AFOMP Newsletter

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INSIDE STORIES

Prof. Dr.Arun Chougule

From the desk of editor

I am happy to present to you the June 2015 issue of the AFOMP news letter. The present issue contains some informative and readable articles, especially "Nanotechnology in Medicine - Physicist's Perspective" by Prof. S. H. Pawar which discusses the contribution of nanotechnology in medicine and the role played by physicists. In addition, the article by Dr. A. Meghzifene on "IAEA Support to Medical Physics" is a very important resource article for medical physicists and concerned professionals so as to best utilize/mobilize the IAEA resources for developing and enriching medical physics. The article by Prof. C. Rangacharulu titled "Prospects of Novel Radiation Sources for Medical Purposes" gives a detailed insight into ongoing research for appropriate radiation sources in medicine.

This year, the AOCMP is being organized during 5 – 8 November 2015, at Xi'an, the ancient city of China. Looking forward for larger active participation of medical physicists and related professionals in forthcoming AOCMP conference at Xian and SEACOMP conference at Yogyakarta, Indonesia.

As usual, I appeal all to kindly provide articles, information, and news for publication in the AFOMP Newsletter. Your feedback and criticism for continuous improvement of the Newsletter are highly appreciated.

Prof. Dr. Arun Chougule

The Announcement of AOCMP 2015

Xi'an China
Nov 5 – 8 2015

Co-Sponsored and Organized by

Chinese Society of Medical Physics (CSMP)

Shaanxi Provincial Cancer Hospital, Shaanxi Province, China

North American Chinese Medical Physicists Association (NACMPA)

Endorsed by

Asia-Oceania Federation of Organizations for Medical Physics (AFOMP)

American Association of Physicists in Medicine (AAPM)

International Organization for Medical Physics (IOMP)

Venue: Kempinski Hotel Xi'an China

Website: www.aocmp2015.com
www.csmp.org.cn/aocmp2015/

Email: aocmp2015@163.com

IMPORTANT NOTICE:
*The conference date has been changed to Nov 5–8, 2015
*The conference venue has been changed to Kempinski Hotel Xi'an.
请注意：
*会议时间更改为 2015 年 11 月 5–8 日
*会议地址更改为西安凯宾斯基酒店。




IAEA support to Medical Physics

Giorgia Loreti and Ahmed Meghzifene
International Atomic Energy Agency

Introduction: role and mandate of the IAEA

The International Atomic Energy Agency (IAEA) is an independent intergovernmental organization founded in 1957 as part of the United Nations family. Its role is to promote and verify the safe, secure and peaceful use of nuclear sciences and technologies with the aim of reaching peace, health and prosperity throughout the world. The IAEA carries on its mandate operating through three main pillars: Safeguards and verification, Safety and Security, Science and Technology [1].

The IAEA offers technical and specialized assistance to its Member States (164 as of April 2015), helping them to reach their developmental goals through a responsible planning and peaceful and safe employment of nuclear technologies. Developing Member States can benefit from the IAEA support by taking part in special activities and programs designed to facilitate the transfer of technology and knowledge in the nuclear and radiation science domain.

The IAEA aims at setting the highest safety level in every application of nuclear sciences and technologies, as well as the protection of human health and the environment against ionizing radiation. For this reason, international safety standards are developed, published and disseminated, in an effort to achieve standardization and encourage best practices. The International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources aims at establishing basic requirements for protection against the risks associated with exposure to ionizing radiation and for the safety of radiation sources that may deliver such exposure [2]. The Standards have been developed from widely accepted radiation protection and safety principles, such as those published by the International Commission on Radiological Protection and the IAEA Safety Series.

Human health is a specific area of interest to the IAEA, as specified in Article II of the Statute: “The Agency shall seek to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world”. Through its Human Health programme [3], the IAEA responds to the needs of Member States, enhancing their capacity to prevent, diagnose and treat health problems by applying nuclear and radiation-based techniques. The Human Health programme includes four major areas: Nutrition, Nuclear Medicine and Diagnostic Imaging, Radiation Oncology and Applied Radiobiology, and Dosimetry and Medical Radiation Physics.

IAEA’s activities in Medical Physics

The IAEA, through the work of the Dosimetry and Medical Radiation Physics Section, develops activities specifically related to Medical Radiation Physics, focussing on clinical and highly specialized technical topics in radiotherapy and diagnostic imaging (nuclear medicine and diagnostic and interventional radiology). The activities of the IAEA in Medical Physics can be grouped in three main areas: dosimetry services, publications, education and training.

Dosimetry Services

The IAEA provides dosimetry services and audits, through its Dosimetry Laboratory located in Seibersdorf, and jointly with the World Health Organization (WHO), in the framework of the IAEA/WHO Network of Secondary Standards Dosimetry Laboratories (SSDLs) [4]. The IAEA Laboratory provides a link between SSDLs and the International

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System of Units and aims at developing and maintaining radiation standards for dosimetry measurements in radiotherapy, diagnostic radiology and radiation protection. This service plays an important role in helping Member States ensure that patients undergoing diagnostic radiology or radiotherapy procedures are receiving the intended dose. In particular, the IAEA services include dosimetry calibration services for SSDLs and to reference hospitals in countries where no SSDLs exist. In addition and since 1969, together with the WHO, the IAEA provides dosimetry audit and verification services to SSDLs, hospitals and radiation protection services in Member States on request, for applications in radiotherapy and radiation protection. Thermoluminescent dosimetry (TLD) is utilized as the basis of the IAEA's dose audits in radiotherapy. TLD dosimeters are sent to participating centres who requested the service, irradiated in specific conditions by the participants, then returned to the IAEA for readout and analysis. The dose received by the TLD is compared with the intended dose stated by the hospital staff. If discrepancies are detected, the IAEA establishes a follow-up programme for quality improvement, including on-site visits by local or international experts, if required.

Publications

Many publications have been produced by the IAEA with the aim of offering support and guidelines on the main Medical Physics' topics. The publications address major broad topics or more specialized ones, which are relevant for the Medical Physics community. These needs are identified through consultancies with professional societies and international experts. The publications aim at providing harmonized international guidance that can support medical physicists in their everyday clinical practice. Some publications offer expert advice and guidance on planning and transitioning to new technologies, as an example: "Transition from 2-D Radiotherapy to 3-D Conformal and Intensity Modulated Radiotherapy" [5]. Specific Codes of Practice were also published for radiotherapy dosimetry (i.e. Technical Report Series 398 for "Absorbed Dose Determination in External beam Radiotherapy") [6] as well as a technical reports on dosimetry in X-ray diagnostic radiology [7, 8, 9, 10].
Guidelines and technical reports on Acceptance Testing, Commissioning and Quality Assurance (QA) procedures are available for both equipment and patient-related procedures. These are intended to serve as practical references for the hospital work, encouraging best practice and promoting quality management and standardization. In addition to radiotherapy [11, 12, 13, 14, 15], the IAEA also published specific guidelines in radiology physics [16, 17, 18] and nuclear medicine physics [19, 20, 21, 22].

All these publications can be freely downloaded from the IAEA website (http://www-naweb.iaea.org/nahu/DMRP/publication.html),.

IAEA support for education and training in Medical Physics

Education and training play an important role in ensuring the application of best practice in hospitals and achieving the highest possible safety standard for patient care. The lack of basic education and clinical training, as well as continuous professional development, are important issues for the Medical Physics profession that needs to be addressed. Therefore, the IAEA pays special attention to this topic and much dedication is set in providing guides, textbooks, training activities and e-learning modules.

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Specific and complete textbooks, endorsed by professional societies have been made available online in the three main medical physics' specialties: radiotherapy [23], nuclear medicine [24] and diagnostic radiology [25]. These books aim at providing the minimum level of knowledge required from a professional in the field and are developed to be a reference text for students or support material for teachers.

Educational material is available online in the Medical Physics section of the Human Health Campus [26]. This website represents a virtual resource center for professionals and students who work in this area. This platform is particularly dedicated to offering training material and aims at becoming a reference free resource for professionals and students in different areas of clinic professions, gathering and serving a global virtual community of learners.

