

- [10] Lencioni R, Crocetti L, Cioni R, et al. Response to radiofrequency ablation of pulmonary tumours: a prospective, intention-to-treat, multi-centre clinical trial (the RAPTURE study). *Lancet Oncol* 2008;9:621–628
- [11] Wolf FJ, Grand DJ, Machan JT, et al. Microwave ablation of lung malignancies: effectiveness, CT findings, and safety in 50 patients. *Radiology* 2008;247:871–879

Special Session (Tue, 27 Sep, 11:30–12:30) Stereotactic Radiotherapy for Liver Metastases

405

INVITED

Radiobiological Aspects of Radiation-Induced-Liver-disease

H. Christiansen¹, M. Rave-Fränk¹, C.F. Hess¹, G. Ramadori². ¹University of Göttingen, Department of Radiotherapy, Göttingen, Germany; ²University of Göttingen, Department of Gastroenterology, Göttingen, Germany

Radiation-induced-liver-disease (RILD) is a dose-limiting complication in abdominal irradiation. This plays a decisive role for example in radio(chemo)therapy for gastric, pancreatic or primary liver carcinomas or liver metastases. The threshold dose for RILD after normofractionated (2 Gy per day, 5 fractions per week) whole liver irradiation without chemotherapy is supposed to be between 20 to 30 Gy. However, in combined radiochemotherapy or in chronic liver disease, the risk of developing RILD is even higher. The acute clinical period of RILD after irradiation tends to be relatively silent, the subacute phase is characterized by the development of anicteric ascites, elevation of liver enzymes, rapid weight gain, and liver enlargement 2 weeks to 4 months after treatment. Finally, liver irradiation above the threshold dose is followed by progressive liver fibrosis and cirrhosis as has been shown in animal studies. Thereby – in contrast to other toxic liver injuries –, the fibrosis may not be followed by restitutio ad integrum. Furthermore, a large volume effect has been demonstrated for RILD: Liver doses associated with a 5% risk of RILD for conventional fractionated IR of one third, two thirds, and the whole liver are estimated to be 90 Gy, 47 Gy, and 31 Gy, respectively. However, several studies implementing modern radiotherapeutic techniques in the treatment of liver cancer/metastases such as stereotactic radiotherapy or brachytherapy have already demonstrated that higher single doses compared to conventional fractionated radiotherapy are tolerable to the liver. On the other hand, clinical studies have shown that liver function may also be influenced by pelvic irradiation when the liver is not included in the target volume. The detailed molecular pathogenesis of hepatocellular damage and RILD after irradiation is still obscure. Cell-cell-interactions via various cyto-, chemokines or adhesion molecules are important for hepatocellular damage, repair and fibrosis development in other toxic liver injuries. Similarly, different cell types interact via such mediators in the development of normal tissue reactions after radiotherapy. Therefore, the molecular mechanisms of RILD might be similar. In the meantime, this hypothesis has been substantiated by several experimental and clinical data. Further detailed knowledge of molecular processes taking place after liver irradiation may in future facilitate their modulation. Such modulations may potentially also protect from radiation-induced liver damage.

406

INVITED

Stereotactic Radiotherapy for Liver Metastases

L.A. Dawson¹, A. Swaminath¹, C. Massey¹, J. Kim¹, R. Diniwell¹, J. Brierley¹, R. Wong¹, M. Velec¹, K. Brock¹. ¹University of Toronto, Princess Margaret Hospital, Toronto, Canada

