Presentation Type:
Platform Preferred

Track:
Aquatic Toxicology and Ecology

Session:
A Systems Biology Approach to Predictive Ecotoxicology

Abstract Title:
A Computational Model Linking Oocyte Growth and Spawning to the Hypothalamic-Pituitary-Gonadal Axis in Fathead Minnow (*Pimephales promelas*)

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Abstract: Reproduction is vital to the survival of all living organisms, and reproductive toxicity is an important outcome in determining the ecological risks of chemicals in the environment. To evaluate reproductive toxicity, fathead minnow fecundity, as measured by the average number of eggs spawned, is used as an endpoint. In order to predict the effect of impaired reproduction upon a population, population dynamic models use fecundity as an input. However, when experimental data are not available, there are only a few computational models that will predict fecundity. These models use plasma vitellogenin, a precursor to an egg yolk protein, as the basis for predicting fecundity, though a more detailed understanding of oocyte growth and development exists. Furthermore, in the paradigm of predictive ecotoxicology, large amounts of data will be obtained from in vitro studies, and computational models will be used to extrapolate between different levels of biological organization, e.g., from an individual to a population. Thus, there is a need to improve existing models of oocyte growth and spawning in order to utilize a wider variety of data. Toward this end, this presentation will describe the development of a Matlab®-based oocyte growth dynamics model linked to an HPG axis model for fathead minnow (*Pimephales promelas*). It extends a previously developed model for oocyte growth dynamics and links to a model of the hypothalamic-pituitary-gonadal axis through plasma vitellogenin and selected steroid hormones.

STICs Field	Entry
1 – Influence/profile	Not applicable
2 – Clearance tracking no.	Assigned automatically
3 – Principal Investigator / Project Officer	Karen Watanabe (non-EPA PI) if you have to list an EPA employee – Dan Villeneuve
4- Product title	Copy and paste from abstract
5 - Authors	See abstract See below for non-epa e-mail addresses
6a- Product type	Presentations and technical summaries
6b-Product subtype	Abstract
6c – Records schedule	Not a senior official
7a – Impact statement	n/a
7b- Product description	Paste in abstract
8 – Bibliographic citation	SETAC North America 33rd Annual Meeting, 11-15 November, Long Beach, CA, USA.
9 - Access	Public
10 – Tracking and Planning Task	2.2.3 2.2.3: Systems models linking reproductive and neurodevelopmental effects to endocrine disruption
10 – Tracking and Planning Product	3) Development of a computational (in silico) systems model that simulates key aspects of a chemicals potential to disrupt normal HPG axis regulation, linking changes in key events within adverse outcome pathways (chemicals selected from EDSP21).
11 – Copyright permission	No
12 - QA	not applicable
13 – Policy implications	No
14 - Keywords	model hypothalamic-pituitary-gonadal axis endocrine disruption fish

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