IMMUNE RESPONSE TO STRESS INDUCED BY CORTICOSTEROID IN COMMON CARP (*CYPRINUS CARPIO* LINNAEUS) EXPOSED TO *AEROMONAS HYDROPHILA*

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By

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Thesis Submitted in Fulfilment of the Requirements for the Degree of Master of Science in the Faculty of Fisheries and Marine Science, Universiti Pertanian Malaysia

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Abstract of the thesis submitted to the Senate of the Universiti Pertanian Malaysia in fulfilment of the requirement for the degree of Master of Science

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Faculty : Fisheries and Marine Science

The effect of simulated stress induced by cortisol implantation in common carp (*Cyprinus carpio*) was studied. Humoral mediated responses to injected antigens following cortisol treatment were assessed by using the passive haemolytic plaque technique and indirect haemagglutination assay. A single cortisol implant and subsequent challenge to *Aeromonas hydrophila* elicited modulation in the fish immune system and also histopathological changes in the kidney, spleen and thymus. Hyperglycaemia which is a stress related physiological change was associatively manifested.

The marked reduction in haemolytic plaque forming cells in cortisol treated carps indicated the suppression of antibody mediated response. Similarly, a quantitative

decrease in haemagglutinating antibody titre suggested that the immunosuppressive action of cortisol could have a pernicious effect on the fish's ability to resist infection. The repression of the ability of the lymphoid cells i.e haemolytic plaque forming cells from the kidney and spleen to secrete antibodies against *A. hydrophila* was demonstrated. It appeared that the cortisol effect was due to the suppression of the differentiation and maturation of antibody forming precursor cells in the tissues studied.

Histopathological studies of the lymphoid organs showed pronounced vacuolation and hydropic degeneration in thymus, kidney and spleen. These marked changes correlated with the functional parameters noted in the immune response. Blood glucose levels which were used as indicator of stress condition, fluctuated in weekly samples in all groups, but in general showed a pattern of initial low levels followed by elevated level in the cortisol treated fish.

The results of this study indicated that the ability of fish to mount an immune response was decreased in the presence of cortisol-mediated stress. While sublethal stress did not detrimentally manifest in the development

of clinical disease infections as a direct effect, it nevertheless was considered an important element in limiting aquaculture production by reducing the optimum immune functions of fish.