Mitogenic and growth-promoting hormones: do they regulate development, growth and function of immune organs in fish?

Summary / Zusammenfassung
The main objective of the proposal is to clarify the potential interactions of estrogen and of the GH/IGF-I system with the immune system in fish. As experimental species, the rainbow trout, Oncorhynchus mykiss, and the tilapia, Oreochromis niloticus, are used which both are widely used in world aquaculture. The study will be performed both by in vitro and in vivo approaches. As basis, the different constituents of the immune system (identified by surface markers) in head kidney, spleen, thymus and melanomacrophage centres will be characterised for the presence of the hormones (GH, IGF-I) and receptors (GH-R, IGF-1R, ERs) by in situ hybridisation and double immunofluorescence.

As test compounds, bream growth hormone and 17beta-estradiol (E2) as prototype of estrogens will be used. E2 and IGF-I serum levels will be measured using radioimmunoassay under the various experimental conditions.

The lymphoid organs (head kidney, spleen, thymus, melanomacrophage centres) will be morphologically explored (cross anatomy, weight, size, lesions, microscopy) under the different experimental conditions. The impact of hormones (estrogens, GH, IGF-I) at the cellular level will be studied in rainbow trout head kidney, splenic and peripheral blood leukocytes used for in vitro challenge. Analysis will be performed by FACS of leukocyte surface and proliferation markers and morphologically by double immunofluorescence.

For the investigation of interactions at the systemic level, rainbow trout and tilapia will be exposed to E2 by feeding. GH and IGF-I will be administered by intraperitoneal injection. In order to study late effects of treatment during early ontogeny in adult life both species will be fed with E2 during the sensitive phase of immune system development. Bacterial challenge (Aeromonas salmonicida) in combination with treatment with E2, GH and IGF-I will be used to study the modulating capabilities of the hormones on the immune system in coping with acute infection.

Publications / Publikationen
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