

Medical Physics World

Bulletin of the International Organization for Medical Physics

Adhering National Organizations 1986

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President's Message

Dear Friends and Colleagues:

I would like to express our collective thanks to Dr. Tapani Jauhiainen, President, to Mr. Hannu Seitsonen, Secretary General, of the 1985 IOMP Conference, and to our Finnish colleagues, for their excellent work in organizing and hosting the Conference in Espoo, Finland. The beautiful setting and pleasant weather contributed to the stimulating scientific and social programs.

The time of the Conference also was the time for changing IOMP officers. Our President for the past three years, Dr. Alexander Kaul, now holds the office of Past President. While I have succeeded Dr. Kaul to the presidency, Dr. John R. Cunningham of Canada has been elected to the position of Vice President. We are indeed fortunate that Dr. Brian Stedeford has been re-elected to the office of Secretary General. Both Dr. Stedeford and Dr. Kaul have worked with great devotion for the benefit of IOMP and its members.

The Editorial Board of **Medical Physics World** has also undergone some changes. Dr. Colin Orton, who had been responsible for the acquisition of advertisers, now serves as Editor. He is assisted by Mr. Geoffrey Ibbott, of Denver, Colorado, who will be in charge of the Calendar of Events. We want to thank Prof. Dr. Lauri Patomaki for serving on the Editorial Board.

Among the official actions at the meeting in Finland was the vote by the national delegates to allow the medical physicists groups of the People's Republic of China, Columbia, and Nigeria to join IOMP as members of our adhering national organizations. One additional country will most likely become a member in 1986.

During the regional meeting held in Chicago in 1984, the Latin American Medical Physics Association (LAMPA) was formed. LAMPA and EFOMP, the European Federation of Organizations for Medical Physics, have applied for membership in



Dr. Lawrence H. Lanzl, IOMP President

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President's Message

IOMP. It was not possible to admit regional groups under the existing statutes; however, the General Assembly of IOMP decided to amend the statutes to allow not only regional associations, but also corporations to become members.

Two important IOMP committees have been formed: (1) the Developing Countries Committee and (2) the Education and Training Committee. The activities of these committees will be reported on in future issues of **Medical Physics World**.

Our conference in Finland was held in conjunction with our friends of the International Federation of Medical and Biological Engineering (IFMBE). During the conference, our umbrella organization, the International Union of Physical and Engineering Sciences in Medicine (IUPESM), held its first organization meeting, and a method of selecting a council for the IUPESM was decided upon. In addition, it

was decided that the delegates to the General Assembly of the Union should be the national delegates of IOMP and IFMBE. With the formation of the Union and its (associate) membership in the International Council of Scientific Unions, we are witness to the completion of the international structure of the organizations for medical physics and biomedical engineering.

In the present era of more and better communication than was available at any time in the past, we can expect that accomplishments and advances in medical physics will be made known worldwide very quickly. The IOMP, which is the international arm of each of our adhering national medical physics groups, will do its share in informing all of you about things that are new in physics applied to medicine.

Sincerely

Lawrence H. Lanzl, Ph.D.

Officers of the Council/IOMP

President

Lawrence H. Lanzl, Ph.D., Prof.
Medical Physics, Rush-Presbyterian-St. Luke's
Medical Center,
1753 West Congress Parkway, Chicago, Illinois
60612,
U.S.A.

Vice President

John R. Cunningham, Ph.D., Prof.
Ontario Cancer Institute
500 Sherbourne Street
Toronto, Ontario M4X 1K9
Canada

Secretary-General

Brian Stedeford, Ph.D.,
Dept. of Radiation Physics, Churchill Hospital,
Headington, Oxford OX3 7LJ
United Kingdom

Past President

Alexander Kaul, Prof. Dr.
Inst. F. Radiation Hygiene, Federal Health Office,
Ingolstadter Landstr. 1, 8042 Neuherberg,
Federal Republic of Germany

Editorial Board

Colin Orton, Ph.D., Prof., Editor
Radiation Oncology Center
Harper-Grace Hospitals
3990 John R
Detroit, Michigan 48201,
U.S.A.

Geoffrey S. Ibbott, M.S., Calendar of Events Editor
University of Colorado Health Sciences Center
4200 East Ninth Avenue (A-031)
Denver, Colorado 80262,
U.S.A.

Alexander Kaul, Prof. Dr., (ex officio)

Lawrence H. Lanzl, Ph. D., (ex officio)

Brian Stedeford, Ph.D., (ex officio)

Editorial and Business correspondence should be addressed to Dr. Colin Orton.

Events information should be addressed to Mr. Geoffrey Ibbott. IOMP correspondence should be addressed to Dr. L.H. Lanzl and Dr. B. Stedeford.

Editorial Policy

Medical Physics World welcomes correspondence from medical physicists around the world. We are especially interested in receiving articles which review the status of medical physics in countries where "medical physics" is still a developing

profession, such as the articles on Medical Physics in Zambia on page 30. Please send all correspondence intended for publication **double spaced** to the Editor. Deadline for the next issue in June 1, 1986.

IOMP during the time between Hamburg 1982 and Espoo 1985

Report of the Past President on 3 years of activity of the Board of Officers

One of the initial IOMP activities after the Hamburg International Conference in 1982 was the founding of our bulletin "Medical Physics World". It is due to the untiring efforts of our President, the former Vice-President, Prof. Lawrence Lanzl, expertly aided by his colleague, Prof. Colin Orton that "Medical Physics World" has become a successful medium for our discipline with a circulation of more than 7000 copies. By disseminating pertinent information, "Medical Physics World" has drawn medical physicists from all over the world closer together.

One of the major tasks during the past 3 years was to establish contact with those national Medical Physics societies that had not as yet found their way to IOMP. This was looked upon as a main area of activity by our Secretary General, Dr. Brian Stedeford, to which he devoted himself with great energy and diligence. The election to the IOMP, during the conference at Espoo, of the People's Republic of China, Columbia, and Nigeria as adhering societies is a direct outcome to these efforts.

We, nevertheless, must regard our organization from a very critical point of view and try to concentrate our activities on achieving greater practical benefits for our affiliated organizations and their respective members than we were able to do in the past. Although only partly successful, several attempts in this direction have been made:

- we assisted colleagues from economically less prosperous countries in attending the conference in Espoo by means of industrial or organizational funding. Among others, we were able to help a colleague from Poland to participate in the course on "Vision and Image Understanding" which was held in Erice, Italy, in 1984.
- the first steps may have been taken towards meeting the specific needs in developing countries by establishing committees for education and training in order to develop activities in the areas where they are most urgently needed, but could not as yet advance rapidly enough beyond the planning stages. Here, we are in particular need of the collaboration of directly concerned colleagues, specifically those from the developing countries, who could tell us precisely where they require our assistance. I sincerely hope that a close cooperation with these colleagues will give us the opportunity to work out realistic

solutions of their particular problems.

I hope for a continued cooperation with regional associations of Medical Physics organizations, as a result of which - after the European Federation of Organizations for Medical Physics (EFOMP) - the Association Latinoamericana De Fisica Medica (LAMPA) has joined the IOMP as an appropriate partner of work to be done e.g. in the field of education and training with special emphasis on the developing countries.

The IOMP work effort has also been focussed on the conceptual as well as financial support of regional conferences for Medical Physics and its related fields. These were in 1983: the "2nd International Symposium on Fundamentals on Technical Progress in Emission Tomography, Digitized Radiography and Nuclear Resonance", jointly organized by the University of Liege, Belgium, and the Belgian Society for Clinical Physics; in 1984: the Conference on "Applications of Physics to Medicine and Biology", jointly organized by the International Centre for Theoretical Physics, University of Trieste, and the Italian Association for Medical Physics; in 1984: the "Interamerican Meeting of Medical Physics", organized jointly with AAPM, in Chicago, Illinois, USA.

The following future meetings are on the agenda:
September 1986: the "3rd International Conference on Measurement in Clinical Medicine", Edinburgh, UK;

Continued on page 4

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IOMP during the time between Hamburg 1982 and Espoo 1985

December 1986: the "Asian Regional Conference on Medical Physics", Bombay, India.

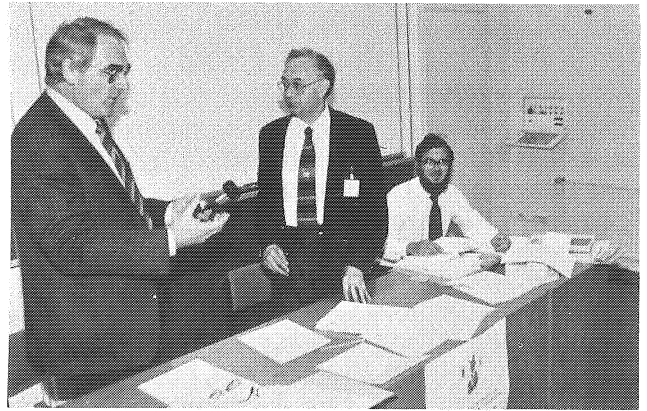
Existing connections to international organizations, such as IAEA, WHO, ICRU and ICRP, have been intensified during the past 3 years. In 1984, for instance, IOMP was officially represented at the WHO Scientific Group Meeting on "Future Use of New Imaging Technologies in Developing Countries" in Geneva. In 1985, the Secretary General was a guest at the ICRU Meeting in Oxford, UK. As for myself, I am an actively involved member of ICRP Committee 2.

As a result of the particular efforts of my predecessor, Prof. John Mallard, the International Union of Physical Engineering Sciences in Medicine (IUPESM) became an Associate Member of the International Council of Scientific Unions (ICSU). IOMP and IFMBE thus are current members (non voting) of this international, non-governmental scientific organization of about 18 autonomous international scientific unions with more than 60 national affiliates. We were in constant contact with IUPESM by reporting on all IOMP activities to the President, John Mallard, and the Secretary General, Prof. Robert Clarke.

In reference to the cooperation with our IFMBE colleagues, I would like to mention that in addition to written communications as, for instance, on the character and operational outline of future joint congresses, we held a 2-day conference in 1984 in Gothenburg where the future collaboration between the two organizations was discussed.

This report, as seen from the position of the now past-President, presents only a generalized summation of individual IOMP activities. We have tried hard, but much could only be started with much still remaining to be done. In conclusion, allow me to emphasize that the results we did achieve could not have been accomplished without team effort. For this, I want to mainly thank Brian Stedeford, Lawrence Lanzl, Rune Walstam, John Mallard, Bob Clarke as well as the colleagues from all national organizations. Without their valuable contribution, our work would undoubtedly have been less stimulating, and altogether more difficult to achieve.

Alexander Kaul



Dr. Lanzl accepts the gavel from Dr. Kaul during the transfer of IOMP Presidency at ESPOO. Secretary-General Stedeford looks on. Photo: Oskar Chomicki, Poland.

