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Medical physics education and radiation medicine

During the past three decades, advances in radiological imaging techniques (both in hardware and software), computer technology and radiotherapy techniques (both in hardware and software) moved the radiation medicine into a new era. It has significantly enhanced our ability to achieve the goals of early cancer detection through accurate diagnosis and of better cancer treatment outcome through advanced treatment modalities. In the diagnostic radiology, besides, the conventional anatomical imaging, there are many new modalities developed for functional/molecular imaging, such as PET and functional MRI. Now, researchers even work further on imaging of cell and DNA to have more "Personalized" diagnosis for the disease in the future. In radiotherapy, intensity-modulated radiation therapy (IMRT) is an advanced method of conventional 3DCRT that utilizes sophisticated computer controlled radiation beam delivery to improve the conformality of the dose distribution. For the better tumor control, the new treatment technique, VMAT (Volumetric Modulated Arc Therapy), was developed and applied to clinic to improve the treatment outcome and to minimize the radiation side effect. Both IMRT and VMAT utilize sophisticated strategies for patient immobilization and positioning, image-guided treatment planning, computer enhanced treatment verification and image-guided treatment delivery (IGRT). In the heart of these techniques is advanced computer technology and 3D patient imaging with CT, MR and/or PET. However, the new advanced technologies create problem of "how to apply these new technologies to the patient effectively and safely". The key person to assure the quality of the equipment and the treatment and to assure the radiation safety is the medical physicists. Without qualified physicists, even with state of arts equipment, patient cannot be benefited from these advanced technologies, imaging or treatment. Furthermore, patient may suffer from radiation side effects. On the top of that, most of new technologies were developed by the medical physicists. Therefore, the medical physicists are important in the radiation medicine field. Unfortunately, nowadays for the most area, there are either not enough medical physicists on-site or the on-site physicists were not well trained in the radiation field to learn the core knowledge and to gain the solid clinical experiences. Therefore, I would introduce here a comprehensive medical physicist's education program to the audiences. My talk will use the Medical Physics Two-year Graduate Program at Duke Kunshan University as an example.

Biography

David Huang, upon completion of his PhD in Particle Physics, was trained at Medical Physics Residency Program at UC San Francisco, San Francisco. Then he worked at Memorial Sloan-Kettering Cancer Center, New York as a Faculty Physicist before moving to Long Island Jewish Medical Center, New York as Senior Medical Physicist. In 1995, he went back to Taiwan to help in establishing the first cancer center and was there for 7 years as Chairman of Medical Physics Department at Sun Yat-Sen Cancer Center in Taipei. In 2002, he went back to Memorial Sloan-Kettering Cancer Center as Associate Attending and Chief Physicist/Radiation Safety Officer at Rockville Centre Site. In 2014 summer, he retired from Memorial Sloan-Kettering Cancer Center and accepted offer from Duke University as Professor and Director at Medical Physics Graduate Program at Duke Kunshan University, China. Besides the clinical experiences, he is also a Professor at Young-Ming University, Taiwan and Central Taiwan Technology University, Taiwan, a Visiting Professor at Beijing University, School of Oncology, China and at Tsing-Hwa University, China and Adjunct Professor at University of Missouri, USA.

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