The IAEA also supports and encourages on-the-job training: fellowships are granted for professionals working in medical physics for specialized training; and workshops are organized at national and regional levels in well-defined topics. The IAEA has also set up a gamma camera laboratory in Seibersdorf, near Vienna, Austria. The laboratory offers the possibility of using Quality Control (QC) tools, equipment and radioisotopes for continuous professional development.

The roles, responsibilities and, consequently, clinical training requirements of medical physicists are still today very diverse among countries. The Medical Physics profession plays a key role in the safe and effective application of medical diagnostic imaging and therapy. Therefore, the IAEA defined internationally endorsed roles and responsibilities of medical physicists and established harmonized requirements for education and clinical training worldwide. The publication on the "Roles and Responsibilities, and Education and Training Requirements for Clinically Qualified Medical Physicists" [27], endorsed by the International Organization for Medical Physics (IOMP) and the American Association of Physicists in Medicine provides recommendations for the academic education and clinical training requirements of clinically qualified medical physicists, including recommendations for their accreditation certification and registration, along with continuous professional development.

In addition to academic education, medical physicists should obtain specialized clinical training. Often, even if a specific academic education is available for medical physicists, it lacks clinical training or, if included, it is usually not properly structured and supervised. A formal certification process is also missing in many countries. To help in providing harmonized guidelines, the IAEA has published three Training Course Series publications, which provide references to clinical training material for medical physicists specializing in radiation oncology (TCS-37 [28]), diagnostic radiology (TCS-47 [29]) and nuclear medicine (TCS-50 [30]).

How to benefit from IAEA support-

The IAEA delivers its support to Member States in the safe and secure application of

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nuclear science and technology for peaceful purposes. The support of the IAEA is directed mainly to capacity building and includes different elements: human resources development, education and training, knowledge management and networks. The IAEA delivers its services and technical support mainly through the Technical Cooperation (TC) programme [31].

Technical Cooperation programme

The TC programme supports transfer of know-how and technology through the procurement of equipment, training and expert missions, and operates in four geographic regions: Africa, Asia and the Pacific, Europe and Latin America. The programme also fosters and encourages cooperation among countries – for example, pairing technically advanced countries to developing ones in projects of common interest. Through the TC programme, support is also been given for building competencies on a large scale, for example, setting-up national medical physics education and clinical training programs in Member States. The IAEA through the TC activities can also support requests by Member States and offers the possibility of a comprehensive audit to assess the whole radiotherapy process [32, 33] or imaging modalities [34, 35]. These comprehensive peer-review missions aim at evaluating the safety, effectiveness and quality of all components of the practice at the institution, including its professional competence.

Support by the IAEA through its TC programme is based on formal requests for participation expressed within the framework of national, regional or inter-regional projects, by completing on-line applications [36] and submitting them through the relevant national authorities to the IAEA. Requests for fellowships and scientific visits, and for participation in meetings, workshops and trainings, should be related to an on-going IAEA TC project, and must be channelled through the National Liaison Officer of the applicant's country.

Coordinated Research Activities

The IAEA also fosters and encourages research by institutes in IAEA Member States in selected nuclear and radiation technology fields through dedicated Coordinated Research Activities (CRAs). These projects aim at transferring knowledge and know-how among the participants. Most of the CRAs are carried out under Coordinated Research Projects (CRPs), which bring together experts from developing and developed countries to work and collaborate on problems of common interest. To participate in the CRAs, the proposals should be prepared by institutes in IAEA Member States and submitted to the Research Contracts Administration Section [37]. If the proposal is positively evaluated, the IAEA may offer requesting institutes: a research, technical or doctoral contract, or a research agreement. When a research contract is awarded for proposals coming from developing countries, financial support is given for the implementation of activities that are related to the Coordinated Research Project. A research agreement does not include financial support and is offered to institutions contributing to the achievement of the objectives of a CRP. The CRP team members prepare the project work plan, regularly meet and review the ongoing work, creating a network that often favours new collaboration and leading to new projects. The IAEA ensures that the end results of the research and collaboration activities are freely available to all its Member States. This is often achieved through the publication of the results in the form of an IAEA report or in the open literature.

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References

[1] https://www.iaea.org/ourwork

[2] INTERNATIONAL ATOMIC ENERGY AGENCY, Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards, Jointly sponsored by EC, FAO, IAEA, ILO, OECD/NEA, PAHO, UNEP, WHO, IAEA, Vienna (2014), http://www-pub.iaea.org/MTCD/publications/PDF/Pub1578_web-57265295.pdf

[3] http://www-naweb.iaea.org/NAHU/index.html

[4] http://www-naweb.iaea.org/nahu/DMRP/tld.html

[5] INTERNATIONAL ATOMIC ENERGY AGENCY, Transition from 2-D Radiotherapy to 3-D Conformal and Intensity Modulated Radiotherapy, TECDOC 1588, IAEA, Vienna (2008) - http://www-pub.iaea.org/books/IAEABooks/7907/Transition-from-2-D-Radiotherapy-to-3-D-Conformal-and-Intensity-Modulated-Radiotherapy

[6] INTERNATIONAL ATOMIC ENERGY AGENCY, Absorbed Dose Determination in External Beam Radiotherapy An International Code of Practice for Dosimetry Based on Standards of Absorbed Dose to Water Sponsored by the IAEA, WHO, PAHO and ESTRO, TECHNICAL REPORTS SERIES No. 398, IAEA, Vienna (2000) - http://www-pub.iaea.org/mtcd/publications/pdf/trs398_scr.pdf

[7] INTERNATIONAL ATOMIC ENERGY AGENCY, Dosimetry in Diagnostic Radiology: An International Code of Practice, Technical Reports Series 457, IAEA, Vienna (2007) - http://www-pub.iaea.org/books/IAEABooks/7638/Dosimetry-in-Diagnostic-Radiology-An-International-Code-of-Practice

[8] INTERNATIONAL ATOMIC ENERGY AGENCY, Implementation of the International Code of Practice on Dosimetry in Diagnostic Radiology (TRS 457): Review of Test Results IAEA Human Health Reports 4, IAEA, Vienna (2011) - http://www-pub.iaea.org/books/IAEABooks/8561/Implementation-of-the-International-Code-of-Practice-on-Dosimetry-in-Diagnostic-Radiology-TRS-457-Review-of-Test-Results

[9] INTERNATIONAL ATOMIC ENERGY AGENCY, Dosimetry in Diagnostic Radiology for Paediatric Patients, IAEA Human Health Series 24, IAEA, Vienna (2014) - http://www-pub.iaea.org/books/IAEABooks/8965/Dosimetry-in-Diagnostic-Radiology-for-Paediatric-Patients

[10] INTERNATIONAL ATOMIC ENERGY AGENCY, Quality Assurance for Radioactivity Measurement in Nuclear Medicine, Technical Reports Series 454, IAEA, Vienna (2006) - http://www-pub.iaea.org/books/IAEABooks/7480/Quality-Assurance-for-Radioactivity-Measurement-in-Nuclear-Medicine

[11] INTERNATIONAL ATOMIC ENERGY AGENCY, Record and Verify Systems for Radiation Treatment of Cancer: Acceptance Testing, Commissioning and Quality Control, IAEA Human Health Reports 7, IAEA, Vienna (2013) - http://www-pub.iaea.org/books/IAEABooks/8941/Record-and-Verify-Systems-for-Radiation-Treatment-of-Cancer-Acceptance-Testing-Commissioning-and-Quality-Control

[12] INTERNATIONAL ATOMIC ENERGY AGENCY, Radiotherapy Facilities: Master Planning and Concept Design Considerations, IAEA Human Health Reports 10, IAEA, Vienna (2014) - http://www-pub.iaea.org/books/IAEABooks/10561/Radiotherapy-Facilities-Master-Planning-and-Concept-Design-Considerations

