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Coordinator's Welcome

Season's Greetings and a warm welcome to the fourth issue of the **ERGO** E-Newsletter!
In case you missed our previous issues, you can find them here.

As the COVID-19 pandemic restrictions began to finally ease this year, slowly but surely, we have started to regain some normality. It was finally possible to hold the **ERGO** Annual Partner Meeting in April 2022 at the **ERGO** headquarters – Denmark! The meeting took place in a hybrid format, allowing those who could travel to come to the island of Funen, and those who couldn't travel to attend online.

ERGO's main objective is to improve hazard assessment of hormone disruptors for the protection of human health and the environment. Below you will read about a very exciting result emerging from the project's research, the OECD endorsement of five adverse outcome pathways (AOPs) linking thyroid hormone system disruption (THSD) to adverse effects on swim bladder inflation and survival in fish. This important development supports the addition of new endpoints to existing OECD Fish Test Guidelines which will improve the evaluation of these chemicals and will be included in approaches for extrapolation of THSD effects across mammalian and amphibian species.

It is foreseen to start in 2023 the first OECD validation of the swim bladder inflation and three more THSD sensitive endpoints to be included in fish tests (thyroid histopathology, thyroid hormone levels and eye development). This was supported at the OECD VMG-Eco meeting in November 2022.

Finally, this month the **EURION Cluster** held a virtual stakeholder workshop on 2 December 2022. During the workshop, partners presented and discussed stakeholder views, needs and expectations related to endocrine disrupting chemical (EDC) test method development and international strategies and guidelines. For more information, please visit the **EURION** website's Events page.

Follow **ERGO** on its ground-breaking journey. Keep up to date with the project website, watch the video, subscribe to news and follow **ERGO** on Twitter.

Assoc. Prof. Henrik Holbech, ERGO Coordinator

University of Southern Denmark (SDU)

About

ERGO aims to improve identification and hazard assessment of endocrine disrupting chemicals (EDCs) for the protection of human health and the environment. EDCs are chemicals that mimic natural hormones, harming the endocrine system which regulates important biological functions in humans and animals. Impacts of EDCs can include breast and testicular cancers, reproductive abnormalities and even neurodevelopmental delay in children.

EDCs are often man-made and can be found in plastics, clothes, cosmetics, toys, flame retardants and many other household products. Total avoidance is not practical in modern life, but actions should be taken to reduce their availability and better protect people, animals and the environment. In 2019, the European Union-funded research project **ERGO** was launched to respond to these challenges.

ERGO's research will break down the wall that currently exists between the different research fields that investigate EDC effects. So far, there has been a segregation between EDC research for human health and the environment. However, **ERGO** believes that research in one field will be applicable to the other and aim to demonstrate that harmful EDC effects observed in a fish or amphibian will also raise concern for harmful effects in humans. **ERGO** will do this by determining key events of thyroid disruption and identifying adverse outcomes in different species while also investigating the bioavailability and biotransformation of chemicals in different species. **ERGO**'s research will enhance existing OECD guidelines for endocrine disruption testing by adding thyroid-related endpoints and biomarkers for different species.

