

# Preface

This Report was developed under the auspices of Program Area Committee (PAC) 4 of the National Council on Radiation Protection and Measurements (NCRP). PAC 4 provides oversight for radiation protection in medicine. This Report is an update of NCRP Report No. 160, *Ionizing Radiation Exposure of the Population of the United States*, Section 4 (Medical Exposure of Patients) (2009). This Report evaluates average individual effective dose and collective effective doses from medical exposures for the 2016 timeframe. The Report pays particular attention to those procedures that contribute the largest share and provides information on nominal effective dose values that individual patients may experience from a specific examination. It is very important to note that these effective dose values should not be used as an indication of acceptability or to estimate individual cancer risk from a certain radiation procedure, but rather used as a metric to broadly compare the magnitude of potential stochastic effects to populations from different radiation sources. This Report does not quantify associated health risks nor discuss potential medical benefits. The Report also does not specify any actions that should be taken in light of these latest data. These subjects were outside the scope of the charge to NCRP. The Report is aimed at medical professionals, patients, regulators, and those involved in radiation protection. It provides indices for comparison among radiation sources and at different time periods.

NCRP has adopted the International System of Quantities and Units for its reports and the current Report has attempted to do that as much as possible although occasionally values are reported in the original data format (*e.g.*, entrance skin exposure in milliroentgen). The definition of effective dose has been published by the International Commission on Radiological Protection (ICRP), and there are defined radiation and tissue weighting factors that changed between ICRP reports in 1990 and 2007. The impact of these changes relative to comparison with previous data is included in this Report.

This Report is dedicated to the memory of Charles E. Chambers, M.D. former Professor of Medicine and Radiology at Penn State University College of Medicine and Director of the Cardiac Catheterization Laboratories. Dr. Chambers was a member of Council from 2007 to 2013 and his expertise as a practicing interventional cardiologist was essential to the writing of NCRP Report No. 168 (*Radiation Dose Management for Fluoroscopically-Guided Interventional*



*Medical Procedures*) as well as to this Report. He had long been a zealous advocate of catheterization lab safety contributing locally, nationally and internationally. On our committee he was an inspiration, significantly expanding our knowledge of cardiac interventions and current data. He was a gracious, humble and wonderful human being. We all miss him.

This Report was prepared by Scientific Committee 4-9 on Medical Exposure of Patients. Serving on Scientific Committee 4-9 were:

**Fred A. Mettler, Jr.,** *Chairman*

University of New Mexico  
Albuquerque, New Mexico

**Mahadevappa Mahesh,** *Co-Chair*

Johns Hopkins University School of Medicine  
Baltimore, Maryland

*Members*

**Mythreyi Bhargavan  
Chatfield**

American College of Radiology  
Reston, Virginia

**Charles E. Chambers\***

Penn State Hershey Medical  
Center  
Hershey, Pennsylvania

**Jennifer G. Elee**

Louisiana Department of  
Environmental Quality  
West Monroe, Louisiana

**Donald P. Frush**

Stanford University Medical  
School  
Stanford, California

**Michael T. Milano**

University of Rochester Medical  
Center  
Rochester, New York

**Donald L. Miller**

U.S. Food and Drug Administration  
Silver Spring, Maryland

**Henry D. Royal**

Washington University  
St. Louis, Missouri

**David C. Spelic**

U.S. Food and Drug Administration  
Silver Spring, Maryland

\*died June 9, 2019

*Technical Advisors*

**Armin J. Ansari**

U.S. Centers for Disease Control  
and Prevention  
Atlanta, Georgia

**Wesley E. Bolch**

University of Florida  
Gainesville, Florida

**Gary M. Guebert**

Logan University  
Chesterfield, Missouri

**Robert H. Sherrier**

U.S. Department of Veterans Affairs  
Durham, North Carolina

**James M. Smith**

Emory University  
Atlanta, Georgia

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**Richard J. Vetter**, *Staff Consultant*  
**Cindy L. O'Brien**, *Managing Editor*  
**Laura J. Atwell**, *Director of Operations*  
**Kathryn D. Held**, *Executive Director (2016 – 2018)*

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John D. Boice, Jr.  
*President (2012 – 2018)*

Kathryn D. Held  
*President (2019)*