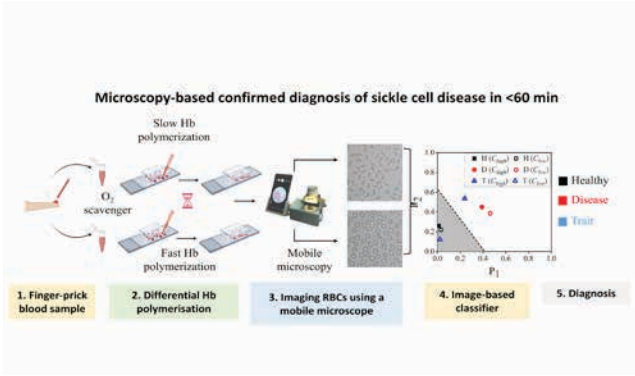
Point of Care Microscopy Test for Sickle Cell Anaemia



Problem Statement: Sickle cell disease is a hereditary haemoglobin disorder that makes red blood cells (RBCs) stiff and sickle-shaped. A confirmed diagnosis to distinguish between patients with sickle cell anaemia (i.e., those with only sickle haemoglobin in their blood) and carriers (i.e., those born with both normal and sickle haemoglobin) requires haemoglobin electrophoresis or high-performance liquid chromatography (HPLC). However, extensive laboratory infrastructure and highly-trained personnel required to perform these tests are unavailable in most endemic regions, mainly in remote locations. Hence there is a strong need for a diagnostic test to replace HPLC (a widely used technique) in remote and rural areas with limited access to healthcare infrastructure.

Uniqueness of the Solution: The team has developed a first-of-its-kind microscopy-based test that can conclusively distinguish between sickle cell anaemia and the trait from only two drops of blood in less than an hour with high accuracy, comparable to the HPLC method.
Blood samples collected from different individuals will show unique sickle-shaped cells if infected and are visible under the microscope, helping in classifying them as either healthy, trait or diseased. The classifier developed by the team can further give a confirmed diagnosis, with accuracies comparable to independently performed HPLC in pilot studies.

Current Status of Technology: The current prototype demonstration and/or pilot-scale system is validated in the relevant environment. The microscope is easy to transport and place in laboratories that are in remote locations with one trained microscope user.

Societal Impact: According to an ICMR survey, approximately 20% of children in India born with sickle cell anaemia will die by the age of two because of a delay in diagnosis. Early diagnosis by counselling parents and awareness about sickle cell anaemia can help in disease management amongst susceptible children, reduce mortality and improve the quality of life. This microscope has already been used to test in different sickle cell screening camps organised at Valsad (Gujarat), Talasari (Maharashtra) and Nagpur (Maharashtra).

Patent(s): Filed

Relevant Industries: Healthcare.

Faculty: Prof. Debjani Paul, Biosciences & Bioengineering.