Verslag van het college van geneesheren
RADIOTHERAPIE-ONCOLOGIE
contract 1 januari 2010 – 31 december 2010

Rapport du collège de médecins
RADIOTHERAPIE- ONCOLOGIE
contrat 1 janvier 2010– 31 décembre 2010

Prof. Pierre Scalliet
Voorzitter-Président
DEEL 2:
RESULTATEN
1. Werkgroep prostaat brachytherapie

Dr. P. Spaas

**Belgian Working Group Prostate Brachytherapy**

Philippe Spaas moet verslag maken: opvragen

**PARTICIPATING CENTRES**

| AZ Sint-Maarten DUFFEL            |
| Sint-Elisabethziekenhuis TURNHOUT |
| AZ Sint-Augustinus WILRIJK        |
| AZ Middelheim ANTWERPEN           |
| UZ LEUVEN                         |
| UCL St-Luc BRUXELLES              |
| Europaziekenhuis BRUSSEL          |
| CHIREC BRUXELLES                  |
| Clinique Générale St-Jean BRUXELLES |
| AZ Sint-Jan BRUGGE                |
| AZ Groeninge KORTRIJK             |
| Heilig Hartziekenhuis ROESELARE    |
| AZ Sint-Lucas GENT                |
| CHU CHARLEROI                     |
| Hôpital de Jolimont HAINES ST PAUL |
| Sart-Tilman LIEGE                |
| Limburgs Oncologisch Centrum      |
| Clinique St-Elisabeth NAMUR       |
2. On site visits: alanine dosimetry of the radiotherapy machines in Belgium

Ir. B. Schaeken - 12/10/2010
1. **Actual status:**

- 36 linacs: Varian: 11; Siemens: 7; Elekta: 16; Novalis: 1; BrainLabAB/MHI “Vero”: 1

- Dosimetry was checked in

- 64 photon beams: 4x 4MV; 1x 5MV; 32x 6MV; 1x 10MV; 17x 15MV; 9x 18MV

- 54 electron beams: 2x 4MeV; 1x 5MeV; 18x 6MeV; 1x 7MeV; 3x 8MeV; 2x 9MeV; 3x 12MeV; 1x 14MeV; 9x 15MeV; 12x 18MeV; 1x 20MeV; 1x 25MeV

- For 1st run measurements in photon beams:
  - $D_{meas} / D_{stated} = 0.999, \sigma = 0.019$ (#778)
  - $D_{blender} / D_{luminometry} = 1.001, \sigma = 0.008$ (#98)
2. Traceability:

![Graphs and charts related to traceability.]
3. Results end septembre:
3. Results and September:

<table>
<thead>
<tr>
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<th>MLC2</th>
<th>MLC3</th>
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<td>1,000</td>
<td>0.100</td>
<td>0.991</td>
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<tr>
<td>0.014</td>
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<tr>
<td>0.058</td>
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<tr>
<td>output measurements</td>
<td>Dose/ Distance</td>
<td>Is</td>
<td>R(min-max)</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------</td>
<td>----</td>
<td>------------</td>
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<tr>
<td>photon ref beam</td>
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</tr>
<tr>
<td>O/C (open beam)</td>
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<td>0.010</td>
<td>0.942</td>
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<tr>
<td>wedge/ photon beam</td>
<td>0.998</td>
<td>0.017</td>
<td>0.988</td>
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<tr>
<td>regular field shas</td>
<td>1.000</td>
<td>0.015</td>
<td>0.985</td>
</tr>
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<td>MLC 1-3</td>
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</tr>
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<tr>
<td></td>
<td>0.993</td>
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<tr>
<td>electron beams</td>
<td>0.994</td>
<td>0.025</td>
<td>0.135</td>
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</table>

Results are incl. 2nd, 3rd run measurements
If deviations are observed, it's likely that they are systematic, even within optimal level...
Finding explanations for a deviation needs a detailed look-up...
Out of tolerance situations disappear in a 2nd run, although a clear explanation is difficult to find...

