A ML Based, Noninvasive Method to Monitor White Blood Cells Count Pre and Post Chemotherapy Sessions

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Every day, thousands of individuals are diagnosed with cancer. Cancer is a common disease caused by uncontrolled multiplication of abnormal cells in the body. All different types of cells are prone to this. According to “A Cancer Journal For Clinicians” as of the year 2022, 5,250 new cancer cases are recorded daily. Whether it's leukemia, lymphoma, lung cancer etc. All types of cancer are considered life- threatening; especially when not treated. Even with treatment, patients undergo several procedures that risk their lives. Chemotherapy being first on the list. Prior or post to any Chemotherapy session, White-blood-cell (WBC) assessment is employed for innumerable clinical procedures as one indicator of immune status. Currently, WBC determinations are obtained by clinical laboratory analysis of whole blood samples. An MIT study demonstrated the feasibility of a non-invasive device to perform point-of-care WBC analysis without the need for blood draws, focusing on a chemotherapy setting where patients’ neutrophils—the most common type of WBC—become very low. In particular, they built a portable optical prototype and used it to collect microcirculatory-video datasets from chemotherapy patients. Here, we provide a basic framework to provide an analysis for the WBC count through analyzing the flowrate of the cells, before and after the session. The displacement and the time for each event is obtained, and the linear regression model is computed to predict and predict the flow rate. It has been concluded that the flow rate for WBC prior to chemo-session is lower compared to that after the session. However, more events (WBC) were reported before the chemo session. To verify the obtained results, computer vision algorithms have been utilized to further verify the results.

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