Resection of colorectal liver metastases results in 5 year survival in 30 to 58% of patients, and long term survivors have been seen following resection of 'oligo' liver metastases from other malignancies. For patients unsuitable for resection, stereotactic radiotherapy is a treatment option. There are 7 published prospective studies of stereotactic radiotherapy for liver metastases (26–60 Gy in 1–6 fractions) and many more single institution series. The majority of patients have had unresectable liver metastases from colorectal carcinoma. A dose response has been observed, with increased chance of sustained local control (80–90% at 2 years) when doses higher than 42 Gy in 3 fractions are used. Local control is also improved in patients with metastases less than 3 cm in maximal size and in breast cancer metastases compared to colorectal cancer metastases. Median survival in the prospective studies ranges from 18 months to 30 months. Liver toxicity has only rarely been observed, primarily in patients re-irradiated or with underlying liver disease. Respecting dose-volume guidelines can reduce the risk of liver toxicity (e.g. mean liver dose <18 Gy in 6 fractions, >700 cc <15 Gy in 3 fractions) and toxicity to luminal

gastrointestinal tissues. In a recent review from PMH in Toronto, 93 patients (54 colorectal, 20 breast, 19 other) with 172 liver metastases were treated with individualized IGRT stereotactic radiation therapy. Extrahepatic disease was present in forty patients (43%), and 75% had received prior systemic therapy. The median GTV was 25.6 cc (0.14–3088 cc). The median dose was 39.6 Gy in 6 fractions (range 25–60 Gy). Median follow-up was 17 months (3–74 months). Local control was improved in patients treated with higher doses and in breast cancer vs. other cancers. Accumulated minimum doses to the GTV of <35 Gy, 35–45 Gy and >45 Gy were associated with 18 month local control of 33%, 55%, and 83%, respectively. Median survival was 20.9 months (16.8, 25.1). Shorter time to local progression and extrahepatic disease were associated with worse survival. No radiation induced liver toxicity was observed. Some patients with 1 to 3 colorectal and breast liver metastases (<6 cm) are alive with no active disease more than 5 years following therapy. The most suitable patients with liver metastases for radiation therapy are those with 3 or fewer metastases <6 cm, with no extrahepatic disease and with metastases >2 cm from luminal gastrointestinal tissues. Randomized trials of radiation therapy are warranted.

407

INVITED

Stereotactic Body Radiotherapy of the Liver – Physical and Technical Issues

L.P. Muren^{1,2,3}, J.B. Petersen¹, P.R. Poulsen^{1,2,3}, M. Høyer^{2,3}.

¹Department of Medical Physics, Aarhus University Hospital, Aarhus,

²Department of Oncology, Aarhus University Hospital, Aarhus, ³Institute of Clinical Medicine, Aarhus University, Aarhus, Denmark

Stereotactic body radiotherapy (SBRT) of liver tumours and metastases has received increased attention in recent years due to promising clinical outcomes in the early studies of Lax, Blomgren and Wulf. Successful SBRT depends on delivery of high fraction doses to small, localised volumes, involving the use of both narrow margins and narrow beams. SBRT in general therefore has several physical and technical challenges, and also several challenges more specific for treatment within the liver. Like for many other tumour sites, internal organ motion is one of the main challenges in SBRT of the liver, influencing both the planning and delivery phases of the treatment. Tumour definition in treatment planning is therefore usually based on the mid-ventilation phase of an abdominal 4-D CT scan. Image-guidance during treatment is also of great benefit, with approaches including both 2D and 3D kV/MV techniques. Image-guided set-up is usually based on registration of surrogates like bony anatomy, the diaphragm or inserted markers, as the tumour itself is not readily visible. Due to the delivery of very high doses, normal tissue morbidity is also a concern during planning. Severe effects like hepatic failure and bowel perforation/obstruction have been reported. For the normal liver, studies have revealed a heterogeneous pattern of organ function pre-therapy, which could potentially be exploited therapeutically for optimal selection of beam arrangements. A further treatment planning issue is related to the use of small fields where edge and penumbra effects are influencing a large part of the total field sizes, with implications for dose measurements and (hence also) dose calculations. Finally, to further reduce normal tissue irradiation and ultimately enable dose escalation, liver SBRT has been shown to be a promising candidate for proton therapy.

