A microfluidic device for differentiating bacterial and Viral Infections

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Delayed diagnosis and common symptoms of bacterial and viral infections often result in inappropriate patient treatment. Rapid diagnosis of bacterial infections is still a challenge, and delayed results may lead to unnecessary consumption of antibiotics in case of a non-bacterial infection leading to antimicrobial resistance (AMR). A point-of-care (POC) test that can differentiate between bacterial and viral infections with high accuracy is the need of the hour. For developing the POC test, biomarkers with high sensitivity and specificity are requisite. CD64 and CD169 expression on neutrophils and monocytes have been identified as a significant combination of biomarkers for differentiating between bacterial and viral infection respectively. The cell surface protein is usually quantified using flow cytometry which is time-consuming and expensive. Here, we have developed a microfluidic system consisting of a cartridge for selectively labeling these surface biomarkers and a fluorescence reader to quantify the expression of these biomarkers. The system has been tested with an in-vitro model by inducing an infection state on neutrophils differentiated from Human Leukemia 60 (HL60) cell line. The results show an excellent correlation between infection and biomarker expression.

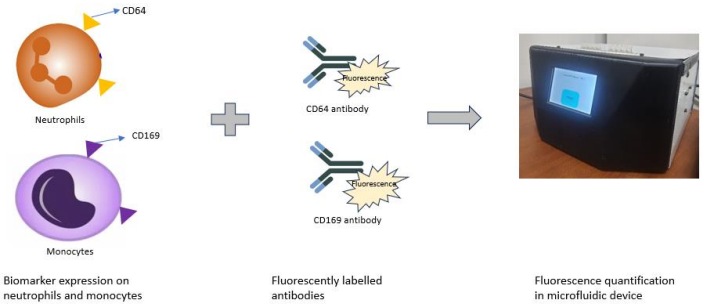


Figure: Assay protocol for quantification of biomarkers

Recent Publications-

1. Arti Tyagi, Neha Khaware, Bramha Tripathi, Tushar Jeet, Prabhu Balasubramanian, Ravikrishnan Elangovan. *i-scope*: a compact automated fluorescence microscope for cell counting applications in low resource settings. Methods Appl Fluoresc. 2022 Sep 13;10(4). doi: 10.1088/2050-6120/ac8f84. PMID: 36063812.

2. Arti Tyagi, Neha Khaware, Bramha Tripathi, Tushar Jeet, Prabhu Balasubramanian, Ravikrishnan Elangovan, "Automated miniscope for fluorescent cell counting applications," Proc. SPIE 11950, Optics and Biophotonics in Low-Resource Settings VIII, 1195002 (2 March **2022); https://doi.org/10.1117/12.2608483**

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Biography



Neha Khaware has expertise in quantifying the biomarker expression on immune cells. She has been working towards developing rapid and deployable point-of-care systems for diagnosing bacterial and viral infections. She has also worked towards developing a microfluidic device for diagnosing bovine mastitis. Apart from this, she is involved in a project focussing on detecting and curbing anti-microbial resistance.

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