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Paper-based diagnostic devices for evaluating the sperm quality

Alex Ching and Chao-Min Cheng
National Tsing Hua University, Taiwan

Male infertility is the leading cause to approximately half of all infertility issues recorded worldwide. Many countries – especially developing ones – host various issues that have caused a rise in male infertility in recent years. With the rise of this issue, there are a limited number of treatments available for the poverty-stricken population. Mammalian sperm motility has traditionally been analyzed to determine fertility using computer-assisted semen analysis systems. To develop inexpensive and robust male fertility diagnostics, we created a paper-based tetrazolium-based colorimetric assay (MTT assay) and used it to estimate the sperm motility. After applying semen to the hydrophilic center circle of our patterned paper, a MTT assay data can be used to help estimate the percentage of motile sperm (sperm motility) in semen. When the porcine sperm (i.e. the model system that we used in this study) motility was influenced by two chemicals for both mitochondrial activity and glycolysis inside single sperms, we simultaneously recorded sperm motility and enzymatic reactivity through using a portable motility analysis system (iSperm) and a paper-based MTT assay, which was based on the calculation of the area mean value signal intensity. Using this paper-based device, we can evaluate fertility levels without consulting doctors. The duration and cost of one entire test are about 30 minutes and 0.1 USD, respectively. We believe that this paper-based assay system would be useful for fertility checks based on WHO references, without need of a microscope, at home. We wish to emphasize that our research could significantly advance a wide range of diagnostic developments.

Biography

Alex Ching is currently working on his internship under the expertise of Dr. Cheng through exploring and investigating in chemical-bioengineering at National Tsing Hua University, Taiwan. Through his developing passion to improve society through science, his simple and non-expensive model based on previous works and inspiration from other innovative scientists' fresh outlooks on this topic has opened a new perspective to improve healthcare products. After years of studying with a sizable measure of interning, he hopes researchers and individuals in developing countries with prospect of curtailing this issue may choose to use this new device to save funding.

chaomin@mx.nthu.edu.tw

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