Special Session (Tue, 27 Sep, 11:30–12:30) End of Life Care in Oncology

408

INVITED

Recognising Dying and End-of-life Prognostication in Elderly Cancer Patients

Abstract not received

409

INVITED

Dying Well – Challenges in Acute Oncology Settings

P. Larkin¹. ¹University College Dublin, Health Sciences Centre Belfield School of Nursing Midwifery and Health Systems, Dublin, Ireland

Despite advances in cancer treatment and concomitant survivorship in recent years, a significant number of cancer patients will still die as a result of their disease. How the transition to palliative care is managed varies widely, may be influenced on the understanding of aggressive treatment and is often predicated on philosophical, ethical and thanatological arguments on the meaning of dying well. Palliative care itself has undergone a notable transformation from a predominantly terminal care approach to one which works in tandem with acute cancer care where it is evident that disease at

presentation is advanced or symptom burden is great. This transformation has led to some concern that contemporary palliative care has lost clarity over its own position in relation to death and dying. In this presentation, a debate on the concept of dying well in an oncology context will be offered. Using exemplars for recently conducted research in the EU and Ireland, the key questions which underpin the concept of a good death will be discussed. The international evidence on how cancer patients see a good death will be presented as well as the challenges facing clinicians who work at the acute intervention level when it becomes clear that different goals and objectives of care are indicated. Based on a recent case study, the presentation will conclude with an interpretation of how a palliative care response can be built into acute oncology practice which may be of benefit to patients with advanced disease and their families.

410 INVITED Nurses Attitudes Towards Caring for Dying Patients in Acute Settings

M. Arantzamendi Solabarrieta¹, A. Richardson², J. Addington-Hall³.

¹University of Navarra, Faculty of Nursing, Pamplona, Spain; ²Southampton University Hospitals NHS Trust and the University of Southampton, School of Health Sciences, Southampton, United Kingdom; ³University of Southampton, School of Health Sciences, Southampton, United Kingdom

There is a need to better understand nurses' experiences and factors that determine these. The evidence on nurses' views about their experiences of caring for the terminally ill in the hospital setting described them as holding largely negative views. Factors that might shape these negative views have been mentioned but have not been studied statistically. If we are able to understand the factors influencing nurses' experiences and on how they go about their daily work with terminally ill patients, we might be able to modify these and effect how they interact and care for these patients. The research reported here about Spanish hospital nurses caring for terminally ill patients, starts to tackle this subject.

A cross-sectional postal survey was conducted involving 165 hospital nurses working on acute wards in 6 hospitals of one region in Spain (65% response rate).

Nurses valued the learning experience of caring for terminally ill patients and did not transmit much discomfort regarding death and dying. They perceived the care of terminally ill patients to be more demanding and challenging than caring for other patients. They were not highly motivated to care for this group.

Focusing on the multivariate analysis of factors that influence the challenges, nurses' perceive they face aspects such as degree of discomfort with death and dying, whether they view it to be a learning experience, their competence to care emotionally and their disposition to involve relatives were among the statistically influential factors.

The results point to the complexity of nurses' experiences of caring for terminally ill patients and the factors underlying these. Nurses' perceived competence to care emotionally for terminally ill patients was revealed to be a key factor influencing nurses' experiences. Tackling nurses' perceived ability to care emotionally for terminally ill patients should form a priority if we aim to improve the care they provide to terminally ill patients. On the other hand, as nurses' inclination to involve relatives decreased, they expressed fewer challenges in caring for patients. This suggests interactions with relatives may have an significant impact on nurses' experiences and more than that expected on the basis of the literature. Further research is needed to understand the nurse-terminally ill patient's relative relationship.

