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of Organisations for Medical Physics (E.F.O.M.P.)

XIV International Conference on Medical and Biological Engineering and VII International Conference on Medical Physics Symposium on the Radiation Protection of the Patient

The aim of the Symposium is to discuss the implications for medical physicists of legislation for the radiation protection of the patient. Through reports and contributed papers the present responsibilities of the medical physicist in Europe will be reviewed, country by country. The E.E.C. Directive will be discussed. Finally the following paper, which suggests the development of EFOMP guidelines will be discussed.

Proposals for EFOMP Guidelines

Prepared and to be presented by Dr. Jean-Claude Rosenwald, Institut Curie, Paris.

1) Introduction

Medical irradiation is the largest 'man made' contributor to the radiation dose received by the population in Europe. The reduction of the dose to the patient, without detriment to the efficiency of the examination or treatment and without unacceptable extra cost, is achievable by combining several components:

- a) a proper decision on the form of examination or treatment to be performed,
- b) restriction of this examination or treatment to what is actually needed,
- c) the selection of appropriate equipment characteristics,
- d) the appropriate use of the equipment.

Each of these components should be optimised in terms of cost, risk and benefit. The requirements for such an optimisation are:

- a) the qualification of the medical and paramedical staff involved in radiation use,
- b) the suitability of the equipment for clinical use and the rapid introduction of beneficial technological improvements,
- c) the definition of strategies and procedures for patient selection, equipment control and equipment use.

These different aspects have been discussed extensively by several international bodies such as the W.H.O., the I.C.R.P., the I.C.R.U. and the I.E.C., as well as by national societies and also by the Commission of the European Communities (C.E.C.) Recently, the C.E.C. has published a Directive 'laying down basic measures for the radiation protection of persons undergoing medical examination or treatment'. This Directive calls for the appointment of a Qualified Expert in radiation physics.

According to the Directive, this expert is required in sophisticated departments of radiotherapy and nuclear medicine to act for the optimal use of radiation techniques and equipment. In fact, such an expert, would be useful for most radiotherapy or nuclear departments, as well as for a number of diagnostic radiology departments. The principal qualifications, experience and qualities required by the Qualified Expert are an adequate theoretical knowledge of the properties of ionising radiation, a thorough knowledge of the hazards they present and knowledge of how to minimise these hazards. This theoretical knowledge must be directed through applied physics so that there is an understanding of the current working procedures and must be combined with a detailed knowledge of all statutory provisions, approved codes of practice and guidance relating to radiation protection. The activity of the expert must therefore be patient oriented, so excluding staff belonging to technical, non patient-oriented departments. The expert's academic degree should be such

that he is on an equal footing with his medical colleagues and is able to deal with both the employer and with his employees.

Medical physicists, through their dedicated training, fulfill all these requirements. In addition, through their personal involvement in many hospital departments they acquire considerable practical knowledge about the medical use of ionising radiations. They have already been considered as qualified by the W.H.O.¹ and the I.C.R.P.² and are officially required in some countries in specific fields such as radiotherapy. They are therefore most suitable for appointment as Qualified Experts for the medical and dental applications of ionising radiation.

2) The Role of the Medical Physicist as Radiation Protection Expert

The role of the medical physicist has been discussed at the European level and a policy statement has already been published by EFOMP. With respect to the role of the physicist as a Qualified Expert in patient radiation protection, the following aspects can be considered;

a) Scientific

Due to his highly specialised scientific level, the physicist seems to be the most appropriate person to recognise radiation hazards and devise means of control. He is the only person actually qualified to select methods for radiation dosimetry, calibrate the measuring instruments and give a correct interpretation of the results.

b) Managerial

The physicist is usually requested to set-up safe working procedures and to ensure the strict respect of these procedures. He is expected to keep any foreseeable event involving radiation under control and take the appropriate decisions. The management of quality control programmes is part of his activity.

c) Educational

An important factor in the protection of the patient is the adequate education of the staff involved in radiation use. Such staff includes radiographers, radiologists, radiotherapists. The medical physicist, because of his theoretical background and of his in-hospital practice is well prepared to give proper training based on both formal courses and informal discussions of demonstrations.

Some specific duties of the physicist acting as the Qualified Expert in the fields of Diagnostic Radiology, Nuclear Medicine and Radiotherapy have been listed in a number of documents published by national or international organisations. An example, adapted from a document prepared by the Hospital Physicists' Association can be found in the Appendix.

3) Present and Future EFOMP Activities Regarding the Protection of Patients

As stated earlier, the medical physicist has a major role to play in the protection of the patient. Considering in addition the wide spectrum of policies, regulations and practical situations in the different European countries the Federation believes that it would be helpful to try to establish guidelines to assist its members in implementing procedures and to act as an official adviser and contact with European authorities and, through its members organisations, with the national authorities.

TECHNICAL NOTE: #1 PHOTON BEAM TREATMENT PLANNING

AECL MEDICAL

... "the aim of clinical dosimetry must be to plan and deliver the required pattern of dosage as accurately as possible, ie. (according to modern radiobiological thought), with an uncertainty of less than $\pm 5\%$."