Report of the Secretary-General, Dr. Brian Stedeford for the period September 1982 to August 1985

One of the major tasks of the Secretary-General is to make contact with medical physicists in countries who are not yet members. We consider it important to keep up these contacts, even if they are unable to join us officially yet. IOMP exists to help medical physicists in all countries, not to further its own ends.

Between the Conferences in Hamburg and in Finland, the number of national members actually decreased by one from 28 to 27, with the resignation of New Zealand. However, this group is presently being re-formed as part of a new Australasian group and it is hoped that in due course we will be able to welcome back New Zealand and also accept Australia as a member.

During the meeting at Espoo near Helsinki, we elected into membership the People's Republic of China, Columbia, and Nigeria. We also received the Latin-American Medical Physics Association into association with us, in a similar relationship that we have with the European Federation of Medical Physics. It is hoped that after the Regional Meeting in Bombay, India in December 1986, it will be possible to form a South East Asia Group. We are negotiating with Argentina and hope they will be able to join us soon. We were however, able to welcome Sr. Singer and Sr. Mazal from Argentina at Espoo and also honoured to receive Professor Xie Nai-Zhu from P.R.C.

We also have contacts in Bulgaria, Czechoslovakia, Egypt, Hong Kong, Iraq, Kenya, Pakistan, The Philippines, Syria, the U.S.S.R. and Zambia and new ones are being added all the time. Our bulletin, *Medical Physics World*, is of great assistance in

giving information to prospective members. If you make any contacts in these or any other countries, please let me know so that I can follow them up.

I append the audited account of IOMP for the period July 1982 to June 1985. It should be noted that the item 'Bank and Exchange' covers losses incurred due to working in three different currencies having variable exchange rates, but presenting the accounts in U.S. dollars equivalent at the end of each year. This is no small task in itself!

At Hamburg in 1982, the officers were authorized to double the annual subscription from \$10 per 25 members which had been the rate since 1972, shortly after the formation of IOMP. For 1983 we kept it at the old rate, increasing it to \$12.50 in 1984 and \$17.50 in 1985. We have now increased the subscription to the full amount of \$20 per 25 members for 1986 but will retain it at that rate until 1988. We need to do this in order to take account of increasing expenses of the organization, particularly with respect to postage and travel, and also to allow us to improve our organization in the fields of Education and Training and in assistance to Developing Countries.

Committees for these were established at Espoo under the Chairmanship of Dr. Carlos de Almeida, Brazil and Professor Walstam, Sweden respectively. The duties of these Committees, as outlined

at Espoo by Professor Kaul, past-president are appended.

In order to help these countries to be members of IOMP however, we continue to offer the reduced subscription of \$10 per 25 members for developing countries. Alternatively or additionally, member organizations which have difficulty in remitting subscriptions to IOMP will be allowed to set up a special fund in their own country for the following purposes-

- (a) to organize a conference in their own country with free participation from other member countries, i.e., a regional group meeting held under IOMP auspices and publicized through that body;
- (b) to pay local expenses of visiting lecturers or experts to further medical physics in that country. The fund need not be disbursed each year but a special IOMP account must be set up, with details submitted to the Secretary/General each year and full audited accounts every three years to be incorporated into the IOMP accounts.

Our budget for 1985-1986 is as follows —

Income	Subscription	\$4,500
	Interest	\$1,500
	TOTAL	\$6,000

Continued on page 6

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Report of the Secretary-General, Dr. Brian Stedeford for the period September 1982 to August 1985

Expenditure	Post, Stationery, 'phone	\$1,250
	Secretarial	\$ 300
	Officers' travel	\$1,250
	Meetings, Subsidy or Travel	\$1,500
	IUPESM	\$ 500
	Medical Physics World	\$1,000
	Bank and Audit	\$ 200
	TOTAL	\$6,000

Any profits from meetings payable to IOMP will be used to increase the capital assets of the organization, with only the interest available for use. Our total assets are small in relation to other bodies and this is disadvantageous to us.

In the past, we have not received accounts from IOMP meetings. In future it is a condition of hosting an international congress or regional IOMP meeting that the budget be submitted beforehand and audited accounts following the meeting.

Commercial sponsorship was sought for people from developing countries to attend this meeting at Espoo. Over 40 firms were contacted, but positive replies were received from only seven, AECL, Brown Boveri, Fabcast (U.K.), Gammex, RMI, Siemens, and Therados. The sum of over \$4,000 was however raised in this manner and was used to assist eight people to attend this meeting. We are most grateful for the support these firms gave us and are only sorry that more companies were not able to help, so that we could help more people to attend the meeting.

It would be a great advantage if such assistance could be put on a more regular basis and we propose to establish a form of corporate membership for firms associated with medical technology, the revenue being used to help sponsor attendance at our meetings by those persons otherwise unable to attend.

During the present term of office your Secretary/General has visited the Inter-American/AAPM meeting in Chicago in 1984 and attended the ICRU meeting held at Harwell in June this year. A report on the first meeting appeared in the last issue of MPW and one on the second appears in this issue. IOMP also assisted Professor C.R. Hill to attend the WHO meeting on Ultrasound and CT in Developing Countries to represent IOMP.

Your Secretary/General also visited Hungary in June at the invitation of the Secretary/General of

IUPAB, Professor Tigyí to discuss furthering relationships with that body. We resigned as a member of IUPAB on the formation of IUPSEM, but they are anxious to re-establish a connection. The Council meeting at Espoo considered that this should be maintained at an informal level for the time being.

At Espoo, Professor Larry Lanzl, U.S.A. became our President and Professor Jack Cunningham, Canada, our Vice President. It was also decided that our 1991 meetings are to be held at Kyoto, Japan.

Finally, should you need to contact me urgently, you can telex me via an Oxford agency, 83147 VIAOR G - ATTN IOMP

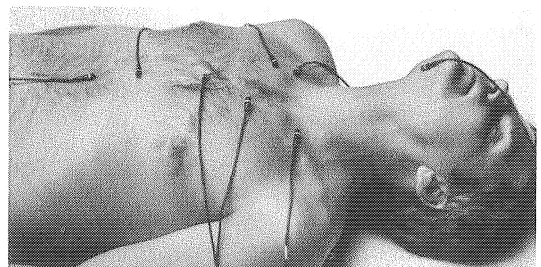
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APPENDIX I

International Organization for Medical Physics
Accounts 1st July 1982 - 30th June 1985

	82/83	83/84	84/85
	U.S.\$=	U.S.\$=	U.S.\$=
Income			
Subscriptions	1885	2695	3836
ICMP Hamburg	5602		
Interest	1032	1483	1379
Total Income	8519	4178	5215
Expenditure			
Post, Stationery, Phone	525	158	866
Secretarial		68	186
Officers' Travel etc.	498	407	1058
IUPESM	162	73	505
Grants for Meetings	118	152	104
Med. Phys. World	2500		1255
Seed Money ESPOO		1875	
Bank and Exchange	11	158	16
Total Expenditure	3814	2891	3990
Balance for Year	4705	1287	1225
Assets 1st July 1982 SK 86,105	=		\$11,480
Balance 82/83			4,705
Assets 1st July 1983 of Accounts			\$16,185
Balance 83/84			1,287
Assets 1st July 1984			\$17,472
Balance 84/85			1,225
Assets 1st July 1985			\$18,697
Comprising			
Cash at Bank	£1270 @ \$1.30 =		1,651
	SK 428 @ SK 8.8 =		48
	\$15,162		15,162
Total at Bank			16,861
Loan to ESPOO			3,800
			20,661
Less held for ESPOO Sponsorship			1,964
			18,697
Brian Stedeford Secretary	J. Stewart Orr Auditor	Rune Walstam Auditor	

APPENDIX II

Duties of Developing Countries Committee

1. To contract national organizations for medical physics in the developing countries to ask what spare parts or journals are needed.
2. To contact national organizations for medical physics in the industrialized countries to ask for spare parts or journals according to a list prepared from answers to the above enquiries.
3. To also give the list to 'Medical Physics World' (MPW) so that MPW can publish it and act as a

clearing house.

4. To negotiate on behalf of IOMP with IAEA and WHO for financial support for transport, and in addition with those national organizations for medical physics that have offered spare parts.
5. To contact manufacturers on behalf of IOMP to get financial support for colleagues of developing countries to visit training centres, regional congresses, etc.
6. To organize information from developing countries for publication in MPW so that people in these countries will not feel so isolated.

Duties of Education and Training Committee

1. To develop task-oriented training programs.
2. To make available useful publications, i.e. publications on matters which are important for daily physical routine in a hospital.
3. To publish periodically curricular letters on various subjects such as quality assurance in diagnostic radiology, nuclear medicine and radiotherapy.
4. To organize short refresher courses, seminars or workshops where access will be easy for medical physicists from the countries concerned, i.e. in connection with local, regional, inter-regional or international congresses.
5. To stimulate the foundation of regional centres for education and training in co-operation with IAEA and WHO.

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More about the ICRU

by *Brian Stedeford*

In the last issue of MPW, Dr. Harold Wyckoff reviewed the work of the ICRU. This organization kindly invited the IOMP to send a representative to the meeting of its commission held in June 1985 at Oxford. Since that is your Secretary/General's residence, he seemed to be the most convenient representative to send.

It turned out the meetings were held at the Medical Research Council Unit at Harwell, by kind invitation of Dr. G. Adams. This is in fact twenty miles from Oxford, but still closer by a factor of more than one or two orders of magnitude than were the President and Vice-President respectively. There was of course no necessity for it to have been one of the officers - for a future meeting of this or another organization it might be more convenient to send a representative from the member organization in whose country the meeting is being held.

The meeting spent most of its time discussing three reports whose publication is imminent, those on Dosimetry for Radiation Processing, Modulation Transfer Function of Screen - Film Systems, and Clinical Neutron Dosimetry. Your Secretary/

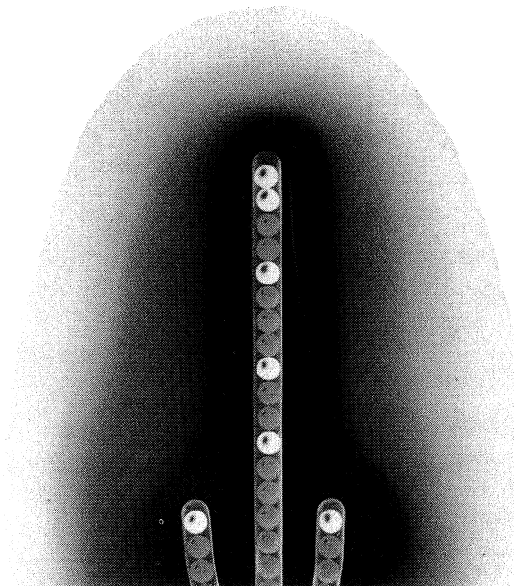
General made some comments on the drafts of these reports, particularly the last one, which he hoped were of some assistance, especially where he felt that some clarification might be needed for those persons who did not spend their entire (working) lives living and breathing neutron dosimetry.

