Bridging Diagnostic Gaps in Sickle Cell Disease with Sickle SCAN

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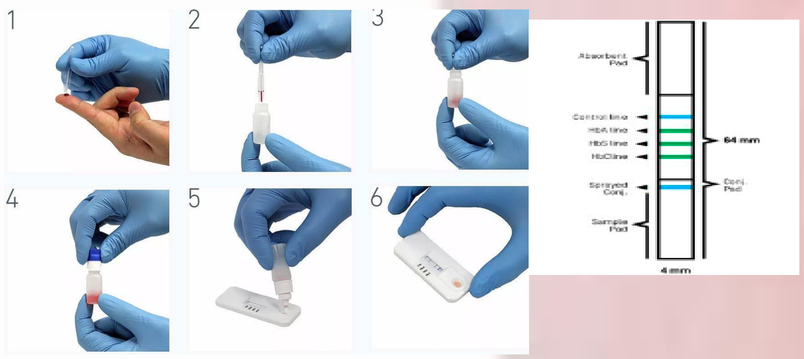
Introduction:

Sickle cell disease (SCD) is a hereditary collection of disorders that is identified by the presence of hemoglobin S (Hb S). This can occur either through having two copies of the sickle mutation (Hb SS) or through having one copy of the sickle mutation and another beta globin variation (such as sickle-beta thalassemia, Hb SC disease).
The defining characteristics of SCD are the occurrence of vaso-occlusive events and the presence of hemolytic anemia.
It also represents a substantial public health challenge, especially regarding the management of acute disease manifestations that lead to mortality.
Sickle cell trait is a non-threatening carrier disease.

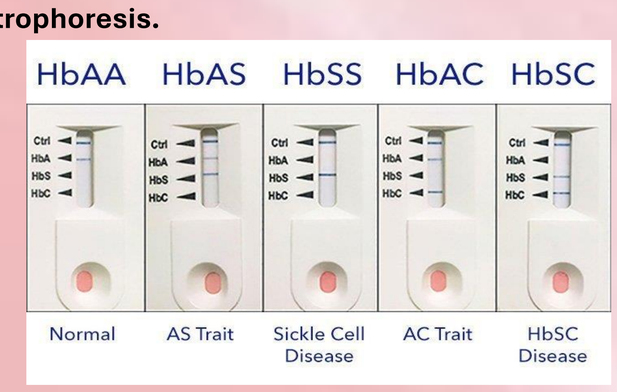
What is Sickle Scan?

- **Sickle SCAN™ is a qualitative lateral flow immunoassay for the detection of abnormal hemoglobin variants associated with sickle cell disease**
- **Utilizes sandwich chromatographic immunoassay format**
- **Employs antibody-conjugated colorimetric nanoparticles as detectors**
- **Capable of identifying hemoglobin A (HbA), hemoglobin S (HbS), and hemoglobin C (HbC) in whole blood samples**
- **Requires a small volume (5 microliters) of blood obtained through venipuncture or finger prick**
- **Blood sample is mixed with a pre-filled buffer solution and applied to a test cartridge**
- **Results are interpreted visually after a 5-minute incubation period**
- **Recommended storage temperature range is 2°C to 30°C**



Materials and Methods:

- **During a month period (October 2023 and December 2023), a total of 10 tests were conducted using Sickle SCAN.**
- **Among these, 10 tests were administered to patients presenting with symptoms suggestive of sickle cell disease at our hospital's emergency department.**
- **These symptoms encompassed a range of clinical manifestations, including acute chest pain, generalized bone VOC , and acute anemia due to splenic sequestration.**
- **Additionally, 10 tests were performed on previously diagnosed patients to validate the accuracy of the test results.**
- **For patients in the emergency department, positive test results underwent additional confirmation through High-Performance Liquid Chromatography (HPLC) and electrophoresis.**



Results:

- **Out of the 10 emergency department patients, 3 tested positive for sickle cell disease using Sickle SCAN.**
- **These positive results not only correlated with the clinical presentation but were also subsequently corroborated through secondary testing methods (HPLC and electrophoresis) during follow-up examinations.**
- **This highlights the high level of accuracy and reliability of Sickle SCAN in identifying sickle cell disease in symptomatic patients with unknown history at emergency room.**
- **Among the previously diagnosed patients, all 10 tests conducted using Sickle SCAN reaffirmed the previously established diagnoses, underscoring the test's consistency and effectiveness in confirming existing cases of sickle cell disease.**

What are the key advantages of using Sickle SCAN?

- **Sickle SCAN is an invaluable diagnostic modality for identifying Sickle Cell Disease (SCD) in routine and emergent clinical settings.**
- **Regions with limited healthcare resources and restricted access to sophisticated diagnostic instrumentation derive maximal benefit from Sickle SCAN's expedient and precise screening capabilities.**
- **Sickle SCAN enables rapid and accurate detection of SCD, facilitating prompt initiation of crucial interventions and therapeutic regimens by healthcare providers.**
- **In resource-constrained locales with elevated SCD prevalence, timely diagnosis afforded by Sickle SCAN can significantly improve patient outcomes and mitigate mortality rates, particularly in emergency department settings and vulnerable populations.**

Conclusion:

This review period shows that Sickle SCAN is an effective tool for detecting sickle cell disease, especially in resource-limited settings. Sickle SCAN quickly and effectively identifies SCD cases, enabling timely interventions and treatment methods that minimize disease severity and death.
These findings emphasize the need for ongoing research and implementation to enable universal access to speedy and accurate diagnostic techniques like Sickle SCAN, improving sickle cell disease healthcare worldwide.

Acknowledgements

We thank the Biomedix company for sponsorship of Sickle SCAN test kits. The sponsor had no role in study design, data collection and analysis, decision to publish, or preparation of the abstract.