

## International Organization for Medical Physics: policy statement and editorial (reprinted from *Medical Physics* 40(4) 2013)

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### Editorial: risk of medical imaging

Over the past few years articles 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 articles 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 articles 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 articles.

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 below). 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 below). Now the International Organization for Medical Physics, representing 80 national and 6 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 unsupportable 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

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in the dose range up to around 100 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

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