It was decided to divide this report into two parts (1) Measurement of Absorbed Dose and (2) Treatment Specification, to include radiobiological aspects. This was decided mainly in the interest of getting the first part published relatively soon, there being considerably more work involved in the second section. We would also like to see these reports as soon as the problems they describe become important to us, but unfortunately this is not possible when a subject is in a state of flux. Perhaps in future we will be able to log on to our terminals and read this week's version of any given report - but then it might be distressing for us if we logged on the following week to find it had changed!

A number of ongoing activities of ICRU were discussed at the meeting, as embodied in their various committee reports, as follows:

- (a) Characterization of Irradiation for Materials - Effects Studies (Dr. Caswell and Dr. Sinclair). One aspect being studied is the effects of

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- (b) Chemical Dosimetry (Dr. Adams). Possible future applications are being studied
- (c) Computer Uses in Radiotherapy (Dr. Wambersie)
- (d) Definitions and Terminology for Computer Tomography (Dr. Sherwood and Dr. Mallard)
- (e) Definition of Physical Parameters to Specify Performances of Imaging Instruments (Dr. van der Schoot, Dr. Feinendegen and Dr. Caswell)
- (f) Absorbed Dose Distribution around a Source used for Interstitial Therapy and Dose Specification for reporting Intracavitary and Interstitial Therapy (Dr. Wambersie)
- (g) Measurement of Dose Equivalent (Dr. Allisy and Dr. Cowper)
- (h) Quality Assurance in External Beam Therapy (Dr. Wambersie and Dr. Rossi). The World Health Organization in conjunction with the Federal Health Office of the FRG is compiling a document on this topic following a meeting in December 1984 which Dr. Wambersie and your Secretary/General attended, but any report produced by ICRU will be complementary to this
- (i) Stopping Power (Dr. Allisy and Dr. Caswell). Some of us may regret that this is an ongoing requirement, but such is the case. At present a report giving stopping powers for protons and alpha-particles is in preparation, to include values for high-Z materials

Some potential new activities were discussed at the meeting, including the following -

- (i) Nuclear Magnetic Resonance (Dr. Feinendegen) This would study possible effects of stable and also R.F. magnetic fields. These latter are potentially more damaging than the former and although there is no strong evidence of this to date, the Commission considers this matter should receive close attention
- (ii) Accident Dosimetry (Dr. Feinendegen)
- (iii) Hyperthermia (Dr. Wambersie)
- (iv) Phantoms (Dr. Sinclair)
- (v) Statistical Problems in Particle Counting (Dr. Allisy)

Other activities by related groups were also mentioned at the meeting.

1. The IAEA offers, at cost, a dosimetry service for radiation processing using Analine dosimeters, somewhat similar to that for Radiotherapy.
2. The IAEA is considering producing a report on radiation dosimetry of high energy x- and gamma-rays. The ICRU will review its own plans to initiate new work in this field in the light of this.
3. The ICRP is producing reports on the basic principles of waste disposal and the protection of miners. It is also up-dating ICRP 27 (index of

harm) and will be conducting a complete review of ICRU 26 in due course. There was some discussion of the recent clarification in the Journal of Radiological Protection Dosimetry (Sept/Oct 1985) that 1 mSv (100 mRem) per annum is to be considered the maximum permissible dose for non-occupationally exposed persons, effectively averaged over their life-time.

4. A new inter-comparison between the international standards laboratories will shortly take place. Previous comparisons agree to within better than 1% or on average to 0.5%. Agreement for neutron inter-comparisons are 'improving'. Tissue equivalent chambers are now available for comparison purposes.

Dr. Harold Wycoff retired as Chairman of the Commission at the end of the meeting and dinner was held in his honour. The perspex gavel, incorporating an anode of one of the first Crookes x-ray tubes was figuratively handed over to Dr. Allisy from the Bureau International des Poids et Mesures.

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Quality Assurance in Radiotherapy:

Current Activities of the WHO in Collaboration with the Institute for Radiation Hygiene of the Federal Health Office

A. Kaul, A. Bauml

Institute for Radiation Hygiene, Neuherberg/
Munich

The Institute for Radiation Hygiene of the Federal Health Office has carried out the work of a WHO-collaborating centre on efficacy and efficiency in medical applications of ionising radiation and radio-nuclides since 1979. In the meantime, the term "Quality Control and Assurance" (QA) has been introduced in the agenda of collaboration, as it was recognized that quality assurance is an important feature of efficacy and efficiency of medical uses of ionizing radiation and radioactive substances in diagnosis and therapy.

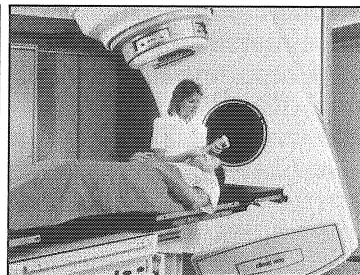
Consequently, according to the WHO's general aim of achieving improved health care in all countries - in particular in developing countries - the Institute of Radiation Hygiene, in collaboration with WHO, has organized a series of expert meetings on problems of and prerequisites for efficacy and efficiency and QA in diagnostic radiology, nuclear medicine and radiotherapy (see Table 1).

The results of the 1980 expert meetings on Quality Assurance in Diagnostic Radiology and Nuclear Medicine have been published by the WHO (1,2). They are intended as guidelines. These guidelines served as a basis for training workshops organized by the Institute for Radiation Hygiene, in collaboration with the WHO, in 1982 and 1983 (Table 2). Based on the practical application of quality assurance procedures, these workshops were aimed at the question whether, and to which extent, these recommendations could be translated into the every day clinical routine. The most important characteristics required of such procedures may be summarized as follows: the procedures should provide sufficient accuracy and easy application under clinical routine conditions; they have to be serviceable and must not be too sophisticated. Paying special attention to the developing countries - where these procedures should preferably be applied to improve the quality, and thereby the efficacy of medical uses of radiation in diagnosis - medical physicists and radiologists, especially from these countries, were invited to participate in the workshops.

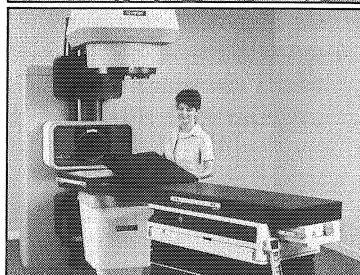
The procedures of QA carried out during these training workshops in the form of a practical training

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Table 1

Expert Meeting of WHO together with the Institute for Radiation Hygiene	
1979	Efficacy and Efficiency in Diagnostic Application of Radiation and Radionuclides
1980	Quality Assurance in Diagnostic Radiology Quality Assurance in Nuclear Medicine
1981	Efficacy and Efficiency of Radiodiagnostic and Nuclear Medicine Procedures
1984	Quality Assurance in Radiotherapy

Table 2

Training Workshops of WHO together with the Institute for Radiation Hygiene on Quality Control and Assurance	
1982	Diagnostic Radiology
1983	Nuclear Medicine
1986	Radiation Therapy (planned)

course were described in detail in the manner of a cooking book. The publications are available (Diagnostic Radiology) (3) or in press (Nuclear Medicine) (4), and are intended as a basis for similar courses to be held in the future, especially in developing countries.

Similar to Diagnostic Radiology and Nuclear Medicine, the efficacy and efficiency of radiation therapy can be improved by introducing measures of QA into the daily clinical practice. This is curtailed by the fact that many procedures proposed for QA in therapy, as in diagnosis, are often too time-consuming to be routinely applied in clinical radiotherapy. Precise application of such procedures, therefore, is often lost at the expense of applicability.

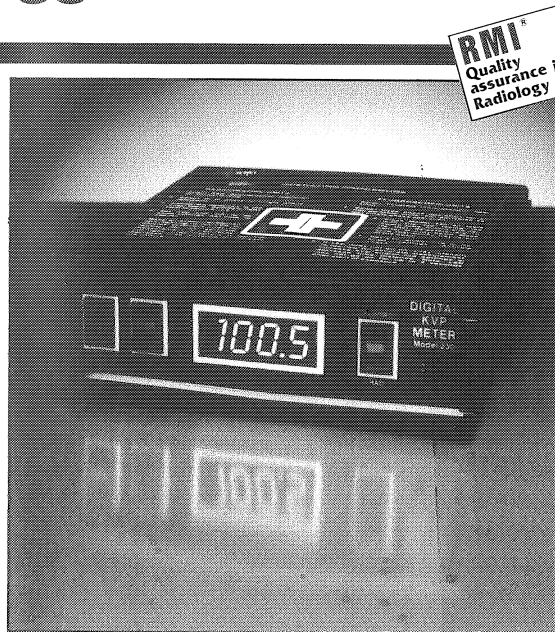
This was the background from which another expert meeting on QA in radiotherapy was organized by the Institute for Radiation Hygiene in collaboration with the WHO in December 1984 at Schloss Reisensburg, a conference center of the University of Ulm. In keeping with the international character of WHO, the participants - radiotherapists and medical physicists - came from various countries around the globe (Table 3).

After introductory lectures on the clinical aspects

Continued on page 12

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Quality Assurance in Radiotherapy:

of QA in radiotherapy and the role of medical physics in QA, state of the art reports were presented by members of international and national scientific professional organizations.

Table 3

Workshop of WHO together with the Institute for Radiation Hygiene on Quality Assurance in Radiotherapy 1984	
Countries represented by Participants from:	
Belgium	India
China, P. R.	Peru
Finland	Sweden
France	Tanzania
FRG	UK
GDR	USA

The activities of nongovernmental international organizations, such as ICRP, ICRU or ESTRO (European Society for Therapeutic Radiology and Oncology), or of IAEA/WHO in the field of QA in radiotherapy, as presented on the occasion of the expert meeting, can be summarized as follows:

ICRP has issued several publications dealing with QA or optimization in radiotherapy.

ICRP Publication 33 (1982) (5) gives recommendations regarding protection design, operation and quality assurance for radiological equipment used in medicine. The publication recommends that in order to maintain good radiation protection, quality assurance programmes should be carried out. These programmes should include both main equipment and accessories, recording and processing systems as appropriate. Quality assurance programmes should include acceptance tests of new radiological equipment to ensure that such equipment meets applicable performance specifications, as may have been determined by national or local authorities, or by the manufacturer. Thereafter, periodic performance tests should be carried out "in order to check that conditions are unchanged . . .". Particular recommendations are made for superficial X-ray therapy units, orthovoltage X-ray therapy units, high energy accelerators, and Co-60 therapy units.

Quality assurance is discussed further in ICRP Publication 44 (1985) (6) which is devoted to "Protection of the Patient in Radiation Therapy". It is noted that modern radiation therapy equipment is designed to give high accuracy in mechanical stability, rotation, angulation, field size, and field location. Some

examples of important parameter accuracies that should be met by radiotherapy units are given.