[13] INTERNATIONAL ATOMIC ENERGY AGENCY, Setting Up a Radiotherapy Programme: Clinical, Medical Physics, Radiation Protection and Safety, IAEA, Vienna (2008) - http://www-pub.iaea.org/books/IAEABooks/7694/Setting-Up-a-Radiotherapy-Programme-Clinical-Medical-Physics-Radiation-Protection-and-Safety-Aspects

[14] INTERNATIONAL ATOMIC ENERGY AGENCY, Commissioning and Quality Assurance of Computerized Planning Systems for Radiation Treatment of Cancer, Technical Reports Series 430, IAEA, Vienna (2004) - http://www-pub.iaea.org/books/IAEABooks/6974/Commissioning-and-Quality-Assurance-of-Computerized-Planning-Systems-for-Radiation-Treatment-of-Cancer

[15] INTERNATIONAL ATOMIC ENERGY AGENCY, Development of Procedures for In Vivo Dosimetry in Radiotherapy , IAEA Human Health Reports 8, IAEA-TECDOC-CD-1588, IAEA, Vienna (2013) - http://www-pub.iaea.org/books/IAEABooks/8962/Development-of-Procedures-for-In-Vivo-Dosimetry-in-Radiotherapy

[16] INTERNATIONAL ATOMIC ENERGY AGENCY, Quality Assurance Programme for Computed Tomography: Diagnostic and Therapy Applications, IAEA Human Health Series 19, IAEA, Vienna (2012) - http://www-pub.iaea.org/books/IAEABooks/8751/Quality-Assurance-Programme-for-Computed-Tomography-Diagnostic-and-Therapy-Applications

[17] INTERNATIONAL ATOMIC ENERGY AGENCY, Quality Assurance Programme for Screen Film Mammography, IAEA Human Health Series 2, IAEA, Vienna (2009) - http://www-pub.iaea.org/books/IAEABooks/7991/Quality-Assurance-Programme-for-Screen-film-Mammography

[18] INTERNATIONAL ATOMIC ENERGY AGENCY, Quality Assurance Programme for Digital Mammography, IAEA Human Health Series 17, IAEA, Vienna (2011) - http://www-pub.iaea.org/books/IAEABooks/8560/Quality-Assurance-Programme-for-Digital-Mammography

[19] INTERNATIONAL ATOMIC ENERGY AGENCY, Quantitative Nuclear Medicine Imaging: Concepts, Requirements and Methods, IAEA Human Health Reports 9, IAEA, Vienna (2014) - http://www-pub.iaea.org/books/IAEABooks/10380/Quantitative-Nuclear-Medicine-Imaging-Concepts-Requirements-and-Methods

-Contd.-

[20] INTERNATIONAL ATOMIC ENERGY AGENCY, PET/CT Atlas on Quality Control and Image Artefacts, IAEA Human Health Series 27, IAEA, Vienna (2014) - http://www-pub.iaea.org/books/IAEABooks/10424/PET-CT-Atlas-on-Quality-Control-and-Image-Artefacts

[21] INTERNATIONAL ATOMIC ENERGY AGENCY, Quality Assurance for SPECT Systems, IAEA Human Health Series 6, IAEA, Vienna (2009) - http://www-pub.iaea.org/books/IAEABooks/8119/Quality-Assurance-for-SPECT-Systems

[22] INTERNATIONAL ATOMIC ENERGY AGENCY, Quality Assurance for PET and PET/CT Systems IAEA Human Health Series 1, IAEA, Vienna (2009) - http://www-pub.iaea.org/books/IAEABooks/8002/Quality-Assurance-for-PET-and-PET-CT-Systems

[23] INTERNATIONAL ATOMIC ENERGY AGENCY, Radiation Oncology Physics: A Handbook for Teachers and Students, IAEA, Vienna (2005) - http://www-pub.iaea.org/books/IAEABooks/7086/Radiation-Oncology-Physics-A-Handbook-for-Teachers-and-Students

[24] INTERNATIONAL ATOMIC ENERGY AGENCY, Nuclear Medicine Physics: A Handbook for Teachers and Students, IAEA, Vienna (2015) - http://www-pub.iaea.org/books/IAEABooks/10368/Nuclear-Medicine-Physics-A-Handbook-for-Teachers-and-Students

[25] INTERNATIONAL ATOMIC ENERGY AGENCY, Diagnostic Radiology Physics: A Handbook for Teachers and Students, IAEA, Vienna (2014) - http://www-pub.iaea.org/books/IAEABooks/8841/Diagnostic-Radiology-Physics-A-Handbook-for-Teachers-and-Students

[26] http://nucleus.iaea.org/HHW/MedicalPhysics/index.html

[27] INTERNATIONAL ATOMIC ENERGY AGENCY, Roles and Responsibilities, and Education and Training Requirements for Clinically Qualified Medical Physicists IAEA Human Health Series 25, IAEA, Vienna (2013) - http://www-pub.iaea.org/books/IAEABooks/10437/Roles-and-Responsibilities-and-Education-and-Training-Requirements-for-Clinically-Qualified-Medical-Physicists

[28] INTERNATIONAL ATOMIC ENERGY AGENCY, Clinical Training of Medical Physicists Specializing in Radiation Oncology, Training Course Series 37, IAEA, Vienna (2009) - http://www-pub.iaea.org/books/IAEABooks/8222/Clinical-Training-of-Medical-Physicists-Specializing-in-Radiation-Oncology

[29] INTERNATIONAL ATOMIC ENERGY AGENCY, Clinical Training of Medical Physicists Specializing in Diagnostic Radiology, Training Course Series 47, IAEA, Vienna (2010) - http://www-pub.iaea.org/books/IAEABooks/8574/Clinical-Training-of-Medical-Physicists-Specializing-in-Diagnostic-Radiology

[30] INTERNATIONAL ATOMIC ENERGY AGENCY, Clinical Training of Medical Physicists Specializing in Nuclear Medicine, Training Course Series 50, IAEA, Vienna (2011) - http://www-pub.iaea.org/books/IAEABooks/8656/Clinical-Training-of-Medical-Physicists-Specializing-in-Nuclear-Medicine

[31] http://www.iaea.org/technicalcooperation/Home/index.html

[32] INTERNATIONAL ATOMIC ENERGY AGENCY, Comprehensive Audits of Radiotherapy Practices: A Tool for Quality Improvement, Quality Assurance Team for Radiation Oncology (QUATRO), IAEA, Vienna (2007) - http://www-pub.iaea.org/books/IAEABooks/7680/Comprehensive-Audits-of-Radiotherapy-Practices-A-Tool-for-Quality-Improvement-Quality-Assurance-Team-for-Radiation-Oncology-QUATRO

[33] INTERNATIONAL ATOMIC ENERGY AGENCY, On-site Visits to Radiotherapy Centres: Medical Physics Procedures, Quality Assurance Team for Radiation Oncology (QUATRO), TECDOC 1543, IAEA, Vienna (2007) - http://www-pub.iaea.org/books/IAEABooks/7681/On-site-Visits-to-Radiotherapy-Centres-Medical-Physics-Procedures-Quality-Assurance-Team-for-Radiation-Oncology-QUATRO

[34] INTERNATIONAL ATOMIC ENERGY AGENCY, Quality Management Audits in Nuclear Medicine, Publication 1371, IAEA, Vienna (2008) - http://www-pub.iaea.org/MTCD/publications/PDF/Pub1371_web.pdf

[35] INTERNATIONAL ATOMIC ENERGY AGENCY, Comprehensive Clinical Audits of Diagnostic Radiology Practices: A Tool for Quality Improvement Quality Assurance Audit for Diagnostic Radiology Improvement and Learning (QUAADRIL) IAEA Human Health Series 4, IAEA, Vienna (2010) - http://www-pub.iaea.org/books/IAEABooks/8187/Comprehensive-Clinical-Audits-of-Diagnostic-Radiology-Practices-A-Tool-for-Quality-Improvement-Quality-Assurance-Audit-for-Diagnostic-Radiology-Improvement-and-Learning-QUAADRIL-

[36] http://intouch.iaea.org/Default.aspx

[37] http://cra.iaea.org/cra/forms.html

Nanotechnology in Medicine- Physicists' Perspective

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Introduction to nanotechnology in Medicine:

