

PROJECTE DE DOCTORAT INDUSTRIAL EXPEDIENT 2016 DI 040

DADES DE L'EMPRESA I DE L'ENTORN ACADÈMIC

Títol del projecte

Biomarker identification in extracellular vesicles of human seminal fluid in assisted reproduction technologies (ART)

Empresa

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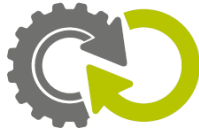
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BREU DESCRIPCIÓ DEL PROJECTE DE RECERCA

Infertility is a global disease of high prevalence and far reaching personal and social consequences (Hochschild, 2009). On average, 1 in 7 couples trying to conceive will have some difficulties and most will need assisted reproduction technologies (ART) (Boivin, 2007). About 40% of the cases, infertility is due to a male factor (Hudson, 1987). To achieve a pregnancy, men need to produce healthy spermatozoa, through correct spermatogenesis and maturation process. Spermatozoa undergo meiosis and maturation in the testis and during ejaculation are transported through the male genital tract, where they mix with seminal fluid, the product of seminal vesicles and prostate. Deficiency in both sperm maturation and seminal fluid characteristics affect fertility.

Seminal fluid was recently proposed as a source of non-invasive biomarkers for sperm quality as different proteomic analysis converged on a set of proteins that are repeatedly identified (reviewed in Gilany, 2015). Seminal fluid is composed, among others, by soluble biomolecules and extracellular vesicles (EVs) (Ronquist, 1977). Extracellular Vesicles (EVs) are small structures surrounded by plasma membranes, which are naturally released from cells, under both normal and pathological conditions, into the extracellular environment and can serve as vehicles for the transfer of biomolecules (organ tropism) in an evolutionally conserved manner (i.e. proteins, lipids, RNAs) between cells (Zhang et al., 2009; Raposo and Stoorvogel, 2013). EVs present unique



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molecular profiles acquired from parental cells and are present in many biological fluids (Ronquist, 1977). Recently, EVs have emerged as a promising source of successful biomarkers potential tools to identify biomarkers, for drug delivery system in urology (Tompkins, 2015) and may serve as platforms for personalized medicine.

Prostasomes, EVs derived from the epithelial cells lining the acinar ducts of the prostate gland, represent the majority of EVs present in seminal fluid and play an important role in fertility because they bind to sperm and are thought to enhance their motility and ability for capacitation (reviewed in Woodriff, 2014). As an example, SelenoProteins (a family of proteins secreted by the epididymis into the seminal fluid) play an important role protecting sperm from oxidative stress during passage through the male and female genital tract, and during cryopreservation.

We propose to analyze both EVs and soluble biomolecules in the seminal fluid, in order to identify biomarkers of sperm function and to correlate them with clinical reproductive results.

