

# The WHO manual of diagnostic imaging

RADIOGRAPHIC  
TECHNIQUE AND  
PROJECTIONS



World Health Organization  
Geneva





# **The WHO manual of diagnostic imaging**

Radiographic Technique and Projections

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**Published by the World Health Organization  
in collaboration with the  
International Society of Radiology**

WHO Library Cataloguing-in-Publication Data

Sandström, Staffan.

The WHO manual of diagnostic imaging : radiographic technique and projections / Staffan Sandström ; editors Harald Ostensen, Holger Pettersson.

(WHO manual of diagnostic imaging)

1.Diagnostic imaging – manual 2.Radiography – manual I.Ostensen, Harald II.Pettersson, Holger III.Title VI.Series

ISBN 92 4 154608 5

(NLM classification: WN 180)

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Designed and typeset in Sweden  
Printed in India

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# Foreword

Modern diagnostic imaging offers a vast spectrum of modalities and techniques, which enables us to study the function and morphology of the human body in details that approaches science fiction.

However, it should be noted that even in the most advanced Imaging Department in the economically privileged parts of the world, 70–80% of all clinically relevant questions may be solved by using the two main *cornerstones* of diagnostic imaging, which are Radiography (X-ray) and Ultrasonography.

It should also be remembered that thousands of hospitals and institutions worldwide do not have the facilities to perform even these fundamental imaging procedures, for lack of equipment and/or diagnostic imaging skills.

Therefore, WHO in collaboration with the International Commission for Radiologic Education (ICRE) of the International Society of Radiology (ISR) is creating a series of “*WHO Manuals of Diagnostic Imaging*”, developed under the umbrella of the Global Steering Group for Education and Training in Diagnostic Imaging. Among the members of this group are the major regional and global societies involved in Diagnostic Imaging, including the International Society of Radiology (ISR), the International Society of Radiographers and Radiological Technologists (ISRRT), and the World Federation for Ultrasound in Medicine and Biology (WFUMB).

The full series of manuals will primarily cover the examination techniques and interpretation of Radiography, in a later stage also Ultrasonography. The manuals are meant for health care personnel who in their daily work are responsible for producing and interpreting radiographs, be they radiologists or other medical specialists, general practitioners, or radiological technologists working in rural areas.

The manuals are authored by authorities in the specific fields dealt with within each manual, and supported by a group of collaborators who together cover the experience, knowledge and needs, which are specific for different regions of the world.

It is our sincere hope that the manuals will prove helpful in the daily routine, facilitating the diagnostic work up and hence the treatment, to the best benefit for the patient and it is with great pleasure and anticipation we present to you, the readers, the next manual in this series: “*Radiographic Technique and Projections*”.

*Geneva, Switzerland and Lund, Sweden, May 2003*

**Harald Ostensen**  
**Holger Pettersson**

# Preface

This manual on radiographic technique and projections, is a successor to the *Manual of Radiographic Technique* that was published in 1986 with Drs T Holm, P Palmer and E Lehtinen as authors, and was meant as a manual for the WHO Basic Radiological System—WHO-BRS. The present manual can be used with any equipment, but is especially designed for the use with X-ray machines that comply with the specifications for the World Health Organization Imaging System for Radiology, WHIS-RAD.

The *positioning* of the patient is illustrated with a computed animation technique, showing one male and one female patient that are meant to represent all ethnic groups in the world. Reasonable *cassette-screen-film combinations* are suggested, as well as *exposure values*, which have to be adjusted to local conditions. Each page contains a short recommendation of how to handle the patient, and it should, as a rule, be possible to perform the examination of the patient only following the illustrations and instructions on the relevant page. An acceptable, usually normal, *resulting X-ray image* is shown. Following the instructions, the result will be a standard projection that is easily repeated for comparison and easily understood by physicians and others trained to interpret radiographs.

The work with this manual has been done at the WHO Collaborating Centre in Lund, with the old BRS manual as base, and with a strong support from the whole Department of Diagnostic Imaging at the Lund University Hospital, as well as with input from members of the ISRRT and members of the International Commission on Radiologic Education (ICRE). The important input from Dr Thure Holm and Dr Philip Palmer should be noted. The devoted and highly professional and skillful work of the department photographer, Göran Eliasson, should be specifically acknowledged, and so should the work with the final lay-out, performed by Dr Kaj Knutson.

*Lund and Riyadh, May 2003*

**Staffan Sandström**

## General principles for good radiographic practice

### Equipment

Appropriate equipment, well maintained, is the basis for all good radiographic practice.

The present manual is primarily meant for the WHIS-RAD system (the World Health Imaging System for Radiology), but with appropriate modifications the instructions may be used with any type of adequate radiographic machines.

For a detailed description of the WHIS-RAD system, see page 113.

### Maintenance and management

It is mandatory for good radiographic practice that the examination room with its X-ray equipment and accessories, as well as the dark room and the facilities to evaluate radiographs are in good condition. For a thorough description of management and maintenance, see the WHO Manual "Quality Assurance Work Book", Geneva 2001. (WHO/DIL/01.3)

### Patient care

A radiographic examination is an integrated part of clinical management and care of a patient, and the same rules for good patient care apply for the radiographic personnel as for the rest of the

### Radiation protection

X-rays are potentially harmful, and should be used with care.

#### *Care for the personnel and persons accompanying the patient:*

- stand behind the control panel when the X-ray exposure is made.
- make sure that lead aprons are worn if the patient needs to be held.
- if possible, do not allow anyone else in the X-ray room. If other persons must be present, keep them behind the control panel when the exposure is made.
- when supplied, always wear your film badge. Have it checked regularly.

#### *Care for the patient:*

The radiation risk for the patients being x-rayed is very low because they are exposed to x-rays infrequently, and because only a small part of the body is exposed for each patient. Therefore, whenever there is a clinical reason for X-ray examination such an examination is justified and should be performed. However, always try to get all the details right the first time, so that there is no need for a second exposure.

#### *The guiding rule for radiographic examinations must be the ALARA principle:*

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