Pretty a long time, the physicist has played a key role in treating and curing the cancer patients with radiation therapy and it was a great contribution to field of medicine. Similarly, physicists have pioneered the developments in Nanoscience and nanotechnology. Nanotechnology involves man ipulating properties and structures at the nanoscale, often involving dimensions that are just tiny fractions of the width of a human hair. Nanotechnology is already being used in products in its passive form, such as cosmetics and sunscreens, and it is expected that in the coming decades, new phases of products, such as better batteries and improved electronics equipments, will be developed and have far-reaching implications. It has the ability to measure and to control matter at the nanometer scale. The prefix "nano" was derived from the Greek word "dwarf", while the term "nanotechnology" was used by the Japanese researcher Norio Taguchi in 1974. However, the concept of nanotechnology was realized by the famous physicist Richard Feynman in 1959 in his landmark lecture "There's plenty of room at the bottom" at an American Physical Society meeting at Caltech, where he mentioned the possibility of manipulating material at the level of individual atoms and molecules. The major push for nanotechnology came from the electronics industry for the development of miniaturized electronic devices on silicon chips. One area of nanotechnology application that holds the promise of providing great benefits for society in the future is in the realm of medicine. For example Nanotechnology is already being used as the basis for new, more effective drug delivery systems and is in early stage of development as scaffolding in nerve regeneration research. Moreover, the National Cancer Institute has created the Alliance for Nanotechnology in Cancer in the hope that investments in this branch of nanomedicine could lead to breakthroughs in terms of detecting, diagnosing, and treating various forms of cancer.

Nanomaterials in Medicine:

Nanomaterials are now being designed to assist therapeutic agents to pass through biologic barriers, to mediate molecular interactions, and to identify molecular changes. They have a larger surface area with modifiable optical, electronic, magnetic, and biologic properties compared to macroparticles. Current nanotechnology based drug delivery systems for cancer treatment, which are already marketed and under research and evaluation, includes liposomes, polymeric micelles, dendrimers, nanospheres, nanocapsules, and nanotubes. Nanomaterials are synthesized by chemical, physical and biological methods using both top bottom and bottom-up approaches.

The conventional methods based on physico-chemical techniques have been used successfully to produce nanoparticles. However, it causes many difficulties such as use of toxic solvents, generation of hazardous byproducts and high energy consumption. Therefore, there is a growing concern to develop eco - friendly and sustainable method for synthesis of nanoparticles based on green chemistry approach that interconnects nanotechnology and microbial technology. It has been reported that bacteria, fungi, actinomycetes, yeast, algae and viruses have been used for biosynthesis of gold, silver, magnetite, silica, platinum, quantum dots, selenium, titania and zirconia nanoparticles. For example many organisms are found to mediate the deposition of minerals by the special enzymatic sequester system. In biologically-controlled mineralization, the minerals are deposited in a specific location, either on an organic interface or within a vesicle, from supersaturated solutions that are generated by biochemical processes. An example of biologically-controlled mineralization is magnetic iron mineral particle formation in magnetotactic bacteria (MTB).

Another one is, synthesis of silver nanoparticles, based on clean, nontoxic, biocompatible, and environment friendly approache. “Green” synthesis of nanoparticles can be successfully performed extracellularly or intracellularly by organisms such as bacteria, yeast, fungi, algae and plant extracts. Silver nanoparticles (AgNPs) are considered one of the most important and commonly used metallic nanoparticles, in particular in medical applications, due to their known antimicrobial activities.

Nanoscale materials can be observed by using devices based on electrons, photons, scanning probes, ions and atoms. A variety of techniques are available in each of these areas and a systematic application of these tools leads to a complete understanding of the materials. For better understanding, the relation between photocatalytic antibacterial activity and properties of photocatalyst the characterization of photocatalyst is required. The physiochemical properties of a photocatalyst highly depend on the method adopted for the synthesis of photocatalyst. While characterizing a photocatalyst material, the interaction of light with matter is studied to obtain lot of data which is related to the properties of material. This data gives the information about the material, size, shape, morphology, phase, chemical composition, etc. The photocatalytic properties of a surface are explained by its composition and structure on the atomic scale.

Biodegradable and biocompatible natural polymeric nanomaterials that do not cause an immune response in organism, able to integrate with a particular cell type/ tissue are required for medical and pharmaceutical uses. These natural biomaterials help and enhance wound healing at the ideal rate corresponding to the rate of new tissue formation. Additionally, synthetic gel-like materials, films/membranes, composites, micro-/ nanoparticulate systems have featured heavily in the development of biomaterials for wound healing and other tissue-engineering purposes. For enhancing the wound healing moist dressing materials such as gauzes, hydrogels, foams, hydrocolloids (carboxymethylcellulose), alginate, collagen, cellulose, cotton/rayon, transparent films (polyurethane) are recommended as passive dressings for wounds and burns, because of their influence on local cellular response. Thus, they provide useful properties including: maintains suitable moisture at wound level, protect from peri-wound skin, avoid microbial contact, cleanse the injured tissues, avoid dust, and minimizes pain and odors. Naturally occurring products having emollient, demulcent, epithelializing, astringent, anti-microbial, anti-inflammatory and antioxidant properties can improve the wound healing process

The potential contributions of nanotechnology in the medical diagnosis are extremely broad and improve traditional diagnostic tools and methods in the field of clinical diagnosis, imaging and electro- diagnosis. Medical diagnosis based on nanotechnology provides two major advantages: rapid testing and early diagnosis. Emerging modalities such as biochip, microarray, nanobarcode, micro-electromechanical systems, lab on a chip and nanobiosensor have revolutionized the field of medical diagnosis. Nanoscale materials and nano-enabled techniques are used for diagnosis of various diseases such as cardiovascular diseases, cancer, diabetes, infectious disease, musculoskeletal and neurodegenerative disease, etc. For example Electrochemical immunosensors are the promising devices that are used for qualitative as well as quantitative determination of tumor markers. Tumor markers are important biomarkers that can be used for diagnosing, staging and monitoring cancer. The elevated levels of these tumor markers are indications of increased risk of cancer in the patient. Thus, it is important to detect these markers in a biological sample using a very sensitive and accurate techniques. These are based on the principal of a very specific interaction between antigen and antibody. Electrochemical immunosensors can sense a change in either current or capacitance or voltage or impedance during the interaction, depending upon types of electrochemical immunosensors. Nanotechnology based sensors have proved to be very beneficial in improving their sensitivity and accuracy. Gold and magnetic nanoparticles are extensively studied nanomaterials in the field of electrochemical nano-biosensors. Nanomaterials increase sensitivity and detection limit of the sensors.

The new class of nanomaterials especially magnetic nanoparticles have been studied extensively for the diagnosis and/or treatment of different diseases in biomedical research field. Some of the important fields of applications are magnetic resonance imaging (contrast agents), biosensors (immunosensors, enzyme sensors), targeted drug delivery (drug nano- carrier), magnetic particle hyperthermia (heating mediators), cell tracking and separation (labels) and magnetically guided gene transfection.

Magnetic Nanoparticles and Physicists' perspective:

Nanotechnology allows physicists, chemists, material scientists and engineers synthesize systems with nano sizes where the classic laws of physics are different at that small scale. Magnetic nanoparticles are a class of nanoparticles which can be manipulated using magnetic field. Magnetic nanoparticles offer some attractive possibilities in biomedicine. First, they have controllable sizes ranging from a few nanometres up to tens of nanometres, which places them at dimensions that are smaller than or comparable to those of a cell (10–100μm), a virus (20–450 nm), a protein (5–50 nm) or a gene (2 nm wide and 10–100 nm long). This means that they can 'get close' to a biological entity of interest. Indeed, they can be coated with biological molecules to make them interact with or bind to a biological entity, thereby providing a controllable means of 'tagging' or addressing it. Second, the nanoparticles are magnetic, which means that they obey Coulomb's law, and can be manipulated by an external magnetic field gradient. This 'action at a distance', combined with the intrinsic penetrability of magnetic fields into human tissue, opens up many applications involving the transport and/or immobilization of magnetic nanoparticles, or of magnetically tagged biological entities. In this way they can be made to deliver a package of an anticancer drug into a body, such as tumour. Third, the magnetic nanoparticles can be made to resonantly respond to a time-varying magnetic field, with advantageous results related to the transfer of energy from the exciting field to the nanoparticle. For example, the particles can be made to heat up, which leads to their use as hyperthermia agents.

