Poster highlights
Speaker K-A Johannson
Sahlgrenska University Hospital
Gothenburg Sweden

• 10 selected poster in Medical Physics will be presented
• Two to six Power Point images have be sent for explaining each poster. However all PP images can not be presented due to the limited time schedule.
Establishing the efficacy of radiation oncology – standardising the collection and validation of 3D treatment planning data

M Ebert, D Joseph, A Haworth, N Spry, S Bydder, R Kearvell, B Hooton
Western Australia, Perth and Victoria, Australia

Poster 140

Hypothesis
Digital treatment planning data can be collected during multicentre trials to increase the impact of outcomes analysis

Purpose
For this purpose we have developed the SWAN system that enables exchange if data with treatment planning systems and trials-related databases. SWAN complements other such systems currently in use internationally.
Method

SWAN:
* can be used to access plan exports, archived treatment plans, via a web server, or to run reports on archived data from multiple user

• Incorporates two principal components.
  - TPS data from the “viewer” in RTOG or DICOM-RT format and
  - Database which accept treatment plan data from the viewer
SWAN has been used to greatly increase the quality of data collection in the context of a 3DCRT trial of 750 prostate patients

<table>
<thead>
<tr>
<th>Count Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of participating centres</td>
<td>23</td>
</tr>
<tr>
<td>Number of treatment plans reviewed</td>
<td>755</td>
</tr>
<tr>
<td>Number of minor protocol violations</td>
<td>1185</td>
</tr>
<tr>
<td>Number of major protocol violations</td>
<td>86</td>
</tr>
</tbody>
</table>

\(^26\) plan features checked, 750 plans, so violations are from 19,500 items checked; * Requiring plan revision

Plan review with SWAN complemented studies at all participating centres in:

- patient setup accuracy
- GTV definition by clinicians
- Compliance to protocol definitions
- 3D dosimetry via a phantom study
Value of whole body bone SPECT for metastatic work-up in clinical oncology - A study with 120 patient

Afroz S¹, Hossain S², Reza S²

2. Center for Nuclear Medicine & Ultrasound, DMCH, BAEC.

Background
Conventional planner bone scan is usually being performed in metastatic work-up of ca patients and followed by whole body bone SPECT

Aim
To evaluate the role of whole body bone SPECT in metastatic cancer patients

Patients
- Breast ca 68 (57%)
- Prostate ca 15 (12%)
- Lung ca 18 (15%)
- Other ca 19 (16%)

Distribution of patients with a spectrum of primary pathologies undergoing planar and SPECT bone scintigraphy
Results

- Total 120 patient
  - Concordance of lesion detection between Planar & SPECT 54(45%)
  - Improved Quality of reporting on SPECT 66(55%)
  - Positive lesion 60 (91%)
  - New lesion on SPECT 2(3%)
  - Absence of lesion 4(6%)

Conclusion

- SPECT studies have better resolution in detection of vertebral abnormalities due to three dimensional image
- SPECT has better sensitivity and specificity than planar imaging
- SPECT can detect lesions, missed on planar image in bone scintigraphy
CONTRAST MATERIALS INFLUENCE AT COMPUTED TOMOGRAPHY IN 3D RADIOThERAPY PLANNING FOR THORAX TUMORS

Dias JR¹, Martins HL¹, Boccaletti KW¹, Salvajoli JV¹
Hospital AC Camargo Sao Paulo, Brazil

INTERNATIONAL CONFERENCE ON ADVANCES IN RADIATION ONCOLOGY
The use of contrast agent in treatment planning systems (TPS) of radiation therapy allows more accurate target volume contouring. However, the contrast presence increases the Hounsfield units (HUs) due to its high atomic number. In thorax treatment plan, the employment of heterogeneity correction is essential due to the low density of lung.

This study was undertaken to evaluate the influence of computed tomography (CT) contrast agents on the dose distributions of 3D treatment planning for patients undergoing radiotherapy for the thorax, 8 patients.
Results

[Graphs showing Δ% Volume vs. Dose (cGy) for Patient A, Patient B, Patient C, and Patient D.]

Legend:
- PTV
  - unenhanced
  - contrast-enhanced
- PTV of phase 2 (patients with two phases)
  - unenhanced
  - contrast-enhanced
- Heart Area
  - unenhanced
  - contrast-enhanced
- Esophagus
  - unenhanced
  - contrast-enhanced
- Liver
  - unenhanced
  - contrast-enhanced
- Spinal Cord
  - unenhanced
  - contrast-enhanced

- Lung
  - unenhanced
  - contrast-enhanced
Conclusion

- The mean percentage differences in MU were less than 1% for all patients.