I.C.R.U. Report 24, 1976

Most treatment planning systems miss the goal ($\pm 5\%$ uncertainty) at the plan stage, even before the physical complexities of patient set-up are accounted-for. One of the strongest advantages of AECL radiotherapy planning systems is the high quality of the algorithms used to calculate dose distributions. Both TP11 and THERAPLAN use the methods developed and proven over many years by Prof. J.R. Cunningham and his team at the Ontario Cancer Institute.

The photon beam model uses differential Scatter-Air (or Phantom) Ratios, derived from user input of measured central axis data for square fields. The same model and data is used for all beam types: SSD and isocentric, fixed and moving, rectangular and irregular. The model allows for collimator rotation and beam modifiers such as wedges, bars, or compensators with equal ease and accuracy. The differential SAR algorithm allows a correction for both the primary and scatter components of the beam; a correction that is not possible with the more common stored beam model.

At each calculation point, the primary is adjusted for: the distance from the source to the contour, any attenuating material in the path, and depth inside the patient. Scatter is handled as a function of the distance from the point of calculation and also the primary reaching the scattering volume. Hence, at each point, the scatter is a result of an integration over a large number of scattering elements. This technique is more complex than the models that are used in most competitive systems, but offers increased accuracy and a capability for handling complex as well as simple plans.

Corrections for patient inhomogeneity are made using the most rigorous algorithms available and practical. Patient contours having areas of uniform density are corrected — for using a modified Power Law Tissue-Air Ratio technique, a significant improvement over the simple linear attenuation or ratio of TAR methods. If CT data is available for a pixel based calculation, the Sontag-Cunningham Equivalent Tissue-Air Ratio method (the only one to take account of 3 dimensional scattering effects) is used. The table illustrates the relative capabilities of the methods.

Inhomogeneity Correction Method	Accounts for:				
	Field Size	Path Length	Structure Position	Structure Shape	Electronic Equilibrium
Linear Attenuation	No	Yes	No	No	No
Ratio of TAR's	Yes	Yes	No	No	No
Effective SSD	Yes	Yes	No	No	No
Isodose shift	Yes	Yes	No	No	No
Power Law TAR	Yes	Yes	Yes	No	No
Equivalent TAR	Yes	Yes	Yes	Yes	No
Volume SAR integral	Yes	Yes	Yes	Yes	No
Monte Carlo	Yes	Yes	Yes	Yes	Yes

Independently published studies have compared the Equivalent TAR method with measured data and shown errors of less than 3% in homogeneous and inhomogeneous phantoms, for beam energies ranging from cobalt to 25 MV X-Rays. This accuracy is simply not available from other models.

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This is in accord with its constitution which claims the intention of the Federation to contribute to the improvement of the medical physics standards in patient care. The practical basis for this work will develop through the following tasks:

a) The Training of the Qualified Experts

Obviously, the medical physicist functioning as the Qualified Expert must receive proper training. EFOMP has already given, in a policy statement, some guidelines on general training schemes for which European agreement has been reached. These guidelines relate to the minimal level of education prior to the specialisation and to the necessity of both formal and in-hospital training. Their application provides a qualification already recognised in several countries by official accreditation. The EFOMP education and training committee working programme includes the preparation of a detailed syllabus for the main specialties with major consideration of the protection of the patients. Education related to quality assurance procedures is also an important part of this programme.

b) The Education of Medical and Paramedical Staff

As emphasised previously, the qualification of all the staff is an important component for dose reduction. EFOMP will encourage and support such initiatives as formal courses, in-hospital training and staff exchanges on subjects related to radiation physics applied to clinical dosimetry, image quality and radiation protection. Joint sessions with physicists, practitioners, clinical engineers, radiographers and manufacturers should be held, in order to clarify the responsibilities of each profession and in order to keep each of them in contact with the realities.

An important part of educational programmes should concern the different aspects of quality assurance: aim, methods, organisation, assessment of the results. On this subject EFOMP has already set up both scientific sessions and workshops in various instances and it intends to intensify this action.

c) The promotion of Quality Assurance

i) Protocols and data analysis

The objective of EFOMP is not to duplicate the work undertaken in different instances by national Medical Physics Organisations and International Commissions. However, EFOMP is thought to have a role to play in collecting the national protocols in Europe and analysing them in order to find a common basis. Approval, at a European level, of a number of standard methods should strengthen their value.

Even more important is the analysis of the results: an extensive collection of data about the impact of quality assurance programmes in terms of rejection rate, dose to the patient, image quality (or cure rate) and overall cost should help to focus on those aspects of the programmes which are the most critical. Such a collection is obviously difficult to obtain, especially because of the lack of general agreement on the way to assess such factors as image quality and overall cost. Therefore, EFOMP plans to make recommendations on the methods of assessment of quality assurance programmes.

ii) Quality assurance programmes

In most countries, quality assurance is not legally required. Most of the clinicians involved in radiation use, except perhaps the radiotherapists, are not convinced that any improvement is to be expected through the use of quality assurance. It is doubtful that the recent European Community Directive, which makes the setting-up of quality assurance programmes compulsory, will be followed on a wide basis unless a coherent promotion is undertaken. EFOMP can help towards this promotion in the following ways:

- a) The identification and provision of information on quality assurance documentation and equipment which is presently available;
- b) The development of recommendations for procedures and results assessment and their dissemination in specific reports, scientific journals and national and European meetings;
- c) The performance of intercomparisons on the efficiency of Quality Assurance programmes and the publication of the results;
- d) Through official contacts with other professional societies (of, for example, radiologists, clinical engineers, radiographers and manufacturers) with proposals for joint programmes.