4. Future: what did “the others”? (end-to-end tests for IMRT)

The RPC:

Design and Implementation of an anthropomorphic QA phantom for IMRT for the radiation therapy oncology group Int J Radiat Oncol Biol Phys 65, 2006
Design, development and implementation of the RPC’s pelvis and thorax anthropomorphic QA phantoms Med Phys 34, 2007

The Swiss:

In the EU:

An inter-centre QA network for IMRT verification: results of the ESTRO QUASIMODO project
Radiother Oncol 70, 2005

In the UK:

1. A dosimetric intercomparison of kilovoltage X-rays, megavoltage photon and electron beams in the Republic of Ireland
2. A versatile phantom for QA in the UK medical research Council RT01 trial in conformal therapy for prostate cancer
Radiother Oncol 80, 2006.
3. Dosimetry audit for a multicenter IMRT head and neck trial

And far away...

Multicenter dosimetry study of mantle treatment in Australia and New Zealand
Radiother Oncol 40, 1996
5. Future:
- Preservation of BELdART-expertise/ resources
  - End project: feb 2012
  - 1.8 FTE (~ 84.000 €)
  - 207 beams within BELdART; ~ 247 beams present + 6 Tomo
  - Offering actual basic checks as "mailed audits"
  - Offering beam output check for Tomotherapy

- Offering end-to-end test for IMRT: "plan class MS test"
  - head (stereotactic, IMRT brain, ..)
  - thorax (lung, ..)
  - Pelvis (prostate, gyneco, ..)
  - H & N: ?

How we could proceed?

- complete the audit for the 40 remaining beams, as it is (visited audit)
- prepare for IMRT:
  - check 6 Tomo-machines (feasibility study now)
  - check intra-cranial IMRT treatment
    - brain lesion IMRT
    - radiosurgery
    - dedicated, standardized phantom... (~ 24,000 €)
  - localization/delineation becomes important!
  - benchmark with TLD (?)
Which phantom?
3. On site visits: Radiotherapie voor prostaatca

Dr. Katia Vandeputte
Dr. Danielle Van den Weyngaert

Poster

A federal audit of the Belgian radiotherapy departments for prostate cancer radiotherapy treatment. Katia Vandeputtea, Danielle Vandeweyngaertb, Luc VanUytselef c, Pierre Scallietd, The Belgian Federal College of Radiotherapy

a Department of Radiation oncology, Cl. St. Elizabeth, Namur, Belgium, b Department of RadiotherapyUZA –ZNA, Antwerpen, Belgium, c Department of Radiation oncologyHôpital Saint Luc, Roeselare, Belgium, d, Department of Radiation oncology, University Hospital Saint Luc, Université Catholique de Louvain Brussels, Belgium

Purpose: On behalf of the Belgian Federal College of Radiotherapy, an external audit of 375 prostate cancer patients (pts) files treated with external beam radiotherapy (EBRT) only or postoperatively was performed in all of the 25 Belgian radiotherapy centres.

Methods: Between May 2008 and October 2009 two experienced radiation oncologists from different centres site-visited all 25 departments. The verified items were: age of the patients; tumour staging (clinical and pathological); risk groups according to D’Amico; use of hormonal therapy (HT); dose-, volume prescription and quality control of the radiation treatment; type of surgery if performed; delay between surgery and start of EBRT postoperatively.

Results: 375 files were examined of which 236 (63 %) were treated with EBRT only and 139 (37%) received EBRT postoperatively. Mean age in EBRT only group was 72 yrs (range 49 –87) and 66 years (range 45-80) in the postoperative group. A pathological nodal staging was noted in 8.4 % of the EBRT only files by a lymphadenectomy-pre-EBRT and in 45 % of the EBRT postoperative files.
Within the EBRT only group 11% were low risk patients, 30% intermediate risk and 48% high risk. The data of 11% of the patients were insufficient to assess their risk. In the EBRT postoperative group, the preoperative risk assessment was low for 4%, intermediate for 15%, high for 19% and 62% was not assessable.

EBRT only group

In the postoperative EBRT group 33.8% of the pts received adjuvant radiotherapy (A-RT) within 4 months after surgery with a mean PSA of 0.38 ng/ml (range 0.01 - 4) at the start of radiotherapy. The A-RT started 15.8 weeks (range 3 - 54) after surgery. Salvage EBRT (S-RT) for rising PSA, was performed in 60.4% of the pts with a mean PSA of 1.29 ng/ml (range 0.01 - 11.31) and the mean interval between surgery and start of EBRT was 170.2 weeks (range 12 - 800). RT for clinical local recurrence was performed in 5.8%. Mean PSA in that group was 3.88 ng/ml (range 3.5 - 12.50) and the mean interval between surgery and diagnosis of local recurrence and start of EBRT was 460.3 weeks (range 52 - 780).

