Al collegio docenti del Dottorato in Medicina Molecolare

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Ciclo XXXVIII Tutor Prof.ssa Alice Luddi

Attività scientifica svolta nel 1° anno di Dottorato, Anno Accademico 2022/2023

Introduction:

One of the most important goals of reproductive medicine is to select the best embryo to aid infertile couples to get healthy babies. The predominant method used to select the embryo to be transferred is the morphological evaluation at different preimplantation stages. Unfortunately, embryo morphology is directly influenced by the intrinsic quality not only of the oocyte, but also of the spermatozoa; moreover it is strictly operator-dependent As a consequence, a good embryo morphology may not necessarily identify the embryo with the best implantation potential or a chromosomally normal embryo.
In the last years, metabolic, proteomic and genomic analysis of spent culture media appeared as a new method to evaluate embryo quality. These high throughput approaches seem to assure the identification of key factors to be used as predictive biomarkers for embryo competence. On the other side, these methods represent non-invasive alternatives to Preimplantation Genetic Testing (PGT for the selection of a chromosomally normal embryo).
However, to date, there is no useful molecular tool or non-invasive predictive analysis that can ensure information about the viability of the embryo or its ability to implant. The investigation of male and female gametes characteristics and their influence on embryo viability, together with the analysis of secreted molecules in embryo culture media, could complement the existing embryo selection techniques to provide a better predictive profile of embryo competence.

Methods:

- Embryo culture media collection.
- Biobank establishment and samples storage.
- Collection, for each sample, of data about patients, embryo or blastocyst grade, PGT type and result.
- Seminal parameters analysis.
- Sperm DNA fragmentation analysis with Halo Test®.

Results:

During the first year of my PhD, the relationship between sperm DNA fragmentation and male age was investigated, since both these parameters could influence embryo intrinsic characteristics. We demonstrated that advanced paternal age showed a significant increase in mean sperm DNA fragmentation index.
Moreover, we collected embryo spent medium and organized in a biobank where samples are cataloged with information about patients, embryo or blastocyst score and, eventually, PGT type and results. These spent media will be (i) analyzed by transcriptomic or proteomic searching for key molecules associated to the embryo quality and (ii) added to 3D culture of human endometrium to dissect the crosstalk between the endometrium and the implanting embryo.

Lezioni, convegni:

- 27 febbraio 2023:
09:00-13:00 – Microvescicles in cell-to-cell communicazion – Dr.ssa Laura Governini
14:00-18:00 – Biomarkers discovery in precision medicine – Dr.ssa Alice Luddi

Docenza:

Master in ‘’Biotecnologie mediche e biologia della riproduzione umana – UNISI – 2022/2023 – Tecniche di fecondazione assistita di I livello.