

## Dissertation abstract

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A controlled supply of blood to the gut affects the major functions of the gastrointestinal canal including motility, secretion and absorption. Therefore an adequate blood supply is necessary for the optimal performance of these essential functions. Several intrinsic and extrinsic factors including neurohumoral substances affect the relationship between gastrointestinal motility and blood flow. The aim of the present study was to investigate the presence and function of some of the native regulatory peptides in the control of the gastrointestinal motility and circulation in the Atlantic cod, *Gadus morhua*, representing an advanced bony fish. The peptides studied were calcitonin gene-related peptide (CGRP), substance P (SP), neurokinin A (NKA), neuropeptide Y (NPY), and bradykinin.

**Methods:** *In vitro* experiments of peptidergic control of vascular blood flow were performed on isolated celiac arteries using a myograph apparatus, which permitted measurement of vessel isometric wall tension. Intestinal motility was studied on isolated intestinal preparations. By use of immunohistochemistry, the presence of peptidergic perivascular and intestinal nerve fibres were investigated.

**Results and conclusions:** All five regulatory peptides are involved in the control of gastrointestinal motility and circulation as in mammals. CGRP, NPY and bradykinin produced vasorelaxation of the isolated cod celiac arteries. While CGRP appears to directly inhibit the vascular smooth muscles, NPY and bradykinin induced relaxations are mediated via prostaglandins. SP caused biphasic responses: an immediate relaxation followed by contraction and NKA contracts the isolated celiac arteries at high concentrations only.

Except for CGRP, which inhibits the spontaneous activity of the intestinal preparation, the peptides produce contraction of the intestine. CGRP, SP, NKA, and NPY are present in fibres innervating the gut wall in addition to its blood vessels, which supports the regulatory effect of these peptides on the gastrointestinal canal. It seems that tachykinins, acetylcholine, and serotonin are involved in the ascending (orally directed) excitatory part of the peristaltic reflex of the intestine, and CGRP is involved in the descending (anally directed) inhibitory part of the peristaltic reflex.

NPY activates a receptor in cod tissues, which is pharmacologically closely related the Y1 receptor, possibly a receptor with mixture of zYa and cod Yb receptor properties. The results from ligand binding properties of the bradykinin receptor in cod tissues indicate the presence of a receptor more close to the mammalian B2 receptor but differing in binding properties from the trout bradykinin receptor.

**Keywords:** Fish, *Gadus morhua*, native peptide, CGRP, SP, NKA, NPY, BK, intestine, celiac arteries, vasorelaxation, blood flow, and receptor.