



## NCRP Report No. 184: MEDICAL RADIATION EXPOSURE OF PATIENTS IN THE UNITED STATES



### National Council on Radiation Protection and Measurements

NCRP Report No. 184, *Medical Radiation Exposure of Patients in the United States*, is an update to NCRP Report No. 160, *Ionizing Radiation Exposure of the Population of the United States* (2009). This new Report updates medical radiation exposure information with data collected between 2006 and 2016.

**There has been a substantial reduction in medical radiation doses to the U.S. population since NCRP Report No. 160 was published in 2009.**

The 2009 report revealed a dramatic increase in medical radiation exposure over the previous 25 years; medical exposure was essentially half of all radiation exposure to the U.S. population, primarily due to an increase in computed tomography (CT) scanning and cardiac nuclear medicine.

A decade has passed since the publication of NCRP Report No. 160, and changes in technology, emergence of campaigns for dose reduction and optimization, indications for specific examinations, and reimbursement appear to have affected medical radiation exposure and dose to the U.S. population.

NCRP Report No. 184 includes a historical introduction, background content listing, information about relevant dose metrics, a discussion of International Commission on Radiological Protection (ICRP) tissue weighting factors and computational phantoms, and modality-specific medical radiation exposure and dose information.

The audience for this Report is primarily federal and state agencies responsible for the health and well-being of individuals exposed to ionizing radiation and those agencies with responsibility for ensuring radiation protection safety in medicine. NCRP Report No. 184 includes useful information for health physicists, medical physicists, physicians and other medical professionals, radiation safety officers, managers, workers, members of the public, and the media.

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*Medical Radiation Exposure of Patients in the United States*  
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## U.S. Medical Radiation Doses Are Decreasing

There has been a **15-20% reduction in non-therapeutic medical radiation dose** to the U.S. population in the decade between 2006 and 2016.

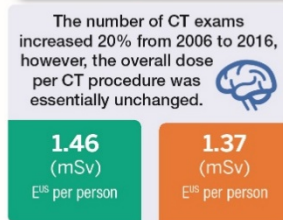
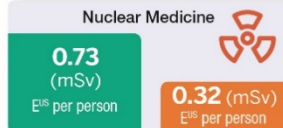
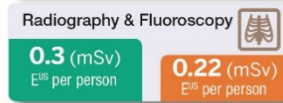
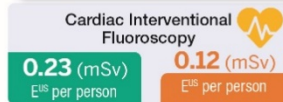
2006  
2016

**2.92**  
(mSv)

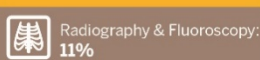
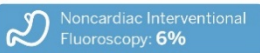
Estimated Average Individual Effective Dose (E<sup>15</sup>) per person

**2.16**  
(mSv)

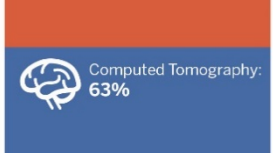
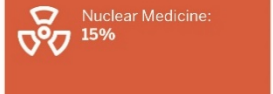
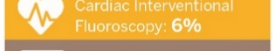
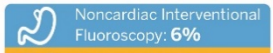
Estimated Average Individual Effective Dose (E<sup>15</sup>) per person



Percent of collective effective dose from different modalities for 2006



Percent of collective effective dose from different modalities for 2016



Note: When current data are compared with NCRP Report 160 utilizing ICRP weighting factors from ICRP Publication 60, the results are the same except for Nuclear Medicine (0.41 mSv), Computed Tomography (1.45 mSv) and total dose (2.33 mSv). For more detail, please see Figure 14.2 in the report.

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