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A Sensitivity Analysis of Dose Calibrator Linearity Assessment¹ MARIO BENCOMO, University of Texas El Paso, Ex Paso TX, USA, MARVIN FRIEDMAN, St. Luke's Roosevelt Hospital Center, New York, NY, USA — A total of eight variations of least squares fitting, both unweighted and (log-transformation and instrument errors) weighted, were applied to data arising from (simulated) exponential radioactive decay measurements in an ionization chamber dose calibrator during its linearity-of-response assessment. The fitting techniques were subjected to a sensitivity analysis, prompted by the instrument's decreased precision at low levels of radioactivity, which consisted of modifying a selected low-activity data point prior to fitting. The increased robustness of the weighted techniques was demonstrated by the sensitivity analysis. A relatively large (10%) change in a low activity (imprecise) measurement value had only minimal effect in the best-fit curve parameters with the weighted techniques, but significantly changed the parameters with the unweighted techniques. These analyses shed new light on the inadequacies of the accepted methodology when transformation bias and measurement-dependent variation of instrument precision are taken into account.

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