

ANNEX

50 Medical physicists
who have made an outstanding contribution
to the advancement of medical physics
over the last 50 years

Outstanding Contributions Over the Last 50 Years

1963- 50 Years of IOMP -2013



Medical physicists who have made an outstanding contribution to the advancement of medical physics over the last 50 years.



To mark the 50th Anniversary of the IOMP, national and regional medical physics organizations were invited to nominate medical physicists, and other closely related professionals, who have made an outstanding contribution to the advancement of medical physics and healthcare through research, clinical developments, education and training activities, service development, and to professional matters over the last 50 years. Whilst in most cases the contribution is of international importance, some of those selected have made such a significant contribution nationally or regionally that the international selection panel considered that they should be recognized.



Barry Allen



Penelope Allisy-Roberts



Carlos E. de Almeida



Peter R. Almond



F. Herbert Attix



Keith Boddy



Caridad Borrás



Anders Brahme



John R. Cameron



John R. Cunningham



Aaron Fenster



Maryellen L. Giger



Dietrich Harder



William R. Hendee



Yimin Hu



Godfrey Hounsfield



Willi Kalender



Constantin Kappas



Kiyomitsu Kawachi



Valeriy Kostylev



Anchali Krisanachinda



Tomas Kron



Lawrence H. Lanzl



John S. Laughlin



Paul C. Lauterbur



C. Clifton Ling



John Mallard



Jim Malone



Peter Mansfield



Sören Mattsson



Charles A. Mistretta



Kwan-Hoong Ng



Fridtjof Nüsslin



Colin G. Orton



Jose Perez-Calatayud



Ervin B. Podgorsak



Ambika Sahai Pradhan



Madan M. Rehani



David W.O. Rogers



Jean-Claude Rosenwald



Wolfgang Schlegel



Tae Suk Suh



Hans Svensson



Eiichi Tanaka



David Thwaites



Giampiero Tosi



David W. Townsend



Jacob Van Dyk



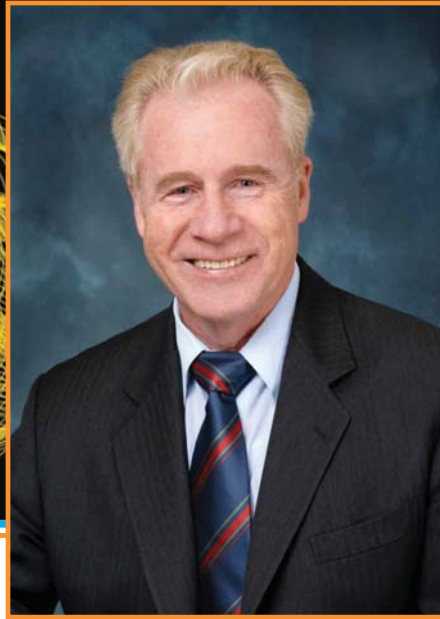
Steve Webb



Peter Wells

Outstanding Contributions Over the Last 50 Years

50 Years
of IOMP



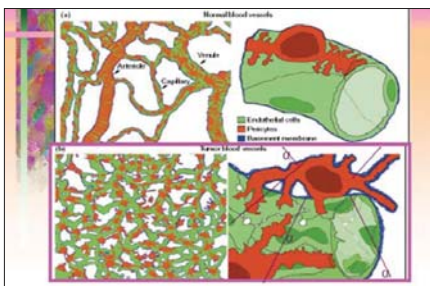
1963-2013

Barry J Allen

Barry Allen PhD DSc is a Professorial Fellow at four Sydney Universities. Previously, he worked at the Australian Nuclear Science and Technology Organisation (ANSTO) as a Chief Research Scientist and more recently as a Principal Medical Physicist Specialist in the Cancer Care Centre and Clinical School at St George Hospital in Sydney.

In the early 1980's Barry Allen began R&D programs in Boron Neutron Capture Therapy (BNCT) for cancer and In Vivo Body Composition (IVBC) for medicine. He designed the in vivo nude mouse irradiation facility at the Moata reactor at Lucas Heights, demonstrating the induction of double strand breaks in DNA arising from neutron capture induced auger emission. Barry went on to become President of the International Society for Neutron Capture Therapy and to convene the Fourth International Symposium in Sydney in 1990.

Barry Allen designed the first human body protein monitor (BPM) in Australia at Lucas Heights, which was installed at Royal North Shore Hospital where it continues to operate today in collaborative clinical studies with most Sydney hospitals. The BPM was an important research tool in studying the efficacy of management of many paediatric and adult diseases and treatments, including cystic fibrosis, renal disease, AIDs, cancer and surgery.



The hierarchy of normal tissue blood vessels is shown in Fig a. The chaotic and leaky tumour capillaries are shown in Fig b, which allow the extravasation of the alpha immune-conjugate to target antigens on pericytes and perivascular cancer cells. Emitted alphas kill the endothelial cells, shutting down the capillaries and starving the tumour.

The Targeted Alpha Therapy (TAT) project, begun in 1994, was successful in developing new agents for the treatment of melanoma and leukaemia, breast, prostate, pancreatic and colorectal cancers. Barry was Study Director of two world first trials of intralesional and systemic targeted alpha therapy for metastatic melanoma, with 51 patients treated in these Phase I trials. Barry developed the tumour anti-vascular alpha therapy (TAVAT) concept to account for regression of solid tumours by alpha therapy, since confirmed by Monte Carlo calculations.

A further development was the biological dosimeter for systemic radiotherapy, based on the formation of micronuclei in lymphocytes. Barry Allen has published over 320 papers in neutron and biomedical physics. Research topics include neutron capture gamma rays, resonance cross sections, stellar nucleosynthesis, clinical in vivo body composition, neutron capture therapy, macro and micro-dosimetry, microbeams, biological dosimetry and preclinical and clinical targeted alpha therapy. He is a co-author of the text book "Biomedical Physics in Radiotherapy for Cancer" (2011).

Professor Allen achieved Fellowship in the AIP (1972), the APS (1981), the ACPSEM (1992) and the Institute of Physics (1999). He was elected President of ACPSEM in 1998, AFOMP in 2003, IOMP in 2006 and IUPESM in 2009, introducing many new initiatives in these organisations, including the Health Technology Task Group for developing countries. He convened the 2003 World congress on Medical Physics and Biomedical Engineering in Sydney.

Outstanding Contributions Over the Last 50 Years

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1963-2013

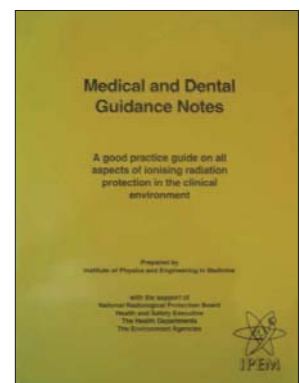
Penelope Allisy-Roberts

Dr Penelope Allisy-Roberts OBE, FInstP, FIPeM, FSRP is known for her work in the field of radiation protection, for which she was awarded an OBE in 1999. Whilst working for the International Bureau of Weights and Measures (BIPM) she oversaw significant developments in the field of ionizing radiation metrology. She has also made a major contribution to the teaching, organisation and professionalism of this discipline.

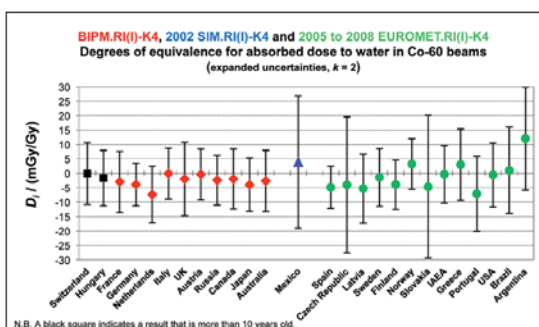
Dr Roberts became a medical physicist in 1971 and first held posts at the Queen Elizabeth Medical Centre in Birmingham, UK, based in the Regional Radiation Physics and Protection Service, of which she became Consultant Physicist and Head in 1988. In 1990, she was appointed Director of Medical Physics and Engineering at Southampton University Hospital. In these posts, she expanded the physics services, training and provision to other hospital departments.

In 1994, she became a radiation metrologist at the Bureau International des Poids et Mesures (BIPM). As Director of the Ionizing Radiation Department there, she was responsible for assuring the metrological equivalence of national standards in radiation dosimetry for x-ray and gamma radiation beams. Under her direction, the range of international standards was expanded to cover

dosimetry in radiotherapy accelerator x-ray beams, mammography x-ray beams and high dose-rate brachytherapy with ^{192}Ir . She also assured radionuclide activity metrology standards for some 65 different radionuclides and promoted the development of a transfer instrument for activity measurements of short-lived radionuclides. Her work ensured the future viability of the International System for Radionuclide activity measurements (SIR) at the BIPM. She retired in 2012.



Example of a cooperative effort in medical radiation protection.



International equivalence of national dosimetry standards assured by the BIPM.

Dr Allisy-Roberts has made a significant contribution to a wide range of organisations

serving this field. She has been active in the Institute of Physics and Engineering in Medicine (IPEM) since 1971, becoming its first female President in 1990. She has served on national committees for the Department of Health, Department for Business, Innovation & Skills and the Health and Safety Executive. Internationally, she has served on committees of: the European Council, the International Commission on Radiological Protection, the International Commission on Radiation Units and Measurements, the International Atomic Energy Agency and World Health Organization Network of Secondary Standards Dosimetry Laboratories (SSDL) and the European Federation of Organisations for Medical Physics. She is currently the Secretary of the EU Training and Education in Radiation Protection (EUTERP) Foundation. Her committee work has resulted in several collaborative publications, including the Medical and Dental Guidance Notes and the SSDL Network Charter.

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1963-2013

Carlos E. de Almeida

Carlos E. de Almeida, a Brazilian medical physicist, received his MSc and PhD at M.D. Anderson Hospital – University of Texas. He is known for his pioneering work to establish the primary standards for air-kerma for Co-60, medium-energy X-rays and the absorbed-dose standard for HDR Ir-192 sources in Brazil.

Carlos de Almeida's career is marked by his work at the Brazilian National Calibration Laboratory and later on the staff of the National Cancer Institute until 1995. At the NCI, he was the mentor of a markedly successful program, the National Quality Assurance Program in Radiation Oncology, which involved physicists, radiation oncologists and technologists from 32 institutions. He is recognized for his persistence to create and improve educational programs, to enhance awareness of the necessity of well-designed quality assurance programs and to promote the creation and organization of local Medical Physics Societies in the region.

As a consultant to PAHO and IAEA, he has taken several missions in many countries in LA for site evaluation or to teach courses on Medical Physics.

In 1993, he became the first Full Professor in Medical Physics at Rio de Janeiro University, the first Medical Physics Chair in the country and Chairman of the Radiological Sciences Laboratory. Since then, he has combined his academic role at the university with an active role at the hospital. His academic role has resulted in the education of more than 50 graduate students, 18 among whom are from Latin American countries.

His leadership in promoting the quality of medical physics and radiation oncology has been recognized by the Radiation Oncology and Medical Physics Societies. As result, in 2001, he received full recognition by the Latin American Medical Physics Society and in the same year became a Fellow of the AAPM. He was a Visiting Scientist at the BIPM, Institut Gustave Roussy and Institut Curie. He has served as president of the Brazilian Association of Medical Physics. He is a diplomat of the American Board of Radiology and the American Board of Medical Physics.

He has authored or co-authored over 100 scientific articles and several chapters in radiotherapy textbooks.

In 2008, he was awarded the Gold Medal by the Radiation Oncology Society. In 2010, the Academie Francaise de Languedoc awarded him the Becquerel Prize.

In conjunction with IOMP, in 1994, he was the President of the World Congress in Rio de Janeiro, the Chairman of the Education Committee for two terms and a member of the Science and Awards Committees.

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1963-2013

Peter R. Almond

Dr. Almond received his undergraduate honors degree in physics from Nottingham University and his training in medical physics from Bristol University, in the United Kingdom. In 1959 he moved to the United States as a fellow in Medical Physics at the University of Texas M.D. Anderson Hospital and Tumor Institute earning his master's and doctoral degrees in nuclear physics from Rice University in Houston in 1960 and 1965 respectively. From 1964 to 1985 he worked at The University of Texas M.D. Anderson Cancer Center in Houston in the Physics Department, where he served as the head of the Radiation Physics section and director of the Cyclotron Unit and Professor of Biophysics. He was a member The University of Texas Graduate School of Biomedical Sciences from 1966-1985 and from 1999 to the 2012 as a Distinguished Senior Lecturer. From 1985-1998 he was Vice-Chairman of the Department of Radiation Oncology at the University of Louisville.

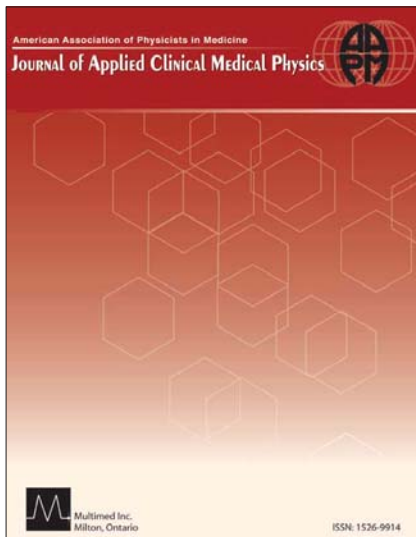


Illustration: Dr. Almond was the founding editor and Editor-in-Chief of the electronic Journal of Applied Clinical Medical Physics.

Dr Almond helped develop cancer treatments with various forms of radiation, including high-energy photons, electrons and neutrons. He has been instrumental in developing basic measurement techniques for these radiations, writing calibration protocols for the United States, the IAEA and ICRU. He helped found the journal, Medical Physics, and has served as the North American Editor for Physics in Medicine and Biology. He has served on numerous national and international committees and councils including the NCRP, the NRC and on the Radiation Study Section of the NIH, serving as chairman for two years. He worked on the dosimetry for the atomic bomb survivors for the NAS/NRC.

Academically, Dr. Almond has supervised over 25 masters and doctoral students in medical physics. He has authored or co-authored over 100 scientific articles and numerous chapters in radiotherapy textbooks. He has served as president of the American Association of Physicists in Medicine and as chairman of the Board of Chancellors of the American College of Medical Physics. Dr. Almond is a fellow of the AAPM, ACMP, ACR and the IOP. He is diplomat of the American Board of Radiology and the American Board of Medical Physics. He is licensed as a Professional Medical Physicist in the state of Texas and a Chartered Physicist (C Phys) in the United Kingdom. He has received the Coolidge Award and the Marvin M.D. Williams Professional Achievement Award from the AAPM and the ACMP respectively. He has twice received the Farrington Daniel Award for the best scientific paper on Radiation Dosimetry in Medical Physics. Now retired, he works on the history of medical physics. Springer has just published his book "Cobalt Blues The Story of Leonard Grimmett, the Man Behind the First Cobalt -60 Unit in the United States."

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1963-2013

F. Herbert Attix

There is both great depth and breadth to Professor Attix's scientific achievements in radiological physics. Few medical or health physicists can perform their daily tasks without using some result or experiment ultimately traceable to Herb Attix. These efforts spanned a career of almost 40 years divided roughly into three periods: the National Bureau of Standards (NBS), the Naval Research Laboratory (NRL), and the University of Wisconsin in Madison.

Herb Attix graduated from the University of California with A.B. (cum laude) in Physics and soon joined the NBS. At the Bureau, he had a unique collaboration with L.V. Spencer which resulted in the well known Spencer-Attix cavity theory of ionization. Their cavity theory still stands as the most comprehensive approach to electron-photon cavity response. Much of this research was included in Attix's M.S. thesis from the University of Maryland. Attix was also a major contributor in the development of the free-air ionization chamber for precise and accurate x-ray measurements at the Bureau.

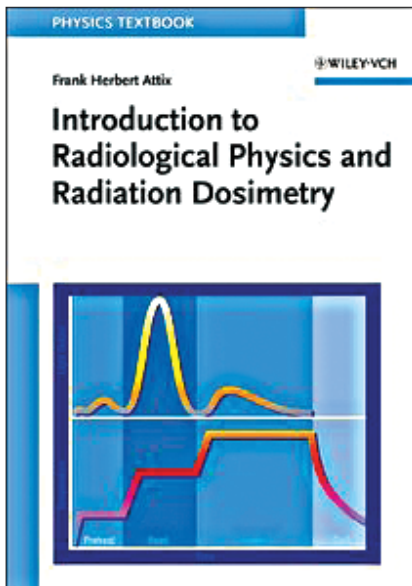


Illustration: Professor Attix published 'Introduction to Radiological Physics and Radiation Dosimetry'.

Attix joined the NRL in 1958 as head of the dosimetry branch and led the way with comprehensive investigations of thermoluminescent dosimeters: TLD response to photons, electrons and neutrons. These efforts led to a new type of TLD adopted by the US Navy, several patents and publications, and the organization of the first international conferences on luminescence dosimetry. With National Cancer Institute sponsorship, Attix led the dosimetry effort in neutron radiation therapy at the NRL. He became a spokesman for fast neutron dosimetry, and chaired the task group of the AAPM responsible for neutron dosimetry in the US radiotherapy program.

When Attix joined the faculty of the University of Wisconsin in 1976 as a Professor of Radiology in the Medical Physics Section, he continued research in dosimetry with publications in fast neutron cavity theory, the invention of A-150-plastic gas, and clarification of several dosimetric quantities. He worked with John Cameron to found the Department of Medical Physics at Wisconsin and served as its Chair for the last two years before his retirement in 1987. He died in 1997.

Professor Attix received the Distinguished Scientific Achievement Award of the Health Physics Society in 1987 and the Coolidge Award of the AAPM in 1994. He had approximately 80 referred articles, 80 invited lectures and 20 books and reports.

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1963-2013

Keith Boddy

The career of Professor Keith Boddy CBE started in radiation safety, an interest that continued for the rest of his life, but his work developed to encompass many other areas. During his 20 years leading medical physics in Newcastle, UK, he built up his group to be one of the leading such departments in the country. He was also a major figure in developing the profession nationally and internationally.

After graduating from Liverpool University in 1959, he was appointed Radiation Protection Officer and Head of Health Physics at the Aldermaston Court Research Laboratory where he was the first to report radioactivity in rainfall following Russian nuclear weapons testing. In 1963, he became a lecturer at the Scottish Universities' Research and Reactor Centre where he developed the first high sensitivity shadow-shield and mobile whole-body radioactivity counters. These and other research contributions earned him a PhD and a DSc.



The mobile whole body counter used to measure uptake of radioactivity in the population of UK following the Chernobyl accident. Professor Boddy led the project.

In 1978, he returned his native North East, on appointment as both Head of the Regional Medical Physics Department of the (then) Northern Regional Health Authority and Professor and Head of the Department of Medical Physics, Newcastle University. He succeeded in transforming a department on just two hospital sites in Newcastle into a truly regional and comprehensive medical physics service with over 270 staff in hospitals or centres across the North East of England.

He served on many committees, including the Committee on Medical Aspects of Radiation in the Environment (COMARE) of the UK Department of Health and the Radioactive Waste Management Advisory Committee (RWMAC) of the Department of the Environment.