Magnetic Hyperthermia; A boon to Cancer Pateints :

There are variety of magnetic properties shown by materials and mainly studied by physicists right from their synthesis, characterization and put them into devices. Application of mnps into medicine is very interesting and revealed number of devices for their biomedical applications. Nanotechnology of these materials in medicine opened frontiers in health care. Magnetic nanoparticle mediated intracellular hyperthermia has the potential to achieve localized tumor heating without any side effects. Hyperthermia is a promising approach for cancer therapy. Cancer cells generally perish at around 43^{0}C because of their oxygen supply via the blood vessel is not sufficient, whereas normal cells are not damaged at even higher temperatures. For this purpose, one promising technique is based on the use of magnetic nanoparticles. These magnetic nanoparticles have

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attractive chemical, physical, biotechnical and physiological properties for hyperthermia agent applications such as: 1) magnetic nanoparticles have high chemical stability, easy control of particle size and direct injection through the intravascular system, 2) transport of magnetic nanoparticles through blood vessel to the targeted cells or tissues is automatically controlled by monitoring the externally applied current for magnetic field gradients; 3) easy coating with biological entities for possible cell differentiations and 4) Self-heating temperature rise by applying an AC magnetic field. These prominent properties guarantee the therapeutic effect of magnetic nanoparticles in hyperthermia treatment with the lowest possible number of magnetic nanoparticles, limited applied AC magnetic field (H), frequency (f) and at a minimum equipment cost, and worthy of thorough investigation.

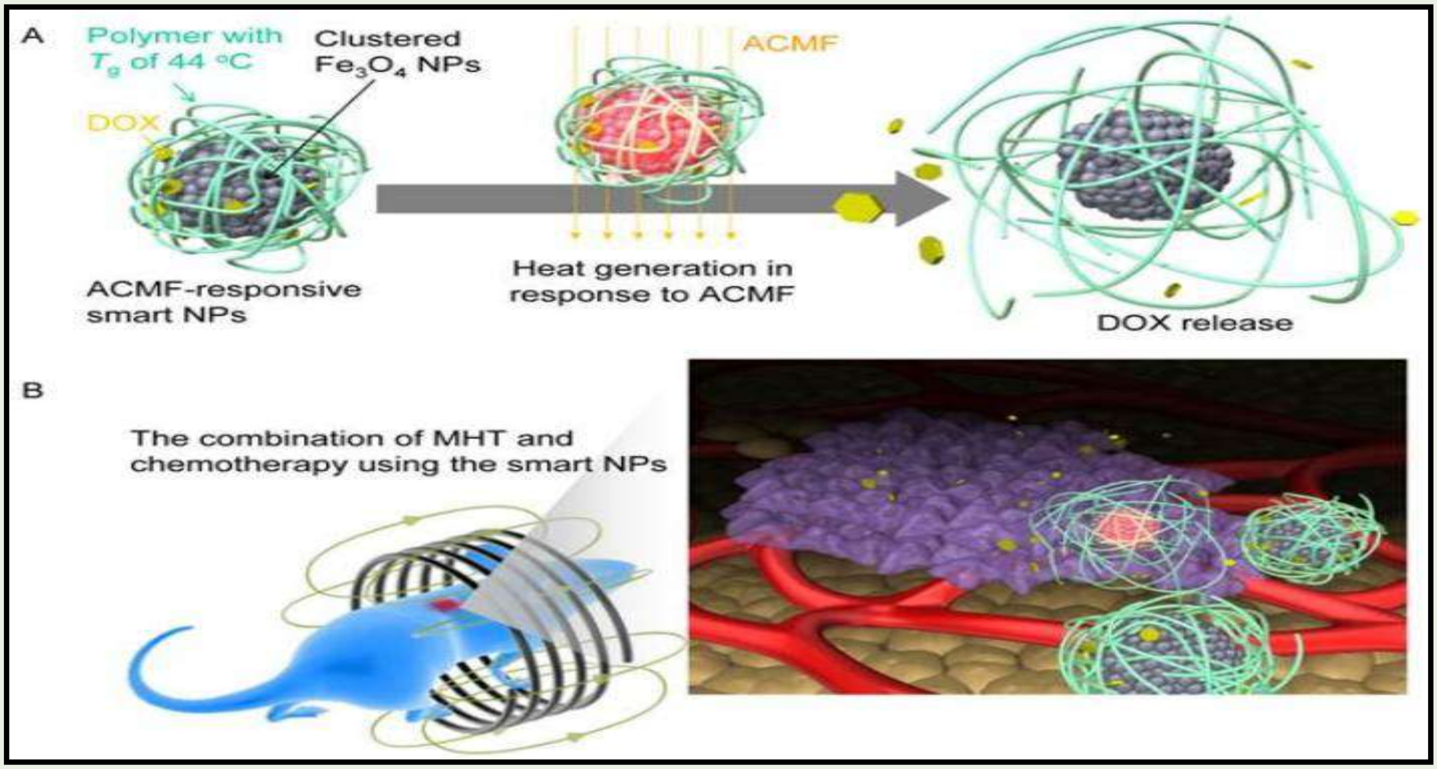

Figure 1 Illustrates the process of nanoparticles that produce heat in response to AC magnetic field and sequentially release Doxorubicin (DOX). (B) Illustration of cancer treatment with the combination of magnetic hyperthermia and chemotherapy.

Prior to this work, researchers had no way of predicting how much heat would be generated by a given nanoparticle formulation. The key to identifying and quantifying the mechanisms involved in heat generation was the use of magnetic particles of highly uniform and well-defined size that do not stick to one another. The researchers note that their modeling and experimental work provide the means to calculate accurately the dose of magnetic nanoparticles and the length of treatment required to produce a desired level of heating. The development of patients friendly magnetic hyperthermia therapy as an alternative to present uncertain and painful treatments of cancer patients, may be one of the major challenges for medical physicists in future. Further, operationless removal of blockage in the heart with MNPs seems to be a boon to the patients suffering with heart disceases which may be carried out by medical physicists.

Prospects of Novel Radiation Sources for Medical Purposes

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Since the discovery of X-rays nearly 120 years ago, gamma rays and particle radiations have been increasingly employed for diagnosis as well as therapy. Soon after the first cyclotron was built, the inventor Ernest Lawrence embarked on making radioisotopes for medical purposes. He engaged his brother John Lawrence, a graduate of Harvard Medical school, to start radiopharmaceutical program. The year 1939 marked the first time that beams from a particle accelerator were used to cure cancer, as John Lawrence employed energetic neutron beams to treat leukemia (http://www2.lbl.gov/Publications/75th/files/04-lab-history-pt-3.html). The important thing to note here is that there was a strong collaboration between a medical researcher and a physicist to accomplish this feat.

Since then, many developments in nuclear/particle physics research for accelerators or detector materials or instrumentation have found applications in medicine. To name a few, the evolution of high current electron accelerators, novel isotopes, digital data acquisition systems are the tools of radiation therapy and single photon emission computed tomography (SPECT) and positron emission tomography (PET) for medical imaging. Just 2-4 decades ago, nuclear physics experiments relied solely or predominantly on hardware technologies for experiments involving time coincidence measurements of multiple emissions in reaction or decay studies. As the number of detector components increased and logic requirements varied, the electronic logic and the associated hardware instrumentation and the costs were also increasing exponentially. During this time, the electronic systems have evolved from purely hardware based Nuclear Instrumentation Module (NIM) logic to increasingly software driven Computer Aided Measurement And Control (CAMAC) systems to Virtual Machine Environment (VME) logic to the latest digital technology based Field Programmable Gate Array (FPGA) data acquisitions.

