Al collegio docenti del Dottorato in Medicina Molecolare

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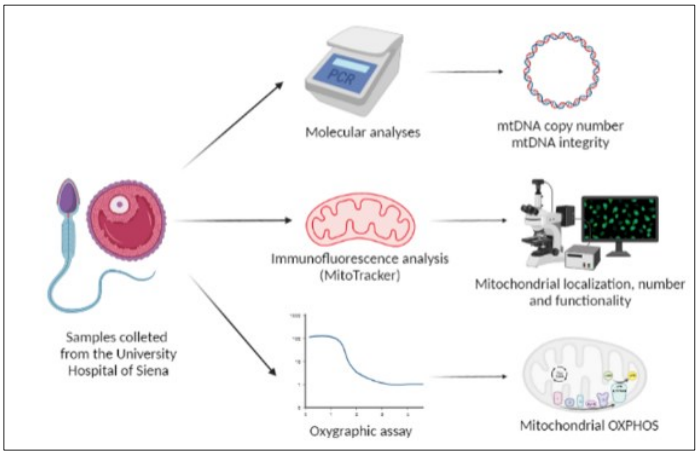
- *Introduction*

There is a correlation between poor semen quality and DNA sperm integrity, which can turn into negative outcomes in terms of embryo development and clinical pregnancy. Sperm selection plays a pivotal role in clinical practice, and the most widely used methods are mainly based on sperm motility and morphology.

During the first year of my PhD program, my project focused on alternative sperm selection techniques. My project was designed to investigate the efficacy of sperm exposure to cumulus cell (CC) secretome during swim-up treatment compared with the routinely used swim-up method. The effectiveness of this method was assessed by examining biological factors that are critical for the ability of sperm to fertilize an oocyte, including: acrosome reaction, DNA integrity and mitochondrial functionality.

- *Materials and Methods*

To evaluate the effect of CC-secretome on sperm recovery and quality, CCs from cumulus-oocyte complex and semen samples were collected at the Unit of Medically Assisted Reproduction, University Hospital in Siena.



As shown in the Figure, different analyses were carried out. The acrosomal status was determined by using the acrosome marker FITC-PSA; MitoTracker immunofluorescent staining was used to assess the mitochondrial membrane potential; sperm DNA fragmentation was assessed using the sperm chromatin dispersion test; in addition, oxygraphic analyzes were carried out to assess the respiration rate of the samples, and consequently, the mitochondrial oxidative phosphorylation system.

- *Results*

Preliminary results of this project revealed that sperm co-incubated with CCs exhibited higher mitochondrial activity and higher membrane potential compared to unselected spermatozoa. Oxygraphic analysis showed significantly higher O_2 consumption in cell-exposed selected spermatozoa compared to unselected spermatozoa.

Further research will be needed to understand the efficacy and the applicability into clinical practice of this sperm-selection technique during ART.

Scientific Publications in international journals:

I. Luongo FP*, **Pérez Casasús S***, Haxhiu A, Barbarulo F, Scarcella M, Governini L, Piomboni P, Scarica C, Luddi A. *Exposure to cumulus cell secretome improves sperm function: new perspectives for sperm selection in vitro.* Cells 2023, 12 (19), 2349; doi.org/10.3390/cells12192349

Abstracts and participation Congresses:

ESHRE 39th Annual Meetig, Copenhagen, Denmark, 25-28 June 2023:

I. Scarica C, Petrocelli P, Pontemezzo E, Haxhiu A, **Pérez Casasús S**, Luddi A. *The interaction between spermatozoa and cumulus cells: a more physiological approach to the selection of good quality spermatozoa for assisted reproduction.* (Poster P-178) Human Reproduction, Volume 38, Issue Supplement_1, June 2023, dead093.538, doi.org/10.1093/humrep/dead093.538

Soft Skills courses:

- Money for nothing and chicks for free: the story of the European Union and its funding. 08/05/2023 - Dr.ssa Anna Pelagotti
- I finanziamenti europei nel settore digitale. 11/05/2023
- Europrogettazione: programmi, progetti e rendicontazione. 18/05/2023
- Science and Society: continuity and Change. 29/05/2023 - Dr.ssa Agnes Allansdottir
- PhD and then? Overview on career paths inside and outside the academia. 12/06/2023 - Prof. Gennaro Prota and Dott.ssa Aida Ribera Navarro
- Last update in Sustainability reporting Regulation. 07/09/2023 - Dott.ssa María del Mar Miras
- Ricerche bibliografiche, bibliometria e open access & science. 14/09/2023 - Dr.sse Fausta Cosci and Maria Cristina Costantini
- Critical issues of patent law. 19/09/2023 - Prof. Alessandro Palmieri
- Crossing Boundaries: Harnessing the Power of Interdisciplinary Approaches in Complex Systems. 28/09/2023 - Prof. Alessandro Vespignani

Other courses:

- *How to study genetics in complex diseases*. 19/01/2023 Prof. Stefano Landi, Università di Pisa.
- *How to study genetics in complex diseases*. 26/01/2023 Prof. Stefano Landi, Università di Pisa.
- *Microvesicles in cell-to-cell communication*. 27/02/2023 Prof.ssa Laura Governini, Università di Siena.
- *Biomarkers discovery in precision medicine*. 27/02/2023 Prof.ssa Alice Luddi, Università di Siena.