- In general, the variation on percentile volume, in function of dose to PTV and organs at risk, was less 10%, except in a few points, where the non significant small volumes origins larger differences.

- It is necessary to point out, possible differences between the noncontrast CT scan and contrast CT scan due to the patient movement. In spite both were acquired together, small variations should be considered. This fact may have caused discrepancy between organs at risk volume and isocenters. Therefore, the related differences in two configurations for treatment planning, may result partially from such factor.

- In conclusion, the use of contrast materials, on CT scans for radiotherapy treatment planning does not present high influence on dose calculations and distributions for thorax tumors.
Transition of 2D to 3D Craniospinal Irradiation and resulting quality improvements: an IAEA/RCA RAS6048 project by Singapore.

Francis Chin K C, Patemah Salleh, Vijay K Sethi.
Department of Radiation Oncology, National Cancer Centre, Singapore.

A project to implement an optimised fully 3D craniospinal irradiation (CSI) technique is done because the old method was unsatisfactory.

Old technique:
• Phase one is conventionally simulated (2D) to brain and spine.
• Phase two is CT Simulation for 3D planning only of the brain alone.

New technique:
* Optimised 3D method, patients are CT sim at the start for planning in both phases
Optimisation done using virtual simulations of field-in-field, boosting, matching fields, wedges
Results

Lateral opposing fields of old CSI method will irradiate bilateral middle ears (brown and light blue)

but is spared using optimized 3D technique involving posterior oblique fields.
Conclusion

• The new optimised fully 3D radiotherapy treatment planning for CSI enabled more accurate dose coverage, more precise dose estimation and better internal ear dose sparing.

• This implementation is sustainable on a long term basis without additional planning

• no extra treatment costs to the patient and the department because only a single CT sim is required at the start of phase I.
Comparision of dose distributions of Novalis Brainlab treatment planning system, Monte Carlo (BEAMnrc and DOSRZnrc) and in vivo dosimetric measurement methods

N KODALOĞLU
Danışman: Doç.Dr. Gökhan ÖZYİĞİT

Hacettepe Üniversitesi, Onkoloji Enstitüsü
Radyasyon Onkolojisi Ana Bilim Dalı
Ankara, Turkey
METHODS

1. Determination of the target volume for the taken CTs of the Alderson Rando Phantom.
2. -Modelling Novalis with BEAMnrc code.
   -Calculating treatment doses for determined target volume after CTs are read by Monte Carlo code (DOSRZnrc)
3. Repeating the same calculation with the Novalis Treatment Planning System (iPlan).
4. Comparison of the evaluated values via DOSRZnrc & Novalis and in-vivo dosimetric systems for Rando Phantom.
Modelling Brainab Linac with BEAMnrc

Calculation of treatment doses with DOSRZnrc

Calculation of treatment doses with Brainlab TPS

Measurement of treatment doses in clinic

CT images for Rando Phantom

EXPECTED RESULTS WORK IN PROGRESS
Effectiveness Of In Vivo Dosimetry As A Tool For QA In Radiotherapy

W Nyakodzwe
Parirenyatwa Group of Hospitals
Harare, Zimbabwe

In-vivo dosimetry is effective and indispensable non-invasive method Assuring that errors in treatment are discovered early during treatment While diodes have their advantages over TLDs this poster will focus On diodes
Comparison of calculated GD and measured GD for SSD between 85 cm and 100 cm and the corresponding percentage deviation, with diode not have received a considerable amount of dose.
Comparison of calculated GD and measured GD for SSD between 85 cm and 100 cm and the corresponding percentage deviation, with diode received a considerable amount of dose
Conclusion

Comprehensive QA in terms of treatment delivery has been achieved by the use of IVD. Even with the growing confidence in the use of diodes for QA/QC purposes the fact remains that treatment should NOT be changed Based SOLELY on the findings of IVD.
Pre-clinical commissioning of plans with an aperture based IMRT treatment planning system

Misleidy Nápoles Morales, MD, R.O.
Yaima Yanes López, BSc, RTT
Rodolfo Alfonso Laguardia, PhD
Carlos Calderón Marín, MSc, Med. Phys.

