Abstract Submitted
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Optimal geometry of x-ray fluorescence arsenic detection in skin phantoms using an x-ray optics system[1] BENJAMIN AVILA, MIHAI GHERASE, California State University, Fresno — Arsenic (As) is a well-known toxic element. While the toxicity of acute As poisoning was known for centuries, the adverse effects of long-term As exposure were the focus of more recent studies. The As exposure occurs via human consumption of contaminated well water – a naturally occurring problem in many parts of the world. The excess of As intake leads to its accumulation in keratin-rich tissues such as skin, nails, and hair. Skin is less prone to external As contamination, hence, a better biomarker than nails or hair. X-ray fluorescence (XRF) uses characteristic x-ray emissions to detect elements in trace concentrations of a few μg/g or lower. Low radiation dose studies with portable spectrometers demonstrated the method's potential for the assessment of As exposure, particularly in remote parts of the world. However, the method was not optimized for superficially distributed As within the skin. In this study the sensitivity of As detection was found to reach a maximum for a 5-degree angle between the skin phantoms and the incident x-ray beam. An x-ray optics system, x-ray detector, and a positional stage assembly were used to measure the As Kα and Kβ peak amplitudes in skin phantoms with 0, 4, 6, 8, and 12 μg/g As concentrations.

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