Professor Boddy was elected President of the UK Hospital Physicists' Association and UK Institute of Physical Sciences in Medicine in 1986. He was President of the International Organisation for Medical Physics (IOMP) from 1994 to 1997. One of his many contributions as President of IOMP

was to initiate and actively promote the inclusion of medical physicist as a profession in the International Standard Classification of Occupations of the International Labour Organisation of the UN. In 1997, he became President of the International Union for Physical and Engineering Sciences in Medicine (IUPESM) and through his tireless efforts IUPESM achieved full membership of the International Council of Scientific Unions (ICSU).

Professor Boddy was awarded the CBE on his retirement in 1998. He died in 2010.

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1963-2013

Anders Brahme

Anders Brahme has, as a scientist and entrepreneur, contributed to the development of radiation therapy physics for more than 40 years. His visionary ideas have improved radiation therapy worldwide and are presently used routinely in clinical practice. We include here some of his major contributions to the field of radiotherapy spanning over a wide area from planning, delivering and adapting the treatment.

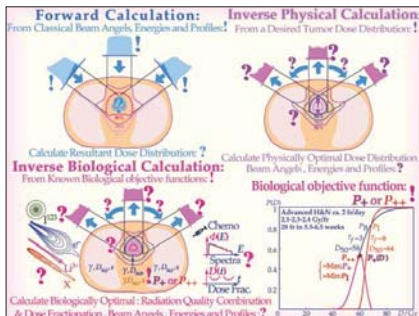


Figure 1: The development from classical forward "trial and error" treatment planning to inverse physical calculation (IMRT) and inverse biological calculation with biological objective functions.

achieve a higher degree of spatial conformality of the resulting dose distribution with the tumor target volume (Brahme 1988). The initial idea was pursued and further developed by Anders Brahme and his co-workers and it made a more than substantial contribution to the development of inverse treatment planning for IMRT.

Biologically Optimized Treatment Planning – The optimization of the dose distribution based on physical objectives was further developed by the research group of Anders Brahme. Biological objectives were included in the treatment planning accounting for the radiobiological response of the tumors and the organs at risk. Biological optimization is considered today state-of-the-art in treatment planning.

Light ions in radiotherapy – Anders Brahme has also made a major contribution to the use of light ions in radiotherapy with a special focus on the radiobiological aspects on the optimal radiation quality.

Treatment gantries – Anders Brahme's first important contributions to radiation therapy were in optimization of treatment heads and gantries. He developed methods to construct scattering foils and applicators for optimizing clinical electron beams, as well as flattening filters and other methods such as scanned beams and multileaf collimators for optimizing clinical photon beams. These ideas are still applied in modern units for radiation therapy.

IMRT – (Intensity modulated radiotherapy) – Inverse treatment planning and IMRT is recognized today by the scientific community as being initiated and conceptually invented by Anders Brahme and his group. In the paper by Brahme et al 1982, a new way of approaching radiation therapy was proposed which is today used as a standard method worldwide. IMRT as it is performed today is, of course, the result of a long chain of gradual developments in which the mathematical approach for inverse planning went hand in hand with technological achievements but they are all based on Anders Brahme's idea of modulating the fluence in order to

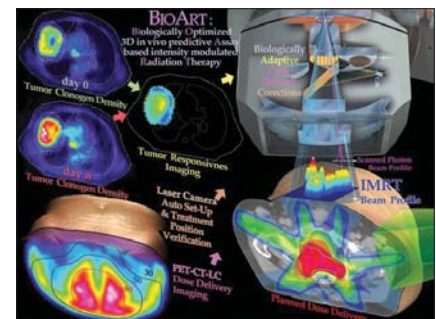


Figure 2: Schematic view of the concept of Biologically Optimized 3D in vivo predictive Assay based intensity modulated Radiation Therapy (BioArt) where PET/CT derived responsiveness information is extracted and used to optimize and adapt the treatment.

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1963-2013

Caridad Borrás

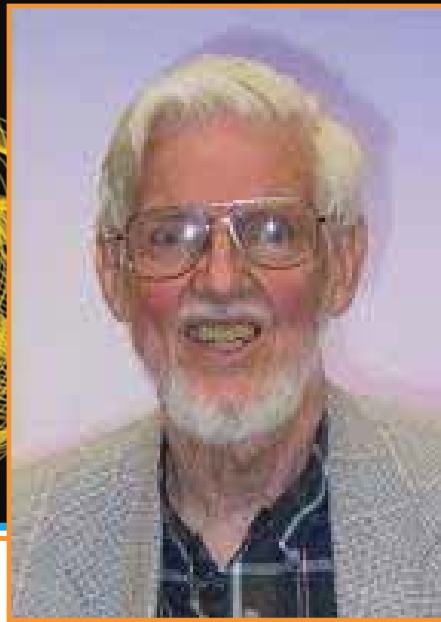
After obtaining her “Licenciatura en Ciencias Físicas” (M.S. equivalent) from the University of Barcelona, Spain in 1964, Dr. Borrás worked for two years as a Hospital Physicist in the Department of Oncology and Nuclear Medicine, Hospital Santa Creu i Sant Pau, Barcelona. Then, with the aid of a Fulbright Scholarship, she moved to the USA where she began graduate research at Thomas Jefferson University, Philadelphia, PA for which she earned a Doctorate of Science degree from the University of Barcelona in 1974. During this period she worked as an Assistant Physicist in the Department of Radiology, Thomas Jefferson University Hospital, Philadelphia, PA. In 1974 Dr. Borrás moved to the West Coast Cancer Foundation, San Francisco, CA as a Radiological Physicist and, from 1985-1986 she also acted as Associate Director of the Western Center for Radiological Physics.

In 1988 Dr. Borrás was appointed Regional Adviser in Radiological Health, Pan American Health Organization / World Health Organization (PAHO/WHO), Washington, DC, which propelled her into the international arena where she has spent the most recent years of her illustrious career. Since then she has served as Coordinator of the PAHO/WHO Program on Essential Drugs and Technology, Washington, DC; Senior Scientist, Director of Special Programs, The Institute for Radiological Image Sciences, Inc., Frederick, MD; Radiological Physics Consultant, Pan American Health and Education Foundation; Los Alamos National Laboratory; PAHO & the IAEA, Vienna, Austria; Consultant on Medical Physics, Radiation Safety and Health Services, Washington, DC; and Guest Researcher / Visiting Professor, DOIN/DEN/UFPE, Recife, Pernambuco, Brazil. During this period she has worked on the preparation of over 100 publications and reports for PAHO, WHO, and IAEA, including reports of investigations of several radiation accidents and radiotherapy overexposures, and has organized and/or participated in more than 200 international courses, workshops and symposia. She has played very active roles in several national and international societies including, for the IOMP and the IUPESM, Chair of the IOMP Science Committee (for nine years) and Chair of the IUPESM Health and Technology Task Group. She currently serves as Chair of the AAPM Work Group on Implementation of Cooperative Agreements between the AAPM and other National and International Medical Physics Organizations.

In recognition of her outstanding contributions, Dr. Borrás has been honored by receipt of the IUPESM Award of Merit, the AAPM Edith Quimby Lifetime Achievement Award, and the Gold Medal of the Sociedad Española de Física Médica.

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1963-2013

John R. Cameron

John experienced first-hand the hardships of the Depression years. His education was interrupted by service in the U.S. Army Signal Corps from 1941–1946. After the war, he enrolled at the University of Chicago, where he received his B.S. degree in mathematics in 1947. He received his Ph.D. in physics in 1952 from the University of Wisconsin [UW]-Madison. For the next two years, he was an Assistant Professor at the Universidad de São Paulo in Brazil. He became an Assistant Professor at the University of Pittsburgh from 1956–1958. In 1958 was appointed physicist in the Department of Radiology at Madison and accepted an Assistant Professor position with a joint appointment in the Department of Physics.

Over the next three decades, the UW Medical Physics program grew from a “one physicist” operation to become one of the largest and most productive departments in the world. Over the years approximately 350 individuals have graduated from the program since its founding. The program was awarded departmental status in 1981, and John served as departmental chairman until his retirement in 1986.

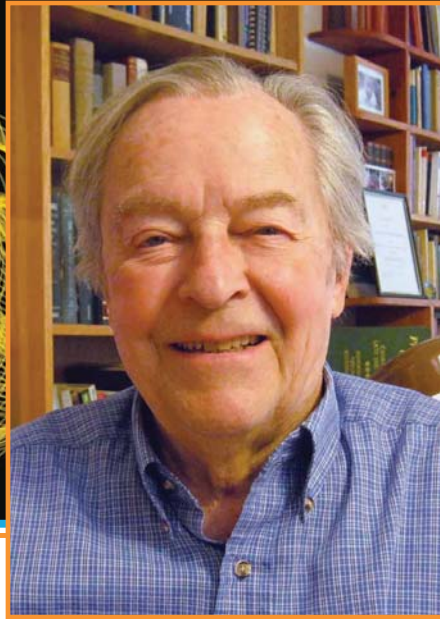
John Cameron investigated and advanced the use of thermoluminescence for dosimetry, writing one of the first books on this topic with Suntharalingam and Kenney in 1960. At about the same time, he also invented bone densitometry, to determine the mineral content of bone. Subsequently, many useful clinical applications of highly accurate bone densitometry became evident and a number of companies developed bone densitometers.

John also worked to develop simple quality assurance tools and techniques to measure radiation and to evaluate the quality of x-ray images. Based upon this work, he founded Radiation Measurements Inc. (RMI), a not-for-profit pioneer manufacturer in quality assurance measurements, materials and devices. He also founded Medical Physics Publishing, a non-profit corporation whose initial objectives were primarily to provide reprints of useful books. That company now publishes a wide spectrum of original books and is a major source of material relating to medical physics.

Over the years, John was involved in numerous professional activities, serving many organizations as an officer, board member or committee member, and in advisory roles. He also retained a lifelong interest in supporting medical physics activities in developing countries, especially in Central and Latin American countries. John received the Coolidge Award from the AAPM in 1980. In 1995, he was one of four who received the first (and only) Roentgen Centennial Award from RSNA. The IOMP awarded him the Madame Curie Award for his activities in Medical Physics education in developing countries. He died in 2005.

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1963-2013

John R. (Jack) Cunningham

Dr. John Robert Cunningham PhD, FCCMP, FCOMP (known universally as “Jack”) received his B.Eng. in Engineering Physics in 1950 and the following year his M.Sc. in Radiation Physics (under Dr. H. E. Johns), from the University of Saskatchewan in Saskatoon. He received his Ph.D. in Physics from the University of Toronto in 1955. After working at the Defense Research Board, he joined the staff of the Ontario Cancer Institute / Princess Margaret Hospital (OCI/PMH) in Toronto as a Medical Radiation Physicist in 1958. He became Chief Clinical Physicist in 1965.

Dr. Cunningham experienced and contributed to the genesis of Canadian medical physics and his achievements in radiotherapy planning software are well-known. During his career Dr. Cunningham published more than 70 scientific papers, proceedings and book chapters, and co-authored, with Dr. H. E. Johns, the textbook *The Physics of Radiology*. His major contributions to Medical Physics have been clinical dose calculation and treatment planning algorithms for radiation therapy. The methods he has developed can be found in many commercial as well as non-commercial treatment planning computer systems throughout the world.

Dr. Cunningham has also been very active in the national medical physics scene in Canada. He served twice as the Chair of the Division of Medical and Biological Physics of the Canadian Association of Physicists (the forerunner of COMP). Internationally, Dr. Cunningham served as the Canadian representative to the International Organization for Medical Physics (IOMP) and as the President of the IOMP. Although Dr. Cunningham retired from the OCI/PMH in 1988, he still remains active in the field.

COMP established the J.R. Cunningham Young Investigator Awards to recognize Dr. Cunningham’s contributions. The awards are presented to the top three speakers in the Young Investigators’ Symposium held during the annual meeting of the Canadian Organization of Medical Physics. The Symposium is widely recognised as one of the highlights of the annual meeting, with presentations that are of international calibre.

In 2006, Dr. Cunningham was awarded the inaugural Gold Medal of the Canadian Organization of Medical Physicists (COMP), COMP’s highest honour. His career has been marked by other important awards including the Kirkby Award of the Canadian Association of Physicists, the Coolidge Award of the American Association of Physicists in Medicine and the international IUPESM Award. This lifetime of contributions culminated in being named Officer of the Order of Canada in 2005. He continues to serve unofficially as the friendly international diplomat of Canadian medical physics.

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David W Townsend

David W. Townsend, PhD, FRCR (Hon), DSc (Hon) is currently Professor of Radiology at the National University of Singapore and Director of the A*STAR-NUS Clinical Imaging Research Centre. He is best known as the co-inventor, with Dr Ronald Nutt, of the first combined Positron Emission Tomography / Computed Tomography (PET/CT) scanner while he was professor of radiology at the University of Pittsburgh in 1998. The prototype PET/CT was built in collaboration with CTI PET Systems of Knoxville, Tennessee and funded by a grant from the National Institutes of Health. The first PET/CT images were acquired in 1998 and in 1999 the work received the Image of the Year Award at the annual Society of Nuclear Medicine Meeting in Los Angeles, California. In 2000, TIME Magazine recognized the PET/CT as the Medical Invention of the Year. The first commercial PET/CT scanners appeared in 2001 and within three years all PET scanners sold worldwide incorporated CT. To date, there are over 6000 PET/CT scanners operational in medical institutions throughout the world, primarily for the diagnosis and staging of malignant disease, and for monitoring response to therapy.



Figure 1. The first prototype combined PET/CT scanner installed at the University of Pittsburgh Medical Center in 1998.

David Townsend obtained a PhD in Particle Physics from the University of London and became a staff member at the European Centre for Nuclear Research (CERN) in Geneva. He moved to the University Hospital of Geneva to apply technology developed at CERN to medical imaging applications and specifically to PET. In collaboration with colleagues at the MRC Cyclotron Unit, Hammersmith Hospital, London and the Free University in Brussels he worked on making PET a fully 3D imaging modality. In 1990 he was the Principal Investigator on a grant to develop a low-cost rotating PET scanner, funded by the Swiss government. In 1993, he moved to the University of Pittsburgh where he was Principal Investigator for the design and development of the PET/CT scanner. In 2003, after ten years at the University of Pittsburgh, Dr Townsend became Professor of Medicine and Radiology at the University of Tennessee, Knoxville and Director of the Molecular Imaging and Translational Research Program. He moved to the National University of Singapore in 2009.

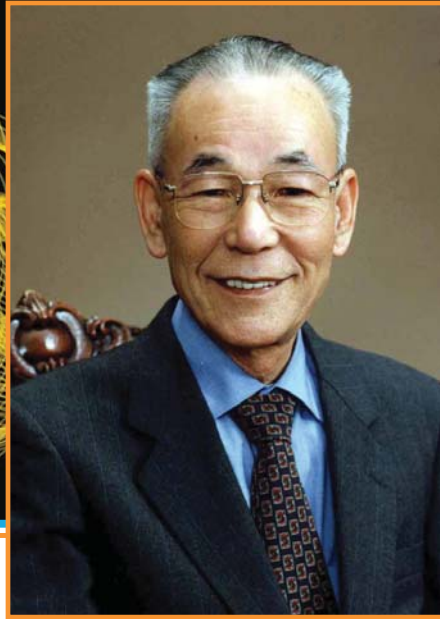
In 2004, David Townsend received the Academy of Molecular Imaging Peter Valk Distinguished Scientist Award. In 2006 he was elected a Fellow of the IEEE and in 2008 he received the Distinguished Pioneer Award from the Austrian Society of Nuclear Medicine. In 2010 he shared, with Dr Ronald Nutt, the IEEE Medal for Innovations in Healthcare Technology. In 2012 he was elected an Honorary Fellow of the Royal College of Radiologists and he has received honorary doctorates from the University of the Mediterranean in Marseille (2009), and the University of Bristol (2013).



Figure 2. A combined PET/CT scan of a patient with head and neck cancer that was awarded the Image of the Year at the Society of Nuclear Medicine Meeting, Los Angeles, 1999.

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1963-2013

Dr. Eiichi Tanaka

Dr. Eiichi Tanaka is one of the leading authorities of Positron Emission Tomography (PET) scanner research and development. After he led the development of the first-ever PET scanner in Japan, he went on to lead internationally cutting-edge research and development on the PET physics and technology. He graduated from the Physics Department of Kyoto University in 1950. He was affiliated with National Institute of Radiological Sciences beginning in 1957 and has served at Hamamatsu Photonics K.K. since 1988 as an Advisor

and Director. He has a doctorate degree in the sciences. Between 1986 and 1989 he served as the president of Japanese Association of Radiological Physicists, the antecedent organization of JSMP. In addition to being awarded the Purple Ribbon Medal (National Honoring for Science, Technology and Culture), Dr. Tanaka has also received numerous academic awards, among them the Shimadzu Prize, the Science and Technology Agency Director-General's Award, the Mainichi Industrial Technology Award, the Eto Memorial Award, and others.

The group led by Dr. Tanaka at National Institute of Radiological Sciences pursued the research and development of the delay-line position encoding scheme from the end of the 1960s to the beginning of the 1970s and, through a joint development project with Toshiba, led the world in successful



Figure 1. The jumbo gamma camera (1972).

commercialization of a gamma camera with a large 35 cm field of view (Fig. 1). During the latter part of the 1970s, Dr. Tanaka developed the first PET scanner in Japan, the Positologica-I (Fig. 2) jointly with the Hitachi Group. This pioneering equipment adopted the BGO crystal, which quickly became the standard, achieving the highest spatial resolution in the world. The group developed the Positologica-II and III by the early 1980s, again incorporating detector technologies ahead of the rest of the world and paving the way to the development of the Positologica-IV, the first PET scanner in the world for small animals.



Figure 2 The first PET scanner, Positologica-I, in Japan (1979).

Dr. Tanaka also pursued research on image reconstruction methods for SPECT imaging since before the invention of the computed tomography (CT), devised a unique method for three-dimensional image reconstruction, and clarified the frequency characteristics of the Fourier rebinning method, which is effective for practical image reconstruction of three-dimensional PET scanning. He also contributed iterative image reconstruction methods for PET. Dr. Tanaka's research achievements in the image-engineering field are rare and lasting, thereby making significant contributions to establishing the foundation for the advanced image reconstruction technology to be used in clinical settings.

Outstanding Contributions Over the Last 50 Years

50 Years
of IOMP



1963-2013

Aaron Fenster

Dr. Aaron Fenster PhD, FCCMP, FCOMP received his PhD in 1976 from the University of Toronto's Department of Medical Biophysics under the supervision of Dr. H. E. Johns. He then began his first academic appointment at the Department of Radiology and Medical Biophysics at the University of Toronto.

In 1987 he became the founding Director of the Imaging Research Laboratories at the Robarts Research Institute and Professor at the University of Western Ontario in Radiology and Medical Biophysics in London, Ontario. He is a Professor in the Department of Radiation Oncology and an adjunct Professor in Physics and Astronomy and Biomedical Engineering. Dr. Fenster has built the Robarts Imaging Laboratories into an internationally recognized group which includes 16 scientists and approximately 90 graduate students. He has a unique leadership style that encourages collaboration, clinical involvement and entrepreneurship.

