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Editorial

1st European Congress of Medical Physics September 1–4, 2016; Medical Physics innovation and vision within Europe and beyond

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ABSTRACT

Medical Physics is the scientific healthcare profession concerned with the application of the concepts and methods of physics in medicine. The European Federation of Organisations for Medical Physics (EFOMP) acts as the umbrella organization for European Medical Physics societies. Due to the rapid advancements in related scientific fields, medical physicists must have continuous education through workshops, training courses, conferences, and congresses during their professional life.

The latest developments related to this increasingly significant medical speciality were presented during the 1st European Congress of Medical Physics 2016, held in Athens, September 1–4, 2016, organized by EFOMP, hosted by the Hellenic Association of Medical Physicists (HAMP), and summarized in the current volume.

1. Introduction

Medical Physics is the scientific healthcare profession concerned with the application of the concepts and methods of physics in medicine. The European Federation of Organisations for Medical Physics (EFOMP) acts as the umbrella organization for European Medical Physics societies [1]. The organization consists of 34 national organizations which together represent around 8150 members [2]. According to the latest data from the International Organization for Medical Physics (IOMP), the total number of medical physicists is approximately 24,000 professionals worldwide [3]. The occupation is a recognized, established, and mature profession that is undergoing considerable growth and change, with many of these changes being driven by scientific, technical, and medical advances [4]. Due to the rapid advancements in related scientific fields, medical physicists must have lifetime education through workshops, training courses, conferences and congresses.

This volume follows the successful works of the 1st European Congress of Medical Physics 2016 (ECMP) held in Athens, September 1–4, 2016, hosted by the Hellenic Association of Medical Physicists (HAMP). The Congress was the first event supervised and organized by EFOMP in contrast to previous events. The decision to have an EFOMP Congress was driven by the successful 8th European Conference of Medical Physics held in Athens, Greece in 2014 [5]. The 1st ECMP structure comprised of the President, the Vice President, the Congress Program Committee, the local Organizing Committee, the Scientific Committee, and finally the Awards Committee. EFOMP accredited the Congress as a Continuing Professional Development (CPD) event for Medical Physicists, with a maximum of 55 h. According to the EFOMP recommendations, this was equivalent to 55 CPD credit points. The Accreditation Code for the event was: CG009 -2016.

The Congress objective was to present the most recent developments and technological advances in the following topics: 1) Radiation Oncology, 2) Nuclear Medicine, 3) Diagnostic and Interventional Radiology, 4) Non-ionizing applications, and 5) all other applications. Prestigious invited speakers, from all over the world, presented the state-of-the-art subjects in the field. Twenty-five companies participated in the technical exhibition some of which organized satellite symposia, where participants had the opportunity to follow the current technological and commercial trends. It was one of the most important international scientific events in Europe in 2016.

As far as the scientific program is concerned, it included scientific sessions, refresher courses, professional symposia, and poster sessions for 4 consecutive days. Due to the large number of talks, the program ran in 3 parallel sessions. Accepted abstracts were published in a supplement issue of European Journal of Medical Physics [6]. EFOMP had joint sessions with the following organizations: 1) European Society of Radiology (ESR), 2) European Association of Nuclear Medicine (EANM), 3) European Society for Radiotherapy & Oncology (ESTRO), 4) the Middle East Federation of Organizations of Medical Physics (MEFOMP), which is the regional organization member of the International Organization for Medical Physics (IOMP) for Middle East, 5) the European Federation of Radiographer Societies (EFRS), 6) the International Society of Radiographers and Radiological Technologists (ISRRT), 7) the International Atomic Energy Agency (IAEA), 8) International Centre for Theoretical Physics (ICTP), and finally 9) International Organization for Medical Physics (IOMP). Just before the Congress, a very interesting IAEA regional workshop on the Implementation of Quality Assurance Programs – Quality Assurance Audit for Diagnostic Radiology Improvement and Learning (QUAADRIL) was held in Athens August 29 – September 1, 2016. The workshop

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comprised a series of lectures, practical demonstrations and discussions, and addressed important aspects of the applications of the QUAADRIL methodologies in diagnostic radiology; particularly focusing on the production of the Quality Manual. Fifteen [15] delegates participated, with a mixture of radiologists, radiographers, and medical physicists. The last day of the workshop, IAEA experts participated in a dedicated IAEA special session, which was included in the EFOMP Congress. HAMP organized also a very successful side event, focusing on the academic and professional mobility of young medical physicists. The event included presentations on the professional status of medical physicists in Europe and their mobility across the continent together with the experience of a number of scientists from United Kingdom, Belgium, Portugal, France, and the United States. During the Congress, a number of parallel meetings were held such as the European Journal of Medical Physics (EJMP) editorial board meeting, the EFOMP Board and Council meeting, and the European Project "Basic Safety Standards Transposition" European Commission project meeting (full title: "Evaluation of national actions regarding the transposition of Council Directive 2013/59/Euratom's requirements in the medical sector).

