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Dried Blood Spot Measurement of Elements

Rapid, nondestructive EDXRF analysis of toxic and nutritional metals in dried blood spots with ppb sensitivity.

Researchers at Purdue have developed a method using energy-dispersive X-ray fluorescence (EDXRF) to measure the concentration of lead in dried blood spots. This new method has reduced complexity, operating time, and is nondestructive, all while having an equal or better limit of detection (LOD) than conventional lead detection methods, such as atomic absorption spectroscopy (AAS) and inductively-coupled plasma mass spectrometry (ICPMS),

Technology Validation:

The researchers found that EDXRF effectively quantified the concentration of lead on dried blood spots with an LOD on the order of 1.0 â€“ 3.0 ppb, matching closely with the measured blood levels from AAS, with measurement times of 5 â€“ 30 minutes. Additionally, varying the volume of the blood sample (70-300 uL) was found to be inconsequential to the accuracy of the EDXRF measurement.

Advantages:

- Generalizable: Can be adapted to detect other metals (e.g. Hg, Cu, Cd, â€¦)

- Reduced complexity

- Much shorter measurement time than ICPMS and AAS

- Old blood spots remain viable for measurement if properly preserved

- Nondestructive measurement method

- Capable of measuring levels of multiple metals at the same time

Applications:

- Monitoring of concentration of toxic elements in blood samples

- Measurement of concentration of nutritional metals in blood samples

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Category
Biotechnology & Life Sciences/Analytical & Diagnostic Instrumentation

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