MICROFLUIDIC SPERM PROCSSING AS A POTENTIAL TREATMENT FOR MALE INFERTILITY

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Microfluidics is the precise control and manipulation of small-volume fluids in order to observe behavior of the fluid itself or its contents. One recently explored application of microfluidics is gamete sorting and selection for use in In Vitro Fertilization (IVF). Previous applications of microfluidic techniques for sperm manipulation involved healthy sperm cells swimming to a collection area. However, these techniques cannot be applied to samples containing healthy non-motile sperm cells, such as for patients with non-obstructive azoospermia. The microfluidic device used in this study gives the opportunity for the separation and organization for non-motile sperm using an innovative spiral-shape, and gives possible current treatments.

The overall goal of this exploration is to design a spiral channel device in order to sort non-motile sperm cells. The objective of this study is to determine the effects that the device has on cell motility and viability; and describe the consequences of changing various aspects of the device. Using in-lab assays as well as simulations in the COMSOL software, the planned outcome will be to optimize the device to allow desired results.

The effectiveness of the device at separating desired, healthy cells from other cells and debris in the sample was shown. First, data suggested that the device was usable because a sufficient live:dead ratio of cells was maintained. Additionally, simulations supported the phenomenon that particles were focused in the inner channel. These results show that the device has the potential to offer a cell-separating mechanism for patients with reproductive disorders such as azoospermia.

References:

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