EURION

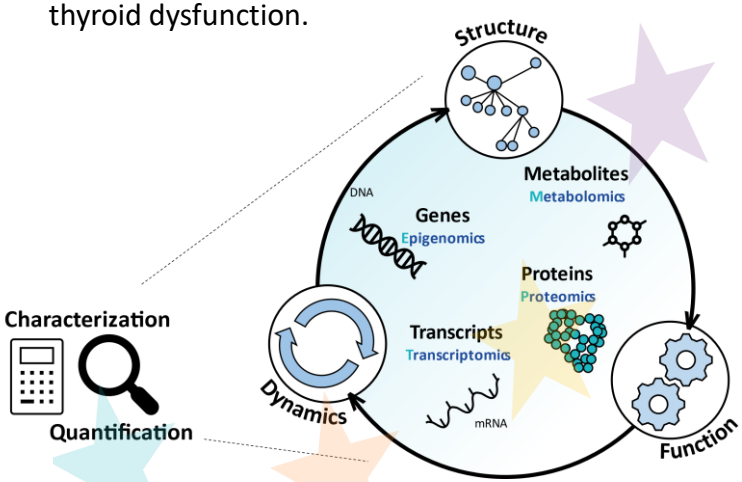
European Cluster to Improve Identification of Endocrine Disruptors

OMICS

Introduction

The combination of -OMICS techniques with biologically-derived *in silico* models of cell function and physiological processes can significantly enhance our understanding of the biological mechanisms leading to onset or exacerbation of human pathologies linked to xenobiotic* exposure.

The eight projects within the **EURION** cluster are using multi-omics approaches to better understand adverse effects of endocrine disrupting chemicals (**EDCs**) in the context of metabolic disruption, developmental neurotoxicity, female reproductive toxicity and thyroid dysfunction.



xenobiotic* : a synthetic chemical

Transcriptomics

What the cell is planning to do?

The study of gene expression (transcriptomics) shows us 'what the cell is planning to do', by having a snapshot of when and where each gene is turned on or off in the cells. In contrast to genome, which is considered as fixed for specific cell types, the transcriptional activity provides a picture of the genes that are actively expressed, under a given external stimuli (such as the EDCs studied in EURION), ready to initiate a change in proteomics.

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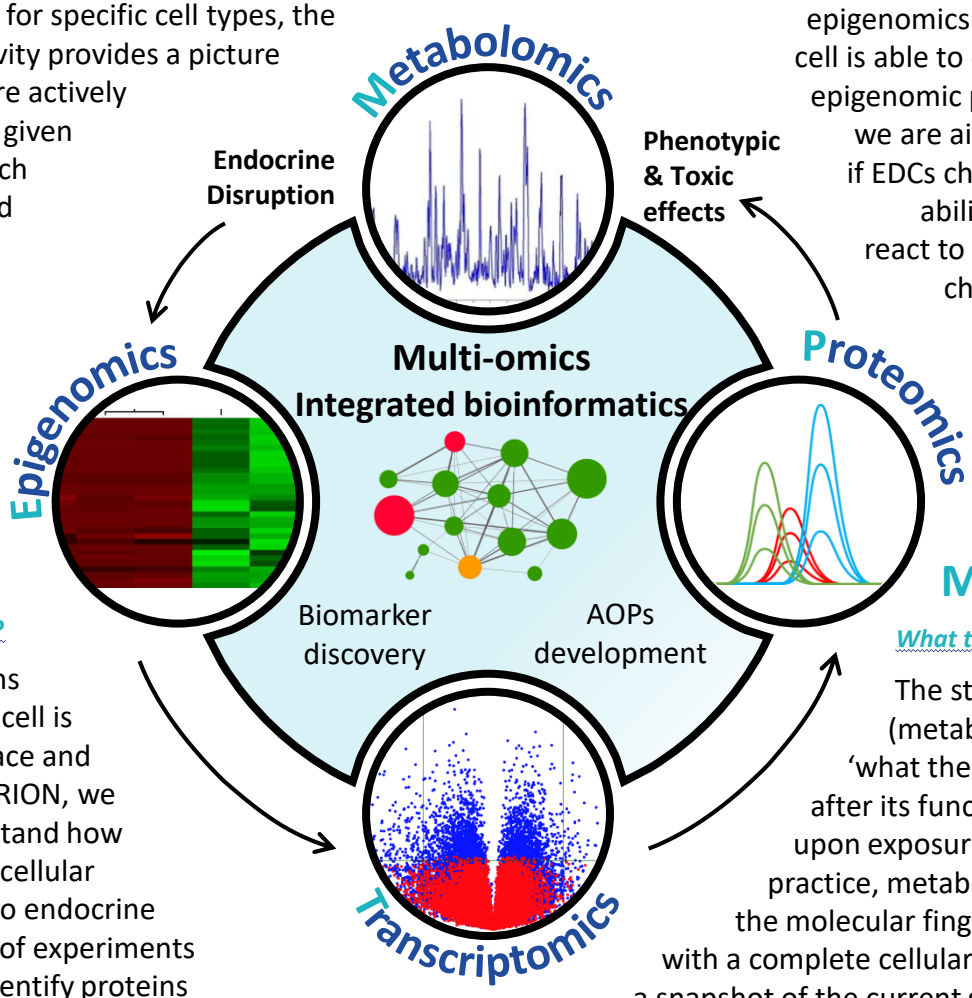
Epigenomics