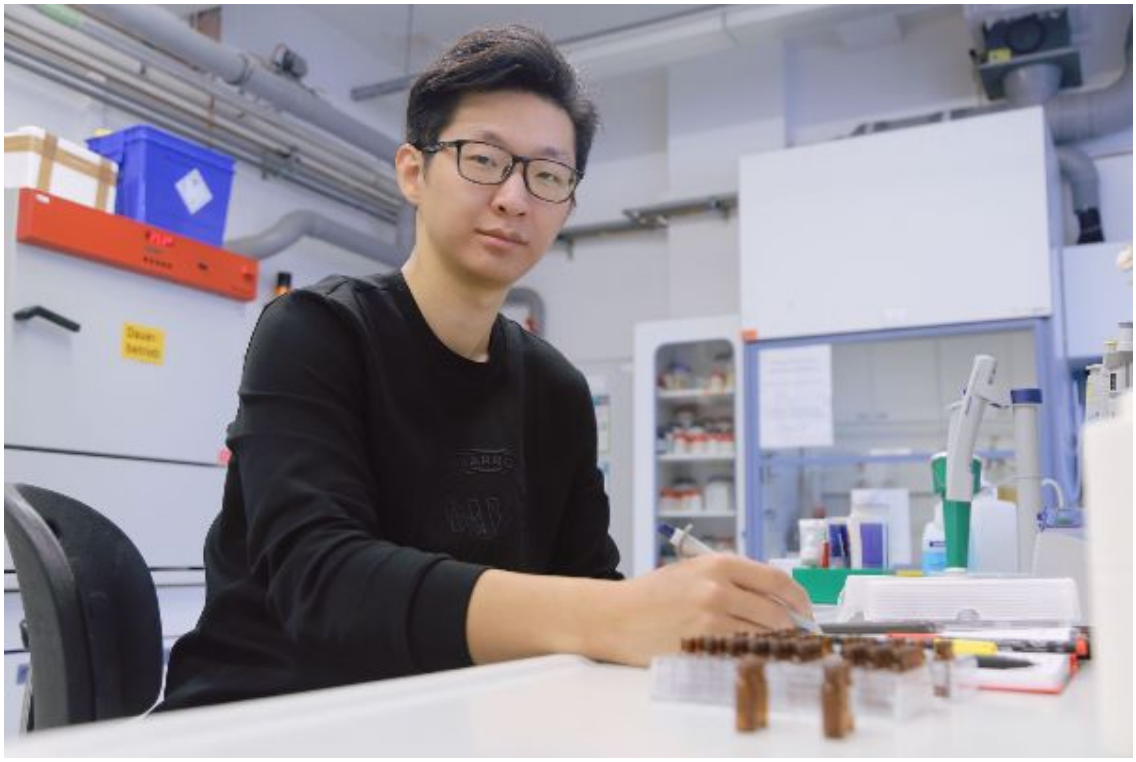
Click here to find out more

Project News & Highlights

The project was again well represented at the largest meeting on environmental toxicology and chemistry in Europe, SETAC Europe 2022 in Copenhagen, Denmark.

Read more

ERGO Researcher Profile



Name: Han Sun

Based in: Leipzig, Germany

Member of ERGO partner: Helmholtz-Zentrum für Umweltforschung (UFZ)

Research areas: Han specialises in employing *in-vitro* assays to study the toxicity of xenobiotics and to determine the biotransformation profiles of thyroid disrupting chemicals (TDCs), in terms of their metabolic kinetics and pathways. He uses analytical chemistry platforms applying liquid and gas chromatography coupled to high resolution mass spectrometry, in combination with environmental chemistry and ecotoxicological trials, to unravel the toxicological effects and metabolic characters of xenobiotics that pose threats to human health.

Academic background: Han carried out his BSc in Environmental Science at the Ocean University of China and completed his MSc in Environmental Toxicology at University of Duisburg-Essen in Germany. He is currently undertaking his PhD in Applied Science at TU Freiberg and UFZ.

Current research role and work within ERGO: Han mainly participates in WP4 and is carrying out *in-vitro* enzyme assays using liver S9 fractions derived from animal hepatocytes to study the metabolic patterns of the TDCs. The determined Michaelis-Menten kinetic parameters and identified metabolic products contribute to the physiologically based toxicokinetic (PBTK) modelling to inform the bioavailability and biotransformation in rat and fish models.

EDCs in the News

ERGO Publications

Rousseau, K., Dufour, S. and Sachs, L. M. (2021). Interdependence of Thyroid and Corticosteroid Signaling in Vertebrate Developmental Transitions. *Frontiers in Ecology and Evolution*, 9.
DOI: HTTPS://DOI.ORG/10.3389/FEVO.2021.735487

Zekri Y, Guyot R, Suñer IG, Canaple L, Stein AG, Petit JV, Aubert D, Richard S, Flamant F, Gauthier K. (2022). Brown adipocytes local response to thyroid hormone is required for adaptive thermogenesis in adult male mice. *Elife* 11: e81996.
DOI: HTTPS://DOI.ORG/10.7554/ELIFE.81996

Zekri Y, Guyot R, and Flamant F. (2022). An Atlas of Thyroid Hormone Receptors' Target Genes in Mouse Tissues. *International Journal of Molecular Sciences* 23(19): 11444.
DOI: HTTPS://DOI.ORG/10.3390/IJMS231911444

Tribondeau, A., Sachs, L.M. and Buisine, N. (2022). Tetrabromobisphenol A effects on differentiating mouse embryonic stem cells reveals unexpected impact on immune system. *Frontiers in Genetics* 13:996826.
DOI: HTTPS://DOI.ORG/10.3389/FGENE.2022.996826

Gölz, L., Baumann, L., Pannetier, P., Braunbeck, T., Knapen, D., and Vergauwen, L. (2022). AOP Report: Thyroperoxidase Inhibition Leading to Altered Visual Function in Fish via Altered Retinal Layer Structure. *Environmental Toxicology and Chemistry*.
DOI: HTTPS://DOI.ORG/10.1002/ETC.5452. Repository link coming soon

Davidsen, N., Ramhøj, L., Lykkebo, C.A., Kugathas, I., Poulsen, R., Rosenmai, A.K., Evrard, B., Darde., T.A., Axelstad, M., Bahl, M.I., Hansen, M., Chalmel, F., Licht, T.R. and Svingen, T. (2022). PFOS-Induced Thyroid Hormone System Disrupted Rats Display Organ-Specific Changes in Their Transcriptomes. *Environmental Pollution*, p.119340
DOI: HTTPS://DOI.ORG/10.1016/J.ENVPOL.2022.119340. REPOSITORY LINK

Flamant, F., Zekri, Y. and Guyot, R. (2022). Functional definition of thyroid hormone response elements based on a synthetic STARR-seq screen. *Endocrinology*, 163 (8).
DOI: HTTPS://DOI.ORG/10.1210/ENDOCR/BQAC084. LINK TO PUBLICATION. Supplementary data coming soon.

