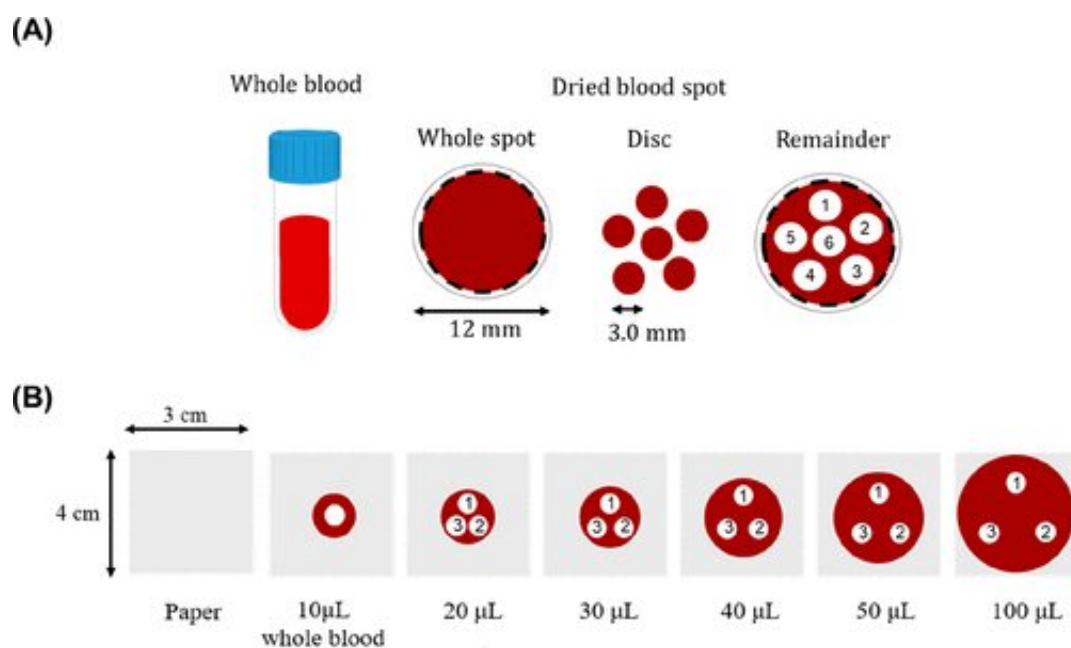


# Research team develops dried blood spot CRM for newborn screening

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(A) Blood samples with different characters. Whole blood is the raw material for DBS preparation by stabilization and homogenization. A whole spot is a 12-mm diameter circle of dried whole blood with a volume of 50  $\mu\text{L}$  taken from the filter paper (DBS card) by scissors. A disc is approximately a 3-mm diameter circle of dried blood taken from a whole spot by a paper puncher, and the remainder is the remaining part of the whole spot after removing all discs. A maximum of six discs were punched out from specific locations as numbered. (B) Precut mass defined (3  $\times$  4 cm) paper for DBS preparation with various sampling volumes from 0 to 100  $\mu\text{L}$ . Three discs were punched out from each DBS sample in the same position, and one disc each was taken from the 0 and 10  $\mu\text{L}$  DBS samples. Credit: *Analytical Chemistry* (2022). DOI: 10.1021/acs.analchem.2c01349

Babies undergo a newborn screening test for inherited metabolic disorders within seven days of birth. The test checks for risk factors such as hypothyroidism, phenylketonuria and maple syrup urine disease, which can lead to developmental disabilities if not detected in their early stage. Every year, one in every 1,000 newborns are diagnosed with inherited metabolic disorders.

The Korea Research Institute of Standards and Science (KRISS) has developed Certified Reference Materials (CRMs) that can enhance the reliability of using dried blood spot testing for [newborn screening](#).

A CRM is a reference material that serves as a standard in determining the accuracy of measurements and analytical methods.

A dried blood post (DBS) is a sample obtained by drying a drop of blood from the finger or heel on a piece of filter paper. This approach is used for [screening](#) rather than actual diagnosis, as it is less accurate than venous blood sample tests. Its common applications include newborn screening for inherited [metabolic disorders](#) and doping control during Olympics.

The proposed CRM provides eight certified values and 10 reference values for [amino acids](#), glucose, galactose, and acylcarnitines, which are diagnostic markers of inherited metabolic disorders in newborns. This allows accurate measurement of the amount of target compounds in the DBS.

The lack of reference values has made it difficult for DBS testing to be considered reliable for medical decision. In addition, there has been a problem with measurement bias caused by the need to retrieve portions of blood spots using a paper puncher.

The KRISS Biodiagnostics Analysis Team found that a 0.4 mm bias in

diameter led to a 0.78  $\mu\text{L}$  (one millionth of a liter) difference in sample volume.

The research team controlled the sample volume to 50  $\mu\text{L}$  during the CRM manufacturing stage, and proposed bias-free measurements as certified values, thereby successfully creating CRMs with complete measurement traceability to the International System of Units. This is the first-ever development of DBS CRMs.

Dr. Ji-Seon Jeong, a principal researcher at KRISS, said, "DBS has come under the spotlight as a convenient way of [blood](#) sampling, which satisfies the high demand for remote healthcare and home sampling in the days of the pandemic. Our study has laid the foundation to improve the reliability in DBS sample measurement, opening the door for DBS to become an effective tool not only in screening but also diagnosis."

KRISS plans to develop more CRMs for other diagnostic markers used in newborn screening.

**More information:** Sangji Woo et al, Development of Certified Reference Material for Amino Acids in Dried Blood Spots and Accuracy Assessment of Disc Sampling, *Analytical Chemistry* (2022). [DOI: 10.1021/acs.analchem.2c01349](https://doi.org/10.1021/acs.analchem.2c01349)

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