Institute of Oncology & Radiobiology (INOR), Havana, Cuba.

Previous to implementation of IMRT, a pre-clinical procedure has been developed, in order to commission the treatment planning techniques on real patients, and validate the rationale of this transition from a dosimetric and radiobiological perspective.

Ten patients were included in the study.

*Inverse planning – aperture based* Radiobiology Evaluations.
Results

IMRT Technique:

Conclusion

This pre-clinical experience is expected to create the basis for further clinical implementation of randomized studies that demonstrate the superiority of the IMRT vs 3DCRT in our environment.
Inverse planning optimization for brachytherapy are becoming commercially available.

**Purpose:** Comparison of IPSA plan with standard point A plan.
Metods and material

Retrospective analysis of MR data sets of 23 patients of cervical cancer consists Tandem – Ovoid CT/MR compatible applicator treated using HDR

Two plans were generated
  Standard plan with prescription to point A
  IPSA plan with an objective function of maximum dose to HR-CTV and minimum to OARs.
**Conclusion**

- No significant change in HR-CTV coverage and point A dose in IPSA plan as compared to standard plan.
- Significant reduction of Bladder and Sigmoid dose in IPSA plan as compared to standard plan.
A New Biologic Radiopharmaceutical for Targeted Therapy of Breast Cancer: 177 Lu Labeling of Mab PR81 and Quality Control

Mojtaba Salouti (Ph.D of Medcal Physics)
Islamic Azad University Zanjan, Iran

More than 80% of breast cancer patients represent a useful target for radioimmunotherapy, RIT. The RP81 is a new murine anti-MUC1 monoclonal antibody that react with several human breast cancerous tissues.
In our previous study we used PR81, a new murine anti-MUC1 monoclonal antibody, labeled with 99mTc, in radioimmunoscintigraphy of breast cancer in mouse model successfully as a scouting procedure.
New study with $^{177}\text{Lu}$

Material and Methods
We did plenty of experiment to determine the optimal conjugation condition of DOTA with PR81. The $^{177}\text{Lu}_2\text{O}_3$ solution was added to DOTA-PR81 and Incubated in water bath

Results and conclusions
We developed an efficient method for indirect labeling of PR81 with $^{177}\text{Lu}$ via DOTA as a chelator to produce a radiopharmaceutical for RIT of human breast cancer. The quality control of new therapeutic radiopharmaceutical was also performed.
4DCT imaging technique for conformal forward planning for lung tumors

S Wadi-Ramahi, J Khader
King Hussein Cancer Center, Amman Jordan

The aim is to make use of data gained from 4D CT imaging in modifying volume expansion and its impact on 3D planning for lung tumors
Regular CT scanning

2.0 - 2.5 cm margin
GTV to PTV

Inevitably a large volume of lung is included in order to account for the internal motion of the GTV as well as patient positioning error.

Planning with 4DCT

Orange: GTV at inspiration
Purple: GTV at expiration

... enables actual GTV motion to be assessed

margins modified
Results

PTV margin expansion

<table>
<thead>
<tr>
<th></th>
<th>PTV cm³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular CT: 2.0 - 2.5 cm</td>
<td>613</td>
</tr>
<tr>
<td>4DCT: 1.0 – 1.5 cm</td>
<td>259</td>
</tr>
</tbody>
</table>

Effect of 4DCT (PTV reduction) on Dose to the lung.

<table>
<thead>
<tr>
<th>Lung Volume</th>
<th>Expansion with 4DCT</th>
<th>Regular expansion</th>
<th>% reduction in dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1500 cc</td>
<td>497 cGy</td>
<td>628 cGy</td>
<td>20</td>
</tr>
<tr>
<td>1000 cc</td>
<td>640 cGy</td>
<td>793 cGy</td>
<td>19</td>
</tr>
<tr>
<td>500 cc</td>
<td>1300 cGy</td>
<td>1430 cGy</td>
<td>10</td>
</tr>
<tr>
<td>MLD</td>
<td>624 cGy</td>
<td>784 cGy</td>
<td>20</td>
</tr>
</tbody>
</table>

Lung V20 130 cc 210 cc 38%
Conclusion

• The use of 4DCT resulted in better estimate of tumor internal motion.
• Informed decision made regarding the expansion volume for PTV.
• PTV volume was reduced.
• Volume of lung exposed to radiation was also reduced.