I believe that the current medical instrumentations almost universally employ the VME logic. If it is not already being done, the SPECT and PET imaging logic will evolve to the FPGA systems, which provide the flexibility of recording the signal arrival times and energy deposits of individual pulses and subject the data to software analyses for timing and energy correlations. The salient feature of the new development is that one can recall the data, almost as simple collection of several individual signals with all the timing and energy informations recorded in a database and reconstruct the images with various software logic choices, all without having to do any further measurements on the patient. The nice thing is the current PET and SPECT detector assemblies can be retrofitted with the new electronic systems at moderate costs and rewriting of some software.

On another front, the particle acceleration technologies is going through almost revolu-tionary developments which may contribute to enormous compactification and possibly bring cost reductions for medical accelerators. Currently, electron accelerators of a few MeV (up to about 25 MeV) are in use to produce Bremsstrahlung beams for radiation therapy. As is well known, the intensities of Bremsstrahlung photons decrease

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with increasing photon energies as $I_\gamma \propto {}^{1}\!/_{E_\gamma} \; for \; E_\gamma < E_e$, and $I_\gamma = 0$ for $E_\gamma > E_e$. where E_γ and I_γ are the energy and intensity of a photon and E_e is kinetic energy of the electron beam. Immediately, we see a few difficulties. First of all, to get finite intensities for a photon energy (E_γ) of our interest, the electron energy must be fairly higher than E_γ. Then, of course, there are photons at both higher and lower energies of our interest. In fact, most of the photon flux is at very low end. This means a loss of efficiency and, worse still, a source of undesirable background radiation and associated effects. It is also well known that the gamma ray dose distribution is an exponential decay curve with no finite endpoint, a concern for radiation therapy as the dose cannot be simply localized to stop in the tumor volume.

In recent years, the backward Compton scattering of laser photon beams (dubbed as LCS beams) off ultra relativistic electrons have become available at electron synchrotrons. The distinguishing feature of these facilities is that the photon intensities are nearly constant up to the maximum endpoint energies. While this does not address the exponential dose distribution, it is expected to improve the dose distribution and also cut off photons of higher energies and associated radiation background effects. Currently, such photon beam facilities are operating in Japan (http://www.rcnp.osaka-u.ac.jp/Divisions/np1-b/ and http://www.lasti.u-hyogo.ac.jp/NS-en/facility/bl01/) and USA (http://www.tunl.duke.edu/facilities/).

We are in the very early stages of a proposal to build such facilities at the INDUS synchrotrons of Raja Ramanna Centre for Advanced Technology, Indore, India (http://www.cat.ernet.in/technology/accel/isrf_index.html). There is also a much advanced proposal to build one such facility at Shanghai Synchrotron Radiation Facility (SLEGS@SSRF). Medical physics colleagues have shown considerable interest to explore these beams for their characteristic dose distributions likely to be of radiation therapy interest.

Currently, LCS beams are not easily accessible to medical hospital uses. However, things are likely to change in the coming 2-3 decades. This expectation is based on the ongoing revolutionary developments in accelerator technologies at several laboratories.

Also, for radiation therapy, the advantages of using protons or heavy ions in stead of gamma radiation is well documented in literature. The simple argument is that charged particles deposit most of the dose (nearly 2/3rd of the total dose) under the Bragg peak at the end of their finite journey in a medium. So, one can tune the particle beam energies to position the Bragg peak in tumor volumes. Typically, the optimum ion beam energies are 200-300 x A (MeV), where A=1 and 12 respectively for protons and carbon ions, the most commonly used ions in radiation therapy.

For ion beam therapy, the workhorses are synchrotrons. They usually have a linear accelerator (linac) as an injector, which feeds ions into an accelerating ring. Both the linac and ring are powered by RF fields. Despite strong interest, ion therapy facilities are just a few, mostly located in Japan, USA and Germany. The reasons are the involved high costs, enormous real estate and large infrastructures. The complex infrastructure of these facilities is exemplified by the facility at Hyogo Ion Beam Medical Center, Japan (http://www.hibmc.shingu.hyogo.jp/english/ionbeam2.html). This facility is perhaps unique in that both protons and carbon ions are available from one single accelerator facility for radiation therapy.

So far, direct current (DC) voltages or microwave radio frequency (RF) alternating fields have been the means to achieve high energy charged particle beams. The DC machines are limited to low energies (about less than 30 MeV per nucleon) and they have never been candidate technologies for medical accelerators. Thus, the choices are either linac or cyclotrons or synchrotrons, employing the RF based particle acceleration with energy gains of 20- 50 MeV/ meter. Typical electron synchrotrons for LCS beams consist of about a 10 meter long linear accelerator connected to about 200 meter diameter ring around which we have to add several meters long beamlines. This becomes a large real estate enterprise with considerable hardware infrastructure.

Since the last few decades, several research groups from around the world have been engaged in research activities for new accelerator technologies based on another physics principle. With RF fields, the limit of a maximum gain of 50 MeV/meter gain is due to electrical breakdown at the walls of the metallic structures in accelerating wave guides. Setting up RF fields higher than this magnitude causes electric sparks and current discharges. Basically, the fields are ionizing the medium and causing the breakdowns. What if we start with an ionized medium? Can we overcome the breakdown problems and make accelerators much more compact? The answer turns out to be 'yes'.

Figure from http://1t2src2grpd01c037d42usfb.wpengine.netdna-cdn.com/wp-content/uploads/sites/2/2011/03/laser-wakefield-principle.jpg

To this end, we shall consider a plasma medium, that of an ionized gas, for acceleration. The source of power is a laser or another charged particle. While the original concept was put forward in 1979 by the late John Dawson, the challenges encountered are of optimizing three different technologies: accelerators, plasmas and lasers. It took a while to get some promising results. This new acceleration schemes are called laser wakefield or plasma wakefield technologies. The difference between the two technologies is the power source. In laser wakefield, as the name implies, a laser is used to cause ionization in a neutral gas medium and the charged particles are subsequently accelerated as they are influenced by the swift moving laser pulse. In plasma wakefield, a short pulse of high energy electron beam is used as the source which drives the acceleration. An analogy is that of a surfer behind a motorboat in a lake. If the surfer catches the wave and maintains balance, he or she will move at very high speed. If surfer loses balance, he or she falls in the lake. Similarly, a wakefield is created along the path of laser pulse or electron pulse, which are ionizing atoms to be torn asunder. The lighter electrons fly away from the pulse, but not for too long, as the heavier positive ions linger along the path of pulse and try to draw the electrons back to the pulse path. Some of them get behind the pulse, see the positive charges and get accelerated. They are just like surfers behind a motorboat.

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In laser/plasma wakefield acceleration, the laser/electron beam pulse is the motor boat and the surfers are electrons and/or positive ions, which depends on the experimental arrangement. While the plasma acceleration is of interest to high energy physicists who seek ever increasing higher energy particles, medical community may be interested in the developments of laser wakefields, as they offer promise of accelerating either electrons of positive ions.

In December 2014, a group at the Lawrence Berkeley laboratory published a result that they managed to accelerate electrons to 4.2 GeV in 9 cm long capillary waveguide (W.P. Leemans et al, Physical Review Letters, volume 113, page: 245002), corresponding to a field gradient of more than 40 GeV/meter, an improvement of more than a factor 1000 compared to RF fields. Also, the energy spread was about 6% and angular divergence was 0.3 mrad. This is an excellent news. The LCS facilities of several tens of MeV photons can be built with this combination of a single Ti:Saphire laser and electron beams.

However, now is not yet the time to celebrate. There are quite a few hurdles to overcome. First, the lasers are high power lasers. The Berkeley Lab Laser (BELLA) is a peta Watt (10^{15} W) power with all the photons contained in a short pulse of about 30 fs (1 fs = 10^{-15} s). The laser infrastructure is humongous and expensive (http://loasis.lbl.gov/facilities_BELLA.html). Nevertheless, laser technologies made significant progress in recent decades bringing the size and costs down. There are reasons to think that this trend will continue in the future also. To make positive ions, we must consider either an external target based plasma acceleration or some means to inject positive ions behind the accelerated electrons. This is not a simple task as positive ions are relatively slow-moving and they are likely to fall behind the wake field like the surfer caught off balance. Then, there are questions about pulse intensity, also known as luminosity.