The development of all these objectives will require the active participation of specific task groups which could undertake such actions as:

- a) the building a data base consisting of bibliographical references, information on available quality assurance equipment, quality control procedures, quality and dose assessment, errors and pitfalls;

- b) analysing the content of the data base to formulate advice and recommendations;
- c) developing the educational and promotional programmes referred to previously.

References

- (1) W.H.O., 1982. Quality Assurance in Diagnostic Radiology. (World Health Organisation, Geneva)
- (2) I.C.R.P., 1982. Protection of the Patient in Diagnostic Radiology. I.C.R.P. Publication 34 p.26 (Pergamon Press, Oxford)

Appendix: Some specific duties of the medical physicist acting as an expert in radiation protection. The material is adapted from an H.P.A. document.

Diagnostic Radiology

- 1) The specification of the protection measures to be incorporated into X-ray rooms and the conduct of subsequent surveys of the rooms and equipment to confirm that the measures have been executed effectively.
- 2) Conduct of performance tests at installation, routinely and when faults are suspected, to ensure that any equipment used in an X-ray examination operates so as to restrict the radiation dose to patients to an extent consistent with the clinical objective.
- 3) Measurement and calculation of doses to patients, including those following irradiation of an undisclosed pregnancy. Provision of advice to the radiologist on the magnitude and distribution of doses received.
- 4) Calibration monitoring and test equipment used in 2) and 3) above.
- 5) Provision of advice on quality assurance procedures to minimise patient dose.

Nuclear Medicine

- 1) Provision of advice on the design, construction or adaption of premises for work with unsealed radionuclides.
- 2) Designation of areas requiring special supervision or control and review of the areas designated in response to changes in the work.
- 3) Provision of tests of the operation of safety features and warning devices against external radiation and against the spread of contamination.
- 4) The drafting of plans for the disposal of radioactive waste for submission to the regulator authorities and the supervision of the execution of the accepted plan.
- 5) Responsibility for ensuring that unsealed radioactive sources are prepared in accordance with good radiation protection standards; for protecting the public from irradiation by radioactivity administered to patients both before and after those patients leave hospital; for ensuring that equipment used and products administered in diagnostic or therapeutic procedures restrict exposure of the patient to the level necessary to achieve the desired clinical effect; for monitoring radiation exposure and radioactive contamination of staff, the public and their environment.
- 6) Calculation of the patient dose likely to arise from the administration of radiopharmaceuticals for diagnostic procedures.

Radiotherapy

- 1) Prior examination of plans for new or modified buildings, equipment, installations and processes which have radiation safety implications.
- 2) Prior examination and review of operational procedures, systems of work and storage arrangements for radioactive sources.
- 3) Verification of provision and maintenance of safety features including checks on interlocks and barriers designed to restrict access to radiation areas.
- 4) Performance of tests for leakage of radioactive material from sources used for brachytherapy and teletherapy and the keeping of records for such tests and for stock control.
- 5) Supervision of maintenance and execution of tests on equipment in order to ensure that radiotherapy exposures can be accurately performed.
- 6) Supervision of physical aspects of radiotherapy planning in order to ensure that radiotherapy doses delivered to the patient agree with those prescribed closely enough for the stated clinical objective.
- 7) Assessment of hazards and preparation of contingency plans for such events as failure of a teletherapy source return mechanism.
- 8) Provision of advice on and assessment of relevant quality assurance procedures.

Letter from the President

Welcome to Espoo for the combined XIV International Conference on Medical and Biological Engineering and the VII International Conference on Medical Physics. Once again we meet together with our bio-engineering colleagues to share ideas and discuss mutual problems. Our Finnish friends in I.F.M.B.E. and I.O.M.P. have worked extremely hard to organise this joint meeting. We trust that the discussions that take place both inside and outside the conference lecture theatres, the exchanges of scientific information and the new friendships that will be made will bring a just reward for all their efforts.

In May 1985 our own Federation, EFOMP, celebrated its fifth birthday. (Our inauguration meeting was held in London, in 1980). When we met at the VI I.C.M.P., in Hamburg in 1982, EFOMP was a fledgling organisation, only two years old but already becoming a vigorous and effective body and the voice of Medical Physics in Europe. Our Federation continues to grow steadily. By the time we reached Hamburg a further three organisations had joined the fourteen founder members. If, as I am confident it will, Council in Espoo approves the Officers' recommendation that Czechoslovakia, Portugal and the Republic of Ireland should be admitted to membership, then our family will have grown to include 22 national organisations.

