European Society for Therapeutic Radiology and Oncology (ESTRO), the European Association of Nuclear Medicine (EANM) and the Cardiovascular and Interventional Radiological Society of Europe (CIRSE). The activities of MEDRAPET have focused on three main tasks, i.e. a) the conduct of a survey on radiation protection education and training of medical professionals in the EUNM member states, b) the organization of a European workshop and c) the development of a European Guidance document on radiation protection education and training of medical professionals. A European Union study was performed to obtain a view on the status and legal and practical arrangements in the European Member States regarding radiation protection education and training of medical professionals. A questionnaire with specific sections for radiation protection authorities, national professional societies and educational institutions was developed. For the radiation protection authorities section, there were 28 respondents (57.1% response rate). The response rate for professional societies was 25.3% (509 contacts - 129 answers) and for educational institutions 19.8% (465 contacts - 92 answers). Results of this survey show that there is a need for implementation of the medical exposure directive’s requirements on radiation protection education and training of medical professionals in many states of the European Union. Also, interventional cardiologists, vascular surgeons and other interventionalists have a need for dedicated training in radiation protection for fluoroscopically-guided interventional procedures.

The results of the MEDRAPET survey were discussed during the MEDRAPET workshop organized in Athens, Greece from 21 to 23 of April, 2012. A wide audience of professionals involved in medical radiation protection attended the workshop (one hundred and eight participants from 19 different countries). Representatives of international organizations, professional societies, regulatory organizations and university students examined opportunities, difficulties and future trends in medical radiation protection education and training. Input was obtained for the drafting of the guidance document. The guidance document provides guidelines on radiation protection education and training of medical professionals in the European Union. The main part of the guidance document is focused on learning outcomes for each medical profession working with ionizing radiation defined in terms of knowledge, skills and competence (KSC) in accordance with the European Qualifications Framework and the European Guidelines for lifelong learning.

**SP-0126 MEDRAPET: Radiologists and radiation protection: Education, training and CPD**

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As the final outcome of the MEDRAPET project, the guidance document shall give specific learning outcomes for each professional group, reflecting the need for education and protection. The section on radiologists concentrates on those aspects where radiologists are most influential, and learning outcomes of education and training in radiology are presented in KSC table format, according to the systematic structure used for the presentations of all med exposure directive (MED), Procedural Guidelines and regulatory instruments. The content has been coordinated with the Education Committee of the European Society of Radiology and will be reflected in the revised training charter for radiologists.

CT alone is responsible for at least 50% of the medical exposure to the population in most European countries, and the risk is mostly stochastic. This contribution is the result of both a high number of examinations and a relatively elevated individual patient dose. Radiologists - in cooperation with the referring clinician - are responsible for justification; choosing the best imaging method for each individual medical problem, thus, has a top priority in the learning objectives. In addition, in CT optimisation - depending on the specific application - can reduce individual exposure by around 50% to 90%. This has become possible through technical advances (such as automatic exposure control, iterative image reconstruction) but requires adequate knowledge of the different tools and protocol adaptation to the specific body habitus, most important in children and obese adults. Similar to CT, optimisation and justification are important for radiographic and fluoroscopic examinations although the contribution to the exposure of the population is smaller. In fluoroscopy, two additional aspects have to be covered by the learning objectives. i) Deterministic effects, mainly to the eye and skin, ii) Accidental occupational exposure of the personnel are therefore included in the education.

**Interventional radiology** is different from general radiology in that the majority of interventions have a femoral access pathway, are often applied to elderly, critically ill patients; the stochastic risk is limited here but the deterministic risk increases. This turns the priority of education towards optimisation. Interventional radiologists, consecutively, undergo the usual education and training of radiologists before they deepen their knowledge (K), skills (S) and competences (C) in these aspects during a period of subspecialisation. Radiation protection is life-long learning and therefore an integral part of continuous professional development.

**SP-0127 ACCIRAD: Organisation and tasks of the European project on accidental exposure and risk analysis**

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^7Fundacion Investigacion Biomédica Hospital Clinico San Carlos (Madrid) (Madrid) and coordinated by the Greater Poland Cancer Centre from Poznan. A Panel of 11 Scientific Experts was set up for the assessment of the work plans and the results achieved and for the support of draft specific tasks.

**Aim:** The main objective is to perform an EU-wide study on the implementation of the MED requirements aimed at the reduction of the probability and the magnitude of accidents in radiotherapy and to develop guidelines on a risk analysis of accidental an unintended exposures in external beam radiotherapy.

**Methodology:** There are 6 work packages: Management and coordination; Questionnaires on MED implementation; Risk analysis of accidental and unintended exposures; Classification, reporting, and registration of events; European Guidelines; European Workshop. The project works are prepared by partners and discussed during six meetings and three video conferences.

The lead contractor is responsible for the management and coordination of the project and has ensured the organisation and resources needed to fulfil the objectives of the contract. The questionnaire was sent out to establish the overall status and the legal and practical arrangements in EU Member States. The questionnaire was carried out in two steps: general and detailed. The methods or risk analyses are being reviewed, partly by an expert knowledge of the consortium, partly based on the results of the questionnaire. The European Guidelines will be a document on a risk analysis of accidental and unintended exposures in external beam radiotherapy and will provide comprehensive description of best practices to conduct a study of risk of accidental or unintended exposures. The proactive methods to identify vulnerable aspects of the radiotherapy treatment, using risk matrix or probabilistic safety assessment will also be presented in detail. The European Guidelines will be discussed during the European Workshop where the feedback from the invited expert organisations is awaited.

