A Modified Sodium Metabisulfite Method to Distinguish Sickle Cell Disease from Sickle Cell Trait for Use in Underdeveloped Countries

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ABSTRACT

The objective of this study was to develop a simple, inexpensive, and rapid confirmatory test using a sodium metabisulfite microscopic method to distinguish *AS* from *SS* genotype in patients with positive test results for hemoglobin S. Equal volumes of de-identified EDTA blood and 2% sodium metabisulfite were mixed, placed on a microscope slide with coverslip, and observed for sickling at 30-minute intervals over 3 hours. Sickle cells were enumerated per 200 red blood cells (RBCs) under 100x oil immersion and placed into 4 Likert categories (1+ to 4+) based on degree of sickling. In *AS* samples, 2+ and 3+ sickle cells rose most rapidly, and 4+ sickle cells showed the steepest rise in the *SS* samples. Based on these data, the number of 4+ sickle cells were counted every 30-minutes over 3 hours in 5 *AS* and 28 *SS* samples at 37°C. The mean numbers of 4+ sickle cells in *AS* samples were 4.75 per 200 RBCs at 2 hours and 17.75 per 200 RBCs at 3 hours. *SS* samples yielded 78.29 per 200 RBCs at 2 hours and 115.43 per 200 RBCs at 3 hours. Two-hour incubation showed a statistical difference ($P = 0.00024$) among groups in the shortest time and may be used to distinguish *SS* from *AS* genotypes. More testing is needed to determine cut points to distinguish genotype.

ABBREVIATIONS: RBC - red blood cell.

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