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**A microbeam scanning method to determine the x-ray attenuation of the soft tissue in an L-shell x-ray fluorescence lead detection in a soft tissue and bone phantom assembly** SUMMER AL-HAMDANI, MIHAI GHERASE, California State University, Fresno — Lead (Pb) is a well-known toxic element residing in the human bone for many years. Hence, *in vivo* measurement of bone Pb concentration is a good metric of long-term human Pb exposure. The L-shell x-ray fluorescence (LXRF) is a non-invasive quantitative method suitable for large population bone Pb surveys since it can use portable x-ray tubes and detectors. In past studies the x-ray attenuation of the soft tissue (XAST) overlying the bone was initially measured using ultrasound soft tissue thickness (STT) measurements and generic elemental composition of the soft tissue to calculate its linear attenuation coefficient ($\mu$). An in-depth analysis revealed the procedure is inaccurate in its simplifying assumptions. A cylindrical plaster-of-Paris Pb-doped (75 $\mu$g/g) bone phantom (BP) and a 3-mm thick cylindrical-shell polyoxymethylene (POM) soft tissue phantom were used to test a new scanning microbeam method for the XAST measurement. The method measured the STT by positioning the microbeam in 0.1 mm steps perpendicular to the BP and the $\mu$ of POM in the direction parallel to BP. The measurements were compared to the $\mu$ of POM calculated value and generated an accurate Pb concentration (<5%) using a bare BP calibration line data.

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