Technology Offer

Ref.-No. M08/18

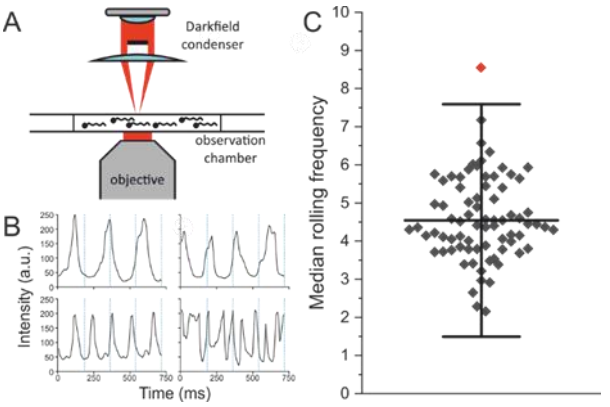
Method for assessing by CASA the fertilizing potential of sperm based on longitudinal axis rotation

Introduction

Infertility affects 10-15% of couples, with male and female (co-)factors contributing in a similar scale. Male infertility is, however, often difficult to diagnose: in about 30% of infertile men the infertility seems to rest on a dysfunction of the sperm rather than on a faulty sperm production. If diagnosed at all, the mechanisms underlying sperm dysfunctions remain largely unknown, precluding an evidence-based treatment decision in reproductive medicine. Thus, there is an urgent medical need for novel biomarkers of sperm dysfunction and male infertility that allow selecting the appropriate assisted reproductive technique, improving patient care and reducing the medical and financial burdens.

Invention

Here, we present a novel biomarker partly closing this diagnostic gap: the rotation of human sperm around their longitudinal axis (rolling) - an essential feature of sperm motility. Rolling enables sperm to navigate by rheotaxis, which is vital to reach the oocyte. A novel microscopic procedure based on dark-field illumination is provided that determines and quantifies rolling in a semen sample. Thereby, rolling is employed as a highly predictive surrogate parameter for the ability of sperm to undergo rheotaxis. We foresee that both the novel microscopic technique and software requirements are implemented into existing systems for computer-assisted sperm analysis (CASA). CASA systems that readout this novel biomarker, reflecting the current state of scientific knowledge on sperm function, would feature a substantial competitive advantage over present CASA systems.



Analysis of longitudinal axis rotation (rolling) of human sperm. (A) Experimental setup for population analysis of rolling using dark-field illumination. **(B)** Rolling is read out as periodic changes in brightness (blinking) of the sperm head. Automated analysis of blinking events in a sperm population allows identifying men with dysfunctional sperm. **(C)** Mean rotation frequencies of 75 patients that underwent semen analysis. Indicated is the median (± 3 × S.D) rolling frequency. In one patient, the sperm featured a significantly enhanced rolling frequency (red square) and, as a consequence, failed to undergo rheotaxis. This highlights the medical utility of our approach.

Advantages of the invention

- Improves diagnostic power of CASA.
- Allows for evidence-based treatment decision, increasing ART success rates and decreasing the medical and financial burdens for infertile couples.
- Motivation for customers to replace or upgrade existing CASA systems.

Patent situation

Patent application filed in Europe.

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