# Initial Clinical Experience with Uni-Directional LDR Brachytherapy in the Treatment of Retroperitoneal Sarcoma

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## PURPOSE / OBJECTIVE(s)

- Retroperitoneal sarcomas (RPS)s constitute 10%-15% of patients diagnosed with soft tissue sarcomas.[1]
- Despite advances in cancer care and aggressive management, the 5-year overall survival rate is 47%-67%.[2,3]
- The crude cumulative incidence of **local recurrence (LR) is 26%.**[2,3]
- A previous trial combining preoperative external beam radiation therapy with post-operative omni-directional brachytherapy found substantial toxicity, most noted within the upper abdomen.[4]
- This report demonstrates the utility of directional LDR brachytherapy for treatment of RPS.

## MATERIAL & METHODS

- A uni-directional device employed was a permanent, Pd-103 brachytherapy device.
- It was designed to be implanted during surgical resection for the treatment of anticipated positive or close surgical margins.
- The device consists of a plane of sources with an uni-directional gold shield backing to protect normal tissues yet direct radiation to the target margin(s).
- The sources were embedded in a bio-absorbable matrix membrane that may be cut to size to allow for conformal targeting of the surgical tumor bed.
- At surgery, patients were assessed and determined to have close or positive margins.
- The prescribed LDR brachytherapy dose averaged 34.7 Gy (range: 20 – 60 Gy) and covered an average area of 6060 $mm^2$ (~58 sources).
- Pd-103 half-life = 16.99 days and delivers therapeutic radiation dose over several weeks.
- The device was attached with sutures and tacks.

## RESULTS

**Planned implant patients consists of:**

- 7 RPS patients
- 4 medical centers
- 6 patients with recurrent sarcoma in the retroperitoneum or pelvic side wall
- 1 patient with locally advanced leiomyosarcoma and no previous treatment
- 3 patients had prior EBRT at first diagnosis (45 – 57.5 Gy)
- 5 patients received neoadjuvant EBRT (35 – 57.5 Gy) prior to surgery plus brachytherapy

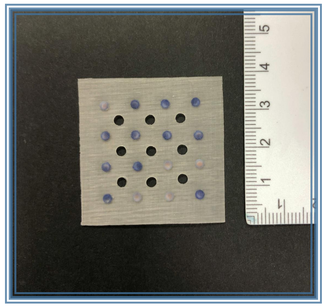

Figure 1: LDR brachytherapy sheet. Pd-103 brachytherapy sources (this side unshielded) embedded in a bioabsorbable matrix with fenestrations for attachments and to promote tissue approximation and healing.

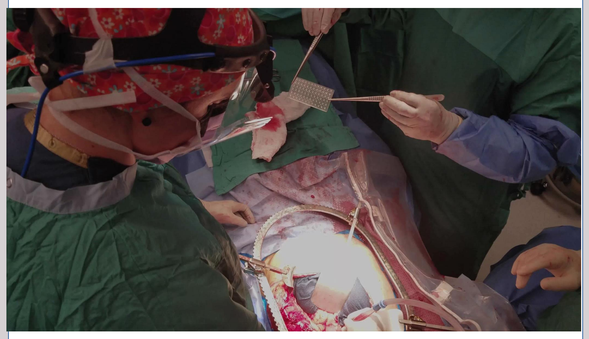

Table 1: Patients & Treatment Demographics

| Pt # | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| **Histology** | Well diff liposarc | Gastric adenoca | Uterine Leio | Liposarc | Dediff Liposarc | - | Leio |
| **Treatment Site** | RP | abdominal wall | pelvis | RP | external iliac s | pelvic wall | - |
| **Dose** | 25 | 29 | 51 | 30 | 20 | 60 | 28 |
| **Adjacent Organs** | kidney, small bowel | small bowel | bladder wall | ureter, kidney | common iliac artery, small intestine | ureter, small intestine | Ileopsoas muscle |

RP – retroperitonal space

**Treatment Outcomes:**

- One patient was treated for local control on the left side, however existing inoperable right-sided disease was also present at the time of surgery.
- The patients tolerated the implant well with no complications following surgery.
- 0 reports of source movement in the RPS patients.
- At median 15 months (8-24 months) follow-up, 0/7 patients have demonstrated local recurrence as defined as the targeted field of brachytherapy radiation.
- One patient (1/7) recurred outside the surgical/brachytherapy field.
- 0 reported incidences of acute or late radiation toxicity despite the surrounding organs at risk, inclusive of the small intestine, ureter and kidneys.

## SUMMARY / CONCLUSION

**Summary:**

- Median of 15 months
- 100% local recurrence-free survival
- No acute toxicities
- No late-term toxicities

**Conclusions**

- Application of uni-directional, planar Pd-103 LDR brachytherapy technology is safe and easy.
- Uni-directional brachytherapy should be considered as a standard option to escalate high dose to the high risk margins of RPS after resection.
- In the setting of previous therapy the directional source distribution allows for re-irradiation or adjuvant brachytherapy boost radiation therapy in patients who have had maximum EBRT dose.

## REFERENCES / ACKNOWLEDGEMENTS

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