The Officers' Meeting held in Binz in 1984, at the invitation of the Clinical Radiation Physics Section of the Medical Radiology Society of the G.D.R. was especially beneficial in enabling the Officers to establish direct contact with colleagues in a number of countries in Eastern Europe. We look forward to welcoming these countries to membership of EFOMP in the near future.

We can be pleased and proud of the progress of EFOMP as a federation and an extended family. Just as individual medical physicists draw strength from their own national organisation so the profession as a whole can strengthen its identity by supporting and being involved in activities at an international European level. In the early years the Federation has concentrated its efforts on fostering the development of Medical Physics throughout Europe, encouraging the formation of national medical physics organisations where they did not exist, providing policy statements to help establish the status of the medical physicist and defining the requirements for education and training. We are fortunate that a very similar philosophy of high standard of scientific services prevails in all our European countries. Exploration of the relatively small differences which exist between member countries helps us to understand our strengths and weaknesses. As we move forward to expand and further improve the standard of medical physics in Europe we at the same time develop a base from which to help others. The existence of firm and uniformly high standards in Europe enable assistance to be offered to developing countries with the training of the teachers and leaders that they need in the field of medical physics. We look forward to encouraging these activities as the Federation strengthens its links with the W.H.O. and the I.A.E.A., and its training programme in conjunction with I.A.E.A. gets underway.

J. Chavandra.

Contents

Symposium on the Radiation Protection of the Patient	1
Letter from the President	4
Notes from the EFOMP Officers' Meeting	4
News from the Professional Committee	4
Medical Physics in Bulgaria	4
Quality Control in Medical X-Ray Diagnostic Equipment	5
Quality Assurance in Radiotherapy	5
EFOMP Co-operating Organisations — Company Profile	6
(MP) ² Medical Physics Mini-Profile	6
Clinical Physics and Physiological Measurement	6
EFOMP Business at ESPOO	6
Forthcoming Meetings	7

Notes from the EFOMP Officers' Meeting

Berne — 5th May 1985

There was an international scientific meeting, held in May at Berne, between the medical physics societies of Switzerland, Austria and the Federal Republic of Germany. The meeting was co-sponsored by EFOMP; the presence of several EFOMP officers also provided the opportunity to hold a meeting to finalise the various EFOMP contributions for four of the conference sessions in which we are to be involved at Espoo. Most of the subjects discussed are dealt with elsewhere in this issue or in the information and reports sent officially to the national organisations.

Additional points of general interest were:

- that interest has been expressed by the American Association of Physicists in Medicine in using the EFOMP Policy Statement on 'The Roles, Responsibilities and Status of the Clinical Medical Physicist';
- that the Officers will be glad of help in establishing the most useful scientific role for EFOMP. The need is to identify ways in which the scientific work of the national organisations may be fostered and co-ordinated without imposing yet more meetings on busy medical physicists;
- that the World Health Organisation have thirty-eight targets in their plan for 'health for all' by 2000 A.D. and have asked EFOMP for comments;
- that the medical equipment industry is taking an increased interest in EFOMP;
- that the Czechoslovak national society has invited EFOMP to hold the next Council meeting in their country.

News from the Professional Committee

In 1984, Pele Asard retired from his activity as chairman of the professional committee. Before he left the committee he suggested a theme for our future work: this theme was to consider details of a code of ethical practice for medical physicists. The Professional Committee has now agreed work on this subject. Although members of the Committee have not had the opportunity to meet, each has received a copy of the guidelines for ethical practice for medical physicists recently published by the American Association of Physicists in Medicine and this will provide a basis for our work.

We plan to have a draft code of ethical practice ready by the end of the year and this timetable can be fulfilled if the members of the Committee meet in Espoo for face to face discussions as I hope they will.

Hélène Aget
Chairman of the Professional Committee

Medical Physics in Bulgaria

The National Society of Biomedical Physics and Engineering of the Union of Medical Science Societies in Bulgaria held its fourth national conference in Sofia in November 1984. The following topics were included in the scientific programme:

- The acquisition and processing of physiological and clinical investigation information.
- Ionising radiation metrology and dosimetry in medicine and biology.
- Physical and engineering problems in diagnosis and therapy with X-rays, radioactive isotopes, light, ultrasound and nuclear magnetic resonance.
- Physical and engineering problems in the assessment of and protection from harmful agents in the free and the working environments.
- Physical methods and instrumentation in medicine and biology.

There were 152 contributions presented either orally or as posters. Sixteen of the contributions came from international participants. Foreign countries represented included Czechoslovakia, Federal Republic of Germany, German Democratic Republic, Poland, Rumania, U.S.S.R. and Yugoslavia. Abstracts and a list of authors were published.

The next conference in the series will be held in 1988.

M. Marinov.

Quality Control in Medical X-ray Diagnostic

Equipment

A report on the EFOMP workshop held at Trieste from 13-19 May, 1985 and submitted by Dr. Arnold Cowen, Lecturer in Medical Imaging, the University of Leeds, England.

