

AbstractID: 7196 Title: Radiopharmaceutical Dosimetry

In the United States, the foundation of computing absorbed dose to organs in a humanized phantom model has utilized methods outlined by Loevinger in the 1950's and standardized more recently by the Medical Internal Radiation Dose Committee of the Society of Nuclear Medicine (MIRD Primer 1991). However, with the recent shift in focus from computing absorbed doses for diagnostic to that of therapy agents, the demands for the dose model to become more patient specific have also increased. Due to safety considerations, the government regulatory agencies have also stepped up their scrutiny of new therapeutic radiopharmaceuticals coming into the market place. These products fall under the general category of targeted radionuclide therapy where the basic mode of biologic action is to bring therapeutic doses of radionuclide to a selected region by a targeting agent. These therapy products include bone metastasis-seeking radionuclides for pain palliation (Sr-90, Sm-153, Re-186, and Sn-111), radiolabeled antibodies for systemic and solid tumor disease (I-131, Y-90, Re-186, Lu-177, Bi-212), direct intratumor or intracavity injection methods (I-131, P-32, Y-90 microspheres) as well as the standard I-131 therapy for the treatment of thyroid related disease.

With the modern practice of medical physics in this dwindling climate of available personnel and resources, the radiation oncology physicist, the diagnostic physicist or hospital radiation safety officer may find themselves in the position of computing release criteria for hospitalized patients undergoing antibody therapy under the new NRC guidelines or calculating the dose fall-off from a beta source inside a balloon catheter for intravascular brachytherapy. Practical tools to handle these special problems created from the rapid progress of translational research are available and continue to be developed by individual investigators (e.g. MIRDOSE 3) as well as national and international committees (AAPM, MIRD, ICRP and ICRU).

Loevinger R, Budinger TF, Watson EE, MIRD primer for absorbed dose calculations, Revised. New York: The Society of Nuclear Medicine; 1991

Objectives:

1. Review the MIRD Schema to calculate absorbed doses to normal organ in humans receiving a radiopharmaceutical agent.
2. Apply standard calculation methods to practical examples related to unsealed source therapy.
3. Introduce new data quantitation methods and calculation tools that are designed to accommodate patient specific dosimetry.