These refer to:

- the adjustable beam-limiting device;
- a light beam for treatment field localization;
- the mechanical and radiation beam isocentres;
- the field size indicator;
- the individual field-shaping blocks.

ICRU has published several reports on methods and data for dosimetry with photons, electrons and neutron beams as an indispensable prerequisite for good dosimetry and for reproducible radiation therapy.

As far as dosimetry in external beam therapy with photons is concerned, Report 23 (1973) (7) deals with "Measurement of Absorbed Dose in a Phantom Irradiated by a Single Beam of X or Gamma Rays". Report 24 (1976) (8) deals with "Determination of Absorbed Dose in a Patient irradiated by Beams of X or Gamma Rays in Radiotherapy Procedures". It includes the problems raised by the complex shape and inhomogeneities of the patient, and the combination of different beams.

Continuing in the same direction, and taking into account the fact that computers have played an increasingly important role in dosimetry and treatment planning procedures, ICRU now prepares a

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report on "Computers in External Beam Radiotherapy Procedures with Photons and Electrons".

As far as measurements in high-energy electron beams are concerned, Report 35 on "Radiation Dosimetry: Electron Beams with Energies between 1 and 50 MeV" just appeared (Sept. 1984) (9).

A clear and unambiguous definition of terms and concepts used in radiation therapy is a further objective of the ICRU. In that respect, Report 29 on "Dose Specification for Reporting External Beam Therapy with Photons and Electrons" (1978) (10) illustrates how the achievement of this objective may lead the ICRU deeply into the field of radiation therapy. Report 29 provides definitions of terms such as "tumour volume", "target volume", "irradiated volume", "target absorbed dose". A report on "Dose and Volume Specification for Reporting Intracavitary Therapy in Gynecology" (Report 38) is in press (11).

In addition to its general activities in quality assurance in radiotherapy, ICRU is now preparing a report dealing specifically with the aims of QA in Radiotherapy: "Quality Assurance of External Beam Therapy with Photons and Electrons".

The principal objective of ESTRO is to improve standards of cancer treatment by promoting the exchange of information among radiation oncologists and other specialists.

Such an objective involves the promotion of Quality Assurance Programmes in Radiotherapy.

The two subjects "Quality Assurance in Radiotherapy" and "Precision in Radiotherapy", which are necessarily closely linked, were dealt with on the occasion of annual meetings:

- In London (1982), a session was devoted to Accuracy in Radiotherapy.
- In Bordeaux (1983), a joint session with EFOMP was held on Quality Control in Radiotherapy.
- In Jerusalem (1984), two symposia, i.e. on New Protocols for Dosimetry and Radiation Treatment Equipment, were related to Quality Assurance in Radiotherapy. The title of the Klaas Breur Lecture held on the occasion of the meeting was "Where, when and how can we improve Precision in Radiotherapy?" (12).

The IAEA, in collaboration with WHO has run a worldwide TLD-dose intercomparison programme since 1970 that is a valuable aid for radiotherapy facilities wanting to improve their dosimetry. It was initiated to provide a means of verifying the doses given in radiotherapy with Co-60 gamma rays for hospitals without access to calibration facilities.

From reports on the situation of radiotherapy in

Continued on page 19



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CALENDAR OF EVENTS

Geoffrey S. Ibbott, Editor

1986

March 3 - 7

Symposium on Siting, Design and Construction of Underground Repositories for Radioactive Wastes, sponsored by The International Atomic Energy Agency, Hanover, Federal Republic of Germany (Secretariat, IAEA, Vienna International Center, P.O. Box 100, A-1400, Vienna, Austria).

March 17 - 21

26th Anniversary Congress and Summer School of the South African Association of Physicists in Medicine and Biology, Momentum Complex, State Theatre, Pretoria, South Africa (SAAPMB Congress, c/o Department of Nuclear Medicine, Medunsa 0204, South Africa).

April 2 - 3

22nd Annual Meeting of the National Council of Radiation Protection and Measurements, Principal Scientific Session: Non-ionizing Radiation, Washington, D.C. (NCRP, 7910 Woodmont Avenue, Suite 1016, Bethesda, MD 20814).

April 9 - 11

British Institute of Radiology Annual Congress: Radiology '86, Bristol, United Kingdom (The Institute of Physical Sciences in Medicine, 47 Belgrave Square, London SW1X 8QX, United Kingdom [01 235 6111]).

April 11 - 18

Annual Meeting of the American Roentgen Ray Society, Washington, DC (American Roentgen Ray Society, Harper Grace Hospitals, Radiology Department, John R., Detroit, MI 48201).

April 12 - 15

North America Hyperthermia Group, 6th Annual Meeting, Las Vegas, NV (Radiation Research Society, 925 Chestnut St., 7th Floor, Philadelphia, PA 19107 [215-574-3153]).

April 13 - 16

British Nuclear Medicine Society Annual Congress, Imperial College, London, United Kingdom (The Institute of Physical Sciences in Medicine, 47 Belgrave Square, London SW1X 8QX, United Kingdom [01 235 6111]).

April 13 - 17

Radiation Research Society, 34th Annual Meeting, Las Vegas, NV (Radiation Research Society, 925 Chestnut Street, 7th Floor, Philadelphia, PA 19107 [215-574-3153]).

April 18 - 22

37th National Conference of the Australian Institute of Radiography, Melbourne, Victoria, Australia (Mr. Graham Woods, Australian Institute of Radiography, P.O. Box 278, East Melbourne, Victoria 3002, Australia).

May 13 - 15

6th European Optoelectronics Meeting, Paris, France (ESI Publications, 12 Rue de Seine, 75006 Paris, France [33-1-325-58-74]).

May 22 - 24

12th International Symposium on Photon Detectors, Varna, Bulgaria (International Measurement Confederation (IMEKO), Karolina Havrilla Sec., P.O. Box 457, H-1371 Budapest 5, Hungary).

May 28 - 31

4th Symposium of the Medical Application of Cyclotrons, Turku, Finland (Dr. Robert Paul, Turku Medical Cyclotron Project, SH-Building, Room, B 206, Turku University Central Hospital, SF-20520 Turku, Finland [21-611 611]).

June 5 - 7

Annual Congress of the French Society of Hospital Physicists: Computers in Radiotherapy, Paul Sabatier University, Toulouse, France (Mme. Myriam Dziadowiec, Centre de Physique Atomique, Universite Paul Sabatier, 118 Route de Narbonne, 31062 Toulouse, France)

June 16 - 20

PATRAM' 86, sponsored by The Department of Energy and the Health Physics Society, Davos, Switzerland (IAEA, P.O. Box 100 A-1400 Vienna, Austria).

June 21 - 26

American Society of Radiologic Technologists, 1986 Annual Conference, San Antonio, TX (The American Society of Radiologic Technologists, 15000 Central Avenue, S.E., Albuquerque, NM 87123 [505-298-4500]).

June 22 - 25

Society of Nuclear Medicine, 33rd Annual Meeting, Washington Convention Center, Washington, D.C. (SNM Meetings Department, 475 Park Avenue South, New York, NY 10016 [212-889-0717]).

June 22 - 27

11th Annual Meeting of the American Association of Medical Dosimetrists, Holiday Inn, City Center, Chicago, IL (Harry Palmer, M.C.E., St. Mary's Hospital, Radiation Oncology, 2323 North Lake Drive, Milwaukee, WI 53201 [414-225-8000]).

June 29 - July 3

Health Physics Society, 31st Annual Meeting, Pittsburgh, PA (Mr. R.J. Burk, Health Physics Society, 1340 Old Chain Bridge Road, Suite 300, McLean, VA 22101 [703-790-1745]).

July 1 - 5

5th International Conference on Mechanics in Medicine and Biology, The University of Bologna, Italy (Secretary of 5th ICMMB, c/o Dr. G. Pallotti, Professor of Medical Physics, Department of Physics, Faculty of Medicine and Surgery, University of Bologna, Via Irnerio 46, 40136 Bologna, Italy [Tel. (051) 226830 Ext 14 - Telex 211664 INFNBO]).

July 5 - 15

Advances in Medical Imaging and Related Dosimetry, Erice, Italy (Prof. Alberto Del Guerra, University of Pisa, Department of Physics, Piazza Torricelli, 21-56100 Pisa, Italy [050-49656, Ext. 213]).

July 16 - 18

International Topical Meeting on Image Detection and Quality, French Optical Society, Paris, France (Secretariat executif, A.N.R.T., 75116 Paris, France).

July 21 - August 8

Latin American School in Experimental and Theoretical Particle Physics and Accelerators, Mexico City, Mexico (C. Avilez, Instituto de Fisica, Apdo. Postal 20-364 01000 Mexico, D.F.).

July 26 - August 9

NATO Advanced Study Institute of Physics and Technology of Hyperthermia, Urbina, Italy (S. B. Field, MRC Cyclotron Unit, Hammersmith Hospital, Ducane Road, London W12, United Kingdom [44-1-743.4594, TX 935589 MRCCYL G] or C. Franconi, Medical Physics Institute II University of Rome, Via O. Raimondo, 00173 Rome, Italy [39-6-613.1200, TX 611462 UNIVRM I]).

July 27 - August 1

American Association of Physicists in Medicine, Summer School: Radiation Oncology Physics -1986, Miami University, Oxford, OH (AAPM, Executive Secretary, 335 East 45th Street, New York, NY 10017).

August

13th International Conference on High-Energy Accelerators, International Union of Pure and Applied Physics, Tsukuba, Japan (Prof. J.R. Klauder, Associate Secretary-General, IUPAP, AT&T Bell Laboratories, 600 Mountain Avenue, Murray Hill, NJ 07974 [Tel. 1-201-582-2404, Telex 138650 BELL UR]).

August 3 - 7

American Association of Physicists in Medicine, 28th Annual Meeting, Lexington, KY (AAPM Executive Secretary, 335 East 45th Street, New York, NY 10017).

August 4 - 8

8th International Conference on Vacuum Ultraviolet Radiation Physics, Lund, Sweden (L. Hedin, Institute of Theoretical Physics, Lund University, Solvegatan 14A, S-223 62 Lund, Sweden).

August 8 - 10

3rd Annual Meeting of the American College of Medical Physics, French Lick, Indiana (P. Almond, Department of Therapeutic Radiology, James G. Brown Cancer Center, University of Louisville School of Medicine, 529 S. Jackson Street, Louisville, KY 40202, USA.)

August 21 - 27

14th International Cancer Congress, Budapest, Hungary (14th International Cancer Congress, Congress Bureau MOTESZ, Budapest, POB. 32. H-1361 Hungary.)

August 22 - 25

5th Asian and Australasian Conference of the International Society of Radiographers and Radiological Technicians, Hong Kong (Mr. Edgar G. Mercer, Secretary-General, International Society of Radiographers and Radiological Technicians, Stoneystack, Woodland Way, Weybridge, Surrey KT13 9SE, UK [Tel. Weybridge 44704]).

