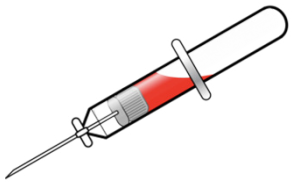
α-Fetoprotein assay on dried blood spot for hepatoblastoma screening in children with overgrowth-cancer predisposition syndromes.

Authors

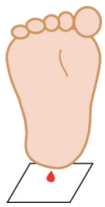
Alessandro Mussa and colleagues

Department of Pediatrics
University of Torino
Torino, Italy

Beckwith–Wiedemann syndrome (BWS) is associated with particular congenital features, embryonal tumor predispositions and increased risk of cancer. Children with BWS are several hundred times more likely than others to develop certain cancers within their first five years; namely α-Fetoprotein (αFP)-secreting hepatoblastoma. Prognosis for hepatoblastoma dramatically improves with early detection and treatment, and young patients could greatly benefit from closer αFP measurements. Plasma αFP levels are currently determined from venipuncture samples. Repeating such blood draws can impose a heavy burden on a young patient, thereby reducing compliance and complicating clinical follow-up. A less invasive method involves pricking the heel and collecting a blood drop with a capillary tube. The sample can then be transferred to paper and dried before analysis. It was thus sought to determine if the dried capillary blood spots (DBS) approach could be amenable for αFP monitoring in patients with BWS.

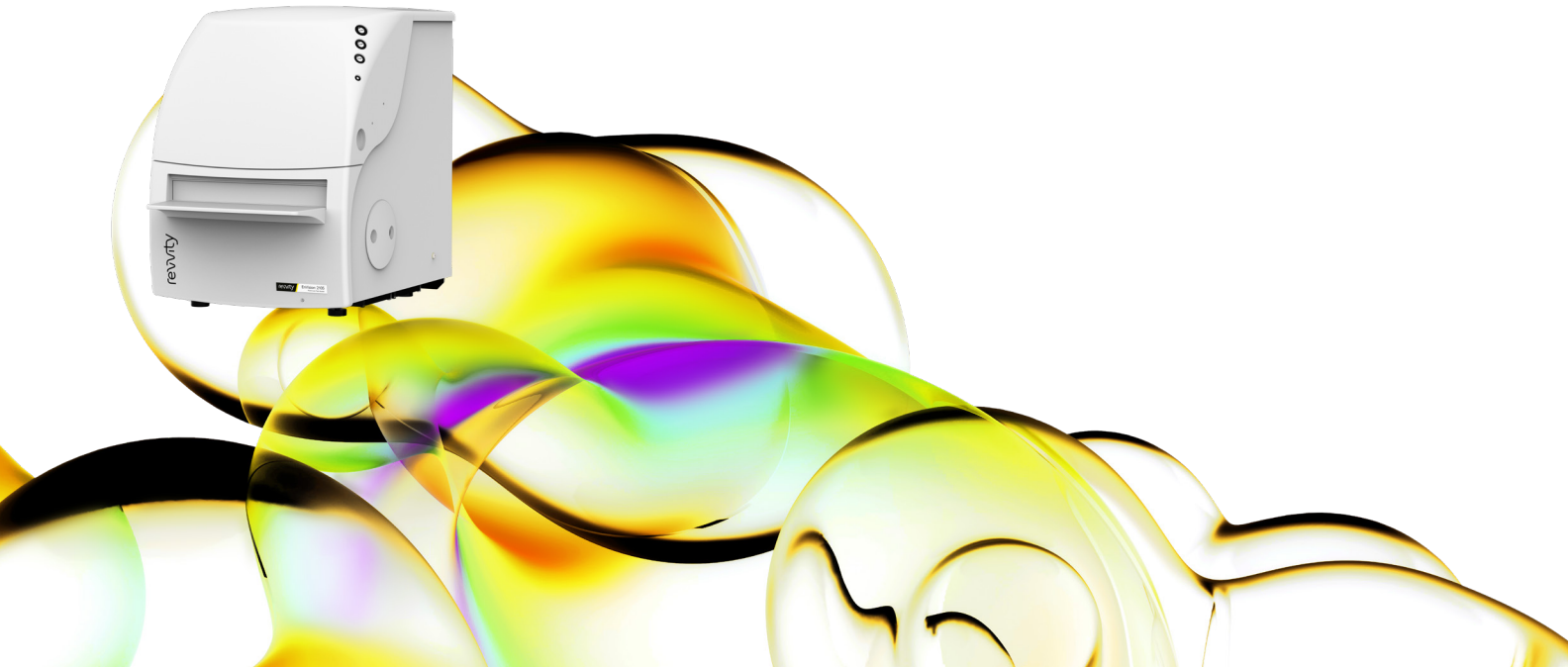


Plasma
- Venipuncture
- Performed at clinic
- Large sample volume
- Storage at 4 °C



Dried blood spot
- Heel stick
- At clinic or home
- Small sample volume
- Room temp. storage
- Can be mailed

EnVision™ XCite multimode plate reader



In this research study, blood samples from 143 children were collected, and plasma and DBS from the same samples were compared. Dissociation-Enhanced Lanthanide Fluorescent Immunoassay (DELFIA®) αFP kit with a VICTOR™ X or EnVision™ reader were used. The values obtained with both approaches allowed detection of normal and disease levels of αFP, while confirming BWS cases. More so, the two methods correlated tightly. Simplicity and flexibility of the DBS method allow sample collection at home, thereby increasing cost-effectiveness and reducing the invasive burden of frequent αFP determinations.

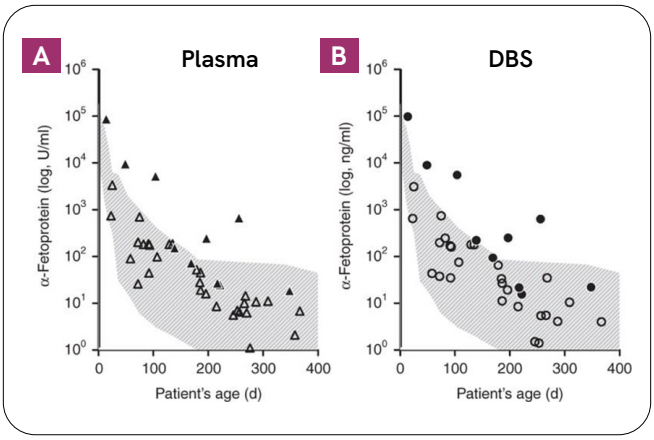


Figure 1: α-Fetoprotein (αFP) trajectory during the first year of life. αFP levels physiologically decrease from 105 to 10 U/mL, measured in both plasma (triangles, panel a) and dried blood spot (circles, panel b). The gray-shaded area represents the αFP reference values. Filled symbols refer to affected patients; empty symbols refer to controls. Values obtained with both sample preparation methods correlate highly (R^2=0.999).

Mussa A, Pagliardini S, Pagliardini V, Molinatto C, Baldassarre G, Corrias A, Silengo MC, Ferrero GB (2014). α-Fetoprotein assay on dried blood spot for hepatoblastoma screening in children with overgrowth-cancer predisposition syndromes. Pediatric Research, 76: (544-548). Figure reprinted with permission from Macmillan Publishers Ltd: Pediatric Research.

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