AbstractID: 5909 Title: Radiation Transport Software for Medical Physics Studies

Purpose: To present a summary of radiation transport software for medical physics applications.

Method and Materials: The Radiation Safety Information Computational Center (RSICC), a center at Oak Ridge National Laboratory (ORNL), is the Department of Energy software center for radiation transport and safety software. The center houses over 1600 software packages and nuclear cross section data of importance to nuclear science applications. The different software packages have been applied to the following topics:
- Dosimetry calculations for radiation therapy
- Treatment planning in radiation oncology
- Design of photon and secondary neutron shielding for therapy rooms
- Evaluating and estimating patient and staff radiation dose
- Electron beam transport and energy deposition
- Secondary neutron and gamma transport and energy deposition
- Cancer brachytherapy dosimetry
- Medical diagnostic imaging applications, including SPECT, PET, and x-ray imaging
- Error evaluations for accelerator particle delivery systems
- Modalities of treatment and exploration of alternatives
- Licensing and safety analysis for medical radiation facilities
- Medical diagnostics and therapy

Examples of software in the RSICC collection include MCNP/MCNPX, ITS, ANISN, TORT, EGS4, PARTISN, SERA, and PENELOPE. There are other software packages (not available through RSICC), which have been applied to the above topics – for example, PENTRAN, A3MCNP, ATTILA, COMET, EGSnrc, TransMED, EVENT, FLUKA, PEREGRINE.

Results: Studies on selected software is presented, particularly on the above applications.

Conclusion: As the field of medical physics advances, computer software technology continues on the road to improvement and efficiency.

Conflict of interest: Work was supported by the Department of Energy under contract DE-AC05-00OR22725.