AbstractID: 11306 Title: SpekCalc: a free and user-friendly software program for calculating x-ray tube spectra

Purpose: To develop a free and easy-to-use software program to model the x-ray spectra emitted from x-ray tubes. Such a program is useful for the education of physicists, technicians and technologists working in radiation physics but also as a research tool. **Method and Materials:** A Graphical User Interface (GUI) was created using REALbasic (REAL software, Inc.). This GUI, designated the name SpekCalc, allows the user to calculate and display the x-ray spectra emitted from tungsten-anode x-ray tubes. The underlying theoretical description for the bremsstrahlung and characteristic x-ray production is taken from a recent published model. **Results:** The user selects the tube potential in kVp, the take-off angle and the amount of filtration. At a click of a button the resulting spectrum is calculated, displayed and can be saved for later use. Beam quality parameters such as the half-value-layer, in mm of aluminum and copper, and the mean beam energy, in keV, are also presented to the user. The range of potentials that can be modeled is wide (40-300 kVp) making Spekcalc useful to both the diagnostic imaging and keV photon radiotherapy fields. Filtration can be selected in mm, for 7 materials: aluminium, copper, tungsten, tin, beryllium, water and air. This allows an in-depth exploration of the filtration effects of materials of differing atomic number. Over 300 individuals have downloaded this program thus-far, for reasons as diverse as teaching in universities, to learn interactively about x-ray tubes, for research in radiology and radiotherapy. **Conclusion:** A useful educational tool for physicists, technicians and technologists has been created, in the form of freely-available software utility to calculate x-ray tube spectra.