

agreement at international level on the principles of RP in emergency situations, eg on the objectives of the protection of the public and worker as well as on the basic levels of protection and the protection strategies to be applied (ICRP publications 103/109) and agreed protection standards are clearly formulated (IAEA; GR-S-2). However, in many countries the efforts of emergency preparedness are focussed on and/or limited to the implementation of short-term urgent protective measures (sheltering, evacuation, iodine blockage, food bans, etc.). Less attention is given to issues, which become dominant in the longer term. Deficits in the practical implementing of existing recommendations and standards have been observed after all major nuclear accidents resulting in situations where the achieved protection did not meet the expectations. Common to all previous accidents are clearly identified deficits in preparedness particularly in the following areas: longer term support of evacuated people, standards for the termination of urgent protective measures, concepts to avoid waste and provision to manage waste; medical screening and follow-up, public communication, standards for the transition from an emergency to an existing situation. During a review of current (2013) off-site nuclear emergency preparedness and response (EP&R) arrangements in EU member states and neighbouring countries the status of existing arrangement and capabilities has been assessed and the existing best practice, gaps and inconsistencies, in particular related with cross border arrangements have been identified. Based on this review an assessment was made how current EP&R could be more effective, eg better use available resources and avoid duplication. The lecture will present a summary of the basic recommendations for radiological protection in nuclear emergency and describe in detail the actual situation in 31 EU states. Based of this summary of facts, some key recommendations for the improvement of the actual situation will be presented.

P3: LESSONS LEARNT FROM EMERGENCIES
P3-3 Lessons learnt from emergencies in the medical field

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The use of ionizing radiations in the medical field has been significantly growing in the past decades. Radiation therapy is a major treatment of about 50 % of cancers. Medical imaging with X rays and nuclear medicine is used for the diagnosis of diseases, the definition of the therapeutic strategy, the follow-up of treatment and the treatment itself with interventional radiology. The benefit of both radiation therapy and medical imaging is already great and these techniques continue to benefit from innovation. "We are doing well in medical applications". However, innovation goes faster than quality assurance and the risk of errors

increases as well. What were the relevant emergencies and accidents in medicine ? Two major radiation therapy accidents occurred in France at Epinal in 2006 and Toulouse in 2007 and concerned 5000 and 143 patients respectively. Basically these 2 major accidents were due to human mistakes in the use of innovative techniques in radiation therapy departments which did not have the competence to perform them. In the past many other radiation therapy accidents occurred worldwide, not as severe as the two accidents mentioned above, but they have in common that they resulted from mistakes which resulted from the so called "organisational and human factors" (OHF). Deterministic effects due to over dosage to tissues, e.g., radiation proctitis, are the most severe consequences of these accidents. Besides the radiation therapy accidents interventional radiology accidents also related to OHF have been reported. More or less severe skin burns result from inappropriate use of interventional radiology. What have we learnt to prevent these medical accidents ? Careful analysis of these accidents have identified the errors. The most significant ones have their origin as follows : · Inappropriate acceptance of equipment, incorrect equipment repair or maintenance · Hardware and software problems of the accelerator, e.g., accelerator interlock failure, outdated computer files, inadequate integration of equipments from different manufacturers ... · Procedures not followed : erroneous use of treatment planning system, untested change of procedure for data entry... · Inappropriate collimation, inaccurate beam calibration or dose calculation · Insufficient training of professionals resulting in incomplete understanding and lack of communication between professionals Thus appropriate measures to prevent the errors include : · Respect of compulsory regulatory measures designed for quality assurance and safety · Critical size of medical department with adequate equipment : no home made software, fully integrated equipment from one manufacturer, proper initial acceptance testing in vivo dosimetry,... · Adequate human resources and well trained professionals : initial and continuous training, especially on new techniques, checking of good comprehension and verification of knowledge · Procedures for patient identification · Procedures for rigorous quality assurance and controls, especially on advanced technology and when escalation of dose is done. Procedures for risk management · Procedures regarding oral and written communication between professionals, and clear identification of responsibilities · Procedures for patient information and follow-up to alert in time and prevent · Registration of anomalies, near-miss events, incidents and procedure for experience feed-back analysis and decision of remediation as a mechanism to develop and maintain safety culture · Clinical audits These measures to prevent accidents have been successful in France. Finally, it is worth noticing that nobody is perfect and that it is counter-productive to expect that a perfect training of staff will suppress accidents. All humans make mistakes in a context of stress, disturbance of

concentration, fatigue... and accidents may occur in a context of poor organization. A good organization is necessary at all times and relies on appropriate procedures to be respected.
