These past two decades, the Research Laboratory on Human Reproduction has developed expertise in an innovative and ambitious fundamental and clinical research program dedicated to the preservation of the fertility of young cancer patients receiving gonadotoxic treatments. Prof. Isabelle Demeestere, gynaecologist and director of the laboratory since 2016, has initiated this research leading to more than 40 transdisciplinary scientific publications and 5 defended PhD theses in the past 5 years. She enjoys a high level of recognition at the European level.

Research areas

The laboratory has structured its fundamental research activity around three axes.

Pharmacological protection approach

The objective is twofold: to find methods of preventing the chemotherapy-induced gonadal damage by identifying signalling pathways involved in their toxicity and to determine individualised targets to prevent these damages according to the treatment received. One of the main current projects is based on microRNA therapeutics with specific gonads targeting using nanoparticles in collaboration with engineers in nanotechnology.

© ULB - Research Laboratory on Human Reproduction - Prof. Isabelle Demeestere, Director of the Research Laboratory on Human Reproduction, Associate Researcher at the FNRS and responsible for the fertility preservation program at CUB-Erasme Hospital

Early stage of ovarian development

The second area is the study of the early stage of ovarian development with a view to

improving techniques for in vitro culture of ovarian tissue. Cryopreservation of ovarian tissue is the only option to preserve fertility in children, but transplantation is required to restore later ovarian function and cannot always be offered. In vitro culture is an attractive alternative but is not feasible yet in human.

Impact of new regimens and individualized therapies

Finally, the third axis aims to studying the impact of new regimen and individualized therapies on the ovarian function in young patients. At present, it focused on breast cancer – as it is the major indication for fertility preservation, and more specifically on patients carrying hereditary mutations of the breast cancer 1 (BRCA1) or breast cancer 2 (BRCA2) genes.

Clinical research and international collaborations

The laboratory is also active in the field of clinical research – as a participant or promoter. They are involved in large international studies in collaboration with oncological groups such as the International Breast Cancer Study Group (IBCSG), the Breast International Group (BIG) or Lymphoma Academic Research Organization (LYSARC). These studies, aiming to prospectively investigate the toxicity of treatments on the gonads, are usually conducted as translational research within oncology trials. Other clinical trials focus on the efficiency and the safety of the fertility preservation techniques.

Biobank and research resources

To carry out its various research projects, the laboratory handles a biobank of human materials. Composed of several hundred samples from patients (ovarian tissue, sperm, oocytes, gametes, blood, plasma and serum samples), this biobank makes it possible to perform both fundamental and clinical research. As such, the laboratory acts as a central laboratory for several fertility-related trials.

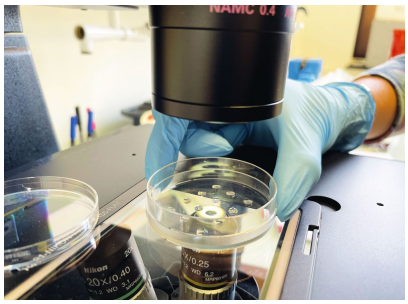
Recognition and guideline development

Thanks to its expertise, Isabelle Demeestere participated in different European expert groups for the drafting of guidelines on fertility preservation such as the European Society for Human Reproduction and Embryology (ESHRE), the European Society for Medical Oncology (ESMO) and PanCareLIFE, a European project to improve long-term care regarding fertility, ototoxicity and health-related quality of life after cancer occurring among children and adolescents. These guidelines were published at the end

of 2020 – beginning of 2021 – a great recognition for the laboratory.

Future challenges

Today, the major challenge is to follow the progress in oncology that continuously proposes new treatments for which consequences on fertility and pregnancy are unknown. Another challenge in basic research is to improve and to find alternatives to existing techniques to offer each patient a possibility to preserve fertility. Today survival should no longer be achieved at the expense of fertility – especially if the patient has not yet had a child. Last but not least, paediatric research still needs to develop appropriate protocols to prevent infertility risks of new therapeutic approaches. This is a major challenge that the laboratory should help to meet too.



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