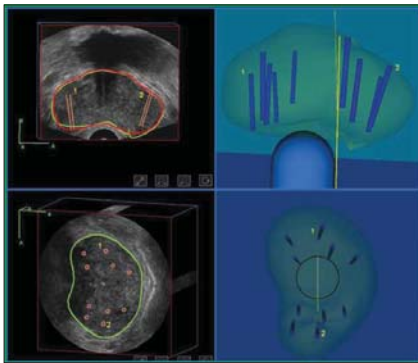


Figure 1. Images showing result of a 3D ultrasound guided prostate biopsy using a system developed in Fenster's laboratory. The panels show view of the biopsy cores superimposed on the 3D ultrasound images and a graphical representations of the segmented prostate and the core locations.

Dr. Fenster was the founder and is the current Associate Director of the Graduate Program in Biomedical Engineering at Western, combining the strengths of basic scientists, engineers and clinician scientists in 3 faculties (Medicine & Dentistry, Engineering and Health Sciences). He is Chair of the Basic Science Division of the Department of Medical Imaging at Western which combines the strengths in imaging research across London's Institutions to make the London medical imaging research community one of the largest in the world, with over 350 staff and students and \$100M in research equipment. He is also the Director of the Biomedical Imaging Research Centre at Western University and the Centre Director for the Centre for Imaging Technology Commercialization (CIMTEC), a Canadian federally funded Centre of Excellence for Commercialization and Research. Currently, he holds a Canada Research Chair-Tier I. He is the first recipient of the Premier's (Ontario) Discovery Award for Innovation and Leadership (2007), the Hellmuth Prize for Achievement in Research at the Western (2008). In 2011 he was inducted into the Canadian Academy of Health Sciences.

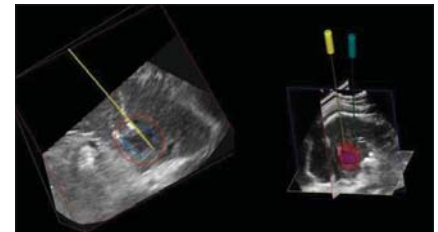


Figure 2. Images showing images obtained during a 3D ultrasound guided focal liver RF ablation procedure. The images show the trajectory of the RF applicator, the segmented tumour (blue) and the ablation region (red).

Following his PhD, Dr. Fenster worked for many years in basic X-ray imaging physics and continues this work at Robarts, becoming a co-founder of Enhanced Vision Systems (EVS), a successful micro-CT company that was eventually sold to GE Healthcare. GE set up its manufacturing base in London ON. For the past 15 years, Dr. Fenster's group has focused on the development of 3D ultrasound imaging with diagnostic and surgical/therapeutic cancer applications in humans and mouse research models. With his team, he developed the world's firsts in 3D ultrasound imaging of the prostate, 3D ultrasound guided prostate cryosurgery and brachytherapy, 3D ultrasound guided prostate and breast biopsy for early diagnosis of cancer and 3D ultrasound images of mouse tumours and their vasculature.

Dr. Fenster's research has resulted in over 25 patents and the formation of three companies (Life Imaging Systems Inc., Enhanced Vision Systems Inc. and Enable Technologies). He has trained over 60 graduate students and fellows, many of whom are well known as leaders in the Canadian medical physics community, and is a prolific publisher, with over 250 peer-reviewed papers and 450 conference proceedings. He is regularly in demand as a keynote speaker around the globe.

Dr. Fenster served as Chair of the Canadian Organization of Medical Physicists (COMP) in 1993 and 1994 and in 2010 was awarded the COMP Gold medal, COMP's highest award.

Outstanding Contributions Over the Last 50 Years

50 Years
of IOMP



1963-2013

Maryellen L. Giger

Maryellen L. Giger earned her Ph.D. in medical physics in 1985 from the University of Chicago, and is presently Professor of Radiology, the Committee on Medical Physics, and the College at the University of Chicago, Chicago, Illinois, USA. She also serves as Vice-Chair of Radiology for Basic Science Research and Director of the Imaging Research Institute, and is the immediate past Director of the Graduate Programs in Medical Physics and Chair of the Ph.D. degree-granting Committee on Medical Physics at the University.

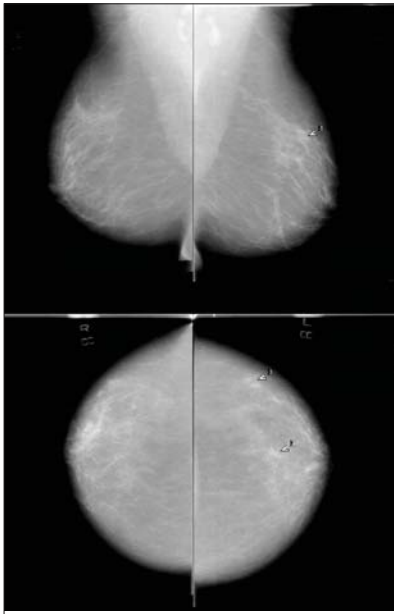


Figure 1. Output from the first prototype CADe system for screening mammography, developed at the University of Chicago (circa 1994).

Maryellen Giger is considered one of the pioneers in the development of CAD (computer-aided diagnosis), and has also extended aspects of CAD to quantitative image analysis and image-based phenotyping with genomics. For over 25 years, she has directed and managed her NIH-funded University of Chicago research lab and have advised over 100 medical physics graduate students, post-docs, undergraduates, and others — many who have gone on to their own successful careers in academic, industrial, or clinical medical physics research.

In addition to her academic career, she has served AAPM since 1987, first as a member (and later chair) of the AAPM Commission on Accreditation of Educational Programs for Medical Physicists and as an annual meeting abstract reviewer; then as annual meeting scientific program director, elected Board Member, elected Treasurer, and ultimately as elected President and Chair of the Board. She has also served SPIE as symposium chair for Medical Imaging and as an elected Board Member.

Maryellen Giger is a member of the National Academy of Engineering (NAE) of the National Academies, an elected fellow of the American Institute for Medical and Biological Engineering (AIMBE) and the American Association of Physicists in Medicine (AAPM), and is a Senior Member of IEEE. She has authored or co-authored more than 300 scientific manuscripts (including 175 peer-reviewed journal articles), is inventor/co-inventor on approximately 35 patents, and serves as a reviewer for various national and international granting agencies, including the NIH and the U.S. Army (DOD).

The Giger lab focuses on the development of multimodality CAD (computer-aided diagnosis) and quantitative image analysis methods. Her research interests include digital medical imaging, computer-aided diagnosis, quantitative image analysis, and data-mining in breast imaging, chest/CT imaging, cardiac imaging, and bone radiography. The long-term goals of her research are to investigate, develop, and translate multi-modality computerized image analysis techniques, which yield image-based tumor signatures and phenotypes, for improved diagnosis, prognosis, and patient care as well as for advanced discovery.

Outstanding Contributions Over the Last 50 Years

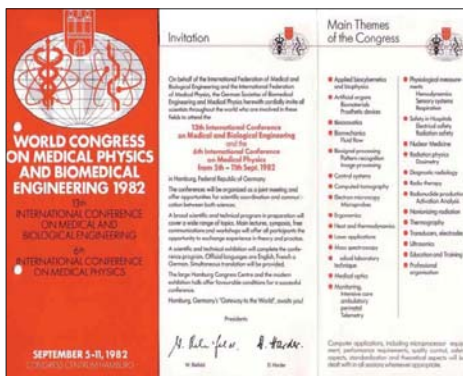
50 Years
of IOMP



1963-2013

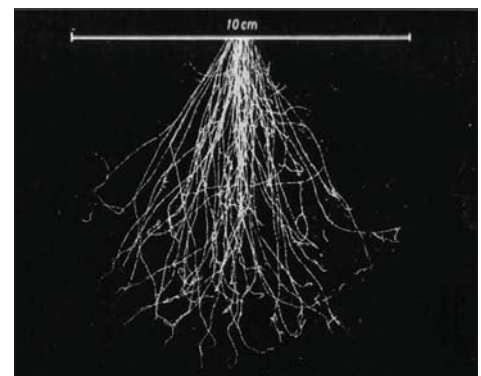
Dietrich Harder

For the postdoc in Rajewsky's Max-Planck-Institute of Biophysics in Frankfurt/Main (1953 - 1960), the 35 MeV betatron group leader at Röntgen's former Institute of Physics in Würzburg (1960-1974), and the director of the Institute of Medical Physics and Biophysics at Göttingen University (1974 - 1999), physics applied to medicine and biology has been the challenge of his life - Dietrich Harder, now emeritus professor of Medical Physics and Biophysics, Göttingen, Germany



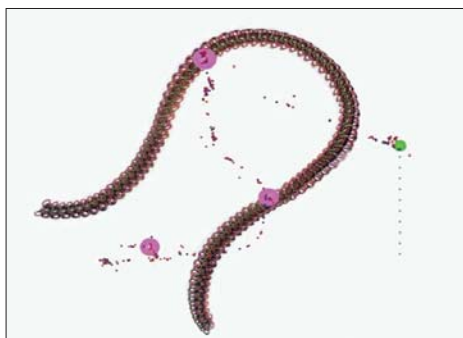
Invitation World Congress on Medical Physics and Biomedical Engineering, Hamburg 1982.

In medical radiation physics, the laws governing the passage of high-energy electrons through thick layers of matter and their visualization in the bubble chamber, the formulation of tissue substitutes, the art of imaging and deconvolution, including portal, ultrasound and photothermal imaging, and the principles of probe-type dosimetry have been the milestones.



Bubble chamber picture, 7.7 MeV electrons in liquid propane.

In radiation biophysics, the recovery of an enzyme system after large pulses of radiation, the chromatin loop deletion as the primary lesion initiating the formation of radiation-induced chromosome aberrations, and the anti-inflammatory reaction of the immune system to low doses of alpha radiation as the molecular mechanism underlying Radon therapy of rheumatic diseases were his achievements.



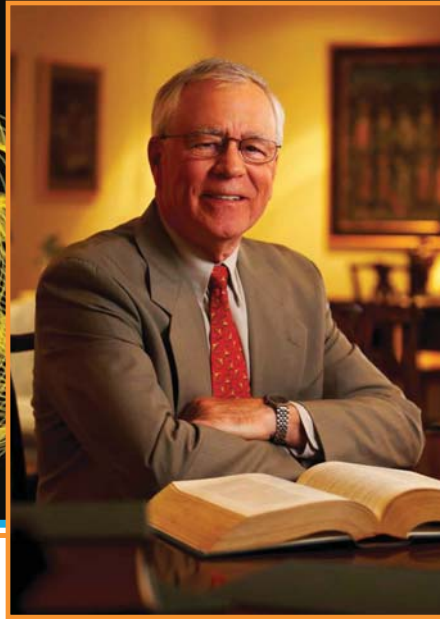
Induction of chromatin loop deletions, the primary lesions for exchange-type chromosome aberrations, by correlated groups of high local energy concentrations along particle tracks.

In radiation protection, national defense measures against the Chernobyl fallout, leukemia clusters near nuclear power stations and the setup of radiation weighing factors required his commitment.

The world-wide family of peers was his objective as co-president of the World Congress for Medical Physics and Biomedical Engineering in Hamburg 1982, president of the rejoining meeting of East and West German medical physicists 1990, founder of the journal "Zeitschrift für Medizinische Physik" and member and chairman of the dosimetry committees of DIN, ICRU and ICNIRP as well as the German Radiation Protection Commission. Born 1930 in Stettin (DE), now Szczecin (PL), the honour probably closest to his heart is the honorary membership of the Polish Society of Medical Physics.

Outstanding Contributions Over the Last 50 Years

50 Years
of IOMP



1963-2013

William R. Hendee

William R. (Bill) Hendee Ph.D. is Distinguished Professor of Radiology, Radiation Oncology, Biophysics, and Bioethics at the Medical College of Wisconsin (MCW). He is also Professor of Biomedical Engineering at Marquette University, Adjunct Professor of Electrical Engineering at the University of Wisconsin – Milwaukee, and Adjunct Professor of Radiology at the University of New Mexico, University of Colorado, and Mayo Clinic. Before his retirement from MCW administrative positions in 2006, Dr. Hendee was President of the MCW Research Foundation, Senior Associate Dean for Research, Dean of the Graduate School of Biomedical Sciences, Vice Chair of Radiology, and Interim Dean of the Medical School. Over this period the Graduate School grew from 102 to 562 students, and the College's extramural research funding expanded from \$26.5M to \$140M. In 2005, he received MCW's Distinguished Service Award.



Prior to joining the Medical College of Wisconsin, Dr. Hendee was Vice President for Science, Technology and Public Health at the American Medical Association (AMA) and Executive Secretary of the AMA Council of Scientific Affairs. Preceding his AMA appointment were 20 years spent at the University of Colorado, including nine years as Professor and Chair of the Department of Radiology.

Dr. Hendee has authored or edited more than thirty books on topics ranging from the physics of imaging and radiation therapy to texts entitled *The Perception of Visual Information* and *The Health of Adolescents*. His books *Medical Imaging Physics* - 4th edition and *Radiation Therapy Physics* - 3rd edition –, are widely used textbooks in medical physics. His two-volume *Biomedical Uses of Radiation* (1999) is a standard reference text, and his *The Health of Adolescents* (1991) was a pioneering work.

Dr. Hendee has published more than 450 peer-reviewed papers focused principally on the physics of medical imaging and radiation therapy, but also on topics such as education and certification in radiology; health physics; patient safety; healthcare quality; research ethics; medical informatics; biotechnology; technology assessment; medical administration and reimbursement; adolescent health; technologies for persons with disabilities; HIV infection and AIDS; and physical fitness. In 1984 Dr. Hendee was awarded the Yearbook Medal for Distinguished Contributions to the Medical Literature.

Dr. Hendee has been president of the American Association of Physicists in Medicine, Society of Nuclear Medicine, American Institute of Medical and Biological Engineering, and American Board of Radiology. He has served as associate editor for many scientific journals, and has been the Editor-in-Chief of *Medical Physics* since 2005.

Dr. Hendee has received many awards and honors, including the Coolidge Award of the AAPM, Gold Medal of the Radiological Society of North America, Gold Medal of the Roentgen Ray Society, and Gold Medal of the American College of Radiology.

Outstanding Contributions Over the Last 50 Years

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of IOMP



1963-2013

Godfrey Hounsfield

Sir Godfrey Newbold Hounsfield CBE, FRS was an electrical engineer, who was awarded the Nobel Prize for Physiology or Medicine for developing X-ray computed tomography (CT). Its introduction was a fundamental advance of the greatest importance to diagnostic medicine. His name is immortalised in the Hounsfield scale, a measure of electron density which is used in evaluating CT scans.

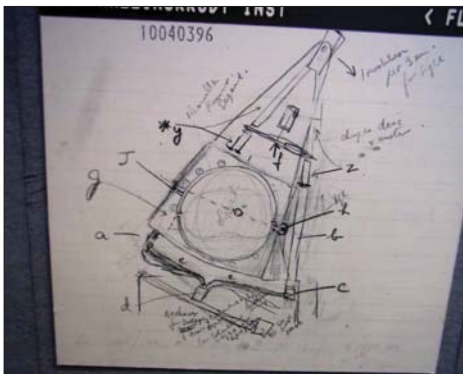


Figure 1. Hounsfield's sketch for a CT scanner.

In September 1939, Hounsfield joined the RAF as a volunteer reservist and worked as a radar mechanic instructor during the war. After the war he obtained a grant to study electrical and mechanical engineering at Faraday House in London and then joined the research staff of Electric and Musical Instruments (EMI) at their Central Research Laboratories to work on radar and guided weapons. He became interested in computers and led the team that built the UK's first all-transistor computer: the EMIDEC 1100. In those days, transistors were much slower than valves. Hounsfield overcame this problem by using a magnetic core to drive the transistor. This led to transistors being used in computing earlier than would otherwise have been possible.

Shortly after this, he began working on pattern recognition and became interested in developing a computer that could take measurements from X-rays at various angles to build up a three-dimensional picture of an object. Hounsfield's first experimental system successfully scanned a pig's brain in 1968. The scanning process took nine days and required two and a half hours to process the resulting 28,000 measurements on a high-speed computer. Replacing the gamma ray source with an X-ray tube reduced the scanning time to 9 hours. In 1968, EMI patented the invention. His idea was applied to medicine and became the EMI-Scanner. On 1 October 1971, CT head scanning was introduced into medical practice with a successful scan on a cerebral cyst patient at Atkinson Morley Hospital in Wimbledon, London, United Kingdom. The EMI scanner, costing about £100,000, was announced in 1972. It could perform a scan in four minutes and render a computerised image in three seconds. In the following years he developed a whole-body scanner and announced it in 1975.

His contribution was recognised with many honours and shared with Allan Cormack, who had published theoretical studies on the mathematics needed for the CT scanner, the Nobel Prize for Physiology or Medicine in 1979. He was also awarded the CBE and FRS and was knighted in 1981. He died in 2004.



Figure 2. The experimental CT scanner.

Outstanding Contributions Over the Last 50 Years

50 Years
of IOMP



1963-2013

Yimin Hu

Yimin Hu was the leading pioneer of medical physics in China and is now acknowledged as one of the profession's most significant contributors. Today, after a career spanning almost 50 years, Yimin Hu has earned the reputation as the father of medical radiation physics in China.

Yimin Hu is the chair professor at the Cancer Institute & Hospital, Chinese Academy Medical Science and Peking Union Medical College. He is chairman of CSMP, president of AFOMP, the AC member of IUPESM and a council member of IOMP. He is a visiting professor at Tsinghua University and University of Science and Technology of China.

Professor Hu has been engaged in both clinical practice and research in medical radiation physics, specializing in radiation oncology physics in China. He designed and supervised the manufacture of the first manual-controlled multi-leaf-collimators for Co-60 unit and for Betatron electron beams in 1960s. In the 1970s he established China's first clinical dosimetry system and proposed "four dosimetric principles" of guiding the treatment planning for radiation oncologist and radiation physicist. Since 1980s, he has focused on establishing and promoting quality assurance and quality control programs as well as the adoption of contemporary techniques. In the early 1990s he pioneered linac-based X-ray stereotactic irradiation using implanted gold-markers for image guiding. He designed the CREAT X-ray Stereotactic System including associated treatment planning system. He also designed planning software for the first generation China-made rotational γ -knife.

Professor Hu was appointed as the chair in medical physics in China and has trained numerous students, many of whom later became leaders in their respective clinics world-wide. Since 1980s he has been pursuing the exchange ideas and innovations in the field by developing medical radiation physicist joint training, academic exchange programs and by chairing multiple national and international conferences. He is the chief editor of various textbooks, "Radiation Oncology Physics", "Radiation Oncology Technology", "Radiation Therapy Treatment Planning" and is the co-editor in chief of "Radiation Oncology" as well as the associated editor of various international journals.

Currently Professor Hu is focusing on completing the next generation of IMRT system, which features three heads delivering three cross-firing-beams. This design integrates the clinical functions of various existing systems: C-arm based Linear Accelerators, TomoTherapy unit, X-ray SRS/SBRT systems, Elekta γ -knife, Cyber knife and Vero unit. This system is capable of doing coplanar and non-coplanar real-time imaging- and dose-guided IMRT/SBRT.

