

PHYSICA MEDICA

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QUEST (a data base dedicated to Health and Medical Physics Journal).

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Editorial

A dedication to the writers of papers in Physica Medica:

*“[A good paper should be like] a miniskirt:
long enough to cover what is needed,
short enough to keep the attention of the reader”*

Adapted from a Mary Quant's definition of the *miniskirt*

Every year, in the first issue of a new volume, I try to illustrate the status of the journal from both the scientific and the editorial point of view.

The Editorial Situation

The composition of the Editorial Board has been largely renewed. Some members have been re-appointed for a three year term and new members have been offered positions that have been gratefully accepted. Some members are still to be selected by the sponsoring societies. I want to express my gratitude to all members that have completed their term and have worked with competence and enthusiasm toward the firm establishment of Physica Medica as a very valuable journal for the medical physics community.

In 2002, four regular issues have been published: *Vol. XVIII(1), (2), (3) and (4)*. Two of these issues contain an *Abstract Section*:

- Volume XVIII(1), the Abstracts of the “4th EFOMP Workshop on New Technologies on Diagnostic Radiology: Patient Dose, Image Quality and Clinical Effectiveness in CT Examinations” (ECR 2002, Vienna, Austria)
- Volume XVIII(2), the Abstracts of the “41th Annual Meeting of the Societe Francaise de Physique Medicale”.

The following societies have adopted Physica Medica as official journal:

- EFOMP (European Federation of Organisations of Medical Physics)
- AIFM (Italian Association of Physics in Medicine)
- SFPM (French Medical Physics Society)
- DGMP (German Medical Physics Society)
- NVKF (Dutch Society of Medical Physics)
- LMEPS (Latvian Medical Engineering and Physics Society)
- SAMPS (South African Medical Physics Society).

In addition, 2002 saw the Journal recognized by the European Physical Society.

The journal home page (www.physicamedica.com) carries not only the indexes of the published issues (since 1996) but also the abstracts of the published papers (since 2000).

The current circulation of the journal is now about 1000 copies. This number includes all members of AIFM (Italian Association of Physics in Medicine), all members of SFPM (the Societe Francaise de Physique Medicale), research institute subscribers, individual member subscribers and complimentary copies.

Papers submission and turn-around

Figure 1 shows the paper submissions in the last 14 years. There has been a favorable trend in recent years with the number of paper submissions increasing. The rejection rate is rather stable at around 30% (see Figure 2). The average return of the first review from referees to the author is now within 2 months and the average acceptance time is now less than 4 months. The actual publication follows within two months.

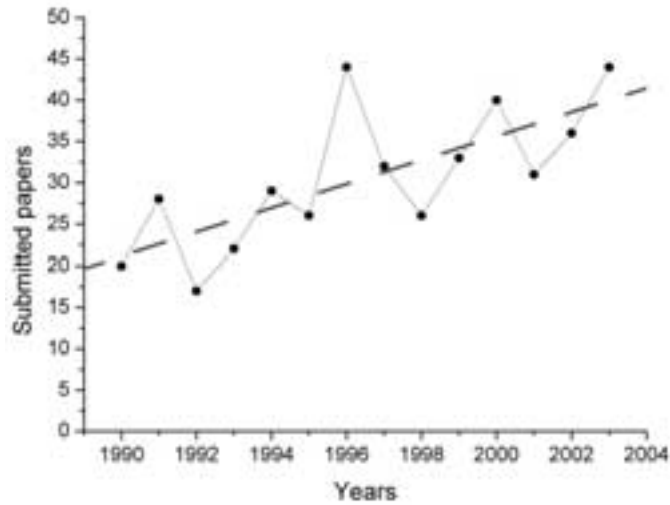


Fig. 1 – Paper submission. The number plotted for 2003 is an extrapolation from the submissions received as of March 31, 2003. (A linear fit is superimposed to the data.)

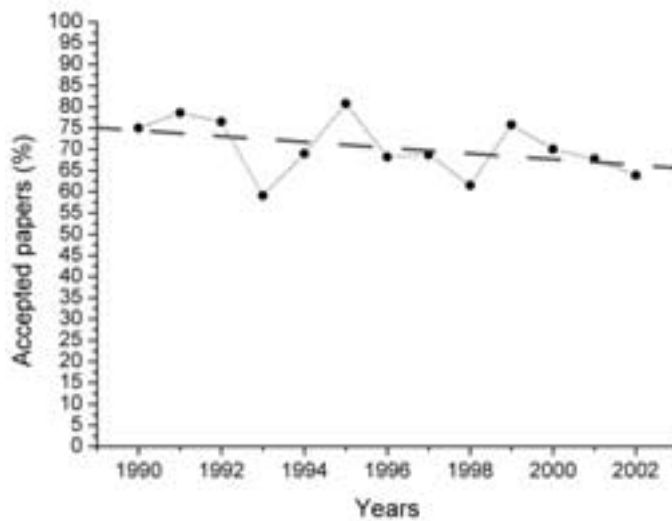


Fig. 2 – Accepted papers (as a percentage), as of March 31, 2003. (A linear fit is superimposed to the data).

