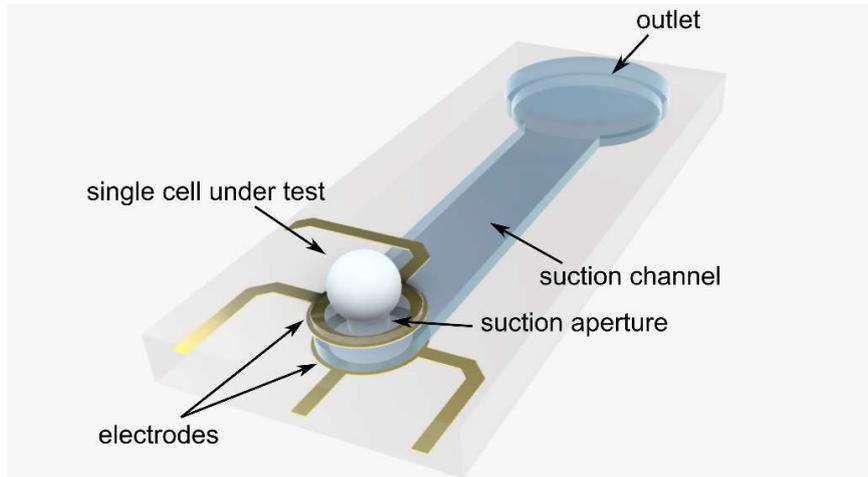


RWTH Technology

System and Apparatus for the Characterization of Oocytes



Challenge

Artificial fertilization of oocytes is an established method in human reproductive medicine that is routinely applied if couples desiring having children are not able to beget children on the natural way. Moreover, artificial fertilization is used for preserving and generating breeding and laboratory animals. The success of artificial fertilization decisively depends on the quality of the oocytes, in particular on the condition of the Zona pellucida (ZP), which is a gelatinous extracellular matrix layer surrounding the oocyte. During oocyte development, the ZP is initially hard, softens until the oocyte is fully mature and finally hardens again after fertilization, preventing the penetration of further sperm. The morphologic evaluation of the oocyte quality is usually estimated via microscopic inspection and is hence extremely subjective and strongly dependent on the individual observer. Other analysis tools are either risky and/or accompanied by ethical issues, meaning that to date there exists no reliable method to determine the time window for successful fertilization by evaluating the oocyte quality in an objective manner.

Solution

A microsystem (see picture above) was developed to characterize the maturation process of oocytes in a time resolved and objective manner. The special design enables the gentle handling of oocytes by means of microfluidics. The use of electrodes enables the detection of the oocyte's hardening by electrical impedance spectroscopy. Therefore, the quality of the oocyte and its potential for fertilization and further development are evaluated in a non-destructive manner. Hence, the system can be used to assist artificial fertilization but might also be used for the development of contraceptives.

Advantages

- User-independent (→ objective analysis of the oocyte quality) and easy to use
- Non-destructive
- Enables substantial decision about oocyte quality
- Array design possible → enables simultaneous analyses of several oocytes
- Applicable for human and animal reproductive medicine

Status

- Granted patent in Germany, international patent application pending.
- Functional model, successful proof of concept, ongoing research.

RWTH Aachen University is looking for partners for patent commercialization and/or for research partners for joint development and/or contract research.

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Fields of application

Reproductive Medicine, Artificial Fertilization, in-vitro Fertilization, Intracytoplasmic Sperm Injection, in-vitro Diagnostics, Contraceptives Research

Keywords

#ReproductiveMedicine; #ArtificialFertilization; #AssistedReproduction; #In-vitroFertilization; #IVF; #IntracytoplasmicSpermInjection; #ICSI; #In-vitroDiagnostics; #OocyteMaturation; #ZonaPellucida

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