



## Three-dimensional visualization of human hemoglobin phenotypes with HPLC

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**ABSTRACT.** Hemoglobinopathies were included in the Brazilian Neonatal Screening Program on June 6, 2001. Automated high-performance liquid chromatography (HPLC) was indicated as one of the diagnostic methods. The amount of information generated by these systems is immense, and the behavior of groups cannot always be observed in individual analyses. Three-dimensional (3-D) visualization techniques can be applied to extract this information, for extracting patterns, trends or relations from the results stored in databases. We applied the 3-D visualization tool to analyze patterns in the results of hemoglobinopathy based on neonatal diagnosis by

HPLC. The laboratory results of 2520 newborn analyses carried out in 2001 and 2002 were used. The “Fast”, “F1”, “F” and “A” peaks, which were detected by the analytical system, were chosen as attributes for mapping. To establish a behavior pattern, the results were classified into groups according to hemoglobin phenotype: normal (N = 2169), variant (N = 73) and thalassemia (N = 279). 3-D visualization was made with the FastMap DB tool; there were two distribution patterns in the normal group, due to variation in the amplitude of the values obtained by HPLC for the F1 window. It allowed separation of the samples with normal Hb from those with alpha thalassemia, based on a significant difference ( $P < 0.05$ ) between the mean values of the “Fast” and “A” peaks, demonstrating the need for better evaluation of chromatograms; this method could be used to help diagnose alpha thalassemia in newborns.

**Key words:** Neonatal screening; Hemoglobinopathies; 3-D visualization; FastMap DB