In the postoperative EBRT group the dose prescription was respectively 65.8 Gy (range 60 - 73.8) for A-RT group, 67.9 Gy (range 60 - 74.4) for S-RT group and 69.5 Gy (range 64 - 74) for the clinical local recurrence group.

EBRT postoperative group:

In the EBRT only group, no significant difference in prescribed total dose to the prostate was seen between the different risk groups. The average prescribed dose to the prostate was 72.5 Gy. However, important fluctuations between minimum and maximum prescribed dose was noted, from 54 Gy (aT4, palliative RT) to 83.6 Gy. The variability in dose prescription is much larger for the dose to the seminal vesicles which varies from 53 Gy to 60.12 Gy. The minimum and maximum prescribed dose varies from 45 Gy to 83.6 Gy.

The indication of lymph node irradiation varies between the different centers and was performed in 17 of the 25 centers. In the EBRT only group, a total of 157 pts (42%) received hormonotherapy concurrently with the radiation treatment: 6/26 (23%) of low risk pts, 35/70 (50%) of intermediate risk pts, 107/113 (95%) of high risk pts and 9/27 (33%) of pts with undeterminable risk.

Dose prescription prostate

Dose prescription seminal vesicles

Conclusion: There was a high degree of conformity in most of the Belgian radiotherapy centers with the minimal requirements for documentation of radiotherapy prescription and administration. For the exclusive radiotherapy indications, variations in dose prescription are especially seen for seminal vesicles and pelvic lymph nodes. There is a clear trend for concomitant hormonal treatment for more aggressive tumors.

Postoperative radiotherapy is very well established and is commonly started as soon as PSA is rising.

A multidisciplinary approach is essential to keep clinical habits adapted to the current medical standards

Barcelona ESTRO 2010

72.08 GY
73.64 GY
72.43 GY
72.54 GY

Dose prescription lymph nodes
Hormone prescription
53.59 Gy
60.12 Gy
56.44 Gy
54.43 Gy

Dose prescription prostate
Dose prescription seminal vesicles
4%
16%
22%
89%

RT Dose
PSA at start of RT
Delay to start RT
60.4%
33.8%
5.8%

Postop. RT indication
11%
30%
48%
11%
23%
50%
95%
33%

15 weeks
170 weeks
460 weeks
0.38 ng/ml
1.29 ng/ml
3.88 ng/ml
4. Procare

Prof. Dr. P. Scalliet
Improving care of rectal cancer in Belgium by standardizing CTV delineation

The PROCARE RT project

Eszter Hortobagyi
Prof. Karin Haustermans, Prof. Pierre Sartor

Introduction

- Current status
- Review procedure
- Analysis of results
- Next steps

Brief history

- 2009 Nov - first Anulab installation
- 2010 March - start of the review with 3 centers
- 2010 April - launch of the official test (4 centers)
- 2010 May - full operation between 10 centers
- 2011 March - 18 centers participating

Clinical guidance

- 2010 March - (On the previous College meeting / a CD distributed
  - Procure guidelines
  - A CTV delineation atlas
  - The ESTRO teaching course presentation
  - An ORT delineation atlas
  - The manuscript on CTV delineation

Clinical guidance

- Guidelines for CTV delineation peer reviewed and published
  - A common solution to all
- Guidelines for ORT reviewed by abdominal radiologist (E. Claus)
- Eszter Hortobagyi trained by UZI and half time appointed to Procure project
Delineation guidelines

Current situation

- 21 centers agreed to participate in the QA Procera network with Aquilab as platform
- 20 centers have their license installed
- 18 centers have been connected to the network/illuminated at least one case

Delineation guidelines for OAR

Current situation

- 21 centers agreed to participate in the QA Procera network with Aquilab as platform
- 20 centers have their license installed
- 18 centers have been connected to the network/illuminated at least one case

Current status

- Review procedure
- Analysis of results
- Workshops

Structure of the system
Review procedure

1. Booking-
2. Inserting the data in the database-
3. Creating the variance-
4. Transmitting data from the department-
5. Modifying the case-
6. Database upload-
7. Sending upload confirmation-
8. Database upload confirmation-
9. Modifications sent back to database.

