OPTIGON-AI (Project Code: ΕΚΠΑΡ01-0058526)

The Assisted Reproduction Unit (ARU) EUGONIA, internationally recognized for its scientific excellence, continues to expand the boundaries in the field of assisted reproduction. Guided by its longstanding commitment to research, EUGONIA constantly seeks innovative solutions to provide pioneering care to couples facing fertility issues and to advance and co-shape international scientific knowledge.

EUGONIA is now integrating artificial intelligence (AI) and three-dimensional (3D) ultrasound imaging into the optimization of gonadotropin dosing during ovarian stimulation in the in vitro fertilization process. The pioneering research project, titled "Personalized Prediction of IVF Success and Gonadotropin Dosing Using Artificial Intelligence Based on AMH, 3D Ultrasound, Age, and BMI," is being implemented by EUGONIA LTD in collaboration with Ubitech Limited, a software and information systems development company.

The Project

OPTIGON-AI is an innovative artificial intelligence system designed to optimize gonadotropin (FSH) dosing during controlled ovarian stimulation in in vitro fertilization (IVF) cycles, providing fully personalized treatment recommendations based on each patient's clinical and biological profile.

The system architecture is based on two complementary subsystems. The first utilizes supervised learning techniques, incorporating data from automatic ultrasound

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imaging of ovarian reserves (antral follicle count, AFC), anti-Müllerian hormone (AMH) levels, age, and body mass index (BMI). The second employs reinforcement learning and Generative AI for the extraction of new knowledge and dynamic improvement of dosing recommendations.

It is worth noting that the selection of the appropriate FSH dose is a critical factor for both the safety and efficacy of ovarian stimulation in the context of IVF. In current clinical practice, reproductive physicians determine dosing largely empirically, without systematic personalization based on the patient's clinical profile. Consequently, a significant proportion of women exhibit either inadequate response—resulting in a low number of retrieved oocytes—or excessive stimulation, which is associated with an increased risk of Ovarian Hyperstimulation Syndrome (OHSS), a potentially serious complication.

Objectives

1. Increase the number of retrieved oocytes by 4% and provide personalized pregnancy success prediction.
2. Improve oocyte and embryo quality while ensuring safety (OHSS avoidance).
3. Interoperability of multiple data types (age, AMH, FSH, 2D/3D AFC) for personalized gonadotropin dosing.
4. Support physicians with less experience in clinical decision-making.
5. Extraction of new knowledge through unsupervised learning.
6. Creation of a commercially viable product to enhance competitiveness and attract medical tourism.

Outcomes

Upon completion of the OPTIGON-AI project, the following outcomes are expected:

At the scientific level, machine learning and artificial intelligence algorithms will be developed for the accurate determination of optimal gonadotropin dosing, utilizing multiple data types (age, AMH, FSH, 2D/3D AFC). Concurrently, new clinical knowledge will be extracted through unsupervised learning techniques.

At the clinical level, a 4% increase in the number of retrieved oocytes is expected, along with improved oocyte and embryo quality, higher pregnancy rates in shorter timeframes, and ensured safety through avoidance of Ovarian Hyperstimulation Syndrome (OHSS). Additionally, clinical decision-making will be facilitated, particularly for physicians with limited experience, while patients will receive personalized success predictions, reducing psychological and financial burden.

At the technological and commercial level, an innovative, commercially viable product will be created and introduced to the assisted reproduction market, enhancing Eugonia's competitiveness, creating new employment opportunities, and attracting patients through medical tourism.

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