National Conference on Latest Innovations in Engineering, Science, Management and Humanities (NCLIESMH – 2024)

26th May, 2024, Raipur, Chhattisgarh, India.

CERTIFICATE NO : NCLIESMH /2024/C0524591

A Study of Microfluidic and Biophysical Techniques for Low DNA Fragmented Sperm in IVF

Nancy Sharma

Research Scholar, Department of Biotechnology, Kalinga University,
Naya Raipur, Chhattisgarh, India.

ABSTRACT

In vitro fertilization (IVF) is one of the most widely used assisted reproductive technologies for treating infertility. The success of IVF largely depends on the quality of sperm used during fertilization. One of the important factors affecting sperm quality is DNA fragmentation. High levels of DNA fragmentation in sperm can lead to poor fertilization rates, impaired embryo development, and reduced pregnancy outcomes. Therefore, selecting sperm with low DNA fragmentation is essential for improving the success rate of IVF procedures. In recent years, microfluidic and biophysical techniques have emerged as advanced and effective methods for selecting high-quality sperm. Microfluidic technology uses small fluid channels that mimic the natural environment of the female reproductive tract. This allows only the most motile and healthy sperm to move through the channels, thereby separating them from damaged or fragmented sperm. Biophysical methods, such as density gradient centrifugation and electrophoretic separation, rely on physical properties like size, charge, and motility of sperm cells to isolate the best-quality sperm. These techniques minimize mechanical stress and reduce the chances of additional DNA damage during sperm processing. As a result, microfluidic and biophysical approaches provide a more efficient, non-invasive, and reliable method for selecting sperm with low DNA fragmentation. The integration of these advanced technologies in IVF laboratories has significantly improved sperm selection strategies and contributed to better fertilization outcomes, embryo quality, and overall reproductive success.