Foreword

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In February 1968, Edward M. Smith, then cochairman of the Medical Internal Radiation Dose (MIRD) Committee, introduced MIRD Pamphlet Nos. 1–3 (*1*) with these words:

> "This is the first in a series of pamphlets that the Medical Internal Radiation Dose Committee (MIRD) of the Society of Nuclear Medicine will publish as a supplement to *The Journal of Nuclear Medicine*. Subsequent supplements will contain pamphlets presenting absorbed-dose calculations and other pertinent information for various radiopharmaceuticals, including the physical, nuclear and anatomical data needed for absorbed-dose calculations as well as pamphlets dealing with other related topics. These pamphlets will be revised periodically when new information or technical data become available.
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> "This supplement and future ones are written as authoritative references in the field of absorbed-dose calculation resulting from the diagnostic use of radiopharmaceuticals. The pamphlets comprising these supplements will be written for two distinct audiences. First, for one who desires to make his own detailed calculations, and second, for the individual who wishes to use the results of these calculations."

Thirty years later, 13 pamphlets have been published by the MIRD Committee, and much of what Dr. Smith wrote is still relevant to the work of the MIRD Committee. The focus of the Committee is changing as radiotherapeutic agents become more commonly used in nuclear medicine, but the goal to provide useful information for calculating absorbed-dose estimates remains the same. This most recent supplement to *The Journal of Nuclear Medicine* is a continuation of the work Dr. Smith envisioned in 1968.

The primary authors of the five papers that will be included as supplements to JNM over the next months are or have been members of the Society of Nuclear Medicine's Medical Internal Radiation Dose (MIRD) Committee. Three of the papers, MIRD Pamphlet Nos. 15–17 (*2–4*), represent work that has not previously been published. The MIRD Perspective 1998 (*5*) and MIRD Pamphlet No. 14 Revised (*6*) are revisions of earlier publications.

Roger Howell (*5*) has collaborated with Robert Loevinger to revise Dr. Loevinger's paper entitled "The MIRD Perspective" (*7*). In addition to a description of the technique for internal dosimetry of radiopharmaceuticals known as the MIRD schema, a brief history of the development of the schema is included. The article focuses on the suitability of the MIRD schema for absorbed-dose calculations in the human body determined for target volumes ranging in mass from large organs down to the size of single cells and cell nuclei.

After the publication of MIRD Pamphlet No. 14 (*8*), "A Dynamic Urinary Bladder Model for Radiation Dose Calculations," the authors discovered an error in the computer code used to generate the output values (leading to an underestimate of the dose by ~40%, depending on the radiopharmaceutical), as well as typographical errors in the published text. An erratum announcement was published in *The Journal of Nuclear Medicine* (*9*). This revised Pamphlet No. 14 (*6*) corrects these errors and expands the utility of the document through inclusion of additional radiopharmaceuticals not in the original publication and the incorporation of updated biokinetic parameters.

Pamphlet No. 15, "Radionuclide S Values in a Revised Dosimetric Model of the Adult Head and Brain" (*2*), describes a dosimetric model of the head and brain developed at the University of Florida. The new head model presented incorporates new features to the model of MIRD Pamphlet No. 5 Revised (*10*), such as eyes, a separate neck region and a more extensive facial skeleton. Instead of a brain represented as a solid mass of tissue that was used in dosimetry calculations for many years, this model is divided into many of the subregions and small structures that can now be delineated in brain studies. Because electrons emitted in small regions may irradiate nearby tissues, the S values in this pamphlet contain absorbed fractions for electrons, as well as for photons. The S values have been calculated for 24 radionuclides.

Many researchers have requested information on techniques for collection of biological data needed for internal dosimetry. Siegel et al. (*3*) have prepared Pamphlet No. 16, "Techniques for Quantitative Radiopharmaceutical Distribution Data Acquisition and Analysis for Use in Human Radiation Dose Estimates," a monograph designed to help answer many of the questions raised concerning biological data collection. The document has been organized so that people who are not experts in dosimetry, as well as those who have experience with dosimetry calculations, can benefit from the material presented.

The fifth paper in this supplement addresses the problem of dose estimation for organs or tissues in which radionuclides are distributed nonuniformly. Pamphlet No. 17, "The Dosimetry of Nonuniform Activity Distributions: Radionuclide S Values at the Voxel Level" (*4*) describes techniques that have been used to improve dose estimates in this situation. The document presents S values for cubical voxel arrays that can be used to calculate radiation dose estimates for nonuniform distributions of activity.

ACKNOWLEDGMENTS

The MIRD Committee has prepared these documents as part of its mission to provide information that will improve radiation absorbed-dose estimates for radiopharmaceuticals. Many hours of work by many people have gone into the preparation of this supplement, and we are grateful for that. We especially wish to thank Stanley Goldsmith, MD, Editor of *The Journal of Nuclear Medicine*, for suggesting this publication to the Committee. He and his staff have been most cooperative and agreeable. We also want to thank John Childs, PhD, of the Society of Nuclear Medicine Department of Communications for his assistance in furthering the publication of MIRD documents.

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