Professor Hu has had enormous influence on the development of radiation physics in China, and on the global physics community as well, that encourages not only sound clinical practices and the adoption of modern techniques, but also ensures that his passion is passed down to a new generation of professionals.



Outstanding Contributions Over the Last 50 Years

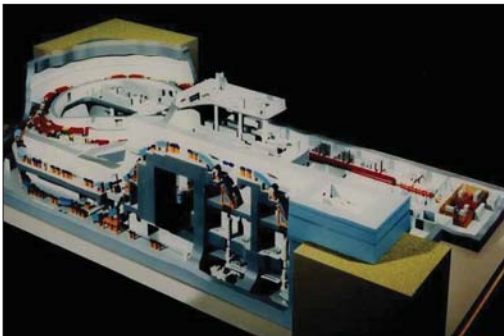
50 Years
of IOMP



1963-2013

Kiyomitsu Kawachi

Kiyomitsu Kawachi graduated from the Applied Physics Department of Tokai University in 1963, when he joined National Institute of Radiological Sciences (NIRS), and was affiliated with Division of Physics. Although he did the most of research works at NIRS, between 1969 and 1974, he spent at the National Cancer Center of Japan, and the University of Chicago. In the meantime, he developed the well known the electron beam calculation model for treatment planning. He got a doctorate degree in medical sciences from Tohoku University in 1977. At NIRS, he contributed to the developing of various particle therapy systems, such as fast neutrons, protons and heavy ions. He developed three dimensional scanning techniques for proton therapy at NIRS cyclotron in his early days. He also compared potential of charged particles including protons, carbon ions and the other heavy ions for cancer therapy, and concluded that carbon beam was the most suitable for deep seated tumor therapy.



With regards to heavy ion therapy in Japan, Kawachi led the project from the beginning. In 1984 NIRS started a well known HIMAC (Heavy Ion Medical Accelerator in Chiba) project and Division of Heavy Ion Research was established in 1987. He managed the progress of the project as a Section Head and later the Division Director in 1993. HIMAC was completed in 1993 and carbon ion therapy, which was selected at NIRS according to his analysis, started in 1994. Kawachi was appointed Deputy Director General of NIRS in 1999.

HIMAC has been very reliable and efficient during 20 years operation, and so far more than 7,000 patients were treated with carbon ion beam. Now, carbon beam facilities are being constructed or planned not only in Japan, but also all over the world. Therefore, the contributions of Kawachi to carbon ion beam therapy are significant and may be lasting to the future. Kawachi was recommended an Honorary Member of PTCOG (Particle Therapy Cooperative Group) in 2001.

He served as the president of Japanese Association of Radiological Physicist (JARP) between 1998 and 2000, and the president of Japan Society of Medical Physics (JSMP) during 2001. It was during his presidency that JARP developed to JSMP, an academic organization truly independent and to open to all experts in the fields related to medical physics. After JSMP establishment, the number of ordinary members of JSMP increased rapidly and has become three times compared to that of JARP.

Although Kawachi initiated the HIMAC project and played a definitive role, its success was the result of cooperation of many people including administration staffs. Especially Drs. Yasuo Hirao, Satoru Yamada, Tatsuaki Kanai and Masahiro Endo at NIRS were acknowledged for their essential contributions.

Outstanding Contributions Over the Last 50 Years

50 Years
of IOMP



1963-2013

Constantin Kappas

Constantin Kappas is Professor on Medical Physics and Head of Medical Physics Department, Medical School, University of Thessaly and University Hospital of Larissa, Hellas. He was born in Athens in 1954 and his studies include BSc in Physics (University of Patras, Hellas), MSc in Medical Physics (D.E.A. - C.P.A.T. Université Paul Sabatier, Toulouse), Doctorat de Spécialité and Doctorat d'État ès Sciences (Institut Curie, Paris). He has studied with Basil Proimos and Jean-Claude Rosenwald.



UN – IAEA Mission in Zaria General Hospital, Nigeria.

medical doctors, to radiation physicists and to general public as well as being an author to several scientific books.

For this work he has been awarded on several occasions by different academic bodies and organizations. He is also actively involved in ethical matters (writing and participating in respective committees) concerning scientific misconduct and medical malpractice.

Finally, Constantin Kappas is actively involved in social work at national and international level. He participated in several UN – IAEA and other Organizations' scientific missions in developing countries for commissioning of radiotherapy units, gives lectures and supports local clinical projects. Moreover he is the founder of the National Institute for Documentation, Information and Research on Cancer named "G. N. Papanikolaou" as well as he is the founder of the National Institute Against Narcotics named "I.K.A.N.O.". Both the Institutes do not only have a positive social impact but they also attract and actively involve medical students, health scientists and academic staff.

For the last 30 years Constantin Kappas has successfully combined a highly regarded academic work with quality medical physics service at the hospital. His research was mainly focused to the Radiotherapy Physics and he is known in particular for his work in inhomogeneity corrections in radiotherapy treatment planning and in the development of a new non-invasive stereotactic unit (K.Theodorou & C. Kappas), which was also the first installed in his country. He and his colleagues are also actively involved in Treatment Planning Algorithms, Networks & Integration Procedures in Radiotherapy, Monte Carlo Methods in Radiotherapy, High Field MR Imaging, Quantitative MR Imaging and MR Spectroscopy.

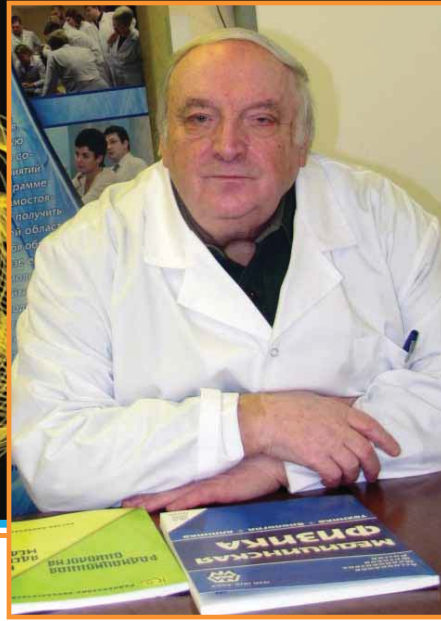
Constantin Kappas is also very active in the education process; he teaches a broad spectrum of medical physics subjects to under and post graduate students, to



First Stereotactic Unit in Greece, designed and developed by Patras team.

Outstanding Contributions Over the Last 50 Years

50 Years
of IOMP



1963-2013

Valeriy Kostylev

Valeriy Kostylev graduated from the faculty of experimental and theoretical physics of the Moscow Engineering Physics Institute (MEPhI) in 1968. Since then he has been working for more than 40 years in the N.N.Blokhin Russian Cancer Research Center (N.N.Blokhin RCRC) and in 1972 received his PhD and in 1985 he earned the Doctoral degree in physics and mathematics. The theses were devoted to the scintigraphic images measurement and processing optimization. The last 12 years he was the head of medical physics department.

In 1993 Valeriy Kostylev organized the Association of Medical Physicists in Russia (AMPR) and became its president. Now AMPR represents about 400 professionals working in the field of fundamental and applied medical physics, engineering, high medical radiation technologies, education and publishing. In 1995 he was the founder and Editor-in-chief of the Journal "Meditsinskaya Fizika" which is an official journal of the Association of Medical Physicists in Russia (AMPR).

In 2004 he organized the Institute of Medical Physics and Engineering for efficient scientific and educational activities in the field of research and education projects and became its director.

Valeriy Kostylev was the founder (2011) and co-chair of the Radiation Oncology Society which counts 868 individual members from Russia and other CIS countries today. The same year he founded and served as Co-chair of the Editorial Board of the Journal "Radiation Oncology and Nuclear Medicine". A year later he was the founding rector of the International Educational Center on medical physics, radiation oncology and nuclear medicine which provides postgraduate education in medical physics for the Russian speaking specialists in the CIS region.

Professor Kostylev is a leading specialist in the medical radiation physics, radiation therapy and nuclear medicine. He's the author of 250 scientific publications in this field. He has acted as scientific advisor and consultant for 60 projects on the development and implementation of domestic medical radiation devices and technologies for radiation therapy and nuclear medicine in clinical practice, including clinical dosimeter with diamond detector, 3D treatment planning system "Amphora" for external beam radiation therapy and treatment planning system "Contact" for intracavitary and interstitial brachytherapy. He is one of the founders of the Russian radiation medical physics school and mentor and guide of several generations of qualified medical physicists in the N.N.Blokhin RCRC, MEPhI. He has also organized many Eurasian and National congresses, conferences, symposia and schools on medical physics and radiation oncology.

Valeriy Kostylev is a member of Expert Councils under the Ministry of Industry and Trade, the State Atomic Energy Corporation ROSATOM, the Federal Antimonopoly Service of Russian Federation. He is chair of the International working group "Modernization and Development of Radiation Therapy and Nuclear Medicine" of the CIS Commission on the use of atomic energy for peaceful purposes. He is an IAEA expert assisting Member States in the upgrading of radiation oncology facilities.

Professor Kostylev has received international recognition for promoting medical physics in Russia and the CIS region.

Outstanding Contributions Over the Last 50 Years

50 Years
of IOMP



1963-2013

Anchali Krisanachinda

Professor Krisanachinda, the Founding President of the Thai Medical Physicist Society, was the President of SEA-FOMP from 2005 through 2012, one of the Founders of AFOMP and has been the AFOMP Treasurer since 2001. She was a member of the IOMP ETC and IAB for Asia (2003-2006), became the Chair of ETC (2006-2009) and joined the Validation and Accreditation Committee of ETC (2009-2012). She was a member of the Awards and Honors Committee (2003-2012), a member of the Finance Committee (2009-2012) and is currently the IOMP Honorary Treasurer.

She started her career in medical nuclear physics in 1970 and became an IAEA national coordinator for the project Quality Control of Nuclear Medicine Instrumentation in 1984. She travelled to 20 nuclear medicine centers to establish the quality control procedures for nuclear medicine equipment from 1985 to 1990 and became an IAEA Expert to Malaysia and Vietnam in 1989-1991. She was involved in the publication of the IAEA technical document "Quality Control Atlas for Scintillation Camera Systems".

Since 1999 she has been the national coordinator of the IAEA Project on Distance Assisted Training in Nuclear Medicine for Thailand in which most nuclear medicine technologists participated. She has also trained IAEA fellows from Myanmar, Malaysia and Vietnam.

In 2002, she pioneered the graduate program in diagnostic radiology medical physics education, with IAEA support, at Chulalongkorn University. She is also a National Project Coordinator (NPC) of the IAEA Regional Cooperative Agreement RAS 6038 project: Strengthening of Medical Physics through Education and Training in Asia and the Pacific.

She supervised the integration, of the IAEA training modules, to the clinical residency training programs in radiation oncology medical physics (ROMP) in 2007, diagnostic radiology medical physics (DRMP) in 2010 and nuclear medicine medical physics (NMMP) in 2011. Fifteen clinically trained ROMP and DRMP medical physicists have graduated from the pilot. A second group of residents are currently enrolled in the ROMP training program. Chulalongkorn University is the only University that recognizes the IAEA structured clinical program as an academic program, offering a post-graduate degree since 2010.

As a consultant in radiation protection of patients she has contributed to the IAEA Technical Document on Optimization of Patient Dose and Image Quality in General Radiology, Computed Tomography and Interventional Radiology, by way of a national project.

Dr. Krisanachinda has been dedicated to the promotion of medical physics, both nationally and internationally, serving a lifetime to the advancement of the science from the university to the United Nations.

Outstanding Contributions Over the Last 50 Years

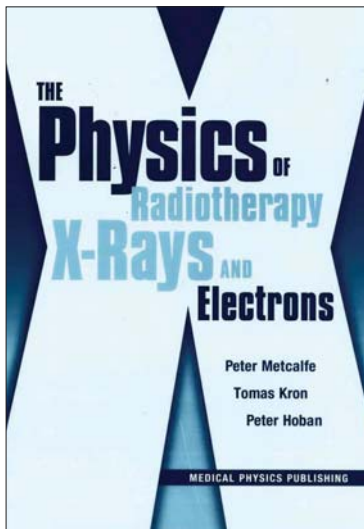
50 Years
of IOMP



1963-2013

Tomas Kron

Tomas was born and educated in Germany. After being awarded his doctorate in biophysics for work on tracer kinetic studies at the University of Frankfurt in 1989 he migrated to Australia working as a clinical medical physicist in Sydney, Wollongong and Newcastle where he was chief physicist. From 2001 to 2004 Tomas worked in Canada at the London Regional Cancer Centre commissioning one of the first helical tomotherapy units. Since 2005 he is Principal Research Physicist at the Peter MacCallum Cancer Centre in Melbourne, Australia and holds professorial appointments at Melbourne, Monash, RMIT and Wollongong universities.



Tomas has research interests in radiation dosimetry and imaging for radiation oncology documented in more than 50 invited conference presentations, 175 peer-reviewed publications and authorship of textbooks and book chapters. Tomas has particular interest in clinical trials and is trial co-chair of two multicentre trials with the aim to demonstrate the value of new technology in clinical practice. This focus on the impact of technology and techniques on cancer patients and society has led to his involvement in two projects funded by the Australian government that bring together all professions involved in the delivery of radiation oncology services: The writing practice standards for radiation oncology in Australia and the development of a framework to for the Assessment of New Radiation Oncology Technologies and Treatments.

Tomas was president of the Australasian College of Physical Scientists and Engineers in Medicine (ACPSEM) in 2008 and 2009 and is a member of the IOMP executive where he chairs the Awards and Honours committee. He has been convenor of several

conferences most recently the International Conference on the Use of Computers in Radiation Therapy (ICCR) in Melbourne 2013.

Tomas has a long standing interest in education and training of medical professionals. This has led to his involvement in many national and international workshops and consultancies for the International Atomic Energy Agency (IAEA) for which he also has designed two series of teaching presentations (Radiation Protection in Radiation Oncology and Training for QUATRO). Tomas is on the editorial board of several international journals including clinical journals such as Clinical Oncology and Radiotherapy and Oncology. He has supervised many postgraduate students, an activity he enjoys very much.

Tomas believes that physical sciences are essential ingredients in health care. His work is aimed at optimising and publicising this impact with the ultimate aim to improve the lot of patients.



Tomas with a 'friend' in 2000 after being awarded a grant from the John Hunter Children's Hospital Research Foundation to study dose distributions in children undergoing radiotherapy.

Outstanding Contributions Over the Last 50 Years

50 Years
of IOMP

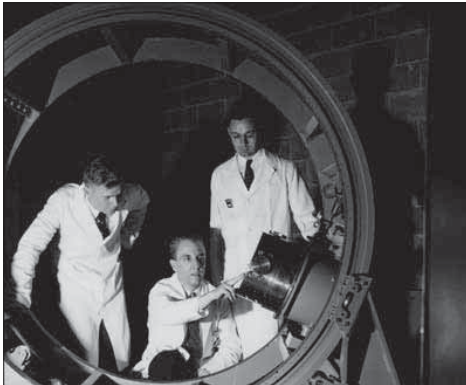


1963-2013

Lawrence H. Lanzl

Lawrence H. Lanzl majored in physics at Northwestern University. After graduation, he joined the Manhattan Project, working first in Chicago and then at Los Alamos. He returned for graduate study in physics at the University of Illinois where he became involved in the development of the betatron for radiotherapy. Dr. Lanzl was on the faculty of the University of Chicago for many years, and much later, at Rush-Presbyterian St. Luke's Medical Center. He worked on the development of Co-60 and linear accelerator teletherapy, and did pioneering work in such topics as bone densitometry, anthropomorphic phantoms for and the handling of radiation accidents. It was during the 1950s and 1960s that he became interested in organizational medical physics, and made several important contributions

regarding the professional aspects of medical physics, including education and training, remuneration, and staffing requirements.

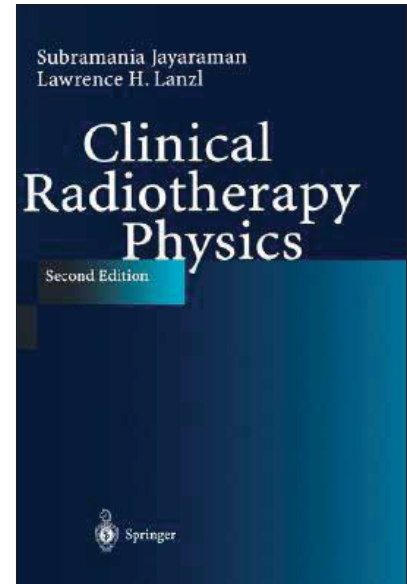


Dr. Lanzl, with Dr. Lester Skaggs and Donald Davidson, with a cobalt-60 rotational therapy machine.

Dr. Lanzl was instrumental in the formation of graduate medical physics programs at both the University of Chicago and Rush-Presbyterian St. Luke's Medical Center. He also worked a year for the International Atomic Energy Agency, and was active in the World Health Organization and ultimately, the International Organization for Medical Physics (IOMP). He spearheaded the establishment of the IOMP bulletin, *Medical Physics World*, and was its first Editor. He assisted medical

physicists in development of their profession in numerous countries worldwide. He also served as a consultant on medical physics in various countries and as President of the AAPM and the IOMP.

Among many honors bestowed upon him was the William D. Coolidge Award from the AAPM in 1978. The Lanzl Institute in Seattle, a medical physics research institution, was established and named in his honor. After becoming a professor emeritus at the University of Chicago, he continued to be active, heading the medical physics program at Rush-Presbyterian-St. Luke's for some time. However, if you had asked him what he considered to be his greatest professional achievement, he would most likely have responded as he did when he received the Coolidge Award "to improve people's health, and establish the profession of medical physics, and by doing these things, to make the world a little more civilized."



"Clinical Radiotherapy Physics" a textbook Dr. Lanzl wrote with Subramania Jayaraman

Outstanding Contributions Over the Last 50 Years

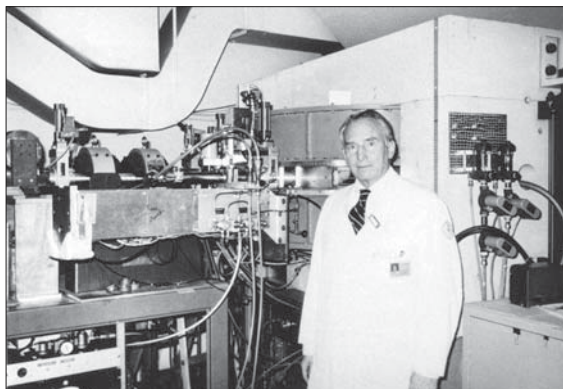
50 Years
of IOMP



1963-2013

John S. Laughlin

He received his Ph.D. in Nuclear Physics from the University of Illinois in 1947 where he performed research on particle accelerators, in particular on early cyclotrons with Prof. P.G. Kruger and Prof. D. Kerst, who was awarded the Nobel Prize for his invention of the betatron. These years culminated in the first use of high energy electrons produced by a betatron dedicated to the purpose of radiation therapy. In 1952, John Laughlin became the chairman of Medical Physics at Memorial Sloan-Kettering, a position which he held until 1990. He is possibly best known for his pioneering efforts in developing clinical uses of high-energy electrons and the development of dosimetric and calorimetric methods for measuring the energy flux of electrons. During his career, he pioneered developments in every area of diagnostic and therapeutic radiological physics. Recognizing the potential of short-lived positron-emitting nuclides, particularly ^{11}C , ^{13}N , ^{15}O , and ^{18}F , in 1968, he installed the first medical cyclotron in a hospital (and in the heart of New York City), which remained operational until 2000.



