New Tool for Nuclear Medicine Patient Release Calculations

Three members of the SNM RAdiation Dose Assessment Resource (RADAR) task group announced in April the development of a new tool for use in calculation of dose to family members of patients released after ^{131}I and other nuclear medicine treatments. The RADAR Exposure Calculator can be applied to other clinical situations involving various external radiation exposure scenarios in which it may be necessary to estimate radiation dose to others. Carol Marcus, MD, Jeffry Siegel, PhD, and Michael Stabin, PhD, developed the tool, which is available at www.doseinfo-radar.com/ExposureCalculator.html. The RADAR task group is committed to providing accurate information to SNM members on internal and external radiation dose and to developing and distributing useful time-saving tools to standardize such calculations. They have developed the MIRDOSE (*1*) and OLINDA/EXM (*2*) software codes, the RADAR Web site (www.doseinfo-radar.com), the RADAR medical procedure dose calculator (www.doseinfo-radar.com/RADARDoseRiskCalc.html), and other useful tools, applications, and publications.

The group developed the new tool in response to comments and concerns about current requirements for release of patients who have been administered radioactive materials. U.S. Nuclear Regulatory Commission (NRC) regulations require medical licensees to limit the potential dose to a maximally exposed individual to 5 mSv (500 mrem), integrated over the assumed time of exposure. To comply, many practitioners have used the associated NRC guidance detailed in NUREG-1556, Volume 9 (*3*). However, persuasive evidence provided by RADAR members in a recent article suggests that this guidance is overly conservative (*4*). The use of NRC guidance documents is entirely optional, but many licensees do not appreciate this. Rigid adherence to these NRC guidance recommendations has placed an undue burden on nuclear medicine therapy patients and their families, as well as on licensees responsible for ensuring compliance.

More realistic guidance (as explained in the recent article) is now applied in the new, freely available online software tool. These more realistic calculations allow for higher releasable activity levels than the widely adopted NUREG levels, particularly for patients being treated for thyroid cancer. RADAR maintains that professionals evaluating compliance with NRC requirements for patient release, pursuant to 10 CFR 35.75, should use the procedures presented on the dose calculator site and not rely automatically on NUREG-1556. Two continuing education (CE) sessions at the 2009 SNM Annual Meeting this month in Toronto, Canada, will discuss these issues and provide an opportunity for discussion of the various approaches and their impact on nuclear medicine patient care issues.

Users of the new dose calculator may enter any values for the calculation variables, although default values are provided for some variables. A companion document, provided for free download from the site, explains the technical basis for the calculations, shows several example calculations worked out for different clinical situations, and provides references for nuclear medicine licensees so that they can better appreciate the alternative patient release approaches available.

As always, RADAR members would greatly appreciate hearing from the user community with any comments or suggestions about this or other RADAR tools. The RADAR Web site and publications (for example, the technical basis for RADAR and OLINDA/EXM [*5*]) have provided a simple, unified approach to internal dose and external dose for nuclear medicine patients, radiation workers, and others. RADAR is always striving to provide data, information, and tools that are needed by the scientific community, and feedback is always appreciated.

Michael Stabin, PhD
Carol Marcus, MD
Jeffry Siegel, PhD
SNM RAdiation Dose Assessment Resource Task Group

REFERENCES

1. Stabin MG. MIRDOSE: Personal computer software for internal dose assessment in nuclear medicine. *J Nucl Med.* 1996;37:538–546.
2. Stabin MG, Sparks RB, Crowe E. OLINDA/EXM: The second-generation personal computer software for internal dose assessment in nuclear medicine. *J Nucl Med.* 2005;46:1023–1027.
3. U.S. Nuclear Regulatory Commission. *Specific Guidance About Medical Use Licenses* NUREG-1556, Vol. 9, Rev. 2. Final Report. 2008.
4. Siegel JA, Marcus CS, Stabin MG. Licensee over-reliance on conservatisms in NRC guidance regarding the release of patients treated with ^{131}I. *Health Phys.* 2007;93:667–677.
5. Stabin MG, Siegel JA. Physical models and dose factors for use in internal dose assessment. *Health Phys.* 2003;85:294–310.