

Policy Statement of the International Organization for Medical Physics

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RISK OF MEDICAL IMAGING

Over the past few years papers have appeared in the scientific literature that predict thousands of cancers and cancer deaths each year in populations of patients receiving medical imaging procedures (primarily computed tomography) employing ionizing radiation. The predictions in these papers are computed by estimating very small and hypothetical risks at low radiation doses and multiplying these speculative estimates by large numbers of patients experiencing medical imaging. The public media use these papers to develop print and electronic news releases that raise anxiety in parents, families and patients, at times causing them to delay or defer needed imaging procedures. Decisions to delay or defer examinations constitute real risks to patients, as contrasted with the hypothetical risks presented in the papers. Professional organizations, including the American Association of Physicists in Medicine and the Health Physics Society, have developed policy positions in an effort to illuminate the controversy over the risks of low-level radiation exposures (see URLs in the supporting documents and additional readings). Scientific advisory groups such as the International Commission on Radiological Protection, the National Council on Radiation Protection and Measurements, and the United Nations Scientific Committee on the Effects of Atomic Radiation have also addressed the controversy (see URLs in the supporting documents and additional readings). Now the International Organization for

Medical Physics, representing 80 national and six regional medical physics organizations and 18,000 medical physicists worldwide, has developed its own policy statement which is reproduced below. One can only hope that the policy statements issued by these knowledgeable organizations will have some deterrent influence on the continued propagation of unsupported cancer risk estimates related to medical imaging procedures conducted with minimum doses of radiation consistent with high quality studies.

IOMP POLICY STATEMENT

This policy statement addresses predictions of induced cancers and cancer deaths in a population of patients exposed to low doses (<100 mSv) of ionizing radiation during medical imaging procedures.

- Prospective estimates of cancers and cancer deaths induced by medical radiation should include a statement that the estimates are highly speculative because of various random and systematic uncertainties embedded in them. These uncertainties include dosimetric uncertainties; epidemiological and methodological uncertainties; uncertainties from low statistical power and precision in epidemiology studies of radiation risk; uncertainties in modeling radiation risk data; generalization of risk estimates across different populations; and reliance of epidemiological studies on observational rather than experimental data. Such uncertainties cause predictions of radiation-induced cancers and cancer deaths to be susceptible to biases and confounding influences that are unidentifiable.

- Paragraph A86 of Report 103 of the International Commission on Radiological Protection (ICRP) states that "There is, however, general agreement that epidemiological methods used for the estimation of cancer risk do not have the power to directly reveal cancer risks in the dose range up to around 100

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mSv". Further, UNSCEAR Report A-67-46, approved in May, 2012, states that "The United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) does not recommend multiplying very low doses by large numbers of individuals to estimate numbers of radiation-induced health effects within a population exposed to incremental doses at levels equivalent to or lower than natural background levels."

- Predictions of radiation-induced cancers and cancer deaths from medical imaging procedures should be accompanied by estimates of reductions in patient morbidity, mortality and cost resulting from the same medical imaging procedures.

- If effective dose is used to generate predictions of cancers and cancer deaths, a statement should be included that the ICRP has expressed caution in the use of effective dose for purposes of estimating risks to individuals or populations exposed to ionizing radiation. Paragraph 151 of ICRP Report 103 states: "The use of effective dose for assessing the exposure of patients has severe limitations that must be considered when quantifying medical exposure", and "The assessment and interpretation of effective dose from medical exposure of patients is very problematic when organs and tissues receive only partial exposure or a very heterogeneous exposure which is the case especially with x-ray diagnostics."

SUPPORTING DOCUMENTS AND ADDITIONAL READING

- National Research Council. Health risks from exposure to low levels of ionizing radiation: BEIR VII-Phase 2. Committee to Assess Health Risks from Exposure to Low Levels of Ionizing Radiation. Washington, DC. National Academies

Press. 2006.

- The 2007 recommendations of the International Commission on Radiological Protection. ICRP publication 103. Ann ICRP 2007; 37 (2-4) 1-332.

- Health Physics Society. Position statement of the Health Physics Society. Radiation risk in perspective. July, 2010. http://hps.org/documents/risk_ps010-2.pdf.

- American Association of Physicists in Medicine. Position statement of the American Association of Physicists in Medicine. Radiation risks from medical imaging procedures. December, 2011, affirmed November, 2012. <http://www.aapm.org/org/policies/details.asp?id=318&type=PP>.

- W. Hendee, M. O'Connor. Radiation risks of medical imaging: Separation fact from fantasy. Radiology 2012. 264:2 312-321.

- United Nations Scientific Committee on the Effects of Atomic Radiation. Report of the United Nations Scientific Committee on the Effects of Atomic Radiation. 59th session (May 21-25, 2012. General Assembly Official Records. 67th session, Supplement No. 46. <http://daccess-dds-ny.un.org/doc/UNDOC/GEN/V12/553/85/PDF/V1255385.pdf?OpenElement>.

- P. Zanzonico, M. Stabin. Benefits of medical radiation exposures. Health Physics Society. <http://hps.org/hpspublications/articles/Benefitsofmedradexposures.html>.

- National Council on Radiation Protection and Measurements. Uncertainties in the Estimation of Radiation Risks and Probability of Disease Causation. NCRP Report 171. National Council on Radiation Protection and Measurements. Bethesda, MD. 2012. http://www.ncrponline.org/Publications/Press_Releases/171press.html.