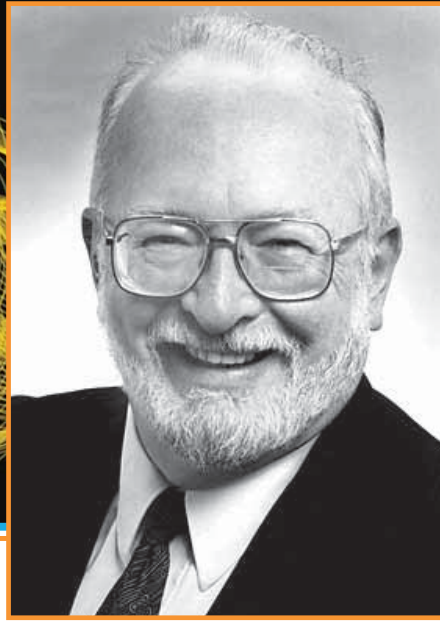
Dr. Laughlin and the first medical cyclotron in a hospital (and in the heart of New York City), which remained operational until 2000.

In the 1960s, high energy optimized whole body rectilinear scanners were built as well as a large-field dual head coincidence gamma camera for dynamic studies. These devices pioneered digital data acquisition and computer processing for digital display and quantitation. In addition to being Chairman of the Department of Medical Physics of Memorial Hospital and Professor of Radiology at Cornell University Medical College, John also served as vice president of the Sloan Kettering Institute [1966-72] and chief of the Institute's Laboratory of Biophysics from 1955 to 1989. He was elected President of the: AAPM [1964-65]; Radiation Research Society [1970-71]; International Organization of Medical Physics [1969-72]; Health Physics Society [1960-61]; and served as Vice-President of the Radiological Society of North America [1992]. For many years, he served on the physics panel of the American Board of Radiology. He was awarded by the American Association of Physicists in Medicine, an organization of which he was a founder, its most prestigious prize, the William D. Coolidge Award in 1974. He also received the Distinguished Scientific Achievement Award of the Health Physics Society in 1982, the Aebersold Award of the Society of

Nuclear Medicine in 1984, the gold medal of the American College of Radiology in 1988, and the gold medal of the American Society for Therapeutic Radiology and Oncology in 1993. He died in 2004.

Outstanding Contributions Over the Last 50 Years

50 Years
of IOMP



1963-2013

Paul C. Lauterbur

Paul Lauterbur was an American chemist who shared the Nobel Prize in Physiology and Medicine in 2003 with Peter Mansfield for work on the development of magnetic resonance imaging (MRI).

He was born in 1929 in Sidney, OH and did his undergraduate work at Case Institute of Technology in Cleveland. He then worked at the Mellon Institute laboratories of the Dow Corning Corp. with a two year break to serve at the Army Chemical Center in Maryland. While working at Mellon, he also studied at the University of Pittsburgh, graduating with a Ph.D. in 1962. He then became Associate Professor at the State University of NY at Stony Brook. During 1969-70, he worked in the Chemistry Department at Stanford University doing nuclear magnetic resonance research. He returned to Stony Brook and continued there until 1985, when he moved to the University of Illinois at Urbana.



Paul C. Lauterbur receiving his Nobel Prize from His Majesty King Carl XVI Gustaf of Sweden at the Stockholm Concert Hall, 10 December 2003. Copyright © The Nobel Foundation 2003 Photo: Hans Mehlin

While Bloch and Purcell received the Nobel Prize in Physics 1952 for the development of NMR, it was not until the 1970's that NMR could be used for imaging of the human body due to the work of Lauterbur and Mansfield. Lauterbur used the idea of Gabillard of introducing gradients in the magnetic field which allowed for determining the origin of the radio waves emitted from the nuclei of the objects of study. This spatial information allows two-dimensional pictures to be produced.

The best NMR machine at Stony Brook at that time was in the Chemistry Department, which Lauterbur would have to visit at night to use it for his experiments. Some of the first images that he took were those of a clam, green peppers, and two test tubes of heavy water within a beaker of ordinary water; no other imaging technique at that time could distinguish between the two kinds of water.

When Lauterbur first submitted a paper with his discoveries to Nature, the paper was rejected by the editors because the images were too fuzzy. He requested a second review and the paper was published. At the time of his initial rejection, Lauterbur stated "You could write the entire history of science in the last 50 years in terms of papers rejected by Science and Nature." While Lauterbur was unable to persuade SUNY to file patents on his work to commercialize the discovery, the University of Nottingham did file patents which later made Mansfield a wealthy man. He died in 2007.

Outstanding Contributions Over the Last 50 Years

50 Years
of IOMP



1963-2013

C. Clifton Ling

C. Clifton Ling was born in China, grew up in Hong Kong and received his primary and secondary education from La Salle College. He obtained his Ph.D. degree in nuclear physics from the University of Washington, Seattle, in 1971. He then was a research fellow in radiation biophysics at the Sloan-Kettering Institute. He has held academic appointments at the Massachusetts General Hospital, Harvard Medical School, George Washington University and the University of California, San Francisco. In 1989, he returned to Memorial Sloan-Kettering as the Enid Haupt Professor and Chair of the Department of Medical Physics and Professor of Radiology [Physics] at Cornell University Medical College. In 2007, he stepped down as Chair to join Varian Medical Systems as Director of Advanced Clinical Research and maintained his research at MSKCC.

Dr. Ling's research interests range from the fundamentals of cancer radiation biology to optimized radiation treatment planning and delivery, and more recently biological imaging as applied to cancer management. He has contributed to brachytherapy dosimetry, particularly of I-125 seeds. In collaboration with other scientists and clinicians, he has participated in the development of 3D-CRT and IMRT, and ushered in the widespread use of these advanced techniques. In biological research, Dr. Ling has studied oxygen effect, dose rate effects and the repair of sublethal damage, hypoxic cell radiosensitization, radiation induced carcinogenesis and apoptosis, and the effects of oncogenes on radiosensitivity. Subsequently, his laboratory focused on the biological basis of molecular and functional imaging. His published papers number over 300.

Dr. Ling actively participated in many societies such as the AAPM, Radiation Research, ASTRO, and served on the USA and Canadian NCI panels, and the Nuclear/Radiation Studies Board of the USA National Academies.

Dr. Ling has received numerous honors and awards, including the Ray Bush Visiting Professorship at Princess Margaret Hospital, the Suntharalingam Lectureship of Thomas Jefferson University, Speaker at the Royal College of Physicians and Surgeons of Canada, the Ira Spiro Visiting Professor of Harvard Medical School, the Franz Buschke Lecturer of the UCSF, and the James Purdy Lecturer of the Washington University, St. Louis. He received the ESTRO Honorary Member in 1998, the AAPM Coolidge Award in 2004, the Gold Medal from ASTRO in 2006, the Lifetime Achievement and Contribution Award, Radiation Oncology Society, Republic of China, 2007, and was the 50th Failla Lecturer of Radiation and Medical Physics Society and NY Health Physics Society in 2012.

Outstanding Contributions Over the Last 50 Years

50 Years
of IOMP



1963-2013

Professor Jim Malone

Professor Jim Malone PhD, MA, FIPeM, FFR(RCSI) is synonymous with Medical Physics in Ireland. He is the Robert Boyle Professor (Emeritus) of Medical Physics at Trinity College Dublin and is well known to colleagues in the international community, having co-ordinated or been closely involved with about 30 EC funded research projects. These resulted in significant contributions to thyroid radiobiology and dosimetry, diagnostic radiology physics and justification of diagnostic medical exposures. He established the first and largest Medical Physics and Bioengineering Department in Ireland at St. James's Hospital, Dublin. Over 140 medical physicists, clinical engineers and technicians have been educated, trained and mentored through the framework he created, many of whom have gone on to become leaders in the profession. Much Irish service and academic output in the area can be traced to Jim's initiatives.



John Synge's "Schrödinger in the hand of God". Jim et al. rescued this fine picture, for posterity. It was loaned for an exhibition and subsequently lost. Schrödinger lived in Dublin 1939-1956.

Jim brings a curiosity about everything to his thinking on the role of the sciences in medicine and society. Once a candidate for Franciscan life, he reconsidered and chose medical physics. He retained a deep interest in the humanities, particularly in literature, the visual arts, spirituality, history and philosophy. In recent years he took an MA on personal spiritualities, which unexpectedly led him to explore ethical issues in radiation protection from medical exposures, a topic to which he now contributes professionally. His broad view contributed to his appointment as the first non-medical Dean, since 1711, of the School of Medicine and Faculty of Health Sciences in Trinity College.

Jim has an ongoing interest in the career of Robert Boyle, seventeenth century scientist and polymath, and excellent model for those striving to bring more science, including physics, into medicine.



Procession, Front Square, Trinity College for opening of new Medical School Building (1994). Jim 4th row from front.

Jim has made many national and international contributions. He has been a Consultant with the International Atomic Energy Agency (IAEA) in Vienna since 2006 and is a regular contributor to the European School of Medical Physics in Geneva. He is Chairman of the IEC's (International Electrotechnical Commission) Medical Imaging Committee and has been a Board member of 10 institutions. He has over 300 publications and was awarded an Honorary Fellowship in Radiology from the Royal College of Surgeons in Ireland.

Jim directed two Merriman Summer Schools, a prestigious, incisive and sometimes irreverent annual think in celebrating and dissecting Irish Life and Culture. He is an accomplished set dancer with a preference for Clare Reels and a regular at theatres and concerts.

Outstanding Contributions Over the Last 50 Years

50 Years
of IOMP

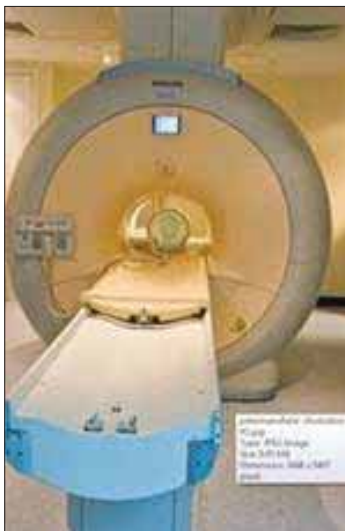


1963-2013

Peter Mansfield

Sir Peter Mansfield FRS was awarded the 2003 Nobel Prize in Physiology or Medicine for his work in developing magnetic resonance imaging (MRI). Mansfield provided the mathematics needed to produce a useful image from MRI radio signals. He also developed echo-planar imaging, a technique which made functional MRI (fMRI) possible.

He was born in 1933 and left school at fifteen, after being told by a careers teacher that science wasn't for him. However, he later went on to study physics at Queen Mary College, London gaining a PhD in 1962. This was followed by a post-doctoral period in the USA. In 1964, he joined the Department of Physics at the University of Nottingham as a Lecturer where he continued his studies in multiple-pulse NMR. He was successively appointed Senior Lecturer in 1968 and Reader in 1970.



MRI scanner. Copyright. The Wellcome Trust.

By the early 1970s, he was working on the application of Nuclear Magnetic Resonance (NMR) to imaging, research that led directly to the development of MRI. Sir Peter's first paper on MRI was presented at the first Specialised Colloque Ampere in 1973. The first image of a living object was performed in 1974. The only thing Sir Peter and his team could squeeze into the tiny scanner was the finger of one of his students Andrew Maudsley. In 1978 Sir Peter offered himself as the first whole-body human volunteer. He subsequently showed how fast imaging could be possible by developing the MRI protocol called echo-planar imaging, leading to functional MRI (fMRI).

He was made Professor of the Department of Physics in 1990, a post he held until his retirement in 1994.

For his work in the development of MRI, Mansfield was awarded a Nobel Prize in 2003, which he shared with Paul Lauterbur of the United States. His work has also been recognised with a knighthood and a fellowship of the Royal Society (FRS). In 2009, the British Prime Minister, Gordon Brown, presented him with a Lifetime Achievement Award. He continues to work on the safety and acoustic screening of MRI.

Outstanding Contributions Over the Last 50 Years

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of IOMP



1963-2013

Sören Mattsson

Sören Mattsson started his career studying radiation physics at Lund University in the early 1960s. Already then he showed an outstanding curiosity and determination to formulate strategies to solve problems and to find answers. His formal studies ended up with a PhD in 1972, based on a thesis about transfer of radionuclides in the food-chain lichen-reindeer-man. His professional career started as a medical physicist in Malmö, and in 1983 he became professor and head of Radiation Physics in Gothenburg. His administrative capacity resulted in setting up research groups in all fields of medical physics, raise the necessary funds and fill the groups with enthusiastic students. This was repeated and even more successful when he returned to Lund University at Malmö in 1988 as professor and head of a new department of radiation physics. He stayed there until his retirement in 2010 and since then he has been Senior Professor there.

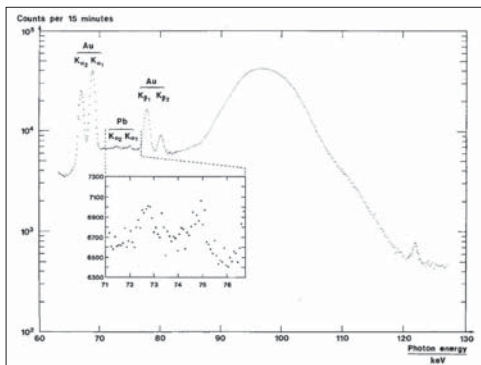


Figure 1. Pulse height distribution recorded at the world's first in vivo x-ray fluorescence study of lead in a retired worker from a metal industry. The lead concentration in the left forefinger bone was estimated to around 50 $\mu\text{g/g}$ [Scand. J. Work, Env. & Health, 1976; 2(2):82-86].

He is known for his and his colleagues' work in the development of various areas of medical physics, including radionuclide imaging and tracer studies, x-ray imaging, in vivo body composition studies, heavy metal research, radiation therapy, radiation dosimetry, radiation protection and environmental radiology.



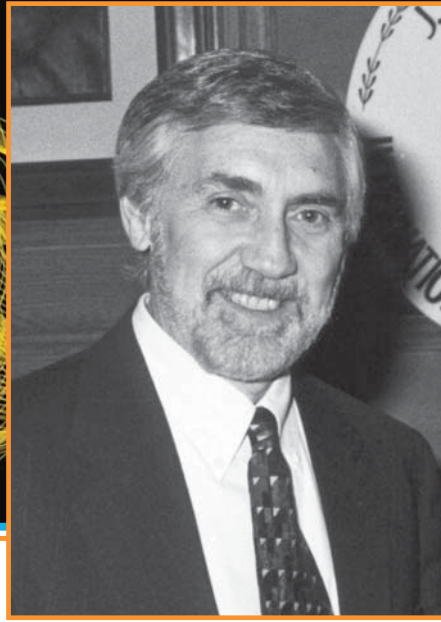
Figure 2. Some of the students that Sören has supervised towards their PhD degree. The photograph is from the dinner of the symposium in honor of his career.

Sören Mattsson's career span more than 40 years, during which advances in medical imaging, radioanalytical techniques and radiation therapy facilitated huge improvements in the diagnosis and management of disease. He has contributed to the development of in vivo x-ray fluorescence analysis of heavy metals, new nuclear medicine methods and

dosimetry, x-ray tomosynthesis as well as retrospective dosimetry and dose estimations. He was active in the planning of a national Swedish proton therapy and has established a very active cooperation between Swedish colleagues and colleagues in the Nordic countries, in Lithuania, UK, Germany, Russia and many other countries. His leadership of the Departments in Gothenburg and Malmö combined an academic role in the university with an active role as chief of the clinical departments there. He was honored with prizes and awards from the Swedish Society of Medicine, the Nordic Society for Radiation Protection, the Swedish Society for Radiation Physics, and the Swedish Society for Radiation Biology as well as the St. Petersburg Research Institute of Radiation Hygiene. He was appointed as honorary doctor at Kaunas University of Technology in 2008. In the period 1985 to 2013 he was an active member of ICRP Committee 3.

Outstanding Contributions Over the Last 50 Years

50 Years
of IOMP



1963-2013

Charles A. Mistretta

Charles A. Mistretta received his Ph.D. from Harvard in 1968 and in 1971, encouraged by John Cameron, began his career in Medical Physics at the University of Wisconsin. Dr. Mistretta became a full professor in the Department of Radiology in 1978 and in 1986 was designated as the John R. Cameron Professor in the Departments of Medical Physics, Radiology, and Biomedical Engineering.

Mistretta has been involved in numerous research areas related to the development of modern time-resolved angiography. This began with the development of digital subtraction angiography (1980). The development of fast angiographic techniques was then extended to magnetic resonance angiography where the development of highly undersampled acquisition such as VIPR and the introduction of constrained reconstruction techniques like HYPR permitted violations of the Nyquist theorem by factors as large as 1000. These principles were extended to X-ray angiography in the form of 4D digital subtraction angiography [DSA] that provides time-resolved 3D volumes 200 times faster than traditional rotational 3D DSA techniques. 4D DSA is combined with 4D Fluoroscopy that provides fluoroscopic viewing from arbitrary views without gantry rotation. These techniques complete a thirty-year circle of angiographic development that permitted improved, less invasive diagnosis and safer interventions.

Dr. Mistretta has trained some of the most prominent investigators in medical imaging and has greatly benefitted from his association with these individuals. He has mentored 33 Ph.D. students and 25 postdoctoral fellows. Among them are Willi Kalender, primary developer of spiral CT; Robert Kruger, co-inventor of DSA and thermoacoustic CT; Stephen Riederer, inventor of MR Fluoroscopy and fast MRI methods; Orhan Nalcioğlu, developer of contrast enhanced MRI methods for breast cancer; Bruce Hasegawa, for dual-modality SPECT/CT imaging; James Dobbins III, dual energy tomosynthetic chest radiography; and Yi Wang, fast vascular MRI and quantitative susceptibility methods.

Chuck presently holds 43 issued and 9 pending US patents and their foreign counterparts. He is a Fellow of the American Association of Physicists in Medicine and of the American Institute for Medical and Biological Engineering. He has received the Edith Quimby Award for Lifetime Achievement from the AAPM, and has been awarded the J. Allyn Taylor International Prize in Medicine, and an MIT Technology Achievement Award. He was the RSNA Outstanding Researcher for 2010 and was recently selected by the International Organization of Medical Physics as the recipient of the 2012 Marie Curie Skłodowska Award.

Outstanding Contributions Over the Last 50 Years

50 Years
of IOMP



1963-2013

Kwan-Hoong Ng

Professor Kwan-Hoong Ng PhD, FIPM, MIPEM, ABMP, CSci, FInstP, AMM is a professor at the Department of Biomedical Imaging, University of Malaya and a Consultant of the University of Malaya Medical Centre, Kuala Lumpur, Malaysia.

He received his M.Sc. (Medical Physics) from University of Aberdeen and Ph.D. (Medical Physics) from University of Malaya. He is American Board of Medical Physics certified. His main research contributions are in radiological protection, radiation dosimetry, risk communication, biophysical characterization of breast diseases and quantification of breast density.



