

surgery and 5 years of adjuvant tamoxifen to postoperative whole breast irradiation or no further therapy. At a median follow up of 5.7 years the local recurrence rate was reduced by RT from 4% to 1%. However there has been limited impact on practice. A survey of Medicare patients (2) who met the eligibility criteria of the CALGB 9943 trial showed approximately a 3% reduction in use of adjuvant radiotherapy in a period following the publication of the 5 year results of the CALGB trial. The reasons for this limited impact on practice are uncertain. The 10 year results of the CALGB 9943 (3) show that the difference in local control has widened (2% vs 9%). In the UK postoperative radiotherapy remains the standard of care for all patients technically suitable for radiotherapy irrespective of age and other clinico-pathological risk factors. The benefits of adjuvant radiotherapy on local control have to be balanced against the issues of comorbidity, breast toxicity, risks of second malignancy (4) and the costs of radiotherapy. Results will be presented from the international PRIME 2 trial in over 1300 hormone receptor positive, T1-2 (up to 3cm) pNO breast cancer in women \geq 65 years treated by breast conserving surgery and adjuvant endocrine therapy with or without postoperative radiotherapy (5). A case can be made for offering selected older patients the option of the omission of RT. Techniques of partial breast irradiation are also being investigated which might be more convenient and less morbid than whole breast irradiation.

There is limited level 1 evidence on the impact on quality of life of adjuvant radiotherapy. The PRIME quality of life trial suggests that there is no significant difference in global quality of life in early breast cancer patients treated by breast conserving surgery with or without whole breast irradiation (6).

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SP-0208

High tech hypofractionation to optimise treatment: patient selection and radiation-delivery set of problems

J. Johansen¹

¹*Odense University Hospital, Oncology, Odense, Denmark*

Hypofractionation has lately been implemented as standard treatment in the adjuvant setting as well as in radical radiotherapy for various solid tumors such as in breast and lung carcinomas. Also for metastatic disease in the liver or brain, hypofractionated stereotactic radiotherapy has proven effective for both palliative purposes and sometimes cure. Palliative schedules have conventionally been designed to deliver sufficient radiation dose within a short period of time to achieve optimal palliation with particular consideration to life expectancy. Such treatment strategies may be assigned to frail and elderly patients at the expense of curative fractionation schedules, particularly for logistic reasons in those with impaired functional conditions, that the patient may better comply to treatment. However, data from DAHANCA showed no impact of age, comorbidity, or WHO performance status on delay of treatment in patients undergoing a fast-track work-up for head and neck cancer (H&N), and elderly patients (above 70) demonstrated equivalent compliance to prescribed radical radiation treatment compared to younger patients which was further translated into similar cancer-specific survival figures between the age-groups. However, if for a particular clinical reason a reduced treatment time is opted for in an elderly H&N patient, several considerations should be made. Whether the intention of treatment is palliative or curative, treatment volume and fractionation schedules are obviously related to toxicity. Elderly H&N patients with a low propensity for HPV-derived carcinomas have generally lower rates of neck metastases than younger patients (N0-1 below 20% vs 35%) which defines a smaller target area. With modern diagnostic procedures and cone-beam based adaptive IMRT techniques, both dose-planning and execution of radiation treatment have become more precise which elderly patients may profit from, particularly if elective radiation is omitted, similar to stereotactic strategies. Delivery of 30 Gy in 10 fraction over 2 weeks, or 20 Gy in 5 fx, confer a dose-intensity much higher than conventional or accelerated regimens and, consequently, increases the risk of severe mucositis. We have adopted a hypofractionated schedule from the DAHANCA 2 trial consisting of 52 Gy in 13 fractions with two weekly fractions (8 Gy per week). This has secured a tolerable treatment schedule with a considerably high radiobiological dose for potential cure. Toxicity has been mild in comparison to standard fractionation, and the schedule has been employed for patients considered unsuitable for standard treatment. IMRT and VMAT are easily applied in hypofractionated regimens for elderly patients since these techniques have become standard of care, and acceptable toxicity and cure rates are expected.

SP-0209

Brachytherapy for elderly with prostate or gynaecological cancers: Patient selection and compliance

A. Bossi¹

¹*Institut Gustave Roussy, Radiation Oncology, Villejuif, France*

Rapid population ageing in most area of the developed world substantially contributes to the significant increase in the cancer burden in the elderly. In the subgroup of cancer patients' (pts) over-75 years of age, for ex, prostate cancer (PCa) becomes the most common tumour diagnosed in men in Europe and North America. On the other hand, life expectancy is increasing in western countries and this translates in a general feeling that curative treatment options should be offered even to elderly pts independently of their chronological age. Oncologists treating a geriatric population of pts face several major issues when developing

therapeutic strategies addressed to these pts. At first it has become evident that any age-cut-off adopted to identify “elderly pts” (> 65 yo, > 75 yo or even > 85 yo) has intrinsic limitations because geriatric pts are an extremely heterogeneous group with respect to their general health status. Second, a comprehensive geriatric assessment is needed to stratify and weigh the spectrum of dysfunctions present at old ages in order to select pts suitable for treatment (with standard protocol or with adapted ones). Several instruments and screening tools are proposed in the literature aiming at evaluate the vulnerability of elderly cancer pts: from complex and time consuming procedures to more easy to apply ones and to self-administered questionnaires based on self-assessment of a short list of items. Finally elderly pts should be evaluated during and after their cancer treatments in order to detect signs and symptoms related to potential complications due to the treatment itself in order to eventually modulate it accordingly.