Required Information

- Name of the sender hospital
- Identification of the patient
- National registration number - NISZ/NISS
- TNM Staging
- Localization of the tumor
- Name of the hospital where surgery or chemotherapy is planned
- Any further comment

Agreement

- Contours are reviewed within 24 hours
- If uncertain: supervision by Professor Scaliet and/or Professor Haustermans
- Modified CTV structures are sent back as "CTV-mod"
- It is not mandatory to implement the modifications!
- Please send back "CTV-used"

Agreement

- Delineation of OAR is not required but highly recommended
- UZ Leuven is checked by UCI and vice versa
- The final database will be archived at the Cancer Registry using national registration number-NISZ/NISS

Cases submitted (as of 2011 Feb)

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<tr>
<th>Case</th>
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<th>2011</th>
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<td>Case 2</td>
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</tr>
<tr>
<td>Case 3</td>
<td>20</td>
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<td>Case 4</td>
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<td>Case 5</td>
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<td>Case 6</td>
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<td>Case 7</td>
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<td>Case 8</td>
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<td>20</td>
</tr>
<tr>
<td>Case 9</td>
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<td>20</td>
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Cases submitted (as of 2011 Feb)

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<tr>
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<tr>
<td>Case 18</td>
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</table>

Year 2010

Cases submitted: 130

Year 2011

Cases submitted: 150
OARs (as of 2011 Feb)

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<tr>
<td>OAR present</td>
<td>438</td>
</tr>
<tr>
<td>Femoral heads</td>
<td>356</td>
</tr>
<tr>
<td>Bladder</td>
<td>407</td>
</tr>
<tr>
<td>Small bowel</td>
<td>305</td>
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Evaluation - Comparison

Evaluation (as of 2011 Feb)

Evaluation vs. "reference" volume

Evaluation vs. Ref (as of 2011 Feb)
PROCRE on the web

- [http://www.registreduancer.be/](http://www.registreduancer.be/)
- PROCARE
  - Latest news
5. Incident report systems

Prof. Dr. P. Scalliet
Prof. Dr. C. WELTENS

ADHECO

An incident management system used for incident registration and benchmarking is proposed by Adheco (http://www.adheco.be/). The proposed system is the PRISMA RT system. In this system both the analysis and classification of the incidents are performed by trained personnel of the department itself, but benchmarking with other departments (national, international) is also possible.
Quality management systems (QMS)

C. WELTENS
The implementation of a Quality Management System in the Belgian Radiotherapy departments is coordinated by the College. This project consists of 3 sub-projects:
1. Installation of an INCIDENT REPORT SYSTEM
2. Participation to external dosimetry audits (see chapter about Beldart)
3. Participation to on site audits (organized by the college, starts in 2011)

The installation of Quality management systems is funded by the “Nationaal Kanker Plan/Plan National Cancer”. This plan includes the progressive installation of a QMS in all radiotherapy departments (5 departments start each year). The QMS consists of the installation of an Incident reporting system and the participation to external dosimetry audits. Furthermore on site audits are planned.

In 2010 the College focused on the preparation of the Implementation of the Incident Report System.

Following steps were prepared in 2010:

1. Configuration Hosting environment
2. Installation Benchmark environment
3. Installation Basic Environment (Proof of concept)
4. Installation 25 environments (13 Dutch, 12 French)
5. Communication towards all members to officially announce the project
6. At the same time invite all members to join network
7. Invite members to participate in POC
8. Communicate further timelines:
   o Start POC
   o Evaluation & validation POC
   o Start national Network
9. Start PR activities towards media

Planning for 2011:
1. Information to all radiotherapy departments about installation of PRISMA RT
2. Installation of the system in the 5 first departments: ZNA, Sint Augustinus, UZLeuven, Bordet en Roeselare
3. Education of the quality coordinators

Planning for 2012:
1. Installation of the system in the 5 departments: CHU André Vésale, Saint Luc, CHIREC, Baudour, RUG
2. Organisation of a national and international benchmark
6. IMRT

M. Van Dijcke
MT. Hoornaert

QA of IMRT treatments in Belgium
Survey of the physical aspects

Marie-Thérèse Hoornaert
Michel Van Dycke

Collego radiotherapie – réunion chefs de service 19/03/2010
Introduction

Purpose: overview of the situation in Belgium regarding QA programs for the physics part of IMRT

