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**A Study of Healthy Sperm with Low DNA Fragmentation Using  
Microfluidic Approaches in IVF**

**Nancy Sharma**

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

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**ABSTRACT**

In vitro fertilization (IVF) is a widely used assisted reproductive technology that helps many couples overcome infertility. The success of IVF largely depends on the quality of the sperm used for fertilization. One of the most important indicators of sperm quality is the level of DNA fragmentation. High DNA fragmentation in sperm can negatively affect fertilization, embryo development, implantation, and pregnancy outcomes. Therefore, selecting healthy sperm with low DNA fragmentation is crucial for improving the success rate of IVF treatments. In recent years, microfluidic approaches have emerged as an advanced and efficient method for sperm selection. Microfluidic technology uses specially designed microchannels that mimic the natural conditions of the female reproductive tract. These channels allow only the most motile, structurally normal, and healthy sperm to pass through, while sperm with damaged DNA, poor motility, or abnormal morphology are left behind. This process helps in isolating sperm with low DNA fragmentation without causing mechanical stress or additional damage. Unlike traditional methods such as centrifugation, microfluidic techniques reduce oxidative stress and improve the overall quality of selected sperm. As a result, the use of microfluidic sperm selection in IVF laboratories has shown promising results in improving fertilization rates, embryo quality, and pregnancy success. These innovative approaches are becoming an important tool in modern reproductive medicine and fertility treatments.