Illustration 1. Professor Ng with Professor John Cameron. Professor Ng delivered the the Second John Cameron Memorial Lecture at Seacomp'07, Manila, in 2007.

Prof Ng's research effort has led to the publication in a recent Lancet Oncology paper calling for standardization of breast density measurement that will have significant impact on improving the predictability of breast cancer risk.

Prof Ng also established the Master of Medical Physics program at the University of Malaya, Kuala Lumpur in 1998 which was awarded the Institute of Physics and Engineering (IPEM) accreditation in 2004. At present, this is the only such accredited program outside the British Isles.

A prolific writer, Prof. Ng has authored/coauthored over 200 papers in peer-reviewed journals, 80 conference proceedings papers, and 20 book chapters, as well as edited four books. He has also organized and directed several local/

international workshops on radiology quality assurance, radiation protection, digital imaging and scientific writing.

As the co-founder and co-editor in chief of the open-access e-journal Biomedical Imaging and Intervention Journal (www.bijj.org), Prof Ng is passionate about encouraging academic publishing. Prof. Ng is also in the editorial board and advisory board of several journals, including European Journal of Medical Physics, Singapore Medical Journal, Journal of Mechanics in Medicine and Biology, International Journal of Medical Physics, Clinical Engineering and Radiation Oncology, and World Journal of Radiology.

Prof. Ng is an IAEA expert/consultant and has served in this capacity in the drafting committee for several IAEA publications. He is also a member of International Advisory Committee (EMF) of the World Health Organization and has served as a consulting expert for the International Commission on Non-Ionizing Radiation Protection (ICNIRP).

Prof. Ng is actively involved in regional and international professional organisations, including as the Founding President of the South East Asian Federation of Medical Physics (2000-2006) and the Immediate Past President of the Asia-Oceania Federation of Organizations for Medical Physics (2010-2012). He was Chairman, International Advisory Board of the International Organization of Medical Physics 2003-2006. In this role he encouraged and stimulated the formation of two new IOMP regional chapters. He also served as Chairman, IOMP Publication Committee 2003-2006.

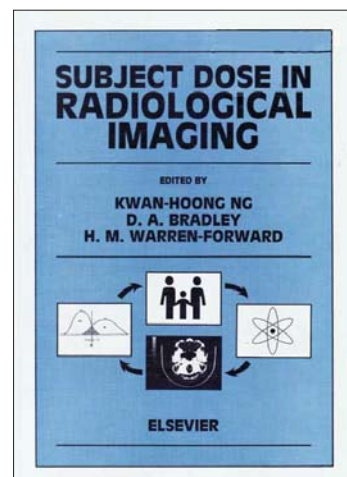


Illustration 2. One of the books edited by Professor Ng.

Outstanding Contributions Over the Last 50 Years

50 Years
of IOMP



1963-2013

Fridtjof Nüsslin

Growing up in nuclear physics Fridtjof Nüsslin changed to medical physics in 1972 when he was appointed as physicist in the radiotherapy clinic at the newly established Medical School in Hannover. In 1988 he was appointed Chair of the Department for Medical Physics at the University of Tübingen. He retired in 2004 and moved to the Technische Universität München where he was invited to work as Visiting Professor for Biomedical Physics at the Department for Radiooncology. In 2008 he was awarded Distinguished Affiliated Professor of the Technische Universität München and Fellow of the Institute of Advanced Study.



Hyperion – a novel Monte-Carlo IMRT treatment planning program based on isoeffect dose optimization. (F.Nüsslin, M. Alber, M.Birkner, M.Fippel: World Congress on Medical Physics & Biomedical Engineering, 2003, Sydney).

One of his major scientific interests was to bridge imaging and radiotherapy technologies to optimize diagnosis and treatment of cancer. Examples are his pioneering work in the early CT-era up to the recent achievements of his working group in the application of molecular imaging in radiotherapy treatment optimization. His group was the first to develop an algorithm for a combined physical and biological dose planning optimization (HYPERION). Since its launch in 2007 Nüsslin has played an active role in the research cluster Munich Advanced Photonics (MAP) to investigate the application of laser technologies to be utilized for imaging and particle beam radiotherapy. Most recently, he is promoting the new field of small animal high precision image guided irradiation.

Nüsslin is an enthusiastic teacher in medical physics. Through his worldwide lecturing activities he contributed significantly to the development of medical physics as an academic discipline. Under the auspices of the German Research Foundation (DFG) he initiated the Academy of Young Scientists. He is the co-founder of the European School for Medical Physics in Archamps. Under the EU 5th Framework Programme he successfully applied for the first Marie-Curie Training

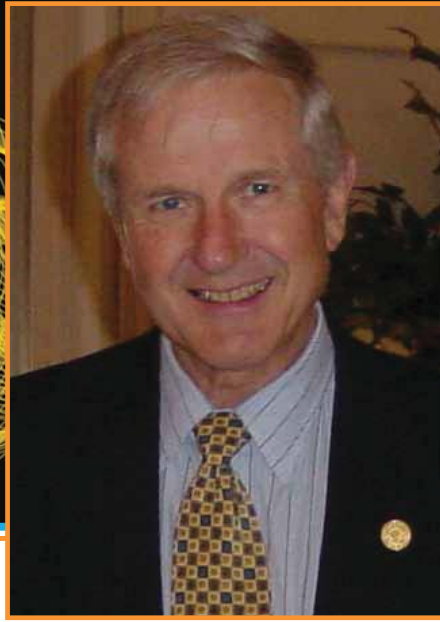
Site for Medical Physics in Europe. Furthermore, he was involved in the IOMP sponsored project of e-Learning in Medical Engineering and Physics.

Additionally to his scientific and educational activities, Nüsslin took over leadership positions in many national and international medical physics organizations. He served as president of the Deutsche Gesellschaft für Medizinische Physik (DGMP), as president of the European Federation of Organizations for Medical Physics (EFOMP) and from 2009 till 2012 as president of the International Organization for Medical Physics (IOMP). As one of the most important achievements under his term of office in IOMP the occupation of the Medical Physicist has been explicitly included in the International Standard Classification of Occupations ISCO-08 of the International Labour Organization. Furthermore, he promoted a stronger cooperation of the IOMP with major international bodies, e.g. WHO, IAEA, IUPAP, IRPA and BIPM. The focus of his international activities is promotion of medical physics in developing countries, in particular in Africa and Latin America.

From 2009 till 2012 Nüsslin served as editor of the European Journal of Medical Physics.

Outstanding Contributions Over the Last 50 Years

50 Years
of IOMP



1963-2013

Colin G. Orton

Colin G. Orton, Ph.D., FAAPM, FACMP, FACR, FlntP, started his career in Medical Physics at St. Bartholomew's Hospital Medical College, London University, as an Instructor teaching physics to pre-medical students and radiation oncologists while working on his M.Sc. and Ph.D. degrees in Radiation Physics under the guidance of Professor Joseph Rotblat. In 1966 he moved to the USA as Chief Physicist/Assistant Professor at NYU Medical Center, where he stayed until 1975. On his 1st day at work, the radiobiologist in the department came to his office and asked him if he'd be willing to teach radiobiology to the residents because he preferred to be in the lab and didn't like to "waste time" teaching. This was a seminal moment in Dr. Orton's career since he continued to teach radiobiology to residents, therapists and physicists every year for the next four decades. This also led to his lifelong research interest in biological

aspects of radiotherapy. It was during this period in New York that he became involved in AAPM activities, including President of RAMPS and Editor of the Quarterly Bulletin of the AAPM. Whilst Editor, he initiated a series of "Mind Benders" and one of these involved solving a relatively simple NSD problem, which he also sent to about 30 experts worldwide. Over 50% of the responders submitted the wrong answer. This led Dr. Orton to devise the Time Dose Factor (TDF) in order to simplify the NSD.

In 1975 Dr. Orton was recruited to work as Chief Physicist and Associate Professor of Radiation Medicine at Rhode Island Hospital, Brown University and, in 1981 as Chief Physicist/Professor at the Radiation Oncology Center/Wayne State University, Detroit, where he stayed until his retirement in 2003. While at Wayne State he was elected President of the AAPM, Chairman of the ACMP, President of the American Brachytherapy Society, Editor of the new Medical Physics World, IOMP Secretary-General and President, and President of the IUPESM. In 1997 he became Editor of Medical Physics, a position he held for eight years. At Wayne State he directed the medical physics graduate program for over 20 years, with close to 200 M.S. and Ph.D. graduates.



Dr. Orton was editor of Medical Physics for eight years.

1973, *British Journal of Radiology*, 46, 529-537

A simplification in the use of the NSD concept in practical radiotherapy

By C. G. Orton, Ph.D., M.Sc. and F. Ellis, M.A., M.Sc., M.D., F.R.C.P., F.F.R.

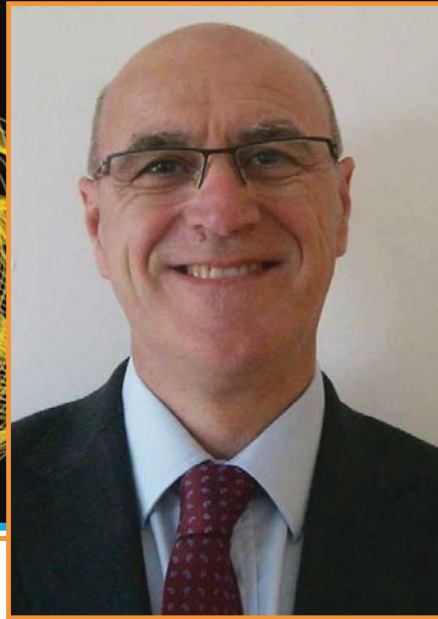
$$TDF = n \cdot d^{1.538} \cdot x^{-0.169} \cdot 10^{-3}$$

Dr. Orton devised the Time Dose Factor (TDF).

During his career Dr. Orton has published over 200 papers, 50 book chapters, and 19 books, and has received numerous honors including the AAPM Coolidge Award, the ACMP Marvin M. D. Williams Award, and the IUPESM Award of Merit.

Outstanding Contributions Over the Last 50 Years

50 Years
of IOMP

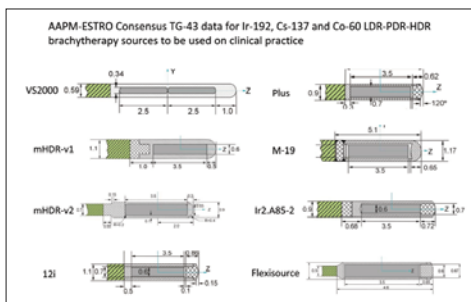


1963-2013

Jose Perez-Calatayud

Jose Perez-Calatayud graduated in Physics in 1981 at Valencia University. He obtained his PhD at the Zaragoza University. He started in Medical Physics in 1985 dedicated to Radiotherapy Medical Physics and subsequently was Associate Professor of the Valencia University (1998-2006). Since 1989 he is the Head of the Radiotherapy Physics Department at the Hospital La Fe in Valencia (Spain) and a member of the Medical Physics Department at Clinica Benidorm (Alicante).

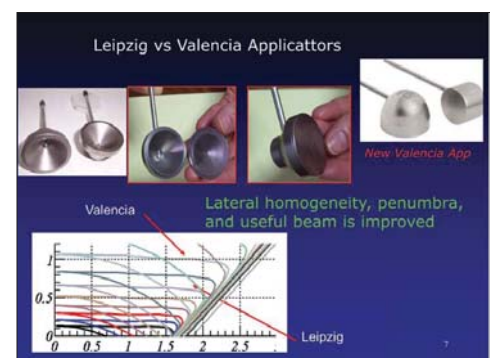
His main research field is Brachytherapy, as part of a Research Group of The Valencia University. The main goals of the group have been the Monte Carlo characterization of a numerous number of brachytherapy sources, the development of the Valencia applicators and last but not least treatment planning aspects on MR based gynecological brachytherapy with the development of dummies compatible with MR.



He is currently or recently been chairman of the Spanish Society of Medical Physics (SEFM) brachytherapy group, Spanish delegate at the GEC-ESTRO BRAPHYQS working group, chair of the AAPM/ESTRO HEBD (High-Energy Brachytherapy Source Dosimetry) Working Group, member of the AAPM Brachytherapy Subcommittee, member of the AAPM TG-143 (Task group on dosimetry for elongated brachytherapy sources), member of the GEC-ESTRO Committee, member of the Physics Committee of the American Brachytherapy Society (ABS) and member of the Brachytherapy Clinical

Applications Working Group (BCA-WG) of the AAPM.

Being one of the figureheads of the Valencia Brachytherapy group, he is responsible for an impressive list of high-quality publications in the brachytherapy field. He has contributed to the development and application of the Monte Carlo code to brachytherapy source calculations and consequently a whole set of treatment sources have been characterized.

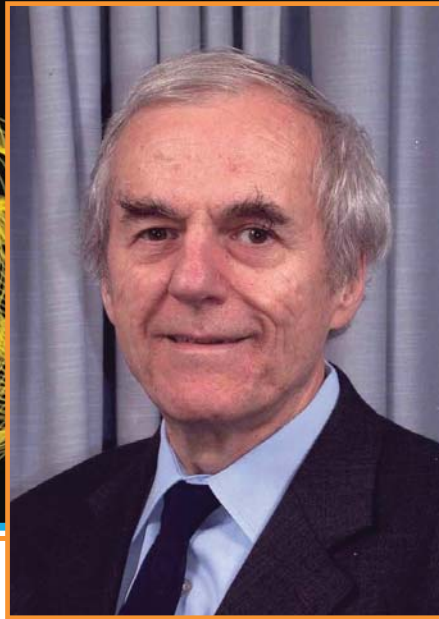


As member or chair at the main international brachytherapy working groups, he has contributed to establish an international common framework in brachytherapy quality control that it's now referenced all over the world. He has been involved in the process of drawing up the recommendations (AAPM-GEC-ESTRO) for enhancing the quality of treatments and training in brachytherapy.

Finally, as has to be properly mentioned, a worldwide recognized researcher has behind him an outstanding working group, and in this case a grateful recognition has to be included in this poster to: F. Ballester, D. Granero, J. Vijande, M. Rivard, F. L. Liso, V. Carmona, M. C. Pujades, T. García, J. Richart, J. Venselaar, R. van der Laarse, F. A. Siebert, S. Rodriguez, M. Santos y A. Tormo (University of Valencia, Hospital La Fe, Clinica Benidorm, AAPM working groups, and BRAPHYQS-ESTRO group).

Outstanding Contributions Over the Last 50 Years

50 Years
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1963-2013

Ervin B. Podgorsak

Dr. Ervin B Podgorsak PhD, FCCMP, FCOMP grew up in Slovenia, where he earned his Dipl. Ing. degree from the University of Ljubljana. He pursued graduate work in medical physics at the University of Wisconsin, receiving his Ph.D. in 1973. Following an invitation by Dr. Harold Johns, he moved to Toronto as a post-doctoral fellow at the University of Toronto and then worked as clinical physicist at the Ontario Cancer Institute. In 1975 Dr. Podgorsak joined McGill University in Montreal and remained there until his retirement in 2010.

As Director of the McGill University Medical Physics Unit from 1991 until 2009, Dr. Podgorsak headed a leading clinical service and an academic program. He built a strong research team at McGill and led the McGill medical physics graduate program and the clinical residency program which were the first Canadian programs to be accredited by CAMPEP.

The author of 157 peer reviewed publications, 3 textbooks, 18 invited book chapters, 70 conference proceedings, and some 360 invited and proffered presentations, Dr. Podgorsak has been involved in medical physics research, such as solid-state dosimetry and linac target design, as well as the development of numerous innovative cancer therapy techniques, most notably dynamic stereotactic radiosurgery.

He has been active within the Canadian College of Physicists in Medicine (CCPM) serving as President from 1987-1989, the American Association of Physicists in Medicine (AAPM), the American College of Medical Physics (ACMP) and the Commission on Accreditation of Medical Physics Educational Programs (CAMPEP). Dr. Podgorsak was also the Chair of the Joint AAPM-COMP Annual Meeting in Montreal in 2002. He has served on the International Stereotactic Radiological Society and on several committees of the International Atomic Energy Agency and is often called upon by international granting agencies for his expertise and ability to function in several languages.

Throughout his career, Dr. Podgorsak worked to improve health care in Quebec and Canada. His long service to the CCPM improved health services by setting standards for education and certification of the medical physicists active in patient care. As the physics leader of one of the larger radiation oncology treatment services in Quebec, Dr. Podgorsak was able to trigger significant improvements in funding for cancer centres in the province.

Dr. Ervin Podgorsak is an outstanding leader and champion of professionalism for clinical medical physicists. In 2006 he received the William Coolidge Award, AAPM's highest honour and in 2009 the Gold Medal, COMP's highest honour. In 2011, the Canadian Association of Physicists (CAP) and COMP awarded Dr. Podgorsak the 2011 CAP-COMP Peter Kirkby Memorial Medal for Outstanding Service to Canadian Physics. This award recognized his leadership in developing and enhancing the Medical Physics profession at the national and international level.

Outstanding Contributions Over the Last 50 Years

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1963-2013

Ambika Sahai Pradhan

Dr. Ambika Sahai Pradhan is the Editor-in-Chief of Journal of Medical Physics (JMP), an official publication of Association of Medical Physicists of India (AMPI), published by Wolters Kluwer Health and Medknow Publications, online since 2006. The journal caters to the academic need of dissemination of outcome of the newer research in all areas of medical physics. The journal with its international membership of the Editorial Board and the transparent peer review system has attained wide recognition and attracted researchers and readers to opt this journal.



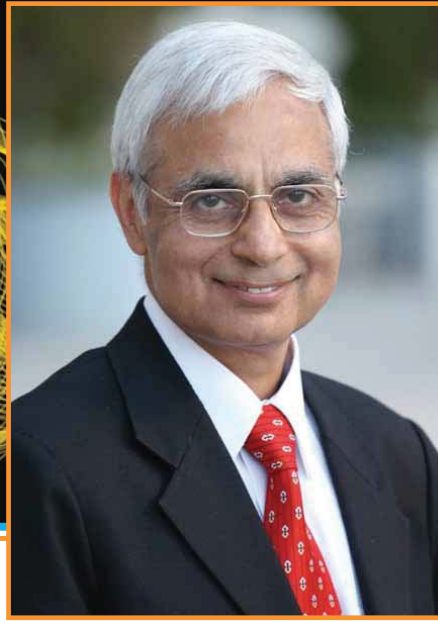
Dr. Pradhan joined Bhabha Atomic Research Centre (BARC), India (a premier research institute of high international repute) in 1969 after his MSc Physics and earned his PhD titled "Thermoluminescence in Radiation Dosimetry" at the University of Bombay in 1981. His early work on indigenous development of thermoluminescence dosimetry (TLD) found wide applications, viz. the TLD badge system continues to be used for countrywide personnel monitoring in India for all occupational workers including those in diagnostic and radiation therapy institutions. His post-doctoral work (including that during fellowship of Alexander von Humboldt (AvH) Foundation of Germany) on in-phantom point dosimetry and measurement of doses due to low and high LET radiation has also found wide application and citation. His current research focuses on on-line dosimetry, imaging and dose mapping using optically stimulated luminescence, radioluminescence and scintillation techniques. He has published 250 research papers (146 in peer reviewed journals) and edited 4 books / conference proceedings

Dr. Pradhan has been a research guide to medical physicists at University of Mumbai and several of them are leading medical physicists both in India and abroad. AMPI conferred on him its award 'Ramaiah Naidu Memorial Oration Award- 2010'. He was also awarded 'KG Vohra Memorial Oration Award -2010' by Indian Association for Radiation Protection (IARP), India. He is a Fellow of Maharashtra Academy of Sciences and is an active member of several other professional bodies in addition to AMPI. He had been

a member of Committee-2 of the International Commission on Radiological Protection (ICRP) and continues to be a member of editorial board and book-review-editor of Radiation Protection Dosimetry (RPD) journal of Oxford University Press UK and a member of Safety Review Committee for Applications of Radiation (SARCAR) of Atomic Energy Regulatory Board (AERB) of India. His dedication to human health care continues unabated.

