New technology may standardize sickle cell disease screening for infants

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Researchers from Seidman Cancer Center at University Hospitals Case Medical Center and Case Western Reserve University School of Medicine presented new research findings this weekend at the 57th Annual Meeting of the American Society of Hematology (ASH) in Orlando.

In a poster presentation (Abstract #3379), Yunus Alapan, Umut Gurkan PhD and Jane Little, MD presented promising findings related to new technology aimed at facilitating early detection of sickle cell disease for infants in developing countries. Current standardized screening methods are too costly and take too much time to enable equitable and timely diagnosis to save lives in economically challenged nations. However, an innovative mobile biochip device, the HemeChip, has the unique ability to rapidly screen for sickle cell disease with just a few drops of blood.

"While sickle cell newborn screening is standard in the U.S., very few infants are screened in Africa because of the high cost and level of skill needed to run traditional tests," says Dr. Little, Director of the Adult Sickle Cell Anemia Center, UH Seidman Cancer Center and Associate Professor at the School of Medicine. "This new mobile technology provides an easy to use, cost-effective tool that takes us closer to standardizing newborn screenings on mobile devices, thus simplifying diagnosis. It could make a huge difference in developing nations worldwide, enabling early treatment for this disease."

Over half of babies born with sickle cell disease (SCD) in countries with limited resources die before age five. Over 6 million people in West and Central Africa suffer from the disease, which causes pain crises, widespread organ damage and early mortality.

Today, newborn screening tests can only be performed in central laboratories in third-world countries. Results can take several weeks and it may be impossible to reach the parents after they have left the health center. This may delay the onset of important interventions, including immunizations, antibiotics and vitamins. Therefore, there is a need for simple, rapid and mobile analyses of hemoglobin types in newborn blood with which to diagnose hemoglobinopathies while the baby is still on-site.

With a miniscule blood sample, the HemeChip, a micro-electrophoretic device, examines and identifies hemoglobins, including hemoglobinopathies sickle cell anemia (HbSS), sickle trait (HbAS) and SC disease (HbSC). Using this new hemechip platform, the research team is planning to travel to Ghana to implement validation of screening in pediatric patients.

The HemeChip was developed by Dr. Gurkan, assistant professor of mechanical and aerospace engineering at Case Western Reserve

University, working in collaboration with a team of researchers, including Dr. Little who is also a member of the Case Comprehensive Cancer Center at Case Western Reserve.

Provided by University Hospitals Case Medical Center