TEACHING LECTURE:

SP-0613
Target volume definition in upper GI malignancies
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This teaching lecture will focus on esophageal and gastric cancer. It remains a challenge to treat these patients outside a context of clinical trials.
Different published delineation guidelines will be discussed and compared in esophageal and gastric cancer. The role of imaging modalities such as endoscopy, endoscopic ultrasound, CT scan, FDG-PET-CT in the delineation process and during (chemo) radiotherapy will be highlighted.
Whether squamous cell carcinoma and adenocarcinoma of the esophagus can be regarded as one tumor entity remains unclear. The same holds true for adenocarcinomas of the GE junction and the stomach.
Organs at risk and dose constraints will be considered. The challenge of organ motion and tumor shrinkage during a course of (preoperative) chemoradiation will be discussed.
Learning objectives:
1. To understand the impact on target definition and delineation when comparing preoperative versus postoperative chemoradiation
2. To understand the impact of different imaging modalities on the delineation process
3. To understand the impact of organ motion during treatment
4. To understand the impact of tumor shrinkage during treatment

SP-0614
Clinical audit
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As part of a comprehensive approach to quality assurance in the treatment of cancer by radiation, an independent external audit (peer review) is important to ensure adequate quality of practice and delivery of treatment [1]. Historically, clinical audits in radiotherapy have been promoted by IAEA, after the development of a specific methodology in which ESTRO members played an active role. It is available on the IAEA website under the name QUATRO (quality assurance team for radiation oncology).
To capture the actual level of competence of a department, the audit addresses simultaneously the issues of equipment, infrastructure and operation of clinical practice. A major part of the audit is patient oriented. It is carried out by experts inthe 3 main disciplines: RTT, medical physics and radiation oncology.
A clinical audit is not a pass or fail test; it is a process by which a comprehensive quality management system is measured against pre-defined standards or codes of good practice. Its result is a series of recommendations that could fall in 3 categories: (1) urgent corrective actions needed (with or without consecutive re-audit), (2) corrective actions to be implemented in the future without urgent need, and (3) no specific recommendations. The latter category implies that the department runs at an appropriate level of qualityand safety. This does not mean that quality and safety have been achieved, as both should be permanently developed and updated, but that the department has adynamic and organised management system that constantly checks upon their appropriateness.
An appropriate management system is a system with an organized prospective and retrospective quality and safety monitoring, a system that learns from its mistakes (implying that mistakes are actively recorded and analysed), and a system reactive to innovation (proactive safety management through FMEA). *Indeed, quality is not a goal, quality is away*.
Well over 50 hospitals have been already audited in Europe (Central and Eastern) and, in some countries, the clinical audits are already a legal requirement, in compliance with EURATOM directives.
Morerecently, Belgium, through its Federal College of Radiotherapy, has started a program for systematic auditing of radiotherapy departments, drawing upon the IAEA experience and with the help of some of its experts. Ten hospitals have already been audited (out of 25) and results will be presented at theconference.
[1]Comprehensive Audits of Radiotherapy Practice: a tool for Quality Improvement.IAEA, Vienna, 2007 (http://www.iaea.org/books).

SP-0615
Collective cancer invasion: an integrin-dependent, normoxic radioresistance niche
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The tumor microenvironment contributes to cancer invasion, growth and survival and thereby impacts tumor responses to therapy. We here developed an intravital infrared multiphoton imaging model for the multi-parameter visualization of collective cancer cell invasion, guidance by the tumor stroma, and short- and long-term resistance to experimental anti-cancer therapy. The data show for orthotopic fibrosarcoma and melanoma xenografts deep invasive growth driven by proliferation concurrent with collective invasion of multicellular strands along the normoxic perivascular stroma. Invasion was fast (up to 200 µm per day), non-destructive and independent of ß1 and ß3 integrins. Despite normoxia, perivascular invasion strands were resistant to high-dose hypofractionated irradiation which otherwise was sufficient to induce regression of the tumor main mass. This invasion-associated radioresistance was sensitive to the simultaneous inhibition of ß1 and ß3 integrins by RNA interference or combined anti-ß1/aV integrin antibody treatment caused by proliferation arrest, anoikis induction ablating both tumor lesion and invasion strands. In conclusion, collective invasion is an important invasion mode in solid tumors into a microenvironmentally priviledged survival niche which conveys radioresistance by integrin-dependent signals. These findings show how “dynamic in vivo cell biology” identifies a key role for integrin-mediated signaling in mediating cross-talk (reciprocity) between the peri-tumor stroma and the tumor cells to mediate altered biology and response to therapy (plasticity).

SP-0616
How will the new International Basic Safety Standards affect the medical physics practice?
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This paper presents the main elements of the new Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards (the BSS) as it relates to the field of medical radiation physics and highlights the potential benefits for the professionals working in this field.
The BSS is developed by the IAEA and the co-sponsoring organizations through an open and transparent process including inputs from IAEA Member States and international organizations such as the International Organization for Medical Physics (IOMP). The BSS contains a chapter giving the general requirements covering all practices, including uses of radiation in medicine, research and teaching, and also emergency exposure situations and existing exposure situations. This is followed by three chapters giving detailed requirements for each of the three exposure situations, one of which addresses medical exposure. The section on medical exposure covers the responsibilities of those involved including medical physicists, the justification of medical exposures, the optimization of protection covering design and operational considerations, calibration, dosimetry of patients, diagnostic reference levels and quality assurance, the release of patients after radionuclide therapy, the investigation of unintended and accidental medical exposure, and records. The BSS plays an important role in many countries; it is often taken as a template for national regulations, and it is mandatory for those countries receiving technical cooperation assistance from the IAEA.
In the field of medical radiation physics, significant changes have been introduced in the new BSS. First, the medical physicist is identified in the new BSS as one of the key professionals, together with the radiological medical practitioner and technologist/ radiographer, with responsibilities for quality assurance and patient radiation protection. Training and clinical competence requirements for medical physics practice are identified in the BSS. Medical physicists can practice only if they are specialized in the appropriate area, such as radiotherapy,nuclear medicine, diagnostic radiology or image guided interventional procedures. The details of the specialization have to be defined at the national level by the relevant professional body, health authority or other appropriate organization. According to the BSS, for therapeutic uses of radiation, the requirements for calibration, dosimetry and QA, including the acceptance and commissioning of medical radiological equipment, need to be fulfilled by or under the supervision of a medical physicist. For diagnostic uses and image-guided interventional procedures, the requirements for imaging, calibration, dosimetry and QA, including