O36

SIGNALING MOLECULES FOR MULTIDIRECTIONAL NEURO-ENDOCRINE-IMMUNE INTERACTION

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The (neuro-)endocrine and immune systems employ a series of protein or steroid signaling molecules. Distinction between classical hormones and cytokines is partly inspired by a historical demarcation between the disciplines. The current view of allostatic regulation is one of extensive and multidirectional communication between both systems. Neurons and microglia produce interleukins, leukocytes produce neuropeptides; this notion has significant implications for our understanding of physiological regulation. Several classical hormones and cytokines, and their receptors belong to the same ligand or receptor families. With respect to the evolutionary origin of this dialogue we identified and functionally characterized many endocrine and immune signaling molecules and their receptors in teleost fish. The expression profiles and differential regulation of expression were studied in controlled stress paradigms to judge their impact on allostatic responses. Strong evolutionary conservation of bi-directional interaction is observed. However, substantial differences exist in the degree of evolutionary conservation of the messenger molecules of the immune (less conserved) and endocrine system (strongly conserved). Key to this differential degree of conservation are the constantly changing circumstances under which adequate host defence has to be realised and the functional redundancy of peptides involved in this regulation.

O37

EFFECTS OF MITOGENIC HORMONES ON HEAT SHOCK PROTEIN 70 EXPRESSION IN SEA BREAM FIBROBLASTS AND MACROPHAGES

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The role of mitogenic hormones in regulating elements of the fish stress response has been of major interest to us over the past few years. This study was performed in order to elucidate the role of three mitogenic hormones [growth hormone (GH), insulin-like growth factor- 1 (IGF-1) and prolactin (PRL)] on heat shock protein 70 (HSP70) expression in a silver sea bream fibroblast cell line and a primary macrophage preparation. Both cell types displayed the typical heat shock response of transient HSP70 elevation when subjected to acute thermal stress. Fibroblasts and macrophages that were exposed to GH concentrations of 0.01-1000 ng / ml did not exhibit modulated HSP70 expression as determined by immunoanalysis. Using a recombinant IGF-1 preparations for in vitro tests it was found that HSP70 expression remained unchanged in fibroblasts but was significantly decreased in macrophages at exposure concentrations of 1-10 ng / ml. Finally, and using a preparation of ovine PRL it was found that HSP70 expression decreased in fibroblasts at exposure concentrations of 0.1-1000 ng / ml and also decreased in macrophages at exposure concentrations of 1-100 ng / ml. Data from this study demonstrates the complex interactions of hormones and the cellular stress response and that non-immune and immune cells may respond differentially to mitogenic hormones. [This research was supported by an Earmarked Grant 4264/02M awarded by the Research Grants Council, Hong Kong].