August 26 - 29

8th International Conference on Solid-State Dosimetry, Oxford, United Kingdom (L.M. Ashby, National Radiological Protection Board, Chilton, Didcot Oxfordshire, OX11 ORQ, United Kingdom).

September 1 - 5

International Symposium on Radiotherapy in Developing Countries - Present Status and Future Trends, Vienna, Austria (Conference Service Section, International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria).

September 3 - 5

2nd Congress of the Southern Africa Society of Nuclear Medicine, Cape Town, South Africa (Dr. J.A. Smith, Department of Nuclear Medicine, Groote Schuur Hospital, 7925 Observatory, Republic of South Africa).

September 5 - 7

Teaching Course on Brachytherapy in Gynecology, (Director: Prof. Dr. D. Chassagne), Baden-Baden, Federal Republic of Germany (Dr. E. van der Schueren, Department de Radiotherapie, Clinique Saint-Raphael, 35 Chemin des Capucines, B-3000 Louvain, Belgium [016-21 22 31]).

September 8 - 10

5th Annual Meeting of the European Society for Therapeutic Radiology and Oncology, Baden-Baden, Federal Republic of Germany (Dr. E. van der Schueren, Department de Radiotherapie, Clinique Saint-Raphael, 35 Chemin des Capucines, B-3000 Louvain, Belgium [016-21 22 31]).

September 9 - 11

3rd International Conference on Measurement in Clinical Medicine (IMEKO), Edinburgh, United Kingdom (The Institute of Physical Sciences in Medicine, 47 Belgrave Square, London SW1X 8QX, United Kingdom [01 235 6111]).

September 9 - 12

4th Mediterranean Conference on Medical and Biological Engineering, (MECOMBE '86), Sevilla, Spain (Prof. Dra. Laura Roa, Esc. Sup. Ing. Industriales, Avda. Reina Mercedes s/n., 41012 Sevilla-Sevilla, Spain [54-611150, Ext. 259]).

September 13 - 16

The 39th Annual Conference on Engineering in Medicine and Biology, Omni International Hotel, Baltimore, MD (John E. Brennan, Publicity Committee Chair, 39th ACEMB, Blood Services Laboratories, Old Georgetown Road Facility, 9312 Old Georgetown Road, Bethesda, MD 20814 [301-530-6040]).

September 15 - 19

4th European Congress and Regional Congress of the International Radiation Protection Association, Salzburg, Austria (Dr. A. Hefner, Oesterreichischer Verband fur Strahlenschutz, A-2444 Seibersdorf, Austria [Tel. (02254) 80-2640]).

September 16 - 20

43rd Annual Conference of the Hospital Physicists' Association, and HEXPA '86, Coventry, United Kingdom (The Institute of Physical Sciences in Medicine, 47 Belgrave Square, London SW1X 8QX, United Kingdom [01 235 6111]).

September 22 - 24

22nd International Symposium of Radiological Physicists, Slovak Medical Society, Bratislava, CSSR (Dr. Viera Laginova, Secretary General, Institute of Clinical Oncology, Heydukova 10, CS-812 50 Bratislava, CSSR).

October 6 - 9

National Conference of Standards Laboratories: Workshop and Symposium: "25 Years of Measurement Progress", (Special Anniversary Program), The National Bureau of Standards, Gaithersburg, MD (Mr. M.J. Corrigan, Jr., Lockheed Electronics Co., Inc., 1501 US Highway 22, MS 724, Plainfield, NJ 07061 [201-757-1600 Ext. 3023]).

October 24 - 26

10th Annual Symposium on Computer Applications in Medical Care, Sheraton Washington Hotel, Washington, D.C. (Bruce I. Blum, SCAMC, The George Washington University Medical Center, Office of Continuing Medical Education, 2300 K Street, N.W., Washington, D.C. 20037)

October 26 - 30

5th World Congress on Medical Informatics (MEDINFO '86), Sheraton-Washington Hotel, Washington, D.C. (MEDINFO '86 Organizing Committee, Secretariat, c/o George Washington University Medical Center, Office of Continuing Education, 2300 K Street, N.W., Washington, D.C. 20037 [202-676-8929]).

October 30 - 31

John R. Cameron Medical Physics Symposium, (in commemoration of the retirement of John R. Cameron), University of Wisconsin-Madison (Ms. Kathy McSherry, Department of Medical Physics, 1300 University Avenue, Room 1530, University of Wisconsin, Madison, WI 53706).

November 2 - 7

American Society for Therapeutic Radiology and Oncology, Bonaventure Hotel, Los Angeles, CA (A.S.T.R.O., 925 Chestnut Street, Philadelphia, PA 19107 [215-574-3150]).

November 30 - December 5

Joint Meeting of AAPM with the Radiological Society of North America, Chicago, IL (AAPM Executive Secretary, 335 East 45th Street, New York, NY 10017 [212-661-9404])

December 8 - 12

Asian Regional Conference of the International Organization for Medical Physics, Bombay, India (Dr. L.H. Lanzl, President, IOMP, Department of Medical Physics, Rush-Presbyterian St. Lukes Medical Centre, 1753 West Congress Parkway, Chicago, IL 60612).

1987

February 8 - 12

Health Physics Society Midyear Topical Symposium, "Health Physics of Radiation-Producing Machines", Reno, NV (Mr. R.J. Burk, Health Physics Society, 1340 Old Chain Bridge Road, Suite 300, McLean, VA 22101 [703-790-1745]).

March 10 - 14

27th Conference of the South African Association of Physicists in Medicine and Biology, University of the Orange Free State, Bloemfontein, South Africa (Prof. P.C. Minnaar, Department of Biophysics, Faculty of Medicine, P.O. Box 339, Bloemfontein, 9301, Republic of South Africa).

May 25 - 29

6th Annual Meeting of the European Society for Therapeutic Radiology and Oncology, Lisbon, Portugal (Dr. E. van der Schueren, Department de Radiotherapie, Clinique Saint-Raphael, 35 chemin des Capacines, B-3000 Louvain, Belgium [Tel. 016-21 22 31]).

May 31 - June 6

6th European Congress on Radiology, Lisbon, Portugal (Secretariat ECR 87, S.P.R.M.N., avenida Elias Garcia 123-7 Dto., P-1000 Lisbon, Portugal).

June 9 - 12

International Microwave Symposium, Las Vegas, Nevada (Mr. S.L. March, Compact Software, Inc., 1314 Sam Bass Circle, Suite F, Round Rock, TX 78664).

June 14 - 17

6th Congress of the European Federation of Societies for Ultrasound in Medicine, Helsinki, Finland (6th ECUM Congress Secretariat, P.O. Box 824, SF-00101, Helsinki, Finland).

June 22 - 25

9th International Conference on the Use of Computers in Radiation Therapy. Europa Crest Hotel, Scheveningen, Tilburg, Netherlands (Ir. P.H. van der Giessen, Dr. Bernard Verbeeten Instituut, Brugstraat 10, 5042 SB Tilburn, The Netherlands).

June 27 - July 2

American Society of Radiologic Technologists, 1987 Annual Conference, Washington, D.C. (The American Society of Radiologic Technologists, 15000 Central Avenue, S.E., Albuquerque, NM 87123 [505-298-4500]).

July 5 - 9

Health Physics Society, 32nd Annual Meeting, Salt Lake City, UT (Mr. R.J. Burk, Health Physics Society, 1340 Old Chain Bridge Road, Suite 300, McLean, VA 22101 [703-790-1745]).

July 13 - 17

AAPM Summer School: "Image Communication and Image Analysis", Ann Arbor, MI (AAPM Executive Secretary, 335 East 45th Street, New York, NY 10017).

July 14 - 16

European Society for Hyperthermic Oncology, Cardiff, U.K. (Dr. J. L. Moore, Velindre Hospital, Whitechurch, Cardiff CF4 7XL, U.K.).

July 19 - 23

American Association of Physicists in Medicine, 29th Annual Meeting, Detroit, MI (AAPM Executive Secretary, 335 East 45th Street, New York, NY 10017)

July 19 - 24

8th International Congress of Radiation Research, Edinburgh, Scotland, U.K. (Dr. E. Martin Fielden, Secretary General 8th I.C.R.R., M.R.C. Radiobiology Unit, Harwell, Didcot, Oxon OX11 ORD, U.K.).

July 26 - 28

The 3rd Conference on Spheroids in Cancer Research, Cambridge, U.K. (Dr. P. Twentyman, M.R.C. Clinical Oncology and Radiotherapeutic Unit, Hills Road, Cambridge, CB2 2QQ, U.K.).

September 11 - 14

L.H. Gray Trust Meeting on the Biological Effects of Low Doses of Radiation, Oxford, UK (Mr. K.F. Baverstock, MRC Radiobiology Unit, Chilton, Didcot, Oxon. OX11 ORD, UK [Tel. Abingdon [0235] 834393]).

October 23 - 29

American Society for Therapeutic Radiology and Oncology, Sheraton Boston, Boston, MA (A.S.T.R.O., 925 Chestnut Street, Philadelphia, PA 19107 [215-574-3150]).

November 1 - 4

11th Annual Symposium on Computer Applications in Medical Care, Sheraton Washington Hotel, Washington, D.C. (Bruce I. Blum, SCAMC, The George Washington University Medical Center, Office of Continuing Medical Education, 2300 K Street N.W., Washington, D.C. 20037).

November 29 - December 4

Joint Meeting of AAPM with the Radiological Society of North America, (AAPM Executive Secretary, 335 45th Street, New York, NY 10017 [212-661-9404]).

1988

April 11 - 15

7th International Congress: International Radiation Protection Association, Centerpoint Convention Centre, Sydney, Australia (Mr. R.J. Burk, Health Physics Society, 1340 Old Chain Bridge Road, Suite 300, McLean, VA 22101 [703-790-1745]).

June 12 - 16

American Society of Radiologic Technologists, 1988 Annual Conference, Albuquerque, NM (The American Society of Radiologic Technologists, 15000 Central Avenue, S.E., Albuquerque, NM 87123 [505-298-4500]).

July 4 - 8

Health Physics Society, 33rd Annual Meeting, Boston, MA (Mr. R.J. Burk, Health Physics Society, 1340 Old Chain Bridge Road, Suite 300, McLean, VA 22101 [703-790-1745]).

August 6 - 13

American Association of Physicists in Medicine, 30th Annual Meeting, and 8th Meeting of the International Organization of Medical Physics, San Antonio, TX (AAPM Executive Secretary, 335 East 45th Street, New York, NY 10017).

October 9 - 14

American Society for Therapeutic Radiology and Oncology, New Orleans Hilton, New Orleans, LA (A.S.T.R.O., 925 Chestnut Street, Philadelphia, PA 19107 [215-574-3150]).

November 6 - 9

12th Symposium on Computer Applications in Medical Care, Sheraton Washington Hotel, Washington, D.C. (The George Washington University Medical Center, Office of Continuing Education, 2300 K Street, N.W., Washington, D.C. 20037).