Diffusion: Website BHPA to the members

Questionnaire divided in three parts:
- General information
- Specific IMRT QC on treatment machines
- Patient related QA
Preliminary results

Answers: 15 / 25 centres
- 14 doing IMRT
- 1 not

Incomplete questionnaires
1 centre, 2 questionnaires

General information from 14 centres

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<tr>
<th>Type</th>
<th>Modality</th>
<th>First treatment</th>
<th>% IMRT</th>
<th>Localisation</th>
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<tr>
<td>7</td>
<td>Varian</td>
<td>1 in 1995</td>
<td>2 - 63%</td>
<td>Prostate, HN,</td>
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<td>Dynamic:</td>
<td>Novalis</td>
<td>Others: 2001 to 2009</td>
<td>&gt; 50%: 2</td>
<td>Brain, Breast (?)</td>
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<td>8</td>
<td>Elekta</td>
<td></td>
<td>(20-50%): 1</td>
<td></td>
</tr>
<tr>
<td>Rapid Arc:</td>
<td>Siemens</td>
<td></td>
<td>(10-20%): 4</td>
<td>Gyn</td>
</tr>
<tr>
<td>2</td>
<td>Tomo</td>
<td></td>
<td>&lt; 10%: 5</td>
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<tr>
<td>Tomo: 3</td>
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<td>no answer: 3</td>
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College radiothérapie - réunion chefs du service 19/03/2010
Patient related QA

❖ Before start of treatment:
   - individual field fluence
     • α°
     • treatment gantry angle
   - global dose distribution

❖ During treatment
### Treatment Machines

<table>
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<tr>
<th>Specific tests performed</th>
<th>Type</th>
<th>Performed by</th>
<th>Periodicity</th>
<th>Time spent</th>
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<td>Machine + type IMRT dependant: Ex DMLC: Garden fence Sweeping gap</td>
<td>Physicist</td>
<td>D, W, M</td>
<td>11 answers: 10 min ~ 3h (mean 47 min) Equipment dependant</td>
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### Patient related QA before treatment

<table>
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<th>MU check</th>
<th>Who</th>
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<td>12/14 (85.7%)</td>
<td>15 min (1)</td>
<td>7 (50%)</td>
<td>Physicist</td>
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<tr>
<td>1 ?</td>
<td></td>
<td>Up to 4h</td>
<td></td>
<td>100%</td>
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<tr>
<td></td>
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<td>Mean 92 min</td>
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<td>(1 +other)</td>
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College radiotherapy - division chief's de service 1803/2010

### Patient related QA before treatment

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<td>$\gamma &lt; 1 : 8$</td>
<td>draft : 3</td>
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<td>EPID : 7</td>
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**Patient related QA**

### Before Treatment

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<th>Detectors</th>
<th>Analysis</th>
<th>Acceptation criteria</th>
<th>Each patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 yes</td>
<td>Films: 6</td>
<td>$\gamma$</td>
<td>90-95% pts</td>
<td>9 yes</td>
</tr>
<tr>
<td>2 no</td>
<td>2D array: 4</td>
<td>3mm,3%</td>
<td>$\gamma &lt; 1$</td>
<td>3 no</td>
</tr>
<tr>
<td>1 ?</td>
<td>IC: 7 (some)</td>
<td>Dose: 3-5%</td>
<td>Missing answers</td>
<td>1 ?</td>
</tr>
</tbody>
</table>

**Patient related QA**

### During Treatment

- Performed by 4 centres only
  - *In vivo*: TLD, transit dosimetry, diode
  - Other methodology:
    - analysis of delivered fluence
    - Measured sinograms from CT det
related QA

& total MU for 2 Gy:
- ont répondu: prostate 11
  head and neck 8
- prostate: min 300 (mean linac 432)
  max 1050 (mean linac 734)
- Head Neck: min 390 (mean linac 673)
  max 1500 (mean linac 1200)
- Difference tomo/SMLC/DMLC

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Conclusions

- Preliminary results:
  - missing answers from centres performing IMRT
  - one answer/centre  → one answer/machine
  - incomplete answers: acceptance criteria
  - difficult analysis:
    - small numbers
    - different configuration
  - Complementary informations to be asked to some participants

Comparison with other studies:
- IAEA
- Dutch (in Holland IMRT school)