Outstanding Contributions Over the Last 50 Years

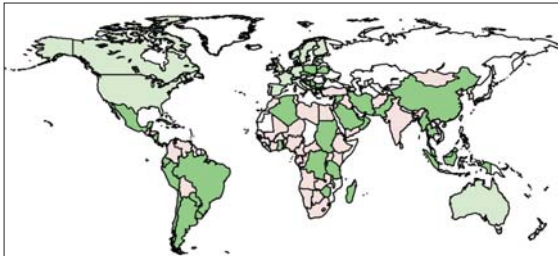
50 Years
of IOMP



1963-2013

Madan M. Rehani

Dr. Madan M. Rehani has raised patient dosimetry skills of medical physicists in over 70 less resourced countries and brought them to the level of publishing their work in international journals with high impact factor. As a Radiation Safety Specialist at the IAEA he has demonstrated improvement of patient protection in radiology in many countries through his training and research actions. The training material developed by IAEA under his direction has been made freely downloadable and is used extensively by medical physicists in more than 100 countries. He has organised more than 100 training courses in Africa, Asia, Eastern Europe and Latin America and has created the website on radiation protection of patients of the IAEA which is currently a prime resource for radiation protection information in the world. Moreover, he has been serving IOMP as Secretary-General since September 2009.



Countries in dark green where difference was made through projects and documented by publications and light green by use of information provided by him through website

Dr Rehani was earlier Professor & Head, Medical Physics Unit in the Cancer Hospital of the All India Institute of Medical Sciences (AIIMS), New Delhi, India and also Head of the Collaborating Centre of the World Health Organization (WHO) on Imaging Technology & Radiation Protection which he established. He is currently Director of Radiation Protection of European Society of Radiology after retiring from IAEA on 31st Jan 2013.

Awards: He has been awarded the Honorary Membership of the Society of Pediatric Radiology in 2011; The Harold Johns Medal by the IOMP in 2009; the most prestigious award of India in nuclear sciences - Homi Bhabha Memorial Oration by Society of Nuclear Medicine India in 1999; Dr.K.M. Rai Oration by Indian Radiological & Imaging Association 2001.

He was founding President, UPDEL Chapter of the Association of Medical Physicists of India (AMPI) during 1990-94; President, Society of Nuclear Medicine, India, 2001.

Publications: He has edited 5 books, responsible for 15 IAEA publications, published more than 130 papers in journals and contributed Editorials in International Journal of Cardiology, British Medical Journal, Indian Journal of Radiology & Imaging. He has published papers in The Lancet, Catheterization & Cardiovascular Interventions, Semin Ultrasound CT MR, Radiother Oncol, J Nuclear Medicine, Radiation Research, Clin Radiol, Am J Roentgenology, Radiology, Rad Prot Dosimetry etc. Under his chairmanship, 3 Annals of ICRP have been published and another 4 with him as member of TG.

He is Associate Editor of Medical Physics and of BJR and Asstt Editor of AJR.

Outstanding Contributions Over the Last 50 Years

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1963-2013

David W.O. Rogers

Dr. David Rogers PhD, FCOMP earned his PhD in experimental nuclear physics from the University of Toronto in 1972. Following a post-doctorate at Oxford, he joined the National Research Council's Ionizing Radiation Standards (IRS) Group that provides Canada's national calibration service for instruments that measure ionizing radiation. He became group leader in 1984 and held that position until 2003. During his tenure, the IRS Group became one of the most respected radiation standards groups in the world. While there he became almost synonymous with the Electron Gamma Shower (EGS) Monte Carlo simulation code. The BEAM code and ESGnrc systems are used often in radiotherapy research and development. At many medical physics meetings, a significant number of the talks on Monte Carlo simulation acknowledge using Dr. Rogers' group's BEAM code.

Dr. Rogers currently holds a prestigious Canada Research Chair at Carleton University's Physics Department. He and his academic team continue to improve, document, instruct and use the EGS Monte Carlo code and solve problems in radiation science.

Professor Rogers emphasizes careful comparison of experimental data to simulations to help improve both. Because of the quality, productivity and importance of his work to the field of medical physics, his collective works are cited extensively.

Professor Rogers is not only an outstanding research scientist but also an accomplished teacher and mentor for students. He has given innumerable EGSnrc/BEAMnrc workshops in Ottawa and around the world. Many of the trainees he has mentored have gone on to leadership roles throughout the North American medical physics community and in various ionizing radiation standards labs in Europe. With Dr. Joanna Cygler, he was the Scientific Co-director and Proceedings Co-editor of the AAPM Summer School in 2009. He has attracted post-doctoral fellows from around the world for his unique mix of Monte Carlo simulation and precise dosimetry metrology knowledge.

David has been actively involved in COMP since its beginnings and has played a major role in shaping the direction of the organization. In addition to his service to COMP, Dr. Rogers also works tirelessly for international medical physics organizations. He has been on the Editorial Board for Medical Physics for decades and Deputy Editor for Radiotherapy for 9 years. In 2010 he won the AAPM's highest award, the Coolidge Award. Dr. Rogers was awarded the COMP Gold Medal in 2012, COMP's highest honour.

Outstanding Contributions Over the Last 50 Years

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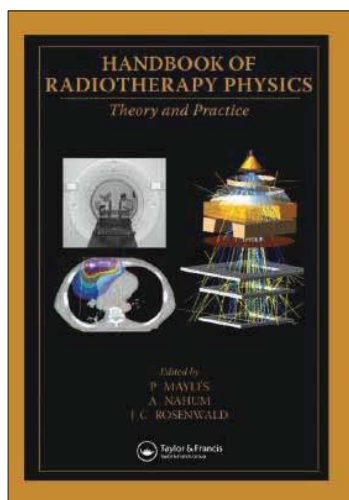


1963-2013

Jean-Claude Rosenwald

Jean-Claude Rosenwald was born in 1945 in Neuilly, close to Paris. After earning an engineering degree in electronics, nuclear physics and computing sciences obtained in Nancy in 1967, he began his career as a computer scientist developing dose calculation programs for brachytherapy at the Institut Gustave Roussy in Villejuif, under the supervision of Andrée Dutreix. He obtained his PhD on this subject in 1976.

He was appointed medical physicist at the Institut Gustave Roussy from 1971–1975 and then, after a short stay in Milwaukee (USA) to help for the implementation of computerized treatment planning, he moved in 1976 to the Institut Curie in Paris, as head of the Medical Physics Department. Altogether, 17 PhD and more than 60 master's students have undertaken research programmes under his supervision. His name is cited in more than 100 publications in journals or books and he has made more than 150 communications in national or international meetings.



Dr. Rosenwald was one of the co-authors of the Handbook of Radiotherapy Physics published in 2007.

Dr. Rosenwald has always had a particular interest in the use of computers in radiation therapy and to the related quality control procedures. He participated in several international conferences, has been a co-author of several reports on this subject (ICRU, IAEA, ESTRO, ICRP). He was involved in the development of commercial solutions for treatment planning both for external-beam radiotherapy and brachytherapy (the ISIS software, now superseded by the ISOgray software from the DOSIsoft company). He also promoted the use of proton beams in radiotherapy and played a major role in the development of the Centre de Protonthérapie d'Orsay, now part of the Institut Curie.

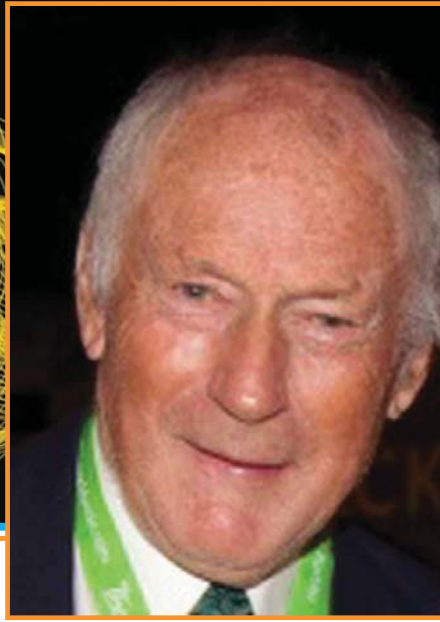
He participated to the education and training of many medical physicists as lecturer for the Master Degrees in Medical Physics and for the French MP Qualification degree. He favoured the creation of the medical physics master degree, at Paris-Sud University in 2004. He was one of the co-authors of the Handbook of Radiotherapy Physics published in 2007.

He served as president of the French Society for Medical Physics (SFPM) 1979–1982, as chairman of the Scientific Committee of the European Federation of Medical Physics (EFOMP) 1990–1993 and chaired the Scientific Committee for Medical Physics at the International Conference of Bioengineering and Medical Physics held in Nice in 1997. He was member of the editorial boards of several journals (European Journal of Medical Physics, Radiotherapy and Oncology and Cancer/Radiothérapie) and associate editor of the European Journal of Medical Physics from 2008 to 2010.

He is now retired, but still doing some teaching, and preparing various reports for the medical physics community. The SFPM recently asked him to manage a working group to elaborate a guide on “good practice of medical physics”. The guide was published in 2012.

Outstanding Contributions Over the Last 50 Years

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1963-2013

Hans Svensson

Hans Svensson was Professor of Medical Radiation Physics, University of Umeå, Sweden, from 1982 until his retirement in 2000. He was one of the most international of the Swedish medical physicists, and as a creative scientist and outstanding dosimetry physicist he was a pioneer of modern radiotherapy dosimetry playing a vital role in promoting quality assurance in its early days. Hans Svensson's career spanned more than 50 years, during which he was fundamental in bringing together the medical physics and standard laboratory communities as well as a key player in many international and organizations and activities, where his political skills flourished.

Hans Svensson and his colleagues in Umeå and in Göteborg were very active in the development of a new dosimetry protocol for external radiotherapy, known as the NACP code of practice for reference dosimetry, and later adopted in the IAEA's TRS-277 guidelines. He was a forerunner in clinical research. Together with Anders Brahme he introduced the very first 50 MV Racetrack Microtron equipped with a computer controlled multi-leaf collimator (MLC) for both MV X-rays and electrons at his own department 1985. He possessed a great amount of humanity and contributed considerable to a world-wide spread of medical physics. He played a leading role in the IAEA dosimetry activities, and as was very active in ESTRO during many years. During the first ESTRO-meeting in London 1982 he and Alan Nahum gave the first lecture in physics on "How Accurate can Absorbed Dose to Tissue be Determined?" followed by many more courses. He was one of the driving forces to establish a separate physics meeting for those years when the annual ESTRO meeting was included in the ECCO meeting. The activity within IAEA significantly contributing by standardisation of protocols and organisation of dosimetry reviews, as well as development of protocols for standardised reporting of the target dose. Hans Svensson was the Chairman of the report committee on "Electron beam dosimetry" 1984, and an active member of ICRU committees on "Reporting photon and electron beam therapy" 1999 and 2004. Hans Svensson was general secretary in IOMP 1993-1997.

Among a number of awards during his career, he was designated an AAPM honorary membership 2001, a distinction rarely given, and he achieved the ESTRO Founding Members Award at the Anniversary Meeting in London 2011, a few months before his decease.

Outstanding Contributions Over the Last 50 Years

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1963-2013

Tae Suk Suh

Dr. Tae Suk Suh, Professor of Medical Physics at the Catholic University of Korea is known for his work with his colleagues on the development of radiotherapy planning, multi-modality imaging, and, in particular, the radiosurgery system.



Tae Suk Suh contributed greatly towards the development of University of Florida radiosurgery system using unique bearing system as one of UF Teams during 1987-1990.

Professor Suh's career has spanned more than 30 years, a period which has witnessed huge advances in radiosurgery hardware and planning systems. He has contributed greatly towards the development of radiosurgery optimization techniques; and in 1998 at Kangnam St. Mary's hospital in Seoul, he was the first to undertake flattening filter free (FFF) beam-based radiosurgery in a clinical setting. He also pioneered many other technologies, including the development of the radiation treatment planning system and 3T active shield magnetic resonance imaging.

Having established his academic career in Korea, Professor Suh has served as an editor and editorial board member for many international journals of medical physics. During his leadership of the Korean Society of Medical Physics, he was well appreciated for his many contributions, including his promotion of medical physics in the Asia-Oceania region, and he organized the World

Congress on Medical Physics and Biomedical Engineering in 2006 (WC 2006, Seoul) and the Asia-Oceania Congress of Medical Physics three times in Asia (AOCMP 2002, 2006, 2012).

In 2001, the Korean Ministry of Science and Technology acknowledged Professor Suh's Radiation Biomedical Engineering Laboratory (RBEL) at the Catholic University of Korea as a National Research Laboratory. In 2009 the RBE Laboratory and Molecular Imaging Program at Stanford jointly established the Advanced Research Center for Medical Physics, as a center for international research. In 2006 and again in 2012, Professor Suh was honored with the Korean Government's Award for the Best Academic Achievement.



Tae Suk Suh organized the WC 2006 in Seoul, Korea, in 2006. (Opening ceremony)

Outstanding Contributions Over the Last 50 Years

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1963-2013

David Thwaites

David Thwaites is currently Professor of Medical Physics and Director of the Institute of Medical Physics in Sydney University, Australia, having previously been Head of the Department of Medical Physics and Engineering in Leeds Teaching Hospitals and Professor of Oncology Physics at Leeds University, UK, with prior posts in the Yorkshire and Edinburgh Cancer Centres.



Enduring career themes, with some examples of national and international level contributions, include:

i) combining academic and clinical service roles, thereby linking basic, translational and clinical research to practice, reflecting his strong belief that medical physics research should be rooted in and contribute to service quality and service development.

Career-long research interests include radiation dosimetry, radiation oncology physics, novel radiotherapy technologies and techniques, including imaging and particle therapy applications, and accuracy and precision in radiotherapy. These have produced more than 150 scientific publications, books and book chapters and a long-time physics editorship of 'Radiotherapy and Oncology'.

Contributions include: dosimetry parameter and protocol (code-of-practice) data and recommendations; establishment and development of dosimetry inter-comparison and audit programmes (UK, ESTRO, IAEA); development of quality assurance, Quality System and audit

recommendations, structures and methodologies for radiation oncology and medical physics in Europe (ESTRO) and more widely via the IAEA; establishing productive research collaborations and networks between universities, hospitals and industry re developing technology applications; and participation in many steering/advisory/guidelines/ recommendations/evaluation groups eg. for clinical trials, novel technologies, dosimetric methods, quality issues (UK, Europe, Australia).

ii) a firm commitment to medical physics education, training and professional standards, including for developing countries. Examples at national/international (ESTRO, EFOMP, ICRU, IAEA, IOMP, ISRO) levels include: staffing and other standards recommendations, a well-used text book for trainees and other significant syllabus, teaching and training materials in the UK, for ESTRO and for the IAEA; extensive involvement in direct teaching, training, assessment and accreditation in the UK, Europe and for developing countries (via IAEA, ESTRO, ISRO); and in Australia, eg. having recently established a national inter-university network for medical physics education and research.

iii) a strong interest in developing and supporting local, national and international collaborations, networks and teams between inter-disciplinary professional groups, including in education, based on the principle that ensuring effective engagement of medical physicists with partner clinicians and clinical services and a focus on quality and clinical needs ensures the best outcome for the patient. This applies equally to service activity as to professional organisation work and these contributions have gained recognition, eg. the first physicist elected to the ESTRO Board in full membership elections, awarded FRCR (UK Clinical Oncologists College) for contributions to education and practice of clinical oncology (UK) and, recently publicly announced by ESTRO, will receive the 2014 Emmanuel van der Scheuren award for scientific excellence and contributions to education, to ESTRO and to radiation oncology in Europe.

Outstanding Contributions Over the Last 50 Years

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1963-2013

Giampiero Tosi

Giampiero Tosi was born in Novara in 1937 and graduated in Physics from the University of Milano in 1961. His thesis was titled "Study on a polarized proton source for an AVF cyclotron". He became early an assistant professor in the same University, carrying out studies on electrostatic accelerators at the Research National Council.

In 1963 he began work at a private hospital in Milan on a 32 MeV betatron for tumor radiotherapy and in 1967 he was invited to work on a 42 MeV betatron and a Cobalt-60 unit at the Niguarda Hospital, where he had the charge of Director of the Medical Physics Department from 1971 to 1993.

At the beginning of '70s, he developed the idea to create at the University of Milano the first post-graduate School in Medical Physics in Italy, giving an important contribution to its establishment in 1978. He was lecturer of this School until 2005. Following the School of Milano, 15 other post-graduate Schools were created in Italy.

At the beginning of 80's, he designed the first dedicated X-ray irradiator of blood components, that was largely adopted not only in Italy, and in 1991 he promoted with Ugo Amaldi the realization of the National Hadrontherapy Center, equipped with a synchrotron able to accelerate both protons and carbon ions. Its realization was completed in 2010, and the synchrotron is now treating selected patients in the so called National Center for Oncological Hadrontherapy (CNAO), in Pavia.

In 1993 he was called by Umberto Veronesi to direct the Medical Physics Unit of the European Institute of Oncology in Milano, where he was one of the promoters of the employ of dedicated linear accelerators for intra-operative radiotherapy, especially for the treatment of early breast cancers.

Between 1990 and 2002, he was Chairman of the IEC SC 62B on "Diagnostic Imaging Equipment", promoting the elaboration of many technical standards on the performance and quality control procedures of diagnostic radiological equipment.

Very recently he has been appointed as a fellow of the Academy of Sciences of Turin for the discipline "Medical Physics".

Now he is retired but he is still a reference for youngest Medical Physicists, carrying out his scientific activity especially in teaching.

Outstanding Contributions Over the Last 50 Years

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1963-2013

Jacob (Jake) Van Dyk

Prof. Van Dyk MSc, FCCM, PhD, DABMP, FCOMP obtained his B.Sc. from McMaster University and his M.Sc. from the University of Western Ontario, Canada in 1971, under the supervision of Dr. J.C.F. MacDonald (2007 COMP Gold Medal winner). He then joined the Clinical Physics group at the Princess Margaret Hospital, Toronto as a valuable member of the Johns and Cunningham “power house” in medical physics.

