

component detected as a positron emitting isotopes by the PET apparatus was defined as  $^{15}\text{O}$ , not only  $^{11}\text{C}$ .

**Conclusion:** Imaging of the autoactivation has an impact to confirm a proton beam in patients with prostate cancer. However, physiological factors, especially urine in the urinary bladder, need to be taken into account for the comparison to the dose distribution in the future.

## 4060

## POSTER

### Annual ibandronic acid to prevent gonadotropin induced bone loss in men with prostate cancer

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**Background:** Gonadotropin decrease bone mineral density (BMD) and increase fracture risk in men with prostate cancer. Ibandronic acid (6 mg IV every 3 months) increases BMD in GnRH agonist treated men. Intermittent ibandronic acid (6 mg IV once annually) increases BMD in postmenopausal women with osteoporosis but the efficacy of the annual treatment schedule in hypogonadal men is unknown.

**Patients and Methods:** In a 12-month open-label study, men with nonmetastatic prostate cancer (n = 44) who were receiving a GnRH agonist were assigned randomly to ibandronic acid (6 mg IV  $\times$  1) or placebo. BMD of the posteroanterior lumbar spine and total hip were measured by dual energy x-ray absorptiometry at baseline and month 12.

**Results:** Mean ( $\pm$ SE) BMD of the posteroanterior lumbar spine increased by  $4.0 \pm 0.9$  in men treated with ibandronic acid and decreased by  $3.1 \pm 0.9$  percent in men who received placebo ( $p < 0.001$  for between-group comparison). BMD of the total hip decreased by  $0.7 \pm 0.6$  percent in men treated with ibandronic acid and decreased by  $1.9 \pm 0.7$  percent in men who received placebo ( $p = 0.005$ ).

**Conclusions:** In men receiving a GnRH agonist for prostate cancer, a single treatment of ibandronic acid significantly increased bone mineral density of the total hip and spine at 12 months. Annual ibandronic acid may provide a convenient and effective strategy to prevent bone loss in hypogonadal men.

## 4061

## POSTER

### Intensity modulated radiation therapy with ultrasound-based daily target localization for clinically localized prostate cancer: institutional experience and acute toxicity outcomes

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**Background:** The I-BEAM ultrasound (US) based system provides a real-time, non invasive and rapid means of patient alignment, to take into account the prostate positional variations during IMRT treatments. This investigation reports our experience on the daily use of I-BEAM and the analysis of 947 US procedures in 42 consecutive patients treated with IMRT for prostate cancer. In addition, the impact of this technology on acute toxicity is assessed.

**Methods and Materials:** From September 2005 to March 2007, 42 patients were treated using I-BEAM. All patients underwent to a 3D simulation-CT, the target and critical organs were delineated using Focal Contouring Software and treatment plans were calculated using XiO Planning System. Patients were classified into risk groups according with their T stage, PSA level and Gleason Score. Prostate and seminal vesicles were treated with a IMRT to 78 and 62.4 Gy respectively, and whole pelvis, when required, was treated with a 3D-CRT to 45 Gy. During the treatment, the position of all patients was controlled using orthogonal portal images for accounting to set-up variations, and a daily US procedure was performed to correct the organ motion displacements. The individual I-BEAM shifts were charted in each of the 3 principal directions. Acute toxicity was scored for all patients according to RTOG genitourinary (GU), gastrointestinal (GI), anal and cutaneous acute toxicity scales.

**Results:** The mean shift in each direction, averaged over all patients, was  $-0.09$ ,  $0.84$  and  $-2.51$  mm in the lateral (RL), antero-posterior (AP) and superior-inferior (SI) dimensions, respectively. Interfraction standard deviation of prostate position was  $3.35$ ,  $4.87$  and  $4.25$  mm in the RL, AP and SI dimensions, respectively. The GU toxicity rates were grade 0: 35.7% and grade 1: 64.3% (no toxicities  $\geq$  grade 2 were reported). The GI toxicity rates were grade 0: 57.1%, grade 1: 30.9% and grade 2: 11.9%. The anal toxicity rates were grade 0: 66.7% and grade 1: 33.3%, and the cutaneous toxicity rates were grade 0: 83.3% and grade 1: 16.7%.

