
**Clinical dosimetry — Beta radiation
sources for brachytherapy**

Dosimétrie clinique — Sources de radiation bêta pour curiethérapie



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 21439 was prepared by Technical Committee ISO/TC 85, *Nuclear energy*, Subcommittee SC 2, *Radiation protection*.

Introduction

Clinical dosimetry covers the methods by which values of the relevant physical quantity, absorbed dose to water, can be measured at a given point by the use of calibrated instruments in a clinical setting. The application of beta radiation sources for brachytherapy requires new and skilled methods for adequate clinical dosimetry necessitated by the short range of the beta radiation. This causes large dose-rate gradients around beta radiation sources, and hence it is necessary that the detector volumes for absorbed-dose measurements be extremely small. This leads to the requirement for highly specialized detectors and calibration techniques, and it is necessary to scrutinize closely every calibration obtained in one beta radiation field and determine if it is applicable in another field.

It is necessary that an appropriate quality system be implemented and maintained in the hospital for clinical beta radiation source dosimetry. It is the responsibility of the medical physicist to carry out testing and calibration activities for any source in such a way as to meet the requirements for adequate dosimetry. This International Standard gives guidance on how to satisfy these needs.

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Clinical dosimetry — Beta radiation sources for brachytherapy

1 Scope

This International Standard specifies methods for the determination of absorbed-dose distributions in water or tissue that are required prior to initiating procedures for the application of beta radiation in ophthalmic tumour and intravascular brachytherapy [1], [2], [3]. Recommendations are given for beta radiation source calibration, dosimetry measurements, dose calculation, dosimetric quality assurance, as well as for beta radiation brachytherapy treatment planning. Guidance is also given for estimating the uncertainty of the absorbed dose to water. This International Standard is applicable to “sealed” radioactive sources, such as plane and concave surface sources, source trains of single seeds, line sources, and shell and volume sources, for which only the beta radiation emitted is of therapeutic relevance.

The standardization of procedures in clinical dosimetry described in this International Standard serves as a basis for the reliable application of beta radiation brachytherapy. The specific dosimetric methods described in this International Standard apply to sources for the curative treatment of ophthalmic disease, for intravascular brachytherapy treatment, for overcoming the problem of restenosis and for other clinical applications using beta radiation.

This International Standard is geared towards organizations wishing to establish reference methods in dosimetry aiming at clinical demands for an appropriately small uncertainty of the delivered dose. This International Standard does not exclude the possibility that there can be other methods leading to the same or smaller measurement uncertainties.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the cited document (including any amendments) applies.

ISO/IEC Guide 98-3, *Uncertainty in measurement — Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

ISO/IEC Guide 99, *International vocabulary of metrology — Basic and general concepts and associated terms (VIM)*

ISO 6980-2, *Nuclear energy — Reference beta particle radiation — Part 2: Calibration fundamentals related to basic quantities characterizing the radiation field*

ICRU Report 51, *Quantities and Units in Radiation Protection Dosimetry*