Indexing, Citation Index and Impact Factor

Physica Medica is indexed in the following data bases:

- | | |
|--|-------------------------------------|
| EMBASE | (Excerpta Medica) |
| Current papers in Physics | (INSPEC) |
| Physics Abstract | (INSPEC) |
| QUEST | (private company data base) |
| Biophysics & Biochemistry Citation Index | (ISI) |
| Science Citation Index Expanded | (ISI) |
| Journal Citation Reports Science | (ISI) |
| Research Alert | (ISI) |
| and partially in Index Medicus | (National Library of Medicine, NIH) |

The Journal has had the IMPACT FACTOR since 1996. Figure 3 shows its positive trend in the last 5 years, as obtained from the 2001 JCR Science Edition. Table I summarizes some of the relevant data for Physica Medica.

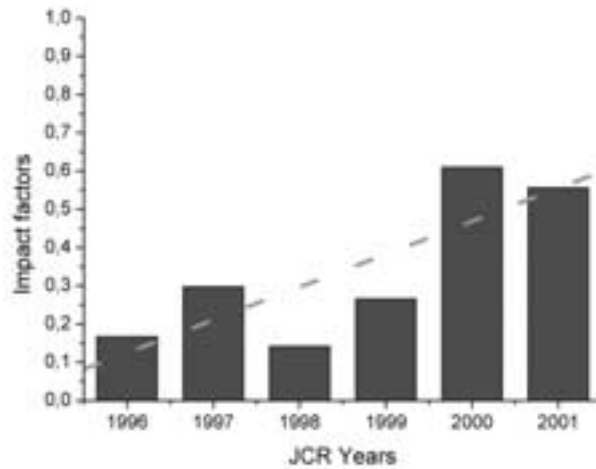


Fig. 3 – Impact Factor trend of Physica Medica (data from JCR 2001 Science Edition). (A linear fit is superimposed to the data).

Table I – Relevant data for Physica Medica (from JCR 2001 Science Edition).

Full Journal Title	Physica Medica
ISO Abbreviated Journal Title	Phys. Medica
JCR Abbreviated Journal Title	PHYS MEDICA
Impact Factor 2001	0.556
Subject Category	Biophysics
Total Cites in 2001	156
Cited Half-life (years)	4.4



Fig. 4 – The medal for the Galileo Galilei Award in Medical Physics: (left) front-side; (right) back-side.

Physica Medica best paper

The Editorial Board of PHYSICA MEDICA has decided to continue the tradition of assigning a prize to the best paper published in the journal. This prize is sponsored by the Galileo-Galilei Foundation of Pisa (Italy) and is called the Galileo-Galilei Award in Medical Physics (see Figure 4). The award is given every second year to the best paper published in the journal from those previous two years. The selection is made by the members of the Editorial Board by a voting procedure. The paper:

A fast voxel-based Monte Carlo method for scanner- and patient- specific dose calculations in Computed Tomography by B. Schmidt and W.A. Kalender, Physica Medica: 2002: XVIII(2); 43-53.

is the winner of the second edition (2001-2002) of the Galileo-Galilei Award in Medical Physics. The prize will be officially given to the authors during the Conference Dinner at the VIII Congress in Eindhoven on Thursday 22 May 2003 (<http://www.efomp2003.nl/>) and will consist of a medal and a certificate for each of the authors of the winning paper.

Congratulations Anders!

It is interesting to note that professor Anders Brahme, one of the long-standing members of our editorial board, has been selected by the Royal Swedish Academy of Engineering Sciences (IVA), to receive the very prestigious prize (Akzo Nobel Science Award, Sweden). The prize is given to Professor Brahme for being engaged, since the 1970's, in developing and making research in methods, techniques and apparatus for efficient radiotherapy for basic cancer therapy. The prize jury at IVA particularly commends the interdisciplinary character of Anders Brahme's dedicated research work. Information on the prize is also available at www.iva.se/akzo and at www.ki.se/onkpat/radfys.

Yours Truly

Pisa, March 31, 2003

The Editor in Chief
Alberto Del Guerra

A theoretical model for *in vivo* dosimetry of rotational beams

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Manuscript received: May 6, 2002; revised: October 8, 2002.

Accepted for publication: November 26, 2002.

Abstract

A model for estimating the dose delivered at the isocenter of a rotational radiotherapy treatment is described which makes use of discrete dose values calculated with Monte Carlo. Validation of the model using EGS4 system was performed, showing 2% agreement between model predicted isocenter dose and Monte Carlo calculations. The model can be used in routine to verify the agreement between actual and prescribed dose with no further modification of a conventional *in vivo* dosimetry system intended for static beams.

KEYWORDS: *In vivo* dosimetry, radiotherapy, stereotactic radiosurgery, EGS4.

