

9th Yazd International Congress and Student Award on Reproductive Medicine with 4th Congress of Reproductive Genetics

Award Winners

A-13

Design and fabrication of a microfluidics device for sperm sorting application

Rafizadeh Tafti S¹, Azimzadeh M¹, Nabi A².

1. Medical Nanotechnology and Tissue Engineering Research Center, Yazd Reproductive Sciences Institute, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.

2. Yazd Reproductive Sciences Institute, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.

Email: m.azimzadeh@ssu.ac.ir

Background: In vitro sperm selection has been of great interest in order to optimize the selection process based on biological parameters of sperm. On the other hand, microfluidics has recently cast light on how deep human being can sort and manipulate cells and fluids, respectively. Hence, using microfluidic technology to design and fabricate a bio-chip for sperm selection seems to be a promising bet. The insane biocompatibility of the microfluidic polymers as well as a wide customizability enriches us with a variety of design and mechanism selections.

Objective: Hereby, we discuss the design, optimization, fabrication of a microfluidic biochip

based on rheotaxial capability of sperms, as well as their attraction to electrostatic charge. Our chip will enable us to have a controlled flow of motile sperms attracted to electrostatic charge and guiding the cells towards groups of selection.

Materials and Methods: The mold for the chip was in Silicon and fabricated using e-beam layer deposition, photolithography and reactive ion etching. Then, polydimethylsiloxane fabricated chips were made and patched by plasma to glass to build up the chip. The system is then connected to a syringe pump and monitored by an inverted microscope.

Results: Our chip, showed high biocompatibility and was able to select a sub population of vital sperms with a greatly higher motility profile. We also provided evidence, that electrostatic charge has the capability to stimulate the sperm cells towards target. The suggested design provides great quality sperm selection in a quicker time manner with high throughput, besides being feasible in costs.

Conclusion: Based on the results, the fabricated chip showed promise to be used in future medical applications, after taking necessary tests.

Key words: Sperm, Sorting, Microfluidics.