If these issues are resolved, the laser wakefield accelerators can revolutionize both LCS facilities and ion beam facilities. The important thing is that energy gains of 4 GeV/9cm are achieved with peta Watt lasers. This accomplishment can already miniaturize the electron storage rings to tabletop machines. It is conceivable, that one laser system can be used both for acceleration and also to serve as photon for the Compton backscattering. Also, this energy is more than adequate to accelerate carbon ions for radiation therapy, if the above mentioned issues can be resolved. Accelerator scientists, medical physicists and other medical professionals have their work cutout to advance this research.

The literature is growing everyday. Below are some articles of interest for non-specialists and specialists.

1. John M. Dawson, 1989 *Plasma Particle Accelerators*, Scientific American, vol. 260, Page 54

2. Thomas Katsouleas, 2004 *Electrons hang ten on laser wake*, Nature , vol 431, page 515

3. Chandrasekhar Joshi, 2006 *Plasma Accelerators*, Scientific American, vol 294, page 40

4. E. Esarey, C.B.Schroeder, and W.P. Leemans, 2009 *Physics of laser-driven plasma-based electron accelerators*, Reviews of Modern Physics, vol. 81, page 1229- a comprehensive review

5. W.P.Leemans and collaborators, 2014 *Multi-GeV Electron Beams from Capillary-Discharge-Guided Sub-petawatt Laser Pulses in the Self-Trapping Regime*, Physical Review Letters,

vol. 113, page 245002

This event will become an excellent opportunity for researchers to share their newest science work and discoveries in the field related to the broad scope of Diagnostic, Therapeutic, Nuclear Medicine, Biophysics & Biomedical Engineering

John R. Cameron Memorial Lecture :

Prof. Kunio Doi, PhD (Gunma Prefectural College of Health Sciences, Japan and University of Chicago, USA)

Topic : "The Potential impact of Computer-aided diagnosis in Medical Imaging"

Workshop :

Prof. Rethy Chhem

Topic : "Workshop on education program to medical physicists on nuclear power disaster and risk communication"

Prof. Hidetaka Arimura (Kyushu University, Japan)

Topic : "Medical image engineering approaches for computer-aided diagnosis and radiotherapy"

Schedule

Abstract submission deadline	: July 31^{th} 2015
Notification of acceptance	: Aug 31^{th} 2015
Manuscript submission deadline	: Oct 31^{th} 2015
Registration & Payment deadline	: Oct 31^{th} 2015
Congress day	: Dec 10^{th} – 12^{th} 2015

Registration Fee:

	before Oct 31^{th} 2015	Late
Registration Student	US$ 120	US$ 120
Members	US$ 200	US$ 300
Non Members	US$ 300	US$ 400

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IOMP INTERNATIONAL ORGANIZATION FOR MEDICAL PHYSICS

Conference Report: ICMPPRPR-2K15 – & AMPI NC CON-2015

20-22 Feburary, 2015
Department of Radiological Physics,
SMS Medical College, Jaipur

The International Conference on Medical Physics, Radiation Protection and Radiobiology "ICMPRPR-2K15" & Annual Conference of Association of Medical Physicists of India (Northern Chapter) "AMPI NC-CON-2015" hosted this year by Department of Radiological Physics, SMS Medical College & Hospital, Jaipur Under the auspices of Association of Medical Physicists of India (Northern Chapter) during 20-22 February 2015 at SMS Hospital Auditorium.

This was a truly international scientific meeting with over 500 delegates participated around the globe .The organizers had set the programme focused on research & recent advancement to cover the whole spectrum of medical radiation physics: Radiation Therapy Physics and Devices; Medical Imaging Physics and Devices; Radiation Dosimetry and Standards; Radiation Physics; Radiation Biology; Time Dose Models; Commissioning, Quality Assurance, and Audits; Clinical Aspects of Radiation Oncology; Clinical Aspects of Medical Imaging; Computational Tools in Medical Physics; Education and Training in Medical Physics; and Radiation Protection and Safety. Presentations on recent developments in the technology of radiation medicine and methodology of imaging and radiation therapy were the few of them. The programme included 30 talks by invited speakers 40 Oral Presentation & 60 poster presentations along with an industrial/trade exhibition.

The key conference themes were:

- Radiotherapy, practice and Quality Assurance
- Radiation Protection, legislation, standards and practice
- Education; Professional Issues and Development across the globe
- Nuclear Medicine, PET and Molecular Therapy
- Radiation Dosimetry
- Novel Medical Devices and Sensors.

Enhancing the role of medical physics into medicine
of particular note was the focus on the digital hospital and medical physics in the new era of genomic medicine. On this occasion abstract book containing all the presentation was published.

In inaugural function of the Conference Welcome address given by **Prof. Dr. Arun Chougule,** Chairman of ICMPRPR 2K15 and Chairman of AMPI – NC, while delivering the inaugural address, **Prof. Dr. Arun Chougule** summarized the importance of Medical Physics in welfare of mankind and shows the willingness to do his level best for upliftment of society. He also stated that society is given me too much it is time to pay back for the society. **Dr. A. Meghzifene,** Head, Dosimetry & Medical Radiation Physics International Atomic Energy Agency, Vienna, Austria stated in his Guest of Honor speech about the importance of conferences to discuss the framework for Basic Safety Standard, **Dr. S.H Pawar,** Vice Chancellor, DY Patil University, Kolhapur , emphasize on intra disciplinary research & its need in present era, **Dr. Raja Babu Panwar,**Vice Chancellor, Rajasthan University of Health Science, Jaipur in his Chief Guest address stated that need of medical physics in to medicine & appeal the society to work together in coordination with Medicine & Chemistry for the betterment of mankind. **Dr. U.S.Agrawal**, Principal & Controller, SMS Medical College, Jaipur & **Dr. Man Prakash Sharma**, Medical Superintendent, SMS Hospital speaks about the facilities at SMS Medical College & welcoming the delegates. The souvenir & Medical Physics Chronicle was released on this occasion.

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The winners of essay competition on "Role of Medical Physics in Healthcare" were facilitated with momentous & cash prize.

The scientific sessions begins with N.C singhal oration talk by M.P.S.Mann highlighting the role of Health Physicist for Hospitals in Indian Scenario, followed by some other scientific talks on Heavy ion radiotherapy technology by Dr. Atsushi Kitagawa,Japan,Modern developments of sources of radiation for therapy and diagnosis, by Dr. Rangacharyulu Chary Canada, Adaptive Radiotherapy: Physical and Biological Aspects by Dr. Satish Jaywant,USA, Nanotechnology in Medicine by Dr. S.H Pawar India, Radiation dose in medical imaging why do we need to care? by Pradip Deb Australia , Radiation Protection during Pregnancy by Dr. L.S. Arun Kumar Oman, Revised QA Protocols for Radiotherapy Equipment's by Dr. S.D. Sharma India & Challenging innovations in clinical practices by Dr. S. Senthil Kumar India are few of them .There was 40 oral presentations & 60 poster presentations by renowned persons in the field , There was a best paper presentation session held on day two, the oral presentation by **Ms. Priyusha Bagdare, Indore** on "Is intensity modulated radiotherapy always superior technique than three dimensional conformal radiotherapy for treatment of non-small cell lung cancer: A comparative study" is declared best paper of the conference.

