

# Effects of mixtures of endocrine disrupting compounds (EDCs) in a chicken embryo model

Would you like to help us to learn more about how chemicals found in blood in pregnant women can affect the developing embryo? Here is a proposal for a degree project in Environmental Toxicology.

## **Project background**

The continuous exposure of humans and wildlife to mixtures of a wide variety of chemicals that may disrupt endocrine functions is of growing societal concern. During the latest decades increasing trends for reproductive disorders have been observed in humans and wildlife. Epidemiological studies associate such effects to exposure to endocrine disrupting compounds (EDCs) but cause-effect relationships are often not clear. Laboratory studies of animals have shown that developmental exposure to potent EDCs can result for instance in reduced reproductive capacity, altered levels of thyroid hormones and metabolic changes. Certain EDCs, e.g. androgen disrupting compounds, may also affect development of the immune organ Bursa of Fabricius in birds.

The proposed project is part of an EU project called EDC-MixRisk which aims to improve our understanding of health effects of EDCs. In EDC-MixRisk, three different mixtures of common chemicals have been identified in blood from pregnant women in Sweden and associated with risk for adverse effects in their children (<http://edcmixrisk.ki.se/>). In this part of the project we use the chicken embryo as a model to investigate how two of these mixtures (G1 and S1) affect end points related to growth and sexual development, respectively.

## **Overall goal and hypothesis of the project**

The goal of the project is to determine developmental effects of the EDC-MixRisk mixtures S1 and G1 using chicken embryos as a model.

We hypothesize that

1. the S1 mixture will affect development of reproductive organs and the bursa in chicken embryos.
2. the G1 mixture will affect endogenous metabolites, growth, morphology of the thyroid gland and fat deposition in chicken embryos.

## **Experimental design and methods**

Chicken embryos have been exposed to the EDC-MixRisk mixtures G1 and S1 with exposure starting at embryonic day 4. The embryos were dissected and sampled on day 16 (G1) and 19 (S1).

S1 mixture: The morphology of the reproductive organs has been analyzed. We will also study the histology of the bursa using certain staining techniques followed by image analysis. The gonads will be analyzed regarding expression of genes involved in sex differentiation. A bisphenolA metabolite (MBP) is included as a positive control.

G1 mixture: We have collected data on body weight and amount of fat tissue in the embryo. Fat tissue and liver will be analyzed regarding expression of genes involved in adipogenesis and thyroid hormone signaling. We will also analyze accumulation of fat in liver using histological sections and analyze histological sections of the thyroid gland. This will be done by staining followed by quantitative image analysis. Allantoic fluid and liver will be analyzed regarding content of metabolites, fatty acids and lipids (performed at Swedish Metabolomics Center). Tributyltin (TBT) will be used as a positive control.

### **Degree project**

The project may include studies on one or both of the mixtures. One or more laboratory techniques may be used, for instance staining, evaluation and quantitative analysis of histological tissue sections or real-time PCR gene expression analysis. The project outline will be determined together with the student.

The project will include participation in planning of work and choice of methods, laboratory work, analysis and evaluation of results, literature studies and participation in department meetings, seminars, and group discussions.

### **Contact**

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