Given the high cost and technical complexity of modern diagnostic X-ray equipment it is natural that the users of such equipment should be concerned that any device which they use has been adjusted correctly prior to clinical acceptance and continues to operate satisfactorily thereafter. In certain parts of the world, particularly in North America and Northern Europe, medical physicists have taken an active interest in this field for many years and a wealth of scientific experience has been accumulated. Recently, however, interest has spread to many other countries and in response to this, EFOMP recently organised a workshop on quality control in medical X-ray diagnostic equipment at which international experiences could be shared. The workshop was held under the auspices of the International Centre for Theoretical Physics in Trieste and was organised on behalf of EFOMP by Dr. Anna Benini of the Medical Physics and Bio-engineering Services of the Maggiore Hospital, Parma.

The workshop attracted visitors from many countries in Europe, the Mediterranean region and West Africa. Participants included workers from a variety of disciplines including medical physics, X-ray engineering, clinical radiology and industry. This undoubtedly contributed to making the meeting both stimulating and successful. Visiting speakers included such luminaries in the field as David Goodenough and John Cameron from the USA.

The morning sessions comprised informal lectures in all aspects of X-ray quality control and included results from a wide range of conventional and computerised radiological equipment. Despite the wide breadth of interest and experience of the participants, there was something useful for everyone. Practical sessions were held each afternoon in the Department of Diagnostic Radiology of the magnificent University Hospital of Catanara, Trieste. The equipment and facilities made available to the workshop at the Catanara Hospital were excellent. Despite the counter-attractions of the Adriatic coast, lecture presentations and practical sessions were both very well attended. Outside the working schedule, however, participants took full advantage of the excellent weather, beautiful scenery and marvellous hospitality of Trieste. Nocturnal discussions were by no means confined to scientific matters but encompassed politics, economics, unemployment, and peace in Europe.

During the final discussion, all participants were invited to express their opinion regarding the success of the workshop and its relevance to quality control in their own country. Participants found the workshop extremely useful and a success both scientifically and in terms of international understanding. The conclusions and recommendations of the workshop are outlined below.

The Conclusions and Recommendations of the EFOMP Workshop on 'Quality Control in Medical X-ray Diagnostic Equipment'

- (i) Participants agreed that quality control in medical X-ray diagnostic work is a useful activity but is only one of several valuable scientific and technical activities in this field, i.e. performance (type) testing and system specification, acceptance testing, service, maintenance and safety testing.
- (ii) A large variety of useful quality control test methods and procedures is currently available. Further refinements to these techniques may emerge in the future. Participants agreed that future activities in this field should include examination of problems associated with the initiation, organisation, management and evaluation of quality control procedures.
- (iii) Existing test procedures will have to be adapted to match national conditions and requirements. The experiences of centres that have already evolved an organisation encompassing quality control, acceptance testing, etc., would be very useful to workers in other nations. It was recognised that no effective method of sharing experiences and exchanging information existed and this will retard progress. Until a suitable agency is set up, the meeting agreed that it would be necessary to rely upon the offices of individual representatives and possibly E.M.P. News.

- (iv) Participants believed that quality control can be justified for a variety of reasons — economic, medical-diagnostic, radiation protection, technical efficiency, education, professional satisfaction and good work practice.
- (v) Professional insecurities must not be allowed to inhibit progress in the subject. Participants recognised that physicists, engineers and radiographers have identifiable areas of responsibility within a quality assessment structure. Interdisciplinary activities in quality control should be encouraged.
- (vi) Scientific and technical exchange and interaction with representatives of the equipment manufacturers should be encouraged. This will lead to a more professional relationship and greater understanding and co-operation.
- (vii) The publication of results of quality control surveys (and follow-up studies), descriptions of national experiences and economic analyses of cost and benefit of both quality control and maintenance programmes should be actively encouraged.
- (viii) EFOMP, the WHO and the EEC could play a vital part in the advancement of quality control in Europe and the emerging nations. Provision of financial support to facilitate scientific and technical exchange and co-operation between established centres and those new to the field would be very useful. Support and co-ordination of internationally recognised research and development projects would be beneficial and reduce the incidence of duplicated work.
- (ix) Participants expressed their gratitude to EFOMP, the International Centre for Theoretical Physics, and the Diagnostic Radiology Department of the University Hospital of Catanara for their contributions to the success of the workshop. Particular thanks were conveyed to Anna Benini for her hard work in organising the workshop.
- (x) The Diagnostic Radiology Department of the Catanara Hospital was commended as a unique site for holding such a workshop. The equipment, facilities and scientific and technical infrastructure were excellent.
- (xi) The possibility of holding a follow-up workshop was considered. Algeria was suggested as a site for a follow-up workshop.

It is proposed that a similar workshop will be held, in Trieste, on 12-17 May 1986.

Quality Assurance in Radiotherapy

A short report on a W.H.O. Workshop

Organised by the World Health Organisation, W.H.O., in collaboration with the Institute for Radiation Hygiene of the Federal Health Office (F.H.O.), an International workshop on quality assurance in radiation therapy was held from 2nd to 7th December, 1984, at Schloss Reisenburg, F.R.G. More than thirty participants from countries around the world had the opportunity for intensive discussions at the pleasant old castle which is well known as a venue for such working parties. The first days of the meeting were used to report the state of the art in quality assurance from the viewpoint of the physician and the physicist. Reports on the activities of the larger international and national associations like the I.C.R.U., the I.C.R.P., the A.A.P.M. and the H.P.A. were presented, as well as details of the legislative situation in various countries. As a result of the discussions on all of these reports there was no doubt that quality assurance is of major importance in radiation therapy.

