

**New European research project:  
The influence of endocrine disruptors  
on the male and female thyroid gland**

***The new European collaborative project SCREENED aims to develop three-dimensional (3D) cell-based in vitro tests to better characterize the effects of endocrine disruptors (EDs) on the thyroid function. These tests are expected to overcome the limitations of existing tests, being more sensitive also at low doses of exposure to chemicals, and enabling the prediction of their toxicity on human health in a sex-specific manner.***

EDs are a class of chemicals used to produce materials commonly found in everyday life, such as some plastics, tin cans, electrical and household appliances, cosmetics, pesticides, and so on. However, EDs are not without danger: these molecules interfere with the endocrine system, disrupting the physiological production and the target effects of hormones. In particular, EDs have proven effects on the reproductive system and an incidence on the occurrence of obesity, type 2 diabetes and cardiovascular disease during aging.

There is also growing evidence that EDs strongly interfere with the function of the thyroid. EDs cause changes in thyroid hormone concentrations, the peripheral metabolism of these hormones and the signalling of their receptors. However, the mechanism by which they act on the thyroid axis is still far from being elucidated: the tests currently available are strongly limited by the availability of adequate quantities of human thyroid tissue, and by the inability to predict the effects of EDs at low dose exposure.

The new European collaborative project SCREENED aims to develop new 3D *in vitro* tests to overcome these limitations. For the first time, based on 3D organomorphic constructs of rodent and human thyroid stem cells these tests will mimic the structure and function of the native thyroid gland and, thus, a number of its anatomical characteristics. Professor Lorenzo Moroni, the Coordinator of the SCREENED project at the University of Maastricht, in Holland explains: *“These new 3D in vitro thymorphic models will make it possible to predict with more sensitivity and specificity the effects of EDs on thyroid function, compared to conventional molecular and 2D in vitro assays. These tests will also allow for selective identification of female and male responses to the exposure to EDs and to test simultaneous action of different EDs on thyroid function.”*

The SCREENED project is part of a bigger cluster of eight research projects, all funded by the European Commission, and each focusing on a different aspect of new testing and screening methods to identify EDs. SCREENED brings together nine European universities and companies, including a composite research Unit at the University of Parma, in Italy led by Professor Roberto Toni, Head of the Laboratory of Regenerative Morphology and Bioartificial Structures (Re.Mo.Bio.S. Lab.) at the Department of Medicine and Surgery - DIMEC. He will share this collaborative effort with Prof. Lisa Elviri from the Food and Drug Department of the same University, Dr. Nicoletta Zini from the CNR - National Research Council of Italy - Institute of Molecular Genetics, and IRCCS Istituto Ortopedico Rizzoli, Bologna, and Professor Giulia Spaletta, Chair of Computational Mathematics at the Department of Statistical Sciences of the University of Bologna, in Italy. Their focus will be on the development of innovative procedures to obtain thyroid gland matrices as natural scaffolds for ricellularization with adult thyroid stem cells, and to ascertain the functional and molecular effects of different classes of EDs both on the various 3D thyroid bioconstructs prepared by the SCREENED

partners and on in vivo rat models of different sexes. As a part of the National Groups on Environmental Endocrinology, and Endocrinology and Metabolism in Sport and Physical Exercise of the Italian Society of Endocrinology (SIE Clubs), and Head of the Endocrinology and Metabolism section of the Unit of Anthropometry and Constitutional Medicine – Interdepartment Center for Sport and Exercise Medicine at the University of Parma, Professor Toni and his group will be engaged in disseminating the results of SCREENED and, in particular those developed by the Parma Unit to the national and international scientific and clinical community focussed to the study, treatment, and prevention of endocrine and metabolic human disorders.

The ambition of the SCREENED project is that these new 3D *in vitro* tests, as well as the increased knowledge about adverse reactions after exposure to EDs, will be used for regulatory purposes, ultimately to improve human health.

Partner organisations:

- Universiteit Maastricht (Netherlands)
- Università degli Studi di Parma (Italy)
- Université libre de Bruxelles (Belgium)
- Consiglio Nazionale Delle Ricerche (Italy)
- Presens Precision Sensing GmbH (Germany)
- University College Dublin, National University Of Ireland (Ireland)
- Atturos Limited (Ireland)
- ARTTIC SAS (France)
- Cyprotex Discovery Limited (United Kingdom)

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