



e-Network Forum

CALIFORNIA BLOOD BANK SOCIETY

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Improved Methods for Quantitating Fetal-Maternal Hemorrhage

A blood banker in Maryland wants to know if other e-network participants are aware of technology to perform quantitation of Hgb F by **flow cytometry**. Her laboratory is currently using the Kleihauer-Betke (KB) stain to quantitate fetal hemoglobin-containing red cells and they are looking for a "less subjective method". Before sending this question to the full e-network, comments were solicited from 'experts' in the field, who routinely test for fetal maternal hemorrhage.

Expert #1: A Texas physician commented that there is an FDA-licensed test for quantitation of fetal cells by **flow cytometry**. This test is manufactured by Caltag, of Burlingame, CA. Its use has been gradually increasing, and this year 23 laboratories using this technology participated in the College of American Pathologists (CAP) Survey program for HBF (Hemoglobin F, Fetal RBC Count) click here for PDF **catalogs** - 1, 2, 3 (updated Jan. 11, 2005). This represents a small fraction of the 960 laboratories that participate in the HBF survey program. The flow cytometry technique was described in 1998 (Davis BH, Olsen S et al. Transfusion 38:749-756, 1998). The technique, as is well documented in the CAP Survey reports, is clearly MORE accurate and precise than the KB stain. The flow cytometric test can differentiate between true fetal cells and adult F cells, which can be helpful in cases of persistent fetal hemoglobinemia. The test uses a murine monoclonal antibody against the fetal hemoglobin and thus is not restricted to the context of Rh incompatibility between mother and fetus. A recent publication (Ochsenbein-Imhof N, Ochsenbein AF, et al. Transfusion 42:947-953, 2002) describes a **fluorescence microscopy** method that appears to be as accurate and precise as the flow cytometry method. However it uses an anti-D, and thus it can only be applied to the calculation of RhIg dose for Rh prophylaxis.

Expert #2: A Southern California blood banker commented that the KB test is 1) quick, 2) inexpensive, and 3) applicable to any type of FMH (not just D+/D- mixes; 1/3 of his facility's requests for FMH detection are generated by questions of fetal bleeding/maternal trauma). His facility solves the problem of overestimation of FMH by **performing flow cytometric analysis if the KB test suggests > 15 ml bleed, or if the KB result looks like there is a "high F" syndrome**. The nice thing about flow cytometry (using anti-HbF) is that it can also be used regardless of the Rh-types. The Californian guesses that his facility has to perform flow cytometry on <10% of the specimens. However, they only have about 2500 deliveries/year. He supposes that if they were in a hospital with, say 6000 deliveries, it would make sense to have a technique dedicated to the D+/D- group.

ADDENDA: Aug. 9, 2002

1. **A blood banker from Northern California** suggests that those who are interested in pursuing a more reliable method of fetal Hb detection than the KB stain might be interested in the article titled "Quantification of fetomaternal hemorrhage by fluorescence microscopy is equivalent to flow cytometry", published in the July 2002 issue of *Transfusion*.

Please submit comments to the [e-Network Forum](#).



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