The final goal of the workshop was the preparation of a general guideline for quality assurance in radiation therapy which would be applicable in developing and undeveloped countries with strong differences in staff qualification levels and availability of equipment. It therefore must avoid being over complicated and too demanding in fine detail. The working party divided into three working groups dealing with organisational aspects, physical and technical aspects, and clinical aspects of quality assurance in radiotherapy. The results from each working group were presented by the respective chairperson in plenary sessions and discussed by all participants. The final results will be published as a W.H.O. technical report, during 1985. The contributed papers presented as introductory or state of the art documents will be published as an associated document in an F.H.O. series.

Prof. Dr. H-K Leetz

EFOMP Co-operating Organisations — Company Profile



Z.I. du Mandinet — Centre Evolic,
Lognes 77200 Torcy, FRANCE.

Mecaserto was created in 1948 by Mr M. Leroy as a small factory producing miscellaneous mechanical devices. Very soon its activities extended into the field of medical applications, especially those in Nuclear Medicine, as the subject was just developing at that time in France. Through close collaboration between Mecaserto and the specialists in Nuclear Medicine, the first scanners were produced in 1952. Later on, around 1960, Mecaserto was also one of the first companies interested in and making radiotherapy simulators. The main equipment presently produced and distributed by Mecaserto includes, in addition to Radiotherapy simulators, Nuclear Medicine instruments (external counting systems, scanners, etc.), Nuclear Medicine laboratory equipment, Radiation Protection equipment, photodensitometers, a contouring device, a radiation field explorer and various radiotherapy accessories including treatment couches.

Mecaserto employs about 40 people and exports about 50% of its products (including 20% to the USA and 20% to the EEC). As well as operating under the Mecaserto trade mark the company manufactures items for other well established companies in the medical field. Sales represented approximately 20 M Francs in 1984. At the present time there are about 120 simulators, 100 scanners and 100 Nuclear Medicine hot laboratories in use and manufactured by Mecaserto.

EFOMP welcomes Mecaserto as a co-operating commercial organisation.

(MP)² Medical Physics Mini-Profile INSELSPITAL, UNIVERSITY OF BERN (SWITZERLAND)

The Inselspital (Island Hospital) in Bern is one of the oldest hospitals in Switzerland. It was founded in 1354 by a wealthy patrician of Bern for the care of the needy sick. A radiology institute was founded in the hospital in 1898 and three years later, in 1901, it had already proved to be necessary to employ a physicist (O. Pasche) for the large number of physical tasks.

The considerable development in the diagnostic and therapeutic use of X-rays in medicine which followed the war warranted the creation of a department of Medical Physics in which today 4 physicists (G. Poretti, R. Mini, E. Born and L. André), an engineer (P. Ott) and a technician (J. Feuz) are responsible for the following principle tasks:

- Radiation dosimetry and treatment planning for three accelerators, one cobalt unit and low energy X-rays;
- Fractionation schemes for radiation treatment;
- Intracavitary and interstitial therapy with Cs-137 and I-125;
- Radiation protection and calculation of radiation shielding;
- Assessment of exposure of the population to X-ray radiation for diagnostic purposes;
- Dosimetry of incorporated radionuclides;
- Whole body counting of contaminated persons;
- Clinical statistics;

For the past three years the department has also been responsible for the physics and engineering development of NMR for medical purposes.

The department can be contacted by telephone: Bern 31 — 64.24.29 (Mrs A. Pochon).

Clinical Physics and Physiological Measurement

Members are reminded that this EFOMP journal is available to them at reduced rates, for their personal use. The contents of the two most recent issues are listed below:

Volume 6, Number 1, February 1985.

Review article

Mass spectrometry in medical research *S J Gaskell*

Papers

Data acquisition from a multiplex, quadrupole mass spectrometer *B L Graham, P R Buchanan, S J Witty and E A Harris*

Factors affecting the 'alveolar deposition' of 5 μ m inhaled particles in healthy subjects *J E Agnew, D Pavia and S W Clarke*

A calorimetric system for metabolic studies of newborn babies *H J Dane, W P J Holland, P J J Sauer and H K A Visser*

A new method for measuring unidirectional transplacental flux *R Wootton, N Illsley and S Hall*

Short communication

Influence of random noise on the accuracy of the indicator-dilution method *J M Bogaard, W A van Duyl, A Versprille and M E Wise*

FRG Federal Health Office Report

Recommendations for the safe use of NMR equipment *J H Bernhardt and F Kossel*

Abstracts of proceedings: Quality control in diagnostic ultrasound

Book reviews

Dictionary of Physiological Measurement. Non-invasive Physiological Measurements. The Physiology and Pathophysiology of the Skin. Biophysics. Biological Effects of Ultrasound: Mechanisms and Clinical Implications (NCRP Report No 74).