November 13 - 18

Joint Meeting of AAPM with the Radiological Society of North America, Georgia World Congress Center, Atlanta, GA (AAPM Executive Secretary, 335 East 45th Street, New York, NY 10017 [212-661-9404]).

1989

June 18 - 22

Health Physics Society, 34th Annual Meeting, Albuquerque, NM (Mr. R.J. Burk, Health Physics Society, 1340 Old Chain Bridge Road, Suite 300, McLean, VA 22101 [703-790-1745]).

July 23 - 27

American Association of Physicists in Medicine, 31st Annual Meeting, Memphis, TN (AAPM Executive Secretary, 335 East 45th Street, N.W., New York, NY 10017).

October 16 - 21

American Society for Therapeutic Radiology and Oncology, Bonaventure Hotel, Los Angeles, CA (A.S.T.R.O., 925 Chestnut Street, Philadelphia, PA 19107 [215-574-3150]).

November 5 - 8

13th Symposium on Computer Applications in Medical Care, Sheraton Washington Hotel, Washington, D.C. (The George Washington University Medical Center, Office of Continuing Medical Education, 2300 K Street, N.W., Washington, D.C. 20037).

1990

August 5 - 9

American Association of Physicists in Medicine, 32nd Annual Meeting, St. Louis, MO (AAPM Executive Secretary, 335 East 45th Street, N.W., New York, NY 10017).

1991

19th Meeting of the International Organization of Medical Physics, Kyoto, Japan.

*Readers are invited to send to the **Calendar of Events** Editor, Geoffrey Ibbott (address on p. 2), information on any events not listed in this issue of MPW and also additions or corrections to the items that are listed. Officers of national societies are especially encouraged to submit information on their future national meetings.*

Quality Assurance in Radiotherapy:

the participating developing countries, it became clear that sophisticated QA programmes, as proposed by medical physicists in industrialized countries, are not necessarily feasible and meaningful in developing countries where very basic problems in radiotherapy have to be overcome first.

During the second half of the expert meeting, working groups on

- organizational aspects
- physical and technical aspects and
- clinical aspects

of QA in radiotherapy drafted recommendations on the respective subjects. The chairpersons of the respective working groups (Mme. Dr. A. Dutreix, Prof. R. Walstam, Prof. Berry, in collaboration with Dr. Racoveanu, WHO) are editing the final version of the recommendations.

The recommendations on QA in radiotherapy will be published by WHO in a similar format as the preceding WHO publications on QA in Diagnostic Radiology and Nuclear Medicine.

The papers presented during the workshop are being edited and published by the Institute for Radiation Hygiene.

As a next step of their joint programme aimed at stimulating further activities in the field of QA in radiotherapy, the WHO and the Institute for Radiation Hygiene will organize a training workshop involving practical exercises on the basis of which the WHO recommendations shall be put into practice. This workshop is to be held in the fall of 1986. It will be organized by the Institute for Radiation Hygiene and WHO in collaboration with the municipal hospital in Passau. As with all previous training workshops, it is intended to invite medical physicists and radiotherapists preferably from developing countries and to publish a detailed description of all practical courses in the same manner as has been done earlier.

References

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- (2) WHO, Quality Assurance in Nuclear Medicine, World Health Organization, Geneva 1982
- (3) A. Bauml (Editor), Quality Control and Assurance in Diagnostic Radiology, Materials prepared for a WHO-Training Workshop, Neuherberg Oct. 27 - Nov. 3, 1982, ISH-Heft 38, Marz 1984
- (4) T.D. Craddock, E. Busemann-Sokole, H.D. Roedler (Editors), Review of Quality Control in Nuclear Medicine, Proceedings of a Workshop in Neuherberg Nov. 23 - 30, 1983 (in press)
- (5) ICRP Publication 33 (1982): Protection against ionising radiation from external sources in medicine. Annals of the ICRP, Vol. 9 No. 1, Pergamon Press, Oxford
- (6) ICRP Publication 11 (1985): Protection of the patient in radiation therapy. Annals of the ICRP, Vol. 15, No. 2, 1985 Pergamon Press, Oxford
- (7) ICRU Report 23: Measurement of absorbed dose in a phantom irradiated by a single beam of X or Gamma rays (1973)
- (8) ICRU Report 24: Determination of absorbed dose in a patient irradiated by beams of X or Gamma rays in radiotherapy procedures (1976)
- (9) ICRU Report 35: Radiation dosimetry: Electron beams with energies between 1 and 50 MeV (1984)
- (10) ICRU Report 29: Dose specification for reporting external beam therapy with photons and electrons (1978)
- (11) ICRU Report 38: Dose and volume specification for reporting intracavitary therapy in gynecology (1985)
- (12) A. Dutreix: When and how can we improve precision in radiotherapy? Radiotherapy and Oncology 2, pp 275-292 (1984)

Quality Assurance in Nuclear Medicine in Special View of WHO Recommendations

Hans Detlev Roedler

Institut für Strahlenhygiene
des Bundesgesundheitsamtes
8042 Neuherberg

1. Introduction

The World Health Organization in collaboration with several scientific institutions, e.g., the Federal Health Office, the German Cancer Research Center, and the Association for Radiation and Environmental Research in 1980 organized a meeting of experts in Heidelberg under the title: "Quality Assurance in Nuclear Medicine." On this occasion recommendations were worked out, considering not only the quality control of nuclear medical equipment and radioactive pharmaceuticals, but also the implementation of quality assurance programs and the evaluation and documentation of results. These recommendations were published in 1982 as a WHO-document, "Quality Assurance in Nuclear Medicine" (1).

2. Purpose and organization of the WHO training workshop in 1983

A follow-up meeting in the form of a workshop was held in November 1983 at the Institute for Radiation Hygiene of the Federal Health Office in Neuherberg/München, again in collaboration with several scientific institutions including the two Munich universities, the Hospital Association Augsburg, and the Institute for Radiation Protection of the Association of Radiation and Environmental Research. The purpose of this was to perform jointly those procedures recommended in (1) for quality control, to test their practicability, to evaluate and, where necessary, to update these procedures, particularly in the area of nuclear medical computer systems and singlephoton emission tomography.

Medical physicists and nuclear medical physicians experienced in the field of quality assurance from 15 European countries accepted the invitation. Several of them had already taken part in the 1980 Heidelberg meeting. The program consisted of 1 day of reviews and experience reports, 6 half-days of equipment demonstrations in small groups of 5 participants each, and 3 half-days of joint discussion.

An extensive number of reference sources on

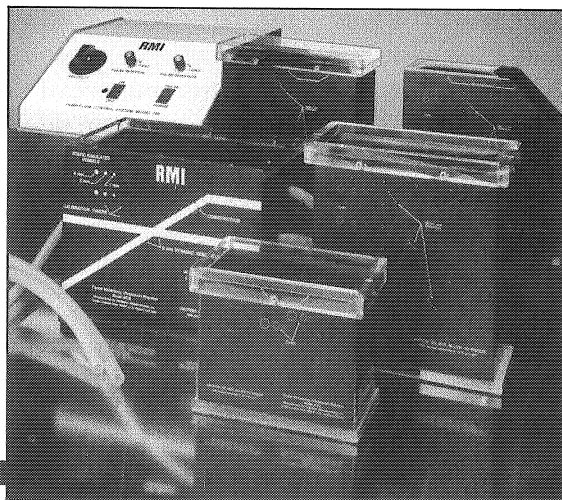
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quality assurance in nuclear medicine (1-10) was available to the participants. Particularly, next to reference (1), the draft of a respective IAEA technical document (2) served as basis for discussion. It contains detailed information on the basic principles of the equipment, purpose of the test, required material, the test procedure itself, observations, interpretation of results, and conclusions. The advantage of this document lies in the comprehensive description of the individual test procedures, so that reference to other and sometimes difficult to obtain publications is unnecessary. Next to the classic NEMA (7) and IEC (8) documents and their clearly demonstrated comparison in (9), the proceedings (4) of a meeting of the British Hospital Physicists' Association on quality assurance in nuclear medicine — published just prior to the workshop — were available in addition to other material. Based essentially on the 1982 WHO recommendations, the following procedures were performed jointly in 6 groups:

I Dose calibrator:

accuracy, precision, linearity, energy dependence.

II Uptake probe and well-type detector: energy calibration, energy resolution, energy linearity and zero offset, sensitivity, background, calibration of a thyroid uptake probe with an IRPA neck phantom, considering depth and size of organ.

III Rectilinear scanner:

largely as under II, with the exception of the IRPA neck phantom. In addition: scan speed, color print or film exposure calibration, background subtraction, cut-off.

IV Gamma camera, static:

peak and window adjustment, uniformity qualitatively according to NEMA (7) and IEC (8), linearity qualitatively with SOH phantom and, with appropriate software, quantitatively and analog to NEMA using a modified phantom, energy resolution according to NEMA, and geometrical resolution as a local variant of the NEMA procedure, since, due to insufficient matrix size, an external 1024-channel analyzer had to be employed.

Gamma camera, emission tomography (SPECT):

center of rotation, head adjustment in reference to tilt and mounting, rotation speed constancy and acquisition time per projection, point source acquired in planar and tomographic mode for comparing the profiles as a possible total performance test.

V Gamma camera, dynamic, and computer system:

count rate performance analog to IEC, however

— for particular reasons — using syringes with known activity, image quality of the IEC phantom at high count rate, image position, size and geometry, pixel loss or artefacts, agreement of counts registered on console panel and by computer.

VI Radiopharmaceuticals:

radionuclide purity as exemplified by the 99-Mo assay, radiochemical purity, and detection methods considering different variants of thin-layer chromatography.

3. Joint recommendations for the quality control of gamma cameras and computer systems, including SPECT

Although a relatively wide spectrum of devices and methods was covered during the demonstrations, the discussion centered largely on the quality control of gamma cameras and computer systems, including SPECT, in addition to the general aspects of quality assurance which will be mentioned in section 4.

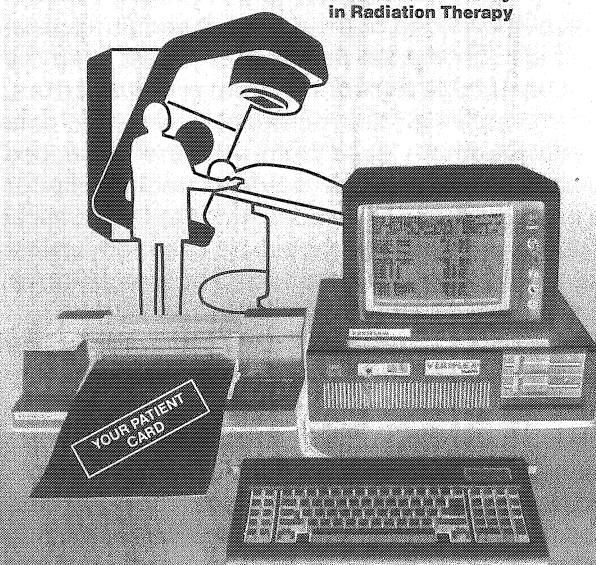
As a sensitive indicator for the condition of the gamma camera system, including the oscilloscope and hardcopy device, the uniformity test was recommended for daily use with or without uniformity correction, where applicable. The mechanical safety

Continued on page 22

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Quality Assurance in Nuclear Medicine in Special View of WHO Recommendations

in regard to fastenings, noises, as well as window adjustments and background should be continuously observed. Resolution and linearity should be checked qualitatively once a week. Additional tests (e.g., count rate performance, multi-peak registration, contrast) depend on the clinical investigations performed and the stability of the system. The test should be performed in observance of the defined criteria and after each repair.

