Dissertation abstract

Angélica Jacobsson Kloberg. **On the development of cardiovascular regulatory systems in the South African clawed frog, *Xenopus laevis*.** Department of Zoology/Zoophysiology, Göteborg University, Box 463, SE-405 30, Göteborg, Sweden.

With this thesis I want to make a contribution to the knowledge of the area of cardiovascular physiological development. The focus of this area has earlier been on mammals and birds, while the contribution from other groups of vertebrates is scant. Amphibian larvae have, from a methodological point of view, been found to be good working models when studying cardiovascular development in vertebrates. *Xenopus laevis* is one of the best-studied amphibian species concerning general development and genetics.

The studies included in this thesis involves *X. laevis* larvae from NF 33/34 to NF 54. Pharmacological *in vivo* studies have been performed on NF 33/34 - 53, using micro techniques, to investigate when during early cardiac development the heart reacts to adrenergic and/or cholinergic agonists and when the presence of an adrenergic and/or cholinergic tone on the heart can be seen. These studies showed that the larval heart of *X. laevis* reacts to the adrenergic agonists isoprenaline from NF 45 with an increased heart rate, and that the cholinergic agonist acetylcholine decreases heart rate from NF 40. Therefore, receptors like β-adrenoceptors and muscarinic cholinoceptors are present very early during cardiac development in *X. laevis*. An adrenergic tone is present on the heart already from NF 40, but no cholinergic tone could be demonstrated from these studies. The adrenergic tone is most probably due to circulating catecholamines and/or catecholamines endogenous to the heart. Histochemical studies performed in this thesis and in earlier studies have not been able to demonstrate adrenergic neurons in the heart this early in development. Moreover, measurements of catecholamines by High Performance Liquid Chromatography showed the presence of clearly measurable levels of NA and A in the heart and extra adrenal sources from NF 40.

From other pharmacological *in vivo* studies in this thesis *X. laevis* larvae of NF 50-54 have been demonstrated to effectively defend an experimental induced hypotension. Pharmacological vascular response experiments suggest a functional renin-angiotensin system to be involved in the cardiovascular responses to hypotension. Likewise, larvae of NF 49-53 show the ability to defend an induced hypertension, and pharmacological vascular experiments suggest NO to be a possible hypertensive regulatory substance at these developmental stages.

Key words: amphibian, development, cardiovascular, adrenergic, cholinergic, catecholamines, ICA cells, angiotensin II, nitric oxide.

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