effect in the central and peripheral immune organs compared to the homotypic stress, as demonstrated by image analysis of histological slides stained for markers of T-lymphocytes; B-lymphocytes, apoptosis and proliferation. The dominating mechanism of cell depletion in the preweaning and infant animals was reduced recirculation rate of T-lymphocytes in the thymus while in the juvenile rats was increased apoptotic rate of lymphoid cells and decreased immigration rate of T-lymphocytes from the thymus to the peripheral immune organs. Heterotypic stress also affected interplay of stromal and lymphoid cells in the age-related manner. Thus, in chronic heterotypic stress central and peripheral lymphoid organs exhibited complex age-dependent immunomodulatory changes associated with a crosstalk of the developmental and post-stress changes in the neuroimmunoendocrine axis of the growing body.

ACKNOWLEDGEMENTS

In the name of Allah, the Most Gracious, the Most Merciful. He has taught humanity what they did not know. Thank you Allah for blessing in completing my thesis.

Special thanks to my supervisor Prof Marina Kapitonova as my main supervisor, Associate Prof Dr Nor Ashikin Mohamed Noor Khan as my co-supervisor for continually supporting, guiding and inspiring me through all the years. It is more than word can express how I feel. For all those times you stood by me, for all the truth you made me see, for all the joy you brought to my life, for all the wrong you made right, for every dream you made come true, only Almighty Allah could payback all your help and kindness to me.

I would like to acknowledge Ministry Of Higher Education (MOHE) for the FRGS grant (Grant number: 600-RMI/ST/FRGS/5/3FST/182/2010)

I would like to extend my gratitude to the anatomy staff especially Mr Chairul Sopian, Ms Nurul Alia Adnan and Ms Juriah Togeman who help me to complete my research. Through them, I learn about synergy, 1+1 is more than 2.

Finally yet importantly, I would like to thankful to my dearest family for their support, encouragement, patience, understanding at all times. I hope that my thesis will be a present to my son later, when he is ready to understand.

TABLE OF CONTENTS