A routine test of the computer hardware should include weekly checking of equal count rates registered on console panel and computer, image size and position, artefacts, particularly at high contrast, as well as the observation of quantitative results from the uniformity check, where applicable. Computer system failure was reported repeatedly when the manufacturers' temperature specifications had been disregarded.

Acceptance tests for gamma cameras should largely be performed in accordance with NEMA (7) or, as an alternative, the less complicated methods recommended by IAEA (2); for computer systems, an updated section of the WHO recommendations (1) applies. Recently, the NEMA test procedures were reported as being suitable not only for acceptance tests, but also for the routine quality control of gamma cameras.

The quality control of software requires a comprehensive knowledge of the software and its application limits. Erroneous results may derive from the use of unsuitable algorithms, from program errors, or from applying false numerical values or data formats. Normal values from software developed elsewhere should not be used unconditionally for one's own patient populations. Prior to their clinical use, software updates should be checked against patient reference data and tested by simulation or phantom measurements.

Single Photon Emission Computed Tomography requires a high degree of total system quality control and calls for an extensive knowledge of the various acquisition and reconstruction parameters influencing the quality of tomographic imaging. Specific quality control requirements in SPECT are: calibration of the center of rotation to less than $\frac{1}{4}$ pixel width deviation from the correct value (weekly or daily, depending on the stability of the system), calibration of the camera head as parallel as possible to the rotation axis (before each acquisition), and control or correction, where applicable, of projection uniformity by precision flood fields

(10-15 million counts) prior to reconstruction.

4. General conclusions for quality control in nuclear medicine

Quality control must not follow the principle of *l'art pour l'art* under any given circumstances; rather its goal is seen in optimizing the quality of diagnostic results from nuclear medical examinations. Therefore, it must never delay patient care by unnecessary and time-consuming procedures. This calls for simple, routinely applicable system tests, as, for instance, the uniformity test for gamma cameras, followed by more elaborate component-specific tests only in case of suspicious findings.

The tests are not to be performed rigidly by following a prescribed scheme, but are to be adjusted to the clinical examinations and the observed stability of the equipment parameters. Simple and non-standard methods or phantoms are quite suitable for routine test purposes if they cover the total system as closely as possible, demand little time, are regularly checked and evaluated, and allow the proper conclusions to be drawn. An individual establishment of limits for the acceptability or non-acceptability of results, e.g., 10% deviation from the reference value, is desirable, even though deriving such limits from diagnostic results hardly seems possible.

For acceptance tests, it was suggested that more complicated phantoms or measuring equipment should be available on loan from the manufacturer and/or national and international organizations, as, e.g., IAEA is providing for developing countries. In addition, the establishment of a center was discussed where reference data for software testing would be collected for general use.

Beyond all of these considerations in reference to equipment parameters, measuring methods, phantoms and software, one essential factor must not remain unmentioned: the education, training, and problem awareness of the technical assistants, physicians, and medical physicists who utilize these devices.

Quality control is a state of mind rather than just the fulfillment of a set of test procedures.

References:

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Technical Document, International Atomic Energy Agency, Vienna, Draft, November 1983
- (3) The Theory, Specification and Testing of Anger Type Gamma Cameras
Topic Group Report — 27, The Hospital Physicists' Association, London 1978
- (4) Quality Control of Nuclear Medicine Instrumen-

tation

CRS-38, R.F. Mould (ed.), The Hospital Physicists' Association, London 1983

- (5) Scintillation Camera Acceptance Testing and Performance Evaluation. AAPM Report No. 6, American Association of Physicists in Medicine, New York 1980
- (6) Acceptance Testing and Performance Evaluation of Scintillation Camera/Computer Systems AAPM Report No. 9, American Association of Physicists in Medicine, New York 1983
- (7) Performance Measurements of Scintillation Cameras
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- (8) Characteristics and Testing Conditions of Radionuclide Imaging Devices
International Electrotechnical Commission 1980
- (9) Sano RM: Performance Standards: Characteristics and Test Conditions for Scintillation Cameras
In: Medical Radionuclide Imaging 1980, Vol. II, pp. 141-159, IAEA, Vienna 1981
- (10) Quality Assurance of Computer-interfaced Scintillation Cameras in Nuclear Medicine (J. Ericson, ed.)
Workshop Manual, National Center for Devices and Radiological Health Draft, October 1983

Announcement

**Nato Advanced Study Institute on:
Physics and Technology
of Hyperthermia**

*Urbino, Italy
June 26, 1986*

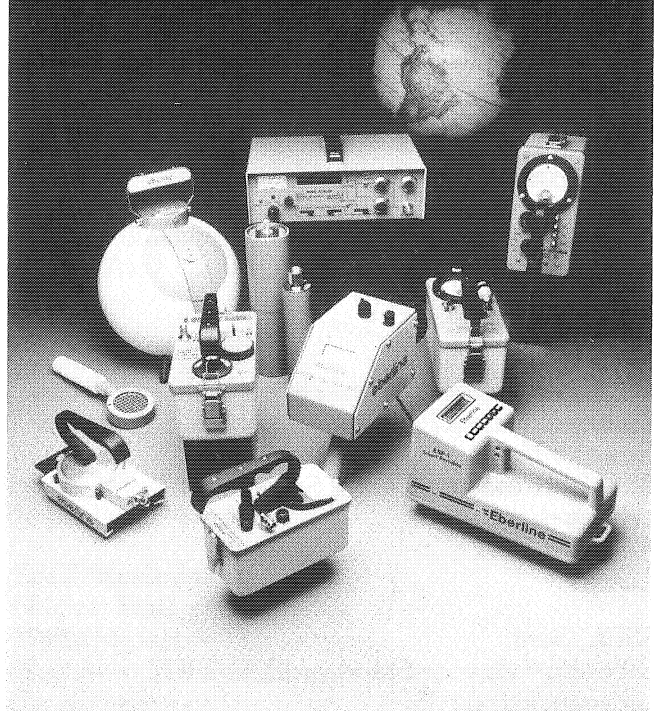
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The aim is to provide graduate physicists and engineers with the basic knowledge of the physics and technology of hyperthermia, together with some of the clinical and biological background, to equip them for research in this field.

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SSDL Lucas Heights Australian Atomic Energy Commission Research Establishment Private Mail Bag Sutherland 2232, N.S.W. Australia	1977	SSDL Shanghai Radioactivity Section Shanghai Institute of Metrological Technology Shanghai China	1982
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SSDL Gent Laboratorium voor Standaarddosimetrie Ledeganckstraat 35 9000 Gent Belgique	1977	SSDL Prague Institut Hygieny a Epidemiologie Institute of Hygiene and Epidemiology Srobarova 48 10042 Praha 10 CSSR	1977
SSDL La Paz Department of Radiological Protection and Safety Bolivian Nuclear Energy Commission Av. 6 de Agosto No. 2905, Casille 4821 La Paz Bolivia	1977	SSDL Nicosia Radiation Dosimetry Laboratory Department of Medical Services Nicosia General Hospital Nicosia Cyprus	
SSDL Rio de Janeiro Laboratorio de Dosimetria de Padronizacao Secundaria Instituto de Radioprotecao e Dosimetria (IRD) CNEN - Comissao Nacional de Energia Nuclear C.P. 37025 22600 Rio de Janeiro Brazil	1976	SSDL Copenhagen The State Institute of Radiation Hygiene 378 Frederikssundsvej Copenhagen K Denmark	1978
SSDL Sofia Laboratory of Clinical Dosimetry and Ionizing Radiation Metrology Medical Academy, Base No. 2, Radiotherapy Department 8 Belo More Street 1040 Sofia Bulgaria	1977	SSDL Cairo Radiation Physics Unit National Institute for Standards Tahrir Street Dokki Cairo Egypt	1977
		SSDL San Salvador Nuclear Medicine Services Hospital Rosales San Salvador El Salvador	
		SSDL Quito Comision Ecuatoriana de Energia Atomica Apartado 2517 Quito Ecuador	

SSDL Neuherberg Laboratory for Dosimetry, Institute for Radiation Protection Gesellschaft fur Strahlen- und Umweltforschung Ingolstadter Landstrasse 1 D-8042 Neuherberg, Post Oberschleissheim Federal Republic of Germany	1977	SSDL Baghdad Institute of Radiology & Nuclear Medicine Elwyiah Baghdad Iraq	
SSDL Helsinki P.O. Box 268 00101 Helsinki 10 Finland	1977	SSDL Baghdad Health Physics Department Nuclear Research Institute Tuwaitha, Baghdad Iraq	
SSDL Le Vesinet Service Centrale pour le Protection contre les Rayonnements Ionisants (SCPRI) Boite Postale Nr. 35 F-78 Le Vesinet France	1977	SSDL Tel Aviv Research Institute for Environmental Health Nuisances Sackler Building, Tel Aviv University Ramat-Aviv Israel	1978
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SSDL Trombay Radiological Standards Laboratory Division of Radiological Protection Bhabha Atomic Research Centre Trombay Bombay 85 India	1976	SSDL Mexico Radiotherapy Department Institute of Oncology, General Hospital SSA Dr. Balmis No. 148 Mexico, D.F. Mexico	1970
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Continued on page 26

IAEA/WHO Network of SSDLs

SSDL Manila Radiation Health Office, Dept. of Health San Lazaro Compound Rizal Avenue, Sta. Cruz Manila Philippines	1976	SSDL Bangkok (DRPS) Division of Radiation Protection Services Department of Medical Sciences Yod-se Bangkok-10100 Thailand	1983
SSDL Lisbon Departamento de Radioterapia Instituto Portugues de Oncologia 1093 Lisboa Portugal	1982	SSDL Bangkok (OAEP) Office of Atomic Energy for Peace Radiation Measurements Division Vipavadee Rungsit Road Bangkhen, Bangkok-10900 Thailand	1977
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The Senior Special Pathologist Connaught Hospital Freetown Sierra Leone	1978	SSDL Caracas Instituto Venezolano de Investigaciones Cientificas (IVIC) Apartado 1827 Caracas Venezuela	1983
SSDL Singapore Singapore General Hospital Radiotherapy Department Outram Road Singapore 3 Republic of Singapore	1970	SSDL Belgrade Boris Kidric Institute of Nuclear Sciences - Vinca Radiation Protection Laboratory Dosimetry and Radiation Protection Section P.O. Box 522 1101 Beograd Yugoslavia	1977
SSDL Khartoum Radiation and Isotope Center P.O. Box 846 Khartoum Sudan	1977		
SSDL Stockholm National Institute of Radiation Protection Karolinska Sjukhuset 1041 Stockholm Sweden	1978		
SSDL Wuerenlingen Abteilung Strahlenueberwachung, EIR Eidgen, Institute fuer Reaktorforschung CH-5303 Wurenlingen Switzerland	1981		

Announcement

The American Association of Physicists in Medicine (AAPM) is interested in forming liaisons with other national medical physics groups, both formal and informal. The AAPM International Affairs Committee is assigning liaison representatives to regions and countries around the world. Any reader who's country or region has not been contacted by such a representative is encouraged to write to: Caridad Borrás, D.Sc., Chairman, AAPM International Affairs Committee, West Coast Cancer Foundation, Radiological Physics Division, 50 Francisco Street, Suite 200, San Francisco, CA 94133, U.S.A.