CoRA: A new Cobalt Radiotherapy Arrangement with multiple sources. A feasibility study

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Manuscript received: August 22, 2000; revised: May 31, 2002 and November 19, 2002

Accepted for publication: November 26, 2002

Abstract

The objective of this paper is an investigation of the feasibility and applicability of a new ⁶⁰Co irradiation facility concept. The concept is in particular appropriate for developing countries to provide access to advanced treatment modalities such as conformal radiotherapy (RT) or radiosurgery (RS).

A concept for a new irradiation facility has been developed. The concept consists of using a small number of ⁶⁰Co sources (typically 5-7), mounted on a swivel arc. This system, named CoRA (Cobalt Radiotherapy Arrangement), would be suited for performing both fractionated or conformal RT and RS with simple ⁶⁰Co technology. The unit is designed as an isocentric device enabling simultaneous irradiation from a number of different directions. If additionally equipped with multi-leaf-collimators (MLCs), the system would be capable of advanced conformal RT techniques. Irradiations of typical indications have been simulated using an in-house treatment planning system. For this purpose typical treatment situations for two different treatment techniques – a fixed beam (RT) and a moving arc technique (RS) – using CoRA were investigated. Results were compared with those for a conventional linear accelerator (Linac) and evaluated using dose volume histograms (DVH).

For the fixed beam technique with extracranial lesions it is shown that acceptable dose distributions can be achieved within the planning target volume and the gross tumor volume. For these examples not more than eight angular positions of the swivel arc were used together with irregular field shaping and field weighting. In comparison to the standard Linac treatment plans, only minor differences are obtained for the organs at risk. For the moving arc technique with cranial lesions no significant differences between the moving arc technique and the CoRA arc technique were found.

The technical design of the new ⁶⁰Co therapy facility CoRA and its arc technique provide dose distributions for treatments of cranial and extracranial target volumes that compare well with modern irradiation techniques using Linacs. The concept of the CoRA system and its multifunctional usage could be particularly advantageous for radiation oncology centers in developing countries.

KEYWORDS: Stereotactic radiotherapy, radiosurgery, cobalt-60, treatment simulation.

Dose distribution around a low dose rate ^{192}Ir seed source implanted in the brain

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Manuscript received: May 6, 2002; revised: August 29, 2002

Accepted for publication: October 30, 2002

Abstract

Dose distribution around a low dose rate (LDR) ^{192}Ir seed source in the brain of a Rando phantom was measured using TL dosimeters. The results for measured dose rate over a distance of 1 to 9 cm from the source, along the transverse (90°) and longitudinal (180° and 0°) axes of the source were presented and the experimental points were fitted graphically. The equivalent dose of a set of organs to be at risk was measured during the source implantation. A quantitative estimation of effective dose $\text{Hp}(10)$ and superficial dose $\text{Hp}(0.07)$ to the staff at distances of 25, 50, 75 and 100 cm from the patient were also measured.

KEYWORDS: ^{192}Ir , Brachytherapy, Rando phantom, Organ dose.

Comparison of the IAEA TRS 398 Code of Practice and the AAPM TG51 Protocol for Dosimetry Calibration of high energy photon and electron beams

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Manuscript received: March 12, 2002; revised August 1 and October 30, 2002

Accepted for publication: November 4, 2002

Abstract

The purpose of this work is the application of new IAEA TRS 398 code of practice [1] and AAPM TG51 protocol [2] to compare the determination of absorbed dose to water achieved following the two different recommendations and to discuss procedures and difficulties encountered. Calibrations of high-energy photon beams of nominal accelerating potential of 6 and 15 MV and electron beams of 6, 9, 12, 16 and 20 MeV nominal energy generated by a Varian 2100CD linear accelerator were performed. Dose values obtained at the energies investigated with both protocols were in agreement for photon beams within 0.1% for 6 MV and 0.4% for 15 MV and for electron beams within 0.6%.

KEYWORDS: Dosimetry protocols, dosimetry, monitor calibration, photon and electron beams.

Matchline dosimetry of half beam technique at fixed SSD using Co-60 and 4 MV photons in the treatment of head and neck tumors

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Accepted for publication: November 26, 2002

Abstract

The problem of beam divergence and overlapping of adjacent fields in the conventional treatment of cancer of the head and neck is well known. The use half beam technique has been suggested as one way of solving this problem. This work reports a matchline dosimetry of this technique using Co-60 beam and 4 MV photons beam and fixed SSD technique.

The dose distributions at the junction between two adjacent fields were measured with films in solid water phantoms for both machines. The dose distributions are compared and discussed. This study shows that ± 1 mm field placement errors are acceptable for each machine within $\pm 5\%$ dose variations. On the other hand in $\pm 2, 3, 5$ mm field placement errors dose variations exceed tolerance limits. However dose variations in Co-60 machine with half block are much less than 4 MV linear accelerator with asymmetric collimator.

KEYWORDS: Matchline dosimetry, 4 MV x-ray, Co-60, Head and neck.