Abstract Submitted
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A Novel Calibration of L-Shell X-Ray Fluorescence Bone Lead Concentration Measurements[1] BLAZ SERNA, SARAH KROEKER, MIHAI GHERASE, California State University, Fresno — Lead (Pb) is a well-known toxic element. *In vivo* human bone Pb concentration measurement can assess life-long Pb exposure unlike blood Pb that indicates short-span exposure. Pb L-shell x-ray fluorescence (LXRF) is a practical alternative to the established *in vivo* K-shell XRF method. An essential step is the calibration procedure which relates the Pb peak area measurements to a bone Pb concentration. Bone and soft tissue (ST) phantoms can be used to determine such relationships. ST overlying the human bone can vary significantly in elemental composition, density, and thickness amongst individuals. An accurate calibration procedure without any additional measurements of the ST x-ray attenuation has not been identified. Pb-doped bone phantoms containing strontium (Sr) and overlying ST phantoms of varying thickness made of three materials: polyoxymethylene (POM), resin, and wax, were used to explore relationships between bone Pb concentration and ST attenuation. Data analysis of acquired x-ray spectra found that the measured beta over alpha ratio of Sr K-shell lines reliably assessed the ST x-ray attenuation across the three different materials and varying thickness.

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Mihai Gherase
California State University, Fresno

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