Forthcoming events

Volume 6, Number 2, May 1985.

Review article

Body temperature measurement *T Togawa*

Papers

Applied potential tomography: possible clinical applications *B H Brown, D C Barber and A D Seagar*

Heart sound propagation in the human thorax *F Meno, P S Reddy and L Bernardi*

A uni-directional urethral force gauge *G L Hosker and G H Ward*

The effect of the transcutaneous electrode on the variability of dermal oxygen tension changes *V A Spence, P T McCollum, I W McGregor, S J Sherwin and W F Walker*

An inexpensive portable monitor for measuring evaporative water loss *R H Smallwood and S E Thomas*

Effects of time varying magnetic fields on fibroblast growth *P W Schuetz, J C Barbenel and J P Paul*

The influence of measurement precision on medical findings *G Schoknecht and C McManus*

Abstracts of Proceedings: HPA Annual Computer Conference

Forthcoming events:

EFOMP Business at ESPOO

As well as participation in the scientific sessions at Espoo, Helsinki, the following business meetings have already been arranged:

EFOMP Officers' Meeting — 9th August at 6 p.m.

EFOMP Council Meeting — 10th August at 9 a.m.

Both meetings will be held at Helsinki University of Technology, Department of Electrical Engineering, Rakentajan aukio 2 C, Otaniemi, Espoo. It is likely that the various committees will try to arrange additional meetings during the course of the main Congress.

Forthcoming Meetings

7th International Conference on Medical Physics and 14th International Conference on Medical and Biological Engineering.
August 11–16, 1985; Helsinki, Finland.
Mr. Hannu Seitsonen, 7th I.C.M.P. Secretary General, P.O. Box 105, 00251 Helsinki, FINLAND.

Medical Informatics Europe 85.
August 24–29, 1985; Helsinki, Finland.
MIE–85 Secretary General, Raija Tervo-Pelikka, The Finnish Hospital League, Toine linja 14, SF–00530 Helsinki 53, FINLAND.

European Society for Radiation Biology: 19th Annual Meeting.
August 26–30, 1985; Prague, Czechoslovakia.
Czechoslovak Medical Society (J. E. Purkyne), Vitezneho unora 31, P.O. Box 88, 120 26 Prague 2, CZECHOSLOVAKIA.

European Nuclear Medicine Congress.
3–6 September, 1985; London, England.
European Nuclear Medical Congress (1985), Institute of Nuclear Medicine, Middlesex Hospital Medical School, Mortimer Street, London W1N 8AA, ENGLAND.

2nd Congress of the European Society of Magnetic Resonance in Medicine and Biology.
October 3–5, 1985; Montreux, Switzerland.
Dr. Max-André Hopf, Route de Florissant 1, CH 1206 Geneva, SWITZERLAND.

2nd International Technical Symposium on Optical and Electro-optical Applied Sciences and Engineering.
(Organised by ANRT and SPIE; programme includes Medical Image Processing and Biostereometrics '85 — the fourth international meeting on Biostereometrics).
25 November – 6 December 1985; Cannes, France.
Judith Praedo, Cannes Conference Coordinator, ANRT, 101, Avenue Raymond Poincare, 75116 Paris, FRANCE.

International Conference on Electric and Magnetic Fields in Medicine and Biology.
December 4–5, 1985; London, England.
Conference Services, Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, ENGLAND.

1986

International Conference on Electronics in Medicine and Biology.
7–10 April, 1986; Nottingham, England.
The Conference Secretariat, Institution of Electronic and Radio Engineers, 99 Gower Street, London WC1E 6AZ, ENGLAND.

7th International Conference on Modern Trends in Activation Analysis.
June 23–27, 1986; Copenhagen, Denmark.
Dr. Kaj Heydorn, Isotope Division, Risø National Laboratory, Post Box 49, DK-400 Roskilde, DENMARK.

5th International Conference on Mechanics in Medicine and Biology.
July 1–4, 1986; Bologna, Italy.
Professor G. Paltotti, Faculty of Medicine and Surgery, Department of Physics, University of Bologna, Via Irnerio 46, 40126 Bologna, ITALY.

3rd International Conference on Measurement in Clinical Medicine.
9–11 September, 1986; Edinburgh, Scotland.
The Secretariat, 3rd IMEKO Clinical Measurement Conference, Institute of Measurement and Control, 87 Gower Street, London WC1E 6AA, ENGLAND.

Thermomedia 86 — The Forth Congress of the European Association of Thermology.
10–13 September, 1986; Graz, Austria.
Dr. H. Waltner, Secretary General — Thermomedia 86, Raubergasse 27, A–8010 Graz, AUSTRIA.

Slovak Medical Society: 2nd Symposium of Radiological Physicists with International Participation.
22–24 September, 1986; Bratislava, Czechoslovakia.
Dr. Viera Laginova, Secretary General, Institute of Clinical Oncology, Heydukova 10, 812 50 Bratislava, CZECHOSLOVAKIA.

3rd International Evoked Potentials Symposium.
28 September – 1 October, 1986; West Berlin, Federal Republic of Germany.
Dr. C. Barber, Medical Physics Department, Queen's Medical Centre, Nottingham, NG7 2UH, ENGLAND.

