SBRT in Oligometastasis

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Disclosures

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The context:

“New concepts” in Radiation Oncology:

Our experience with SBRT in lung cancer:

Our experience with SBRT in bone metastases:

Our experience with SBRT in prostate:

Our experience with SBRT in pelvic oligometastases:

Conclusions:
<table>
<thead>
<tr>
<th>RT Health Care Activity</th>
<th>2016</th>
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</thead>
<tbody>
<tr>
<td>External Beam RT treatments (11 Linacs)</td>
<td>5297</td>
</tr>
<tr>
<td>Brachytherapy treatments (1 HDR, 3 PDR, 1 OR, 14 beds)</td>
<td>1005</td>
</tr>
<tr>
<td>Radiosurgery treatments</td>
<td>153</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Hospitalet</th>
<th>Girona</th>
<th>Badalona</th>
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<tbody>
<tr>
<td></td>
<td>2556 (5 Linacs)</td>
<td>1336 (3 Linacs)</td>
<td>1405 (3 Linacs)</td>
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<td>1005</td>
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In a context of 1 Department with 3 services with 11 Linacs (5+3+3), where we began IMRT and IGRT (2007), SBRT (2008), and IMRT with RapidArc® (2010), TrueBeam® (2010) & TrueBeam Novalis® (2015)
“New concepts” in Radiation Oncology:

Our experience with SBRT in lung cancer:

Our experience with SBRT in bone metastases:

Our experience with SBRT in prostate:

Our experience with SBRT in pelvic oligometastases:

Conclusions:
The accurate delivery of highly conformal, high-dose radiation therapy to limited-volume targets in the body with:

- High dose per fraction (> 7-10 Gy).
- Single or few fractions (1-5) in 1-1.5 wks.
- Highly precise image-guided radiation delivery.
- Rapid dose fall-off gradients encompassing target.

Ploo BW et al. Practical Radiation Oncology (2011) 1, 38–39
There are tumor states intermediate between purely localized lesions and those widely metastatic. They propose the existence of a clinical significant state of oligometastases.
Clinically localized disease
Cure with local treatment

Oligometastatic disease
Cure with local treatment possible

Wide-spread metastatic disease
Local therapy is not curative, Local treatment for symptom control

New definitions:

1. Oligo-Metastases: synchronous o metachronous
2. Oligo-Recurrence: regional or systemic
3. Oligo-Persistence:
4. Oligo-Progression:

Modified from M. Guckrenberger (Zurich, Targeted RT & targeted systemic treatment. Varian Symposium, ESTRO Meeting, Torino 4-2016).
They analyzed OS & Cancer LC of 121 pts with 5 or less metastases, to 1 to 3 organ sites, & treated with SBRT.

...For breast cancer, the 6y OS, Freedom from distant metastases (FFMD), and LC was 47%, 36% and 87%...

...For non breast cancer, the 6y OS, FFMD, and LC was 9%, 13% and 65%...

In conclusion, selected patients (Good Kf, good pathology) with limited metastases (less than 5) treated with SBRT are long-term survivors

Our experience with SBRT in lung cancer:
SABR for the treatment of primary NSCLC

...Systematic review of a large cohort of patients with stage I NSCLC treated with SABR suggests that survival outcome is equivalent to surgery...

Soldà F, et al (UK)
Stereotactic radiotherapy (SABR) for the treatment of primary NSCLC; systematic review and comparison with a surgical cohort
Radiother Oncol 2013;109(1):1-7
1. Phase II SBRT in stage I NSCLC (from 4-2008 to 6-2012)

* 3 fractions of 18 Gy in T <2 cm at >2 cm from mediastinum.
Of 230 patients treated at ICO for NSCLC, results of the first 42 pts:

- **Median FU:** 48m.
- **LC:** 94% at 36m.
- **OS:** 66% at 36m.

No significant impact on lung function at 36 m.

2. **Phase II risk adapted FFF based SBRT in stage I NSCLC and lung metastases (Ongoing trial):**

- **1 fraction of 34 Gy in lesions < 2 cm with a distance from mediastinum > 2 cm & chest wall > 1 cm.**
- **3 fractions of 18 Gy in tumours of 2-5 cm at > 2 cm from mediastinum and > 1 cm chest wall.**
- **8 fractions of 7.5 Gy when lesion are > 2 cm but distance < 2 cm to mediastinum.**
- **4 fractions of 12.5 Gy in tumors < 1 cm for chest wall.**
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Our experience with SBRT in pelvic oligometastases:

Conclusions:
Bone SBRT: Set-up, Dosimetry & Technique
Fractionation schemes:
1 fraction of 16 Gy (Spine) or 3 fractions of 7.5 Gy (22.5 Gy to flat bones).