**Conclusions:** More than half of the EU Countries have already implemented a requirement for risk analysis in radiotherapy, and classification recording, and reporting of adverse events and near misses in their legal systems. However, the requirement for legal framework for risk analysis, classification of events, recording and reporting systems has not been addressed in many EU countries, and thus, the practical implementation of the systems in many countries is still incomplete.

**Acknowledgement:** The following persons are also involved in the project: Herbst R., Bulot M., Bogusz-Czerniwickz M., Skrobala A.

**SP-0128 ACCIRAD: Highlights for the European guideline on risk analysis**

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Focal therapy will treat only the visible tumor and not the whole prostate. The aim of this study was to analyze distances and volumes of satellites relative to the index lesion in order to investigate the potential of a CTV margin for use in focal therapy.

Materials and Methods: A total of 61 patients who underwent a radical prostatectomy were included in this study. On the H&E stained slides retrieved from these specimens, the uro-pathologist contoured the index lesion and satellites. Then the slides were digitized and stacked with a 4 mm distance. The slide-stacks were imported in our in-house developed delineation program (WorldMatch) for further analysis. The distance between the borders of the delineated tumors was measured and volumes of all delineated tumors were calculated.

Results: Of the 61 patients, 51 (84%) had multifocal disease. The median number of satellites in all patients was 3. In 50% of the patients, the distance of the index lesion to the satellites was 1.0 cm or more, with a maximum of 4.4 cm. 32% of the satellites were smaller than 5 mm in diameter. Of the total tumor volume 14% was located in the satellites. However, the contribution of satellites smaller than 5 mm to the total tumor volume only amounted to an average of 0.9%.

If all tumors larger than 5 mm were assumed to be GTV, 54% of the patients did not have any tumor volume outside of the GTV.

Conclusions: A CTV margin around the index lesion which contains all satellites will cover in the majority of patients nearly the entire prostate. The limited contribution of satellites smaller than 5 mm to the overall tumor load however raises the question as to their clinical relevance. If the small satellites are of no/little clinical relevance and the GTV for focal therapy includes all tumors ≥5 mm in diameter, the addition of a CTV margin is not warranted. If however small satellites are clinically relevant, treatment of the entire prostate is necessary with possibly a focal boost to the GTV.

In both cases, careful screening to identify larger satellites is warranted.

POSTER DISCUSSION: 4: CLINICAL: PROSTATE

PD-0129
GTIV and CTV in prostate cancer: distance and size of satellites relative to the Index lesion
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Purpose/Objective: Prostate cancer is predominantly a multifocal disease, which consists of an index lesion and one or more satellites. The success of focal radiation treatment relies primarily on how well prostate tumors can be delineated by using MRI imaging. The sensitivity and specificity for tumor detection on multi-parametric MRI is highly reduced for tumors smaller than 5 mm in diameter.

Focal therapy for prostate cancer can be delivered in different ways. Focal-only therapy will treat only the visible tumor and not the whole prostate. Focal boost therapy (e.g. FLAME study) will treat the whole prostate and boost visible tumor. The aim of this study was to analyze distances and volumes of satellites relative to the index lesion in order to investigate the potential of a CTV margin for use in focal therapy.

Materials and Methods: A total of 61 patients who underwent a radical prostatectomy were included in this study. On the H&E stained slides retrieved from these specimens, the uro-pathologist contoured the index lesion and satellites. Then the slides were digitized and stacked with a 4 mm distance. The slide-stacks were imported in our in-house developed delineation program (WorldMatch) for further analysis. The distance between the borders of the delineated tumors was measured and volumes of all delineated tumors were calculated.

Results: Of the 61 patients, 51 (84%) had multifocal disease. The median number of satellites in all patients was 3. In 50% of the patients, the distance of the index lesion to the satellites was 1.0 cm or more, with a maximum of 4.4 cm. 32% of the satellites were smaller than 5 mm in diameter. Of the total tumor volume 14% was located in the satellites. However, the contribution of satellites smaller than 5 mm to the total tumor volume only amounted to an average of 0.9%.

If all tumors larger than 5 mm were assumed to be GTV, 54% of the patients did not have any tumor volume outside of the GTV.

Conclusions: A CTV margin around the index lesion which contains all satellites will cover in the majority of patients nearly the entire prostate. The limited contribution of satellites smaller than 5 mm to the overall tumor load however raises the question as to their clinical relevance. If the small satellites are of no/little clinical relevance and the GTV for focal therapy includes all tumors ≥5 mm in diameter, than focal-only therapy to the GTV may be safe. If however small satellites are clinically relevant, treatment of the entire prostate is necessary with possibly a focal boost to the GTV.

In both cases, careful screening to identify larger satellites is warranted.

PD-0130
Dependence of intra-fraction prostate motion on fraction duration during pelvic radiotherapy with RapidArc vs IMRT
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Purpose/Objective: To compare the 3-dimensional intra-fraction variations of prostate position within the pelvis with whole-pelvic fixed-field intensity-modulated radiation therapy (IMRT) vs. intensity-modulated arc therapy (IMAT) in high-risk prostate cancer (PCa).

Materials and Methods: Fifteen PCa patients underwent whole pelvic radiotherapy using either dynamic IMRT with a sliding window technique (n= 8) or IMAT (n= 7). All the patients had a kV cone-beam computed tomography (CBCT) before and immediately after each fraction of IMRT or IMAT.

Intra-fraction motions of the prostate were determined using a 2-step procedure performed on each pre- and post-treatment imaging: 1)