**Conclusions:** Organ motion is the main obstacle to correctly delivering IMRT, so an alignment system is necessary to ensure the prostate position

before each IMRT fraction. US-based IGRT is relatively simple, fast and feasible, and permits the safe delivery of high doses of radiation. When available, this technology makes possible a margin reduction and reduces the acute toxicities, especially rectal complications.

## 4062

## POSTER

### Risk-adapted high-dose 3D-radiotherapy combined with hormonal treatment for prostate cancer

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**Introduction:** Based on risk-group (MSKCC classification), we designed in 2001 our protocol of treatment for patients with prostate cancer. We present our preliminary results.

**Material and Method:** According to MSKCC risk-group, there were 3 groups: Group A (low-risk), Group B (intermediate risk) and Group C (high risk). Treatment by groups: Group A, radiation therapy (RT) confined to the prostate (P) to a total dose of 72 Gy; Group B, RT to the prostate and seminal vesicle (SV), 54 Gy, followed by prostate boost to a dose of 76 Gy, combined hormonal treatment (CHT) during 6 months; and Group C, RT to the pelvis 45 Gy followed by RT to P+SV (54 Gy) and a final boost over P to 76 Gy, hormonal treatment consisted of 3-months neoadjuvant CHT, concomitant CHT with RT, and 2 years of adjuvant treatment with LH-RH analogues.

**Results:** There were 142 patients (pts) (2001–2003). Aged from 58 to 81 (median 70 years). Group A 31 pts (22%); Group B 46 pts (32%), and Group C 65 pts (46%). Follow-up: smallest 36 months (median: months). **Protocol compliance:** Of the group C, 6 pts received less dose of RT than scheduled and other 6 adjuvant hormonal therapy only for 6 months (intolerance).

**Acute toxicity (RTOG):** Grade 2: dysuria 49 pts (34%); urinary frequency 38 pts (26%); stool frequency 14 pts (9.9%); rectal 62 pts (43%). Grade 3: dysuria 3 pts (2%); urinary frequency 23 pts (16%); stool frequency 0%, rectal 0%. Grade 4: urinary frequency 1 pt (0.7%).

**Late toxicity:** Grade 2: genitourinary: 8 pts (5.6%); gastrointestinal 31 pts (22%); Grade 3: genitourinary 7 pts (4.9%); gastrointestinal 5 pts (3.5%); Grade 4: genitourinary 1 pt (0.7%). Actuarial toxicity 5 years grade 2–4: genitourinary 14%; gastrointestinal 5.5%.

**Survival:** Five-year biochemical disease-free survival (BDFS): Group A: 100%, Group B: 95%, Group C: 87%. Five-year clinical disease-free survival (CDFS): Group A: 100%, Group B: 85%, Group C: 91%. Five-year disease-specific survival (DES): Group A: 100%, Group B 100%, Group C: 95%.

#### Conclusions:

1. The compliance of the treatment has been acceptable in general, with only minor deviations.
2. Acute and late effects have been moderated and according to the literature.
3. Preliminary data BDFS, CDFS and DES are promising.

## 4063

## POSTER

### 78 Gy prostate cancer dose escalation programme: dosimetry and acute toxicity

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**Background:** Radiotherapy dose escalation in prostate cancer improves outcome. Precision radiotherapy techniques such as 3D CRT and IMRT that incorporate appropriate target dose and normal tissue dose goals and constraints are required to deliver these higher doses safely. This paper presents the dosimetry and acute toxicity of the prospective 78 Gy dose escalation study at Austin Health.

**Material and Methods:** The patient cohort includes the first fifty patients treated for localised prostate cancer to a dose of 78 Gy in 2 Gy per fraction at the Austin Health. The cohort consists of mainly locally advanced prostate cancer patients: 5% low risk, 10% intermediate and 85% high-risk patients (NCCN criteria). The mean PSA was 18 (2–83). The majority received 3 months of neoadjuvant and then concurrent hormonal therapy with LHRH agonists. All patients underwent planning with a CT scan co-registered with an MRI unless there was a contraindication for MRI.

Volumes were marked and planned according to the dose goals and limits listed in table 1. We delivered all treatments re using IMRT. Toxicity was scored according to the RTOG acute toxicity grading criteria.