Insight Medical Publishing

Journal of Womens Health and Reproductive Medicine

2020

Vol.0 No.0

Cryopreservation of individual sperm cells in nanoliter volume

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Abstract

About a million cases of low-sperm-count-related diseases are treated every year at IVF labs using unsuitable procedures and means for cryopreservation of individual spermatozoa. Initial attempts to cryopreserve and thaw spermatozoa in nanoliter containers under oil yielded exceptionally high cell-mortality rates when compared to that obtained within the common microliter containers. The miniaturized volume was found not to be the direct cause of cell death, since spermatozoa have shown satisfactory survival after incubation in such containers. This volume-dependency of the successful sperm cell freezing-thawing cycle leads to the assumption that surface-to-volume ratio may be a significant parameter in the diffusion of essential ingredients from the freezing medium into surrounding oil. Considering the solubility of these ingredients in oil, it appears, surprisingly, that the oil enables absorption of water molecules. This phenomenon was overcome by mixing the oil with pure water prior to use, a procedure that pronouncedly improved survival of cells after thawing. This research is tracked by software developed to trace the cells and provide accurate statistics of their mobility scores. In addition, research and development of nanoliter-volume doughnut-like arrayed micro-chambers for cryopreservation of rare sperm cells at individual-cell resolution has been accomplished. Micro-arrayed donut-shaped chambers (DSCs) are miniature vessels which were developed in the frame of this work. Each chamber is designed to act as an individual isolated reaction compartment, which creates an in-vitro assay, mimicking biology environments. Such a device enables individual live cell treatment and analysis, with the assistance of a designated image processing algorithm.

Biography:

Received her B.Sc in Physics & Computer Science in 2000 from Bar-Ilan University, Israel. received her M.Sc at the Biophysical Schottenstein Center, Bar-Ilan University Physics Department. M.Sc research title: About the evaluation dependency of the of energy transfer efficiency on the emission wave length of the donor. currently studying for her Ph.D. degree. Ph.D Sc research title : Cryopreservation of Individual Cells in Volumes Less than Nano Liter.

International conference on Reproductive Health, Infertility and IVF, Webinar, September 21-22, 2020.

Abstract Citation:

Bat-sheva Galmidi, Cryopreservation of individual sperm cells in nanoliter volume, IVF Health 2020, International conference on Reproductive Health, Infertility and IVF; Webinar, September 21-22, 2020.
(https://ivf.healthconferences.org/abstract/2020/cryopreservation-of-individual-sperm-cells-in-nanoliter-volume)