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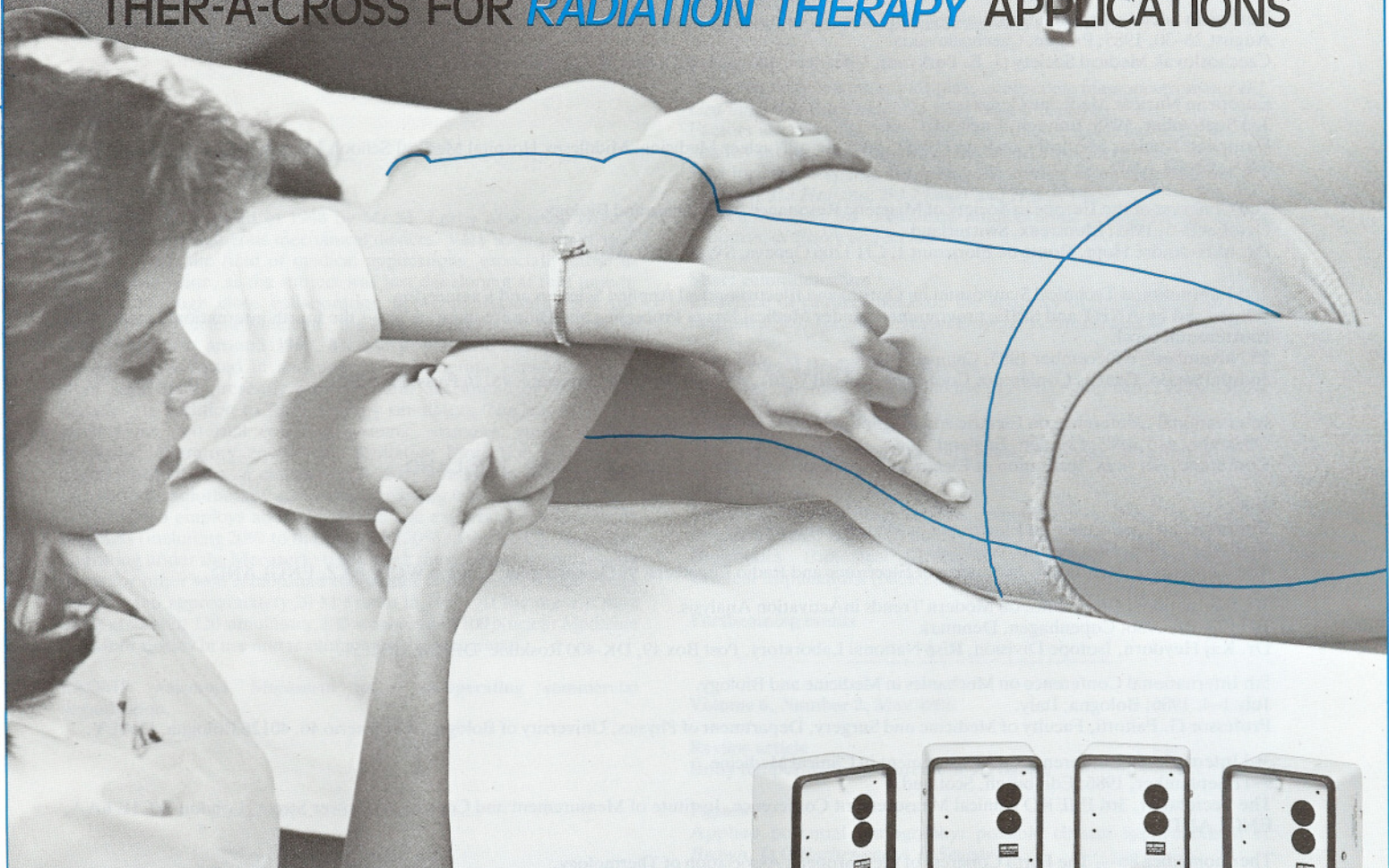
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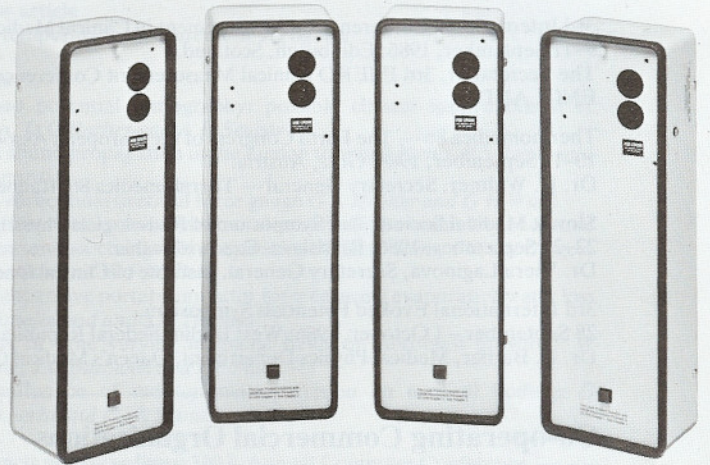
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