Brachytherapy (BT) is an attractive treatment option for elderly cancer patients and this is especially true for prostate and gynaecological malignancies. The International Society of Geriatric Oncology (SIOG) Radiotherapy Task Force has reviewed the current best practice and priorities for research in radiation oncology for elderly patients with cancer. It has been stated that life expectancy and comorbidities should influence the selection criteria for prostate BT and that an international consensus is needed to define the subset of geriatric pts for prospective evaluation of BT acknowledging that a specific literature on BT for this group of cancer pts is virtually non-existent. Interestingly enough the same paper addresses the issue of BT (vaginal Brachytherapy, VBT) for postoperative irradiation of pts diagnosed with Endometrial cancer (ECa) in the Intermediate to High Risk Group. The PORTEC-2 Trial has found no significant differences between external beam RT and VBT in pts > 60 years old in terms of local or distant recurrence rates, but with a reduced toxicity and improved quality of life making VBT the adjuvant treatment option in this setting. Furthermore, the last update of the Guidelines of the European Association of Urology (EAU) devotes a specific chapter to the Management of Prostate Cancer in Older Men, recognizing that this is a specific subgroup of PCa pts emphasizing that, according to published results from the US Surveillance Epidemiology and End Results (SEER) database, 71 % of PCa-related deaths occur in men aged ≥ 75 years. Surprisingly enough, after a list of rather generic recommendations about the need of a comprehensive baseline evaluation of life expectancy, comorbidities and health status, BT is not even mentioned in the paragraph devoted to the treatment of localized disease...On the contrary, the recently published Updated recommendations of the working party on the management of PCa of the SIOG, clearly states that BT “can be a suitable option for older men with PCa”, but any further details is given concerning the profile of the “suitable” pts. In conclusion, the general picture of the management of older pts with PCa or gynaecological malignancies is rapidly changing: particular attention is nowadays reserved to this subset of pts. Specific and details guidelines are still lacking but the oncological community is aware of the importance of a tailored approach that has to take into account a correct evaluation of the baseline profile of the pt before any treatment can be proposed.

Symposium: Nanodosimetry

SP-0210

Experimental methods for microdosimetry, nanodosimetry and track structure determination: state of the art

D. Moro¹

¹INFN- LNL, Radiation Physics, Legnaro (Padua), Italy

Experimental microdosimetry is performed with TEPC (Tissue Equivalent Proportional Counter) that are able to measure the stochastic of radiation interaction with micrometric sensitive volumes. To measure ionizations produced in microscopic site with a macroscopic volume, TEPC are filled with low-pressure gas. At Legnaro National Laboratories of INFN new TEPC have been developed that are able to measure high intensity therapeutic beams. They are called mini-TEPC because of their small dimensions of the sensitive volume. Moreover, miniaturization involves also the external dimensions since the counter is inserted in a titanium sleeve of 2.7mm external diameter. Mini-TEPCs have been tested under different fields. With proton beams, they showed that is possible to assess the RBE of proton beam by using a proper weighting function.

It is possible to perform microdosimetry at nanometric level, at least down to 25nm, with an avalanche confinement TEPC. An Italian research project called MITRA is developing this kind of detector for ion beams.

Finally, in the world there are only three operative nanodosimeters. They measure the track structure of the beam: two of them are able to measure the track structure due to the beam core and the penumbra. The BioQuaRT project compared the responses of the three nanodosimeters. The three nanodosimeters are very different as well as their outputs in terms of ICSD (Ionization Cluster Size Distributions). However, the sum distribution F_k versus M_1 of the three devices forms an almost perfect universal curve, and shows a saturation effect like radio-biological cross sections as a function of LET.

Results will be presented.

SP-0211

Track structure modelling and biodescriptors of the topology of energy deposition

C. Villagrasa¹, G. Gruel¹, G. Gonon¹, S. Meylan¹, M.U. Bug², U. Giesen², M. Bueno¹, W.Y. Baek², A. Arndt², H. Rabus²

¹Institut de Radioprotection et Sûreté Nucléaire (IRSN), F-92262, Fontenay-aux-Roses, France

²Physikalisch-Technische Bundesanstalt (PTB), D-38116, Braunschweig, Germany

Monte Carlo simulations are commonly used in radiobiology or medical applications for evaluating the energy deposition of ionizing radiation in biological targets. Nevertheless, trying to predict the earlier radio-induced biological effects in a cell population starting from an accurate description of the energy deposition at their origin needs the development of dedicated simulation tools. The first requirement of these simulation tools is their capability to calculate the track structure of the ionizing radiation with nanometric precision. Indeed, the nanometer scale corresponds to molecular dimensions and in particular to the scale of the DNA molecule that is the main target for which radiation damages can be linked to mutagenic or even lethal effects. Several dedicated simulation tools for this purpose have been developed in the last decades, following a mechanistic approach for the simulation of early radiation-induced biological effects. In