Special Session (Tue, 27 Sep, 11:30–12:30) Surgical Treatment in Breast Cancer Patients With Distant Metastases

411 INVITED Surgery of the Primary Tumour

Abstract not received

412 INVITED Surgery of Liver and Pulmonary Metastases

Abstract not received

Special Session (Tue, 27 Sep, 11:30–12:30) Desmoid Fibromatosis Tumours Representing an Unmet Medical Need

413 INVITED Desmoid Type Fibromatosis: How Much Surgery and When?

A. Gronchi¹. ¹Istituto Nazionale Tumori, Department of Surgery, Milan, Italy

The first approach to desmoid type fibromatosis (DFs) today should routinely be a watchful surveillance. This policy could be the best way to select patients who really need a therapy, surgical resection included, from those who don't.

Infact DFs are made by different diseases. There seems to be a subset with favourable behaviour. Spontaneous regressions and long lasting stabilization have been repeatedly reported in up to 50% of primary cases. This subset maybe be constituted by tumours characterized by a different molecular profile, even if with an undistinguishable morphology. This hypothesis has recently been supported by the finding that a particular beta-catenin gene mutation subtype could correlate with the outcome. The results of this study, though need to be prospectively validated, look very attractive.

Beside more favourable diseases, there are also aggressive ones for which a treatment needs to be considered. Before resorting to surgery, anti-inflammatory drugs, hormonal therapies and sometimes low-dose chemotherapy are generally considered. Infact several times surgery induce more morbidity than the disease itself. This may not be true for all locations. On the one end patients affected by abdominal wall tumours may well prefer a surgical resection than a chronic therapy. Cosmesis is generally not affected and results are usually good (recurrence rate for tumours at this site being very low). On the other end, patients affected by intra-abdominal, head & neck and intrathoracic tumours are offered more often surgical resection, since the potential life-threat progression of their disease may determine.

When surgery is planned, the resection should not be accomplished with the same strict principles of sarcoma surgery. Indeed many authors have claimed that the outcome of primary disease is quite unpredictable and not influenced by surgical margins. Therefore pursuing wide margins resection in primary surgery should always be weighted with function preservation and cosmesis.

This issue, along with the natural history of the disease, the lack of metastatic potential, the possible implication of inflammatory agents in further tumour re-growth have all become arguments in favour of a less and less aggressive primary approach.

At recurrence repeated surgical excisions are usually not the first choice and again preservations of function and cosmesis are always to be carefully taken into account.

414 INVITED Radiotherapy as Adjuvant Treatment to Surgery or as Definitive Treatment?

V. Budach¹. ¹Budach, Klinik für Strahlentherapie CCM/CKV, Berlin, Germany

Desmoid tumours need more extensive surgery than STS of the same size due to their infiltrating growth pattern needing in order to achieve clear surgical margins. Despite of adequate surgery local recurrence rates are disappointing. A specific tumour grading like for STS does not exist. However, the tumours do not de-differentiate with increasing numbers of recurrences. Lethality is low and only apply to FAP with 10%. R0-Surgery and Wait & See (W&S) for unresectable cases was the standard of care for many decades. However, during the last decade primarily wait & see policies and also neoadjuvant treatments have gained increasing importance. This conservative approach can lead to long periods of stable disease in up to 80% of all cases and is lacking lethality. The importance of the surgical margin status remains so far unclear and is the case of further debates. Many factor may be attributed to the inconsistent evidences for this disease: Most studies were small in number and therefore lack statistical significance, the margin status did not always imply meticulous pathologic work-up.

Postoperative radiotherapy might have offset the detection of the margin impact. The postoperative release of tissue-derived growth factors might be the reason for the observation, that a considerable number of desmoids recur to a certain degree and thereafter remain stable for many years. Two groups of patients are distinguishable: A slow and a relatively faster proliferation subgroup, which needs more than a W&S policy. The DFS after surgical resection and non-surgical treatment seems to be equivalent. From more recent publications RTX as a conservative treatment approach seems to be beneficial when added postoperatively or used definitively for primarily/recurrent or operable/inoperable disease. A comparative review of