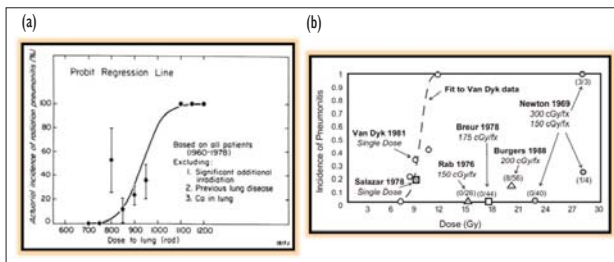


Figure 1. (a) These dose-response data for radiation pneumonitis with single fraction, half-body irradiation were published by Van Dyk et al. in 1981. Along with pneumonitis data for total body irradiation, these data became a guide for dose prescriptions for the many patients treated with these techniques.

(b) The data are still referenced today is indicated by the figure from Marks et al. published in the recent (2010) QUAntitative Analysis of Normal Tissue Effects in the Clinic (QUANTEC) review.

lung toxicity, multiple aspects of quality assurance (QA) and uncertainty analysis of modern radiation therapy. Prof. Van Dyk holds patents for the design of QA phantoms distributed worldwide by Modus Medical Devices. He has an inquisitive scientific mind, an honesty to admit when he does not understand something fully, attention to detail, leadership and organizational qualities, and a strong work ethic that brings key issues to decisive resolutions.

At the 2011 joint meeting of COMP and the AAPM, Prof. Van Dyk was honoured with the Gold Medal, COMP's highest honour which recognized his major national and international contributions to medical physics in research, education, and administration.

In 1995, Prof. Van Dyk relocated to the London Regional Cancer Centre to become Head of Clinical Physics, and in 1999, he became full Professor at Western University in London, Ontario. Prof. Van Dyk became Professor Emeritus on October 27th, 2011 - coincidentally on the 60th Anniversary of the world's first cobalt cancer treatment in London, Ontario. Prof. Van Dyk has won awards of excellence for teaching at both the University of Toronto and Western. He has produced three volumes on The Modern Technology of Radiation Oncology. These are used as major references around the world.

Prof. Van Dyk served as the President of the Canadian College of Physicists in Medicine (CCPM) from 1991-1995 and has participated as an examiner for the CCPM for over 15 years. He also served in numerous capacities for the Canadian Organization of Medical Physicists (COMP), the American Association of Physicists in Medicine (AAPM) and represented Canadian medical physics at the IOMP. He has received honorary fellowships from both the AAPM and COMP. In recent years, he has served as Consultant to the IAEA, living in Vienna and reaching out to assist developing nations. Prof. Van Dyk has authored over 135 peer-reviewed publications and presented over 200 invited lectures in over 30 countries. His collective works have been cited extensively. He is best known for clinically relevant radiobiology research on radiation-induced

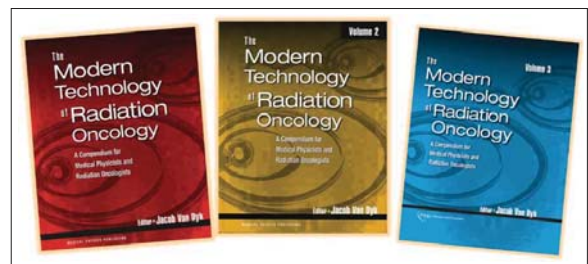


Figure 2. “The Modern Technology of Radiation Oncology” series have become a reference around the world for practicing medical physicists and especially for medical physicists who are sitting their certification exams. Volume 1 was published in 1999, Volume 2 in 2005 and Volume 3 in 2013.

Outstanding Contributions Over the Last 50 Years

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1963-2013

Willi Kalender

Willi Kalender, Ph.D., FBIR, FAAPM, is Professor and Chairman of Medical Physics at the University of Erlangen-Nuremberg. Right from the beginning of his research activities he focused on the development and improvement of diagnostic imaging in radiology, at first in the research laboratories of Siemens Medical Systems, Erlangen, Germany, and since 1995 as the head of the newly established Institute of Medical Physics at the University of Erlangen.

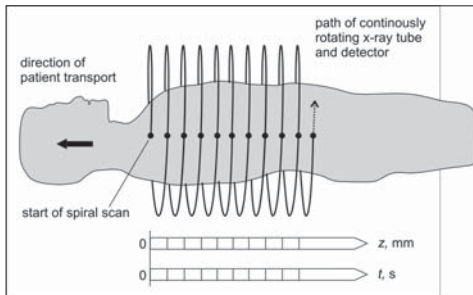


Figure 1: Spiral CT became possible in the late 1980s with the introduction of continuously rotating systems. It allows for fast and gapless acquisition of 3D data volumes at very high quality.

Willi's contributions to the field are well known. His introduction of volumetric spiral computed tomography in 1989, a technique that enabled the transition from sequential two-dimensional (2D) CT imaging to fast volumetric three-dimensional (3D) imaging (fig. 1), has led to a complete change of paradigm in CT imaging. In the 1990s he followed this up by developing phase-correlated cardiac imaging and attenuation-based tube current modulation (fig. 2) based on spiral CT. Nowadays, spiral CT has been fully integrated into clinical practice with considerable benefits for the patient by reduction of scan times and of patient dose.

Other fields of his research were radiation protection and the development of quantitative diagnostic procedures, e.g. for the assessment of osteoporosis, lung and cardiac diseases. Topics of his current research projects are dose assessment and reduction in CT and, in particular, high-resolution CT of the breast at dose levels equivalent to those in screening mammography. Willi has always emphasized the importance of interdisciplinary work and

cooperated strongly with radiology, but also with other disciplines of medicine, natural sciences and engineering as well as industrial partners.

Willi Kalender received a large number of awards reflecting the high recognition of his work by his peers worldwide. Among others, the European Science Foundation (ESF) awarded him the 2007 European Latsis Prize, the American Association of Physicists in Medicine honoured him with the William D. Coolidge Award in 2009. In the same year he was elected as member of the German National Academy of Sciences Leopoldina. In 2004 he received the Cross of the Order of Merit of the Federal Republic of Germany. His work is reflected by more than 900 publications, among these about 270 original articles.

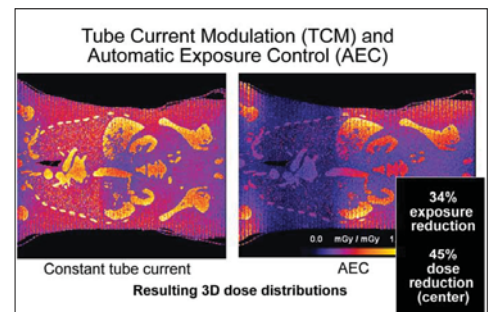


Figure 2: Dose can be optimized and reduced by tube current modulation and automatic exposure control. Spiral CT allows controlling these in real time by using the measured attenuation data.

Outstanding Contributions Over the Last 50 Years

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1963-2013

Wolfgang Schlegel

Wolfgang Schlegel is known for his pioneering work in radiotherapy physics. Under his leadership new technologies for radiotherapy were developed, which significantly enhanced the precision and effectiveness of cancer treatment with ionizing radiation. Wolfgang Schlegel studied Physics in Berlin and Heidelberg and was a graduate student at the Max-Planck-Institute for Nuclear Physics in Heidelberg where he graduated in 1970 and received the Ph.D. (Dr. rer. nat.) in 1972.



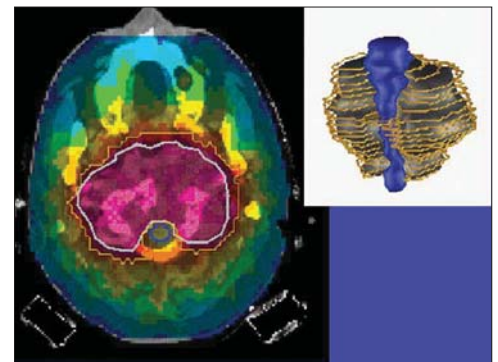
Wolfgang Schlegel with the „Micro-Multi-Leaf Collimator“, which was developed by his group for applications in conformal stereotactic radiotherapy and radiosurgery.

Wolfgang Schlegel's occupational career as a Medical Physicist started in 1973 when he became a Research Associate at the German Cancer Research Center (DKFZ) in Heidelberg. The University of Berlin appointed him to a professorship in Medical Physics in 1988. In 1993 he became a Professor of Medical Physics at the University of Heidelberg and the Head of the Department "Medical Physics in Radiotherapy" at the DKFZ.

His research covers important fields of radiotherapy physics and technology, such as 3D treatment planning, stereotactic radiosurgery, 3D conformal radiotherapy, intensity modulated radiotherapy (IMRT), image guided radiotherapy (IGRT) and ion therapy. The developments of his department initiated a breakthrough in radiotherapy concerning precision and conformality of dose delivery. By combining basic research and translation, the Heidelberg group belongs to those groups performing groundbreaking achievements in 3D treatment planning, radiosurgery of brain tumours, 3D conformal radiotherapy with Multi-Leaf-Collimators and IMRT. Recently his department was instrumental in establishing the "Heidelberg Ion Therapy facility" (HIT) as the first European Ion therapy unit.

Not only as a researcher, Wolfgang Schlegel also distinguished himself as an academic teacher and promoter of education in Medical Physics. He supervised more than 200 diploma-, masters- and PhD-theses in Medical Physics. He established the postgraduate further education programme "Medical Physics" at the University of Heidelberg, the on-line Masters programme "Advanced Physical Methods in Radiotherapy" (APMR) and the Masters programme "Clinical Medical Physics" which recently started as a collaboration between the Pontefica Universidad Catolica/Santiago de Chile (PUC) and the University of Heidelberg.

Wolfgang Schlegel is awardee of numerous scientific prizes: In 1996, he received the "Karl-Heinz Beckurts Award" of the German Ministry of Research and Education for successful technology transfer, he was nominated for the "Future-Award of the German President" in 2001, he received the "German Cancer Award 2003", the "Glockner Medal 2010" of the German Medical Physics Society (DGMP) for his lifelong achievements in Medical Physics and he became a honorary member of the German Society of Radiation Oncology (DEGRO) in 2013.



2D- and 3D-IMRT plan for a chordoma patient (one of the first patients to be treated with IMRT at DKFZ in 1998).

Outstanding Contributions Over the Last 50 Years

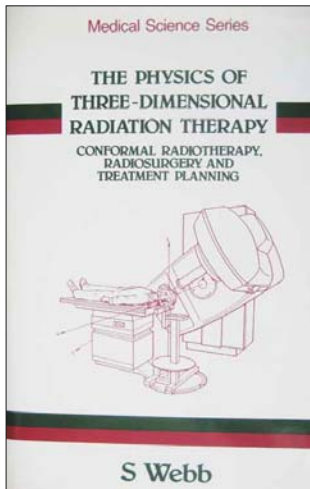
50 Years
of IOMP



1963-2013

Steve Webb

Steve Webb PhD DSc was Professor of Radiological Physics in the University of London from 1996 - 2011 and is now Emeritus Professor. He was Head of the Joint Department of Physics at the Institute of Cancer Research (ICR) and Royal Marsden NHS Foundation Trust (RMH) from 1998 - 2011. He is known for his work in developing intensity-modulated radiation therapy (IMRT). IMRT treatments have now been established to improve the quality of life of cancer survivors and their prognosis, depending on the cancer site.



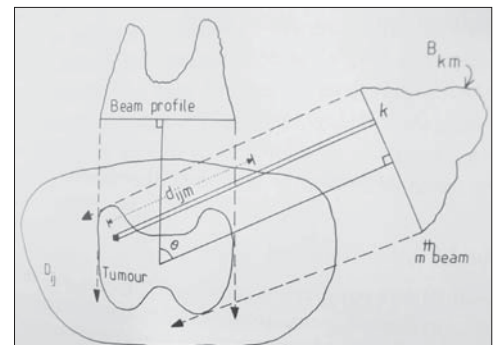
Cover of one of first books on IMRT published in 1993

Steve's early career in medical physics started in 1974 after postgraduate study in cosmic-ray physics at Imperial College. For the first 15 years he contributed to advances in radioisotope imaging (longitudinal tomography, SPECT and PET), x-ray CT for planning breast radiotherapy and Monte Carlo dosimetry. A fundamental switch in 1988 saw Steve commit the next 25 years largely to radiation therapy physics. In the late 1980s, he was one of a handful of people worldwide who started to create the techniques of intensity-modulated radiation therapy (IMRT). Working at the theoretical end of the research feeding pipe, he also guided others closer to practical clinical implementation. At ICR RMH, the almost unique research/clinical/teaching atmosphere, together with a galaxy of talented colleagues, were the key to substantial change and progress.

Perhaps uncharacteristically for a senior scientist with supervisory and management responsibilities, Steve continued independent personal research right up to retirement and some 96 of his 325 peer-reviewed papers were single-authored. He also published five single-author textbooks as well as editing a multi-authored book on medical imaging.

Steve was a Trustee of the Institute of Cancer Research for 12 years and is now a Member. He was Editor in Chief of IPEM's journal Physics in Medicine and Biology from 2006-2011. He was awarded the Silvanus Thompson Medal and the

Barclay Medal of the British Institute of Radiology and is the 4th recipient of the EFOMP Silver Medal. He has held visiting professorships in many cancer centres worldwide. Steve led the teaching of radiation therapy physics for 14 years at the EFOMP/ESI European School for Medical Physics (Archamps).



Breakthrough in IMRT: demonstrating pencil rays individually modulated coming together from different directions to make a concave dose distribution. Illustration from Webb's first paper on IMRT in 1989.

Outstanding Contributions Over the Last 50 Years

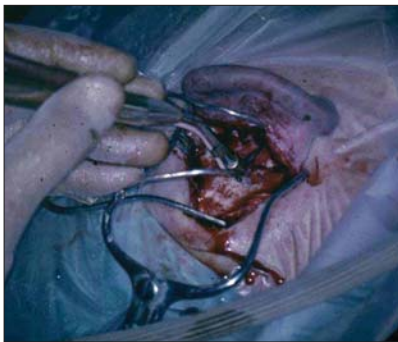
50 Years
of IOMP



1963-2013

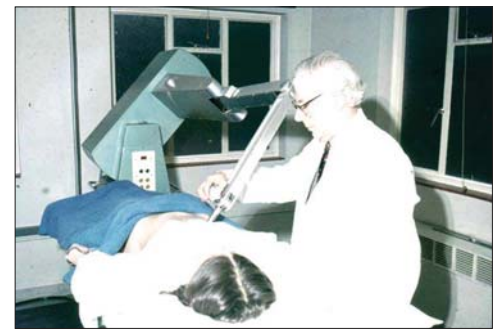
Peter Wells

Peter Wells CBE FRS FREng FMedSci FLSW is recognised internationally for his accomplishments in medical ultrasonics. His earliest work was concerned with ultrasound as a surgical tool and, since 1962, he and his colleagues have pioneered numerous techniques which have been clinically significant, many of which are in diagnostic use today. Perhaps most notable of these are the world's first ultrasonic static scanner with articulated arms, the first water-immersion automated ultrasonic breast scanner, the first realisation of dynamic ultrasonic beam focusing, the first ultrasonic characterisation of the liver in health and disease, one of the first of three simultaneous independent demonstrations of pulsed Doppler ultrasound, the discovery of the ultrasonic Doppler signal due to malignant tumour neovascularisation, and the development of continuous wave ultrasonic Doppler tomography.



Ultrasonic probe for the surgical treatment of Meniere's disease, a procedure pioneered in Bristol in the early 1960s.

He began his career in medical physics in 1959, as a trainee at Bristol General Hospital, having first served a student apprenticeship at the General Electric Company's Telephone Works in Coventry. After this, he worked as a Research Assistant at the United Bristol Hospitals, supported for 12 years by grants from the Medical Research Council. At the age of 35, he was appointed Professor of Medical Physics at the Welsh National School of Medicine, now Cardiff University School of Medicine. He returned to Bristol in 1975, as Area Physicist to the Avon Area Health Authority (Teaching) and Head of



Ultrasonic static scanner, the 1967 development of the first which was built in Bristol in 1963.

the Department of Medical Physics in what is now the University Hospitals Bristol NHS Foundation Trust, retiring from the Professorship of Physics and Engineering in Medicine at Bristol University in 2001. He was appointed Distinguished Research Professor in the School of Engineering at Cardiff University in 2004, where he continues to be active in scientific leadership and research. His most recent paper, his 170th in peer-reviewed journals, has recently been accepted for publication in *Physics in Medicine and Biology*.

Peter Wells was the first recipient of the EFOMP Medal, as well as numerous other medals, awards, honorary fellowships and honorary degrees, both at home and abroad. Almost uniquely, he is a Fellow of three of the UK's National Academies, the Royal Society, the Royal Academy of Engineering and the Academy of Medical Sciences, as well as the Learned Society of Wales.

Outstanding Contributions Over the Last 50 Years

50 Years
of IOMP



1963-2013

John Mallard

John Mallard OBE FRSE was Professor of Medical Physics at the University of Aberdeen from 1965 until his retirement in 1992. He is known for his pioneering work in the field of medical imaging as well as for his many contributions to the profession.



Professor Mallard with Aberdeen's first whole-body magnetic resonance imager.

In the early 1970's he built the first British tomographic imager, for the 3D imaging of radionuclide distributions in the body. This preceded the development of Hounsfield's X-ray CT scanner by several years.

He was a firm believer that positron emission tomography (PET) would prove to be a major clinical diagnostic technique and set up a PET facility in Aberdeen in 1976.

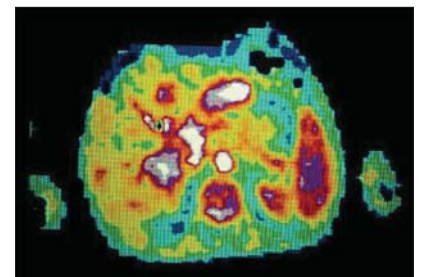
His major contribution to medical imaging was in Magnetic Resonance Imaging. His group was responsible for some of the discoveries which led to this technique becoming a clinically viable technique, including the concept of spin warp imaging which allowed truly 3D MR images of the whole body to be produced for the first time. The production of the first clinically valuable magnetic resonance images from patients in 1980 was a major scientific event.

John's final idea before retirement was for a new medical imaging technique, known as proton electron double resonance, which aims to image free radicals in vivo. His idea originated from a paper he first wrote for Nature in 1963 but worked based on this is now being carried out around the world.

He also made major contributions to the development of the profession of Medical Physics. He was a founder Secretary General of the International Organisation for Medical Physics and later its President. He was Founder President of the International Union of Physical and Engineering Sciences in Medicine. He was also President of both the Hospital Physicists Association and the Biological Engineering Society.

He has received many honours and prizes during his career including the Landauer Memorial Plaque of the American Association of Physicists in Medicine, the Academic Enterprise Competition Prize of the British Technology Group, the Royal Society Welcome Prize and Gold Medal, the George Van Hevesey Memorial Lecture medal, The Royal Society Mullard award and the Royal Medal of the Royal Society of Edinburgh.

He was made an Officer of the Order of the British Empire in the Queen's Birthday Honours List in 1992.



The first clinically useful magnetic resonance image of the trunk taken using the spin-warp technique on August 26th 1980. This section taken through the liver shows multiple hepatic metastases, and a previously unknown metastasis in the spine.