Number of Patients included:
From 2012 to 2017, 50 patients with 62 bone oligometastases were treated at ICO with a median FU of 2y.
All patients underwent MRI and PET/CT scan alternatively, every 6 months.
Primary tumors were: breast (45%), prostate (19%), lung (14.5%), kidney (6.5%), colon (3.2%) and others (11.8%).
Out of the 62 bone metastases, 38 (61.3%) were in spine and the outstanding 24 (38.7%) in flat bones.
Results:
Local Control of the irradiated bone metastases was achieved in 83% of the cases.
2y Overall Survival (OS) was 73.5%.
2y Distant Progression-Free Survival (DPFS) was 45%.
70% (35) of the patients with complete response at the oligometastatic site/s do not present systemic progression after 2y FU.

Toxicity:
18% had pain flare during or after the treatment. Only 2 pts (3.2%) had grade 1 or 2 toxicities (dysphagia G1 and anorexia G2, respectively) & no cases of grade ≥3 toxicity were reported.
Controversy: The role of SBRT for metastatic bone disease

...An increase use of SBRT for the treatment of bone metastases based on lower toxicity & increased effectiveness...

But

...We need demonstration of its efficacy & toxicity in comparison with the true standard, which should be 8 Gy in a single fraction...

Olson RA, et al. (Canada) Use of single vs Multiple fraction palliative RT for Bone metastases: population-based analysis of 16898 courses in Canadian province: IJROBP 89, 1092-1099. 2014.

Comments from Rainece & Bloom (First part of the sentence) IJROBP 91. 2015 Reply from Olson et al. (Segon part of the sentence) IJROBP 91. 2015

ESTRO-ASTRO Symposium in ASTRO San Antonio 2015
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Fractionation schemes:

**Trial 1:** 5 fractions of 7 Gy in Low Risk pts.

**Trial 2:** 1 fraction of 9 Gy after EBRT (60 Gy) with Rapid Arc+ AD in High Risk pts

Number of Patients included:
40 patients (22 pts were included in trial 1 and 18 in trial 2) with median FU of 15 months.

Presented at ASTRO San Diego 2017
Results:

No toxicity greater than grade 2 was observed.

At one week after treatment, acute GU and GI grade 2 toxicities were higher in trial 1.

At one month after treatment, GI Grade 2 toxicity was also higher for trial 1, 36.4% vs trial 2, 13.6%.

No significant differences were found in GU or GI toxicities during FU between groups.
EPIC urinary QoL values were significantly better at 6 and 12 months for SBRT (5x7) vs SBRT (9x1).

EPIC obstructive QoL values were significantly better at 6 and 12 months for SBRT (5x7) vs SBRT (9x1).

Presented at ASTRO San Diego 2017
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Conclusions:
Fractionation schemes:
6 fractions of 7.5 Gy

Inclusion Criteria:
Pts with lymph node metastases (≤ 3) with a primary tumor in Rectum, Gynaecology or Prostate

Number of Patients included:
From 1-2017, 12 patients have been included.
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Conclusions:
... Tremendous advances in radiation therapy technology

Improved tumour control
(eg, SBRT on lung cancer, SRC, BT with I-125 or HDR)

Less toxicity
(eg, IMRT for H&N, IMRT for Prostate, IGBT)

& Shortened treatment courses
(eg, Moderate Hypofractionation,
Extreme Hypofractionation, APBI, IORT)

decrease the indirect costs of cancer care, including lost time and economic productivity secondary to treatment ...

Modified from R Sullivan et al (UK & other countries)
Delivering affordable cancer care in high-income countries
SBRT/SABR treatment of oligometastasis has shown promising local control rates for treated metastases, ranging from 67% to 95% at 2 to 3y.

OS rates have been reported in the range of 30% to 64%....

Corbin KS, et al. (USA)
Extracranial oligometastases: a subset of metastases curable with SBRT
...Randomized trials for oligometastatic disease should be conducted now, before increasing clinical experience and expert opinion...

... Before the strategy of treating oligometastases is accepted as routine clinical practice, there should be stronger evidence supporting its efficacy...


ESTRO-ASTRO Symposium in ASTRO San Antonio 2015