



NEW DIAGNOSTIC TOOLS FOR SPERM FERTILIZING ABILITY

Bassas L (ES) [1], LARRIBA S (ES) [2]

Context

Assessment of male fertility is traditionally based on microscopic evaluation of semen. However, classical sperm parameters have limited power to diagnose male infertility and predict fecundity, both in vivo and after treatment. As a consequence, many efforts have been invested during years to furnish new probes and sperm function tests trying to define gamete competence.

Objective

To review the state of the art of the more relevant diagnostic tools developed during recent years to analyze the sperm fertilizing ability, with special focus on the unexplained male infertility.

Methods

We performed a narrative review of the contributions published by our research team and others, plus a search of scientific reports using appropriate terms.

Results

Some tests already known for years have recently regained interest due to the development of new and convenient methods. Double stranded DNA breaks can now be studied with Neutral COMET assay, high levels being responsible for spontaneous miscarriages in otherwise normozoospermic men. Reactive oxygen species can be detected in routine labs. Mitochondrial function can be assessed using JC-1 or mitotracker, Ca⁺ intracellular flux are observed by fluorescent dyes, sperm maturation can be tracked through probes that bind to histones or protamines (P), as well as the relative concentrations of P1 and P2. Sperm mRNAs present in the spermatozoa could be considered a remnant of gene expression during spermatogenesis. We have shown differences in the expression of a few mRNAs between groups of donors with the lowest and highest pregnancy rates after insemination. Similar to mRNAs, noncoding RNAs (lncRNAs, miRNAs, piRNAs, and others) are differentially regulated during spermatogenesis, where they play relevant roles in the quality of mature gametes. In addition, imbalances in DNA methylation also might explain a group of male infertility disorders. Finally, the emergence of the proteomics and metabolomics is amassing a huge amount of information, and getting a broader view of

[1] FUNDACIO PUIGVERT, [2] Bellvitge Biomedical Research Institute (IDIBELL)

complex biological systems involved in the reproductive mechanisms.

Conclusions

Clinical andrology research will be essential to decipher the relative importance of the new arsenal of diagnostic tools coming up. The main challenge will be to combine the most important data and, to develop proper algorithms for a rational and effective management of male infertility, particularly of occult/unexplained reproductive male dysfunction.