Affortit, C., Blanc, F., Nasr, J., Ceccato, J.C., Markossian, S., Guyot, R., Puel, J.L., Flamant, F. and Wang, J. (2022). A disease-associated mutation in thyroid hormone receptor α1 causes hearing loss and sensory hair cell patterning defects in mice. *Science signaling*, 15 (738), eabj4583.
DOI: HTTPS://DOI.ORG/10.1126/SCISIGNAL.ABJ4583

Bidisha, P., Sterner, Z.R., Buchholz, D.R., Shi, Y.B. and Sachs, L.M. (2022). Thyroid and Corticosteroid Signaling in Amphibian Metamorphosis. *Cells* 11, no. 10: 1595.
DOI: HTTPS://DOI.ORG/10.3390/CELLS11101595

Morthorst, J., Holbech, H., de Crozé, N., Matthiessen, P., and LeBlanc, G. (2022). Thyroid-like hormone signalling in invertebrates and its potential role in initial screening of thyroid hormone system disrupting chemicals. *Integrated Environmental Assessment and Management*.
DOI: HTTPS://DOI.ORG/10.1002/IEAM.4632

Hamdaoui, Q., Zekri, Y., Richard, S., Aubert, D., Guyot, R., Markossian, S., Gauthier, K., Gaie-Levrel, F., Bencsik, A., & Flamant, F. (2022). Prenatal exposure to paraquat and nanoscaled TiO2 aerosols alters the gene expression of the developing brain. *Chemosphere*, 287, 132253.
DOI: HTTPS://DOI.ORG/10.1016/J.CHEMOSPHERE.2021.132253

Maranaa, M.H., Poulsen, R., Thormar, E.A., Clausen, C.G., Thitd, A., Mathiessen, H., Jaafar, R., Korbut, R., Magdalene, A., Hansen, B., Hansen, M., Limborg, M.T., Syberg, K., von Gersdorff Jørgensen, L. (2022). Plastic nanoparticles cause mild inflammation, disrupt metabolic pathways, change the gut microbiota and affect reproduction in zebrafish: A full generation multi-omics study. *Journal of Hazardous Materials*, vol. 424, p. 127705.
DOI: HTTPS://DOI.ORG/10.1016/J.JHAZMAT.2021.127705.
Repository of metabolomics data coming soon.

Svingen, T., Villeneuve, D. L., Knapen, D., Panagiotou, E. M., Draskau, M. K., Damdimopoulou, P., & O'Brien, J. M. (2021). A Pragmatic Approach to Adverse Outcome Pathway Development and Evaluation. *Toxicological Sciences*, 184(2), 183–190.
DOI: HTTPS://DOI.ORG/10.1093/TOXSCI/KFAB113

For a full list of **ERGO** publications, please visit our Publications page.

EURION News

Dates for your Diary

EURION Cluster Annual Meeting 2022 | 30-31 January 2023

More information

ERGO Annual Partner Meeting 2023 | 1-2 February 2023

More information

SETAC Europe 33rd Annual Meeting | 30 April – 4 May 2023

More information

For a full list of events relevant to **ERGO**, please visit our Events page

Full list of events

EDCs Under the Spotlight

Parabens

Image by Nati Melnychuk Unsplash

Parabens are a group of chemicals commonly used as artificial preservatives in cosmetic and personal care products. Often cosmetics contain ingredients that can biodegrade, so parabens are added to prevent and reduce the growth of harmful bacteria, moulds and yeasts to increase the shelf life and stability of the products.

We can be exposed to parabens through touching, swallowing or eating products that contain parabens. Many products, such as makeup, moisturisers, haircare products and shaving creams contain parabens. Parabens in these products are absorbed through the skin.

Read the full article

How to make your own EDC free...

Deodorant

Ingredients:

- 1/3 cup coconut oil
- 1/4 cup baking soda
- 1/4 cup arrowroot starch
- 6-10 drops of essential oils, if desired

Materials: Bowl, spoon, glass jar

Method:

1. Mix baking soda and arrowroot starch.
2. Mash in coconut oil until blended. Add essential oils, if desired.
3. Place the mixture in an empty glass jar.
4. To use, just warm a small amount between your fingers until it turns into liquid and apply to your armpits.

Tip: Choose a glass jar rather than plastic to avoid chemicals potentially leaching into your deodorant.

Source:

Healthline homemade deodorants

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