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JANTARIMA PANTHARANONTAGA : THE STUDY OF CARDIAC
MYOFILAMENT ACTIVATION IN DIABETIC OVARIECTOMIZED RATS.
THESIS ADVISORS : JONGGONNEE WATTANAPERMPHOL Ph.D., NATEETIP
KRISHNAMRA Ph.D., PIPAT CHERDRUNGSU M.Sc., 162 p. ISBN 974-664-594-3

A well recognized gender difference in heart disease risk is also documented in diabetic patients. This observation suggests a possible interactive effect of female sex hormones and insulin in inducing heart diseases. To investigate the combined effects of ovarian sex hormone and insulin deficiencies on the myofilament activation, 10-week ovariectomized rats with streptozotocin-induced diabetes two weeks after ovariectomy were used as the sample of the study. The relations between pCa (-log free Ca^{2+} concentration) to actomyosin adenosine triphosphatase (ATPase) activity of myofibrillar preparations from various groups of rats were compared. Results showed the same magnitude of decrease in maximum ATPase activities of myofibrillar preparations from non-diabetic ovariectomized (Ovx), diabetic (Diab-Sham), and diabetic ovariectomized (Diab-Ovx) hearts as compared to non-diabetic sham control. On the other hand, the myofibrillar Ca^{2+} hypersensitivity detected in Ovx hearts was not observed in Diab-Sham group but was still detected in Diab-Ovx hearts thus indicating a dominant role of ovarian sex hormone deficiency on the myofibrillar activity even under diabetic complication.

To study the effects of these hormone deficiencies on the β -adrenergic receptors of the heart, density (B_{\max}) and binding affinity ($1/K_d$) of the receptors on the cardiac sarcolemmal preparations were measured by [^3H]-dihydroalprenolol binding assay. B_{\max} and dissociation constant (K_d) of the receptors were determined from Scatchard plot of saturation binding analysis. Increases in density but decreases in binding affinity of the β -adrenergic receptors were demonstrated in Ovx and Diab-Sham hearts as compared to non-diabetic sham control. In contrast to Ovx and Diab-Sham groups, both density and binding affinity of the receptors measured from Diab-Ovx hearts were reversed back to be the same as those detected in non-diabetic sham control. Moreover, supplementation of either estrogen or insulin alone in Diab-Ovx rats could restore the effects induced by deficiency of that particular hormone. These results imply possible differential effects of insulin and estrogen on the contractile functions of the heart.