IAEA prepares International Code of Practice for Absorbed Dose Determination in Photon and Electron Beams

H.H. Eisenlohr and M. Gustafsson
International Atomic Energy Agency

Various codes of practice for the measurement of absorbed dose are already in existence to serve national needs in some of the developed nations. These are somewhat difficult to follow, so a more straight-forward and easily understandable code is proposed to be compiled and published by the Dosimetry Section of the International Atomic Energy Agency. This code would also be of great value to the Network of Secondary Standard Dosimetry Laboratories (SSDLs), but would obviously have a great impact also on the many hundreds of radiotherapy hospitals served by them.

An Advisory Group meeting was convened in Vienna, 18 - 22 March, 1985, to bring together authors of national codes of practice and potential users of the proposed IAEA Code of Practice.

During the meeting the various national protocols were discussed and compared. The Group then drafted an outline of the IAEA Code of Practice, and defined some general principles to be followed by the authors. Clearly, throughout the report quantities, units and symbols recommended by the International Commission on Radiation Units and Measurements (ICRU) will be used. Proposed authors of the IAEA Code of Practice are: P. Andreo (Spain), J. Cunningham (Canada), K. Hohlfield (Federal Republic of Germany), N. Suntharalingam (United States of America), and H. Svensson (Sweden).

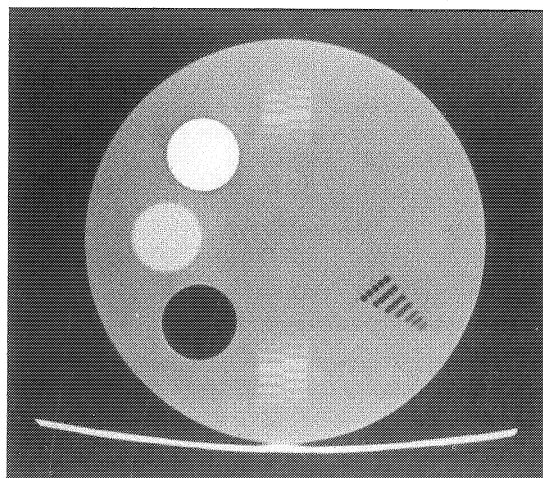
It is planned to publish the IAEA Code of Practice in the IAEA Technical Report Series.

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Announcement

Magnetic Resonance Conference and Summer School Aberdeen, U.K.

Third Congress European Society of Magnetic Resonance In Medicine and Biology SCIENTIFIC PROGRAM

Separate sessions will be held on clinical and on basic science/technical aspects of NMR. The clinical sessions will take place on 22nd. and 23rd. September with basic science and technical sessions on 23rd. and 24th. September.

Special sessions during the appropriate days will be devoted to certain topics including NMR studies of the head, applications in paediatric and geriatric medicine, inter-comparison of imaging modes and the role of NMR imaging, in vivo spectroscopy, flow, surface coils, image contrast and other topics of current interest.

Introductory talks in many of these sessions will be given by speakers of international standing. General sessions will also be held. Proffered papers in all sessions will be limited to ten minutes duration.

Scientific poster and commercial exhibitions will

be on display throughout the entire period of the Congress.

Summer School on NMR Proton Imaging 21 - 22 September, 1986

We offer, in this short Summer School, a series of lectures on the physics of NMR Proton Imaging. Emphasis will be placed on developing an understanding of the fundamental physical processes involved in examining the spin system and on the hardware of NMR imaging.

Information on both of these events can be obtained from:

Dr. Margaret A. Foster
Department of Bio-Medical Physics
and Bio-Engineering
University of Aberdeen
Foresterhill
Aberdeen AB9 2ZD
U.K.

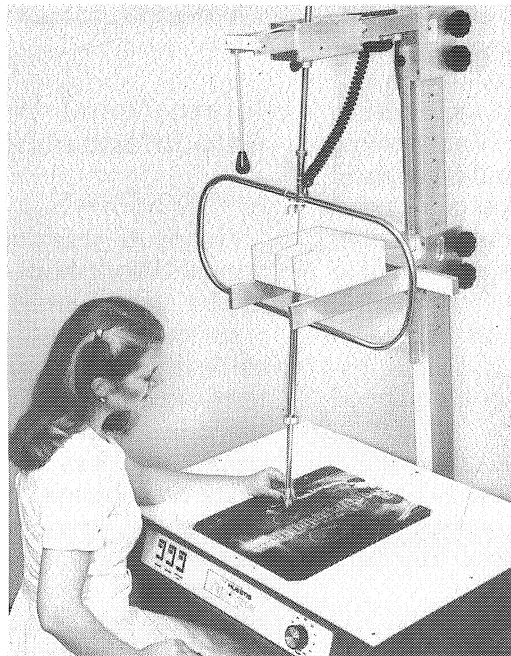
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Correspondence

Medical Physics in Zambia

Dear Doctor Stedeford,

Thank you for your letter and the enclosed bulletin *Medical Physics World*.

I am grateful for your introduction to the International Organization for Medical Physics. Out here we are so much removed from international activities. Our foreign exchange difficulties make it difficult to subscribe to international publications. Our own library is finding it extremely difficult to order the necessary periodicals, etc.

To try and answer some of your questions, I am the only one practising in clinical physics. There is another medical physicist in the country. But he left Hospital work in 1977 and went to read nuclear physics for his Ph.D. He has since been appointed in an administrative post at the Energy Commission of Zambia. The slow development of medical physics in Zambia is due to a number of factors which were so eloquently catalogued at the recent conference in Finland. For a long time, the field was not known or appreciated by both health planners and clinicians. Diagnosis was confirmed by a microscope and in the biochemistry laboratory. The pharmacy department gave the drugs for therapy. Where a patient was lucky he/she was referred abroad. But I notice now that things have changed and shall improve faster. Our support for medical physics is coming from our clinicians who are coming back from training abroad. They want supporting facilities which physics does offer. Soon we shall also be fighting disease with electronics like our counter parts in Europe, America, Japan and elsewhere.

I have been here for almost two years. My first impression was that technology was walking on foot to get here to Africa. Our greatest obstacle here in Zambia is lack of trained Manpower. We have only one Universtiy and the physicists output is very few. The curriculum has no medical physics included both for undergraduate and postgraduate. Even at Colleges we do not have any courses related to clinical physics.

What we do have here in Zambia as related to medical physics are:

- One department of nuclear medicine equipped with a rectilinear scanner
- Two ultrasound departments in the country
- National radiation protection service
- We have nuclei for physiological measurement sections like audiology, respiratory function, neurophysiology, clinical dialysis etc.

My first major tasks have been:

- To have medical physics and its related fields registerable at the Medical Council of Zambia,

otherwise those holding this qualification and intend to work with patients cannot practise.

- Put medical physics in the establishment at the Ministry of Health so that job positions in this area are created.
- Propose an organization chart for the departments of medical physics in major hospitals in the country.
- Form the first department of medical physics at the University Teaching Hospital, Lusaka.

I have been also involved in plans for the following projects:

- Radiotherapy Centre for the country. We have applied to the IAEA for technical assistance including training and equipment. I still need additional educational awards to train medical physicists/technicians. I shall appreciate any help you are able to offer in this time.
- We have an immediate task to develop our nuclear medicine department so that we can increase the number of tests that can be offered.
- Developing physiological measurement tests especially in neurophysiology, ophthalmology and respiratory function, etc.

From the above explanation, you should gather that we have no association for medical physicists in the country.

Please, put us on your list.

Sincerely yours,

Musamba Kabinga,
Medical Physics,
Department of Nuclear Medicine,
University Teaching Hospital,
P.O. Box 37053,
LUSAKA.
Zambia.

International Workshop on High Dose Rate Afterloading

Dear Colleagues:

Nearly 8 years have passed since the International Workshop on High Dose Rate Afterloading In The Treatment Of Uterus Cancer presented first results achieved with new brachytherapy techniques. Meanwhile, many centres in the world have long-term experience.

Modification of fractions and doses gave better results and less complications. The warnings of yesterday changed into enthusiasm of some users and led to unexpected spreading of the high dose rate technology; in the Federal Republic of Germany, for instance, about 100 remote afterloading units have been installed, most of them for HDR use.

Now is the time for worldwide exchange of experience and results with the aim of establishing

the standard of today and showing the way to the future.

I, therefore, have the pleasure of inviting all members of the International Working Party, the participants of the 1978 London Workshop, the users of various afterloading devices and interested radiologists, gynaecologists, physicists and oncologists to join the

International Symposium of High Dose Rate Afterloading in the Therapy of Uterus Cancer in Giessen from July 10 - 12, 1986

Looking forward to seeing you next year in Giessen, I remain with my best Season's Greetings and "Frohliche Weihnachten und ein gluckliches Jahr 1986"

Yours Sincerely,

Prof. Dr. med H. Vahrson
Zentrum fur Frauenheilkunde und Geburtshilfe
Abt. Gyn. Onkologie und Strahlentherapie der
Justus-Liebig-Universitat
Klinikstrasse 32 - D-6300 Giessen - FR Germany
Tel.: 06 41/7 02 - 33 07/-33 08

Scholarships Available to Attend Ninth International Conference on the Use of Computers in Radiation Therapy, June 22-25, 1987.

Dear Editor:

As organizer of the IX International Conference on the Use of Computers in Radiation Therapy in 1987 in the Netherlands, I would like to ask your assistance for the following:

The organization has a limited amount of money available to support colleagues from developing countries to participate in the IXth conference.

Now our problem is how to let these colleagues know that this possibility exists. I thought that maybe a publication in *Medical Physics World* would help but I'm not sure that this will reach those people. As you no doubt have many contacts in those countries I would be very much obliged if you could assist in spreading this information around.

People who are interested can contact me at the address below.

Sincerely yours,

P.H. van der Giessen, M.Sc.
Brugstraat 10, 5042 SB Tilburg, Netherlands

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