Table 1
The countries that were represented in 1rst ECMP 2016.

A/A	COUNTRY	PAX
1	ALGERIA	2
2	AUSTRALIA	1
3	AUSTRIA	6
4	BELGIUM	15
5	BOSNIA & HERZEGOVINA	1
6	BRAZIL	3
7	BULGARIA	11
8	CANADA	2
9	CHINA	1
10	CONGO	2
11	CROATIA	7
12	CYPRUS	4
13	CZECH REPUBLIC	6
14	DENMARK	10
15	ESTONIA	1
16	FINLAND	2
17	FRANCE	34
18	GERMANY	26
19	GREECE	213
20	HUNGARY	1
21	INDIA	2
22	INDONESIA	1
23	IRAN	6
24	IRELAND	4
25	ITALY	85
26	JAPAN	11
27	LEBANON	2
28	LITHUANIA	1
29	MALTA	2
30	MEXICO	2
31	MOROCCO	4
32	NORWAY	1
33	PAKISTAN	1
34	POLAND	19
35	PORTUGAL	19
36	QATAR	4
37	ROMANIA	4
38	RUSSIA	2
39	SAUDI ARABIA	9
40	SLOVAKIA	1
41	SLOVENIA	2
42	SPAIN	35
43	SUDAN	2
44	SWEDEN	9
45	SWITZERLAND	9
46	THAILAND	1
47	THE NETHERLANDS	22
48	TURKEY	11
49	UK	23
50	UKRAINE	1
51	UNITED ARAB EMIRATES	1
52	USA	9
TOTAL		653

The 1st ECMP had 653 participants and 106 invited speakers and chairs. EFOMP invited the Italian Association of Medical Physicists for the official launch of the project "EFOMP meets Italy". In contrast to the 2014 event, in which the largest number of scientists came from Greece (53%), the 1st ECMP gathered researchers from many countries around Europe and beyond. Table 1 presents the 52 participant countries, with the highest percentage coming obviously from Greece (32%), 13% from Italy, 5% from Spain, and the rest of participants from all around the world.

Forty hundred and sixty-nine (469) abstracts were accepted and included in the program either for oral or poster presentation. Seven guest editors selected a number of presentations and invited authors to prepare manuscripts for consideration for publication in an EJMP focus issue. The manuscripts went through a careful peer review process before acceptance to publication. Twenty papers were accepted covering an important range of topics the summary of which will be presented in the following sections.

2. Radiotherapy

Within the large number of studies presented at the 1st ECMP in the field of radiotherapy, twelve were originally selected as "best" papers to be included in this focus issue of EJMP. They included the most complex tasks involved in the radiotherapy chain, starting from accurate target delineation, small field dosimetry, 4-D and adaptive strategies, to biology in brachytherapy and ion radiotherapy, or even proton radiography. At a later stage, seven papers successfully completed the submission and peer-review processes, and therefore were accepted for publication in the current volume and are presented in the following paragraphs.

Carrara M. et al. [7] reported their valuable experience on *in vivo* dosimetry in high dose rate brachytherapy for vaginal cancer treatment. MOSFET dosimeters assembled in a rectal probe were used to detect in real time dose discrepancy between planned and actually delivered doses to the rectal wall. The effects of the time delay between treatment planning procedures and dose delivery were investigated for several treatment sessions. Again in the field of brachytherapy, Peppa V. et al. [8] investigated time effects in pulsed dose rate treatments for patients affected by head and neck carcinoma. Analytical and Monte Carlo (MC) based methods to estimate the biological effective dose, taking into account the dose rate per source dwell position, were compared, showing significant differences especially for short tissue repair half-times.

The paper of Di Lillo et al. [9] investigates the feasibility of a new technique for synchrotron radiation rotational radiotherapy for breast cancer (which they have given the name SR3T). The work undertakes both Geant 4 MC simulations, and measurements to evaluate the possibility for skin sparing in terms of energies in the 60–175 keV space, showing that 7:1 ratio of tumour to skin dose ratio is achievable. The technique also allows varying dose distributions to be created in the target using multiple rotations. The synchrotron radiation was also shown to guide the treatment with CT imaging technique. Furthermore, the use of contrast agents such as iodinated solutions or gold nanoparticles for dose enhancement (DE-SR3T) shows potential.

The paper of Dufreneix S. et al. [10] introduces the reader in the use of experimental designs (a well-known branch of the statistical science) and the analysis of multiparametric problems related to the quality assurance of beam models' validation. The end point of their study was to show how these methods can help define the optimal measurement set to meet the QA acceptance criteria and how they can be used to infer the main factors affecting the