AbstractID: 6717 Title: Electron spectra unfolding from open field depth dose curves

**Purpose:**
To evaluate a new algorithm to unfold the energy spectrum of a large field electron beam from a central axis depth dose curve.
**Methods and Materials:**
As previously reported unfolding of the spectrum of electron beams is best done (1) based on large open field depth dose measurements, (2) incorporating the air space between source and phantom in the simulation of the response matrix and (3) using an inverse geometry with a pencil beam, large scoring voxels. Here an algorithm by Chvetskov based on a special form of the general Tichonov regularization function has been tested. The response matrix was created through EGSsnrc Monte Carlo Simulations of pencil beam depth doses in 0.1 MeV steps and including the air between source and phantom. The depth dose curve to be unfolded was also created through a Monte Carlo simulation which was in excellent agreement with the measurement on a clinical machine. The advantage of using a Monte Carlo based depth dose as the input is that the spectrum is precisely known. In addition it was possible to subtract the head photon component from the depth dose data and perform the algorithms on the electron only data. For later practical implementation, this approach presents a challenge, which however can be met. The Chvetskov algorithm used for the unfolding contains one smoothing parameter the impact of which was explored. For comparison, a generic set of depth dose curves was also used in the response matrix.
**Results and conclusions:**
The algorithm identifies the main energy component well. The smoothing factor impacts the waviness of the curve substantially. Optimizing this factor will be an important task. The comparison with the generic response functions shows that the use of specific response functions, including the air improves the unfolding.
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