AKADEMISK AVHANDLING

On the Regulation of Postprandial Gastrointestinal Blood Flow in Teleost Fish

för filosofie doktorsexamen i zoofysiologi som enligt naturvetenskapliga fakultetens beslut kommer att försvaras offentligt fredagen den 11:e juni 2010, kl. 10:00 i Lyktan, Konferenscentrum Wallenberg, Medicinaregatan 20A, Göteborg

av

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DISSERTATION ABSTRACT

Henrik Seth (2010) **On the Regulation of Postprandial Gastrointestinal Blood Flow in Teleost Fish** Department of Zoology/Zoophysiology, University of Gothenburg, Box 463, 405 30 Göteborg.

The regulation of the cardiovascular changes, in particular the increase in gastrointestinal blood flow that follows after feeding has received little attention in teleost fish. Therefore, the aim of the research that led to this thesis was to discern some of the mechanisms behind the postprandial cardiovascular response.

Several methods, described within this thesis, were used in order to study, *in vivo*, the influence of both mechanical as well as chemical stimuli in triggering the increase in gastrointestinal blood flow that occurs after feeding in fish. Furthermore, additional methods, combining *in vivo* and *in situ* pharmacology were used to study the regulatory mechanisms in more detail.

The results indicate that both mechanical as well as chemical stimuli are important during the postprandial response. Mechanical stimuli within the stomach evoke an increased adrenergic tone and chemical stimuli induce a subsequent hyperemia that is localized within the gastrointestinal tract. The response to chemical stimuli is also influenced by the composition of the diet. Furthermore, even though the extrinsic innervation (*sympathetic* and *parasympathetic*) of the gastrointestinal tract is important in controlling the routine tone of the gastrointestinal vasculature, it is of little importance during the postprandial hyperemia. In contrast, the intrinsic innervation (*enteric*) within the gastrointestinal tract is of fundamental importance to this hyperemia. In addition, the response is most likely modulated, in response to the diet composition, by endocrine and paracrine factors, such as the gastrointestinal hormone cholecystokinin.

In conclusion, the regulation of the gastrointestinal vasculature after feeding is very complex and several mechanisms contribute to the cardiovascular response that will depend on the composition of the diet as well as surrounding environmental factors such as temperature, oxygen levels and stress.

Key words: Rainbow trout (*Oncorhynchus mykiss*), Shorthorn sculpin (*Myoxocephalus scorpius*), Diet composition, Oxygen consumption, Mechanical stimuli, Chemical stimuli.