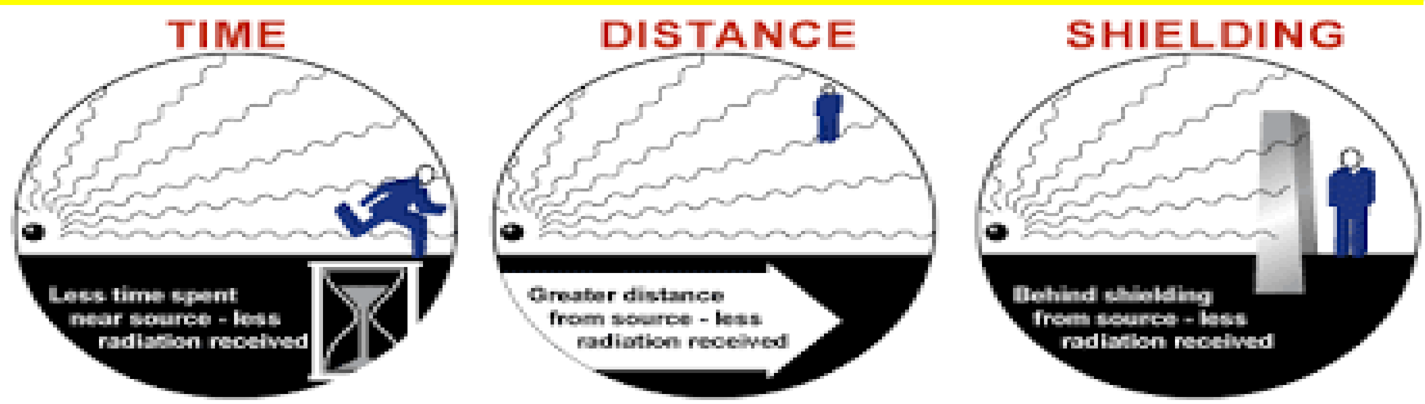
A GBM was held on day two to discuss "Promises and Pitfalls" witnessed the active participation of a large number of medical physicists & the meeting ends with the decision to meet in next year at BHU, Varanasi.(U.P) in AMPI(NC)CON-2K16.

The overwhelming participation of trades dealing with medical radiation equipment, Dosimetry systems, phantoms, computerized treatment planning systems, and treatment accessories was the other attraction of ICMPRPR -2K15 demonstrated in six stalls arranged at the conference venue

The conference programme was accompanied by in housed developed range of cultural programme includes dances, Play & Songs by students of DR Chougule ,It enabled delegates to sample the delights of Jaipur (Rajasthan) in evenings of glorious weather.

In summary, the conference deliberations were useful for radiation scientists, medical physicists, radiation oncologists, radiologists, radiobiologists, dosimetrists, and radiation technologists, researchers & students.

Lets Recall



Glimpses of the Conference

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ICMPROI-2017

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Report on 14th Asia-Oceania Congress of Medical Physics (AOCMP)

M. Akhtaruzzaman
General Secretary,Bangladesh Medical Physics Society (BMPS)& Medical Physicist & RCO
Ahsania Mission Cancer & General Hospital, Dhaka, Bangladesh
23-25 October 2014,Ho Chi Minh City, Vietnam

To promote the co-operation & communication between medical physics organizations and medical physics & related activities in the Asia-Oceania region Asia-Oceania Federation of Organizations for Medical Physics (AFOMP) organize AOCMP each year in the different countries of the region.

This year 14th Asia-Oceania Congress of Medical Physics (AOCMP) was held from 23 to 25 October together with 12th South East Asian Congress of Medical Physics (SEACOMP) in Ho Chi Minh City, a beautiful city of Vietnam. During this three days congress more than 240 participants from 20 different countries were attended and exchange their knowledge, experience and buildup a network. The scientific program of the congress was composed of a full day Pre-Congress, Plenary Sessions, Invited Lectures, Oral, Poster and Vendor Presentations which was covered a wide range of Medical Physics. There were 83 papers including 20 invited lectures and 99 posters were presented in the different scientific sessions.

On the first and second day of the congress I attended AFOMP Education and Training Committee (ETC) and AFOMP Council Meeting respectively which was very much exciting for me. In the ETC meeting, elaborate discussions were made regarding development and co-operation for education and training for the Medical Physicists in AFOMP region. All predefined agenda such as Individual Membership of AFOMP, AOCMP-2013, Singapore, AOCMP-2014, Vietnam, AOCMP-2015, China, New Website of AFOMP, Minutes of ETC meeting were discussed.

On the second day there was a fantastic cultural evening followed by Gala Dinner. The main attraction of the cultural programme was the exchange of culture among the participant's country. I have never seen this kind of blissful cultural evening before in past AOCMP (I have attended three AOCMP before).

Fig-1: AFOMP Council Meeting

Fig-2: Outstanding Cultural Evening

On the last day, the closing session was very precise and enjoyable. In this session awardees received their AFOMP travel award, best oral and poster presenter award.

-Contd.-

There were six oral and six posterawards. In this year there were nine travel awardees from AFOMP and SEFOMP. It was my great pleasure to being one of the awardees. It was a great honour to me as well as for Bangladesh Medical Physics Society (BMPS). Young medical physicists will be encouraged for this type of support from AFOMP. I would like to express my sincere and outmost gratitude to the chairman of the award committee Dr. Kin-Yin Cheung for considering me for this travel award.

Fig-3: Audience of the Congress

Fig-4: Travel Award in the Closing Ceremony

14th AOCMP 12th SEACOMP was a very successful event. I like to convey my special thanks to Nguyen Tan Chau and Nguyen Xuan Canh for their excellent and well disciplined organization of the congress. I was exposed to very many imminent medical physicists from different countries. From this conference I gather a lot of experiences regarding the arrangement of the conference, arts of presentation and many ideas of medical physics. I have learnt lot of things and have seen very many new things in Vietnam that has enriched my ideas that will help me to take the wise step for BMPS in future. Bangladesh is a developing country in which we are struggling to strengthen medical physics education and also quality treatment. I would like to appeal to the AFOMP through the secretary general that it will be really helpful for our small society of medical physicists if we get some training from AFOMP countries as we have lack of clinical training programme.

I am very hopeful that more medical physicists will take part in the AFOMP program from Bangladesh in future.

Calendar of Events

June 2015	1-Jun-2015 To 04-Jun-2015 International Conference ICRESH-ARMS 2015 June 7-12 2015 World Congress On Medical Physics & Biomedical Engineering Toronto Ontario Canada June 14 - 18, 2015 AAPM Meetings,Summer School 22 – 26 June 2015 Train the trainers Workshop on Medical Physics Support for Nuclear or Radiological Emergencies, Fukushima, Japan
July 2015	12-16 July 2015 AAPM 57th Annual Meeting; Anaheim, CA USA
August 2015	August 03-05, 2015 International Conference on Medical Physics Birmingham, UK August 13 - 14, 2015 ASTRO NCI AAPM Workshop - "Exploring Opportunities for Radiation Oncology in the Era of Big Data"
September 2015	September 18 - 20, 2015 AAPM: SRT/SBRT: Safe and Accurate Delivery of Hypofractionated Radiation Therapy
October 2015	October 11 - 15, 2015 ESTRO : KFMC Conference on Physics and Engineering in Medicine
November 2015	November 5 - November 8, 2015 Asia-Oceania Congress of Medical Physics 2015 20th—22nd November 2015 36th Annual Conference of the Association of Medical Physicists of India (AMPI) - **"AMPICON 2015"**. G.V. Raja Convention Centre, KTDC Samudra, Kovalam, Thiruvananthapuram. November 29 - December 4, 2015 RSNA 2015
December 2015	10-12 Dec SEACOMP 2015,Yogyakarta, Indonesia

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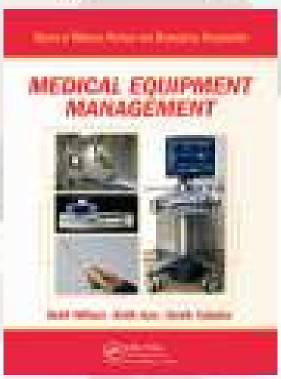

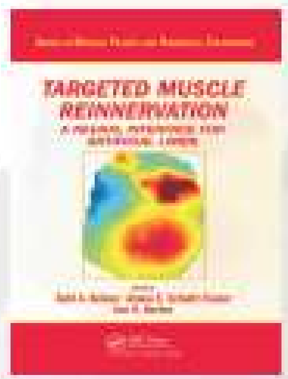

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