What is the cell able to do?

Epigenomics describes information that is put on top of the genome (epi = greek for on top) to allow for cell specific regulation of gene transcription. Thus, the study of epigenomics shows us 'what the cell is able to do'. By investigating epigenomic patterns in EURION, we are aiming to understand if EDCs change different cells' abilities to function and react to stimuli, and if these changes could predict adversities induced by the chemicals.



Proteomics

What the cell is doing ?

The study of proteins shows us 'what the cell is doing' at a given place and point in time. In EURION, we are trying to understand how chemicals can alter cellular processes, leading to endocrine disruption. A range of experiments are performed to identify proteins responding to stress which can be used to find EDCs, and protein targets of those chemicals to identify mechanisms of actions.

Metabolomics

What the cell leaves behind ?

The study of metabolites (metabolomics) shows us 'what the cell leaves behind' after its functionality is altered, upon exposure to xenobiotics. In practice, metabolomics represents the molecular fingerprints associated with a complete cellular process, providing a snapshot of the current state of physiology. The effect on the physiology snapshots will be investigated in EURION, upon exposure to several EDCs and combinations thereof.

edcmet · freia PROJECT · ENDpoINTs · ERGO · OBERON · SCREENED · GOLIATH · athena

Added value of OMICS in research projects

OMICs analyses are not just a state-of-the-art complement to endpoints that are currently assessed in chemical testing. They provide highly valuable additional information on mechanism of action and risks for adverse outcomes. Compared to currently assessed endpoints, the added value include:

Reduced uncertainty in chemical risk assessment

OMICs data provide a holistic understanding of the toxicological responses on different biological levels and in different species; this in turn increases the precision of estimating safety factors used in regulatory risk assessment.

Reduction and replacement of animal experiments

Molecular events addressed by OMICs technologies occur on a cellular level and earlier than adverse outcomes. Thus, lengthy animal experiments can be shortened or even replaced by cell-based methods.

Better protection of vulnerable sub-populations

OMICs responses are linked to the expression of the genome and response to environmental factors, and can thus better predict effects in vulnerable individuals and sub-population

Increased sensitivity for chemical testing

OMICs methodologies allow for integration of mechanistic, spatial, and temporal information and thus data with higher resolution and complexity than single endpoints assessed in traditional chemical testing.

Find out more:
www.eurion-cluster.eu
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