# Initial Clinical Results of Intra-operatively Built Custom Linked (IBCL) Seeds for Permanent Prostate Brachytherapy

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## Purpose/Objectives

- In March of 2007, in partnership with industry, we developed a novel technique of performing prostate brachytherapy using intra-operatively built custom linked (IBCL) seeds. We were the first in the world to use this technology for this purpose. We report the initial prostate specific antigen (PSA) control and toxicity profile of patients treated using IBCL with the QuickLink® device for permanent prostate brachytherapy.

## Materials/Methods

- From March 2007 to June 2013, 148 patients with clinically localized prostate cancer underwent brachytherapy with IBCL seeds using a real-time ultrasound-guided seed placement method and intraoperative dosimetry to optimize target coverage. All patients underwent post-operative CT dosimetric analysis.
- Patients were grouped per NCCN risk stratification.
- Percent biochemical disease free survival (bDFS) was calculated using Kaplan-Meier using the Phoenix definition as the definition of failure.
- Specific endpoint analyses were biochemical disease free survival (bDFS), and CTACE 4.03 toxicity criteria grades three or greater, urinary retention requiring catheter placement, any hematuria, and any rectal bleeding.

## Results

- Median follow-up was 2.7 years (range 0.7 – 6.3 years). See Table 1 for post-implant dosimetry and Table 2 for full patient characteristics.
- Five-year bDFS was 88.1% for Intermediate/High-risk patients and 100% for Low-risk patients (Figures 1 and 2).
- For 5- year rates of toxicity ≥ grade 3, urinary retention requiring catheterization, any hematuria, and any rectal bleeding were 3.8%, 5.3%, 12.2%, and 13.7% (Figure 1).
- Median American Urological Association symptom score returned to baseline by 3 years (Figure 3).
- All rectal bleeding and hematuria resolved on its own with no RT changes on cystoscopy or colonoscopy.

### Table 1

| Post-Implant Dosimetry | I-125 Median (Range) | Pd-103 Median (Range) |
|---|---|---|
| Prostate Volume | 37.1 cc (17.1-69.3) | 30.7 cc (15.2-51.8) |
| Prostate D90 | 176.9 Gy (143.8-221.6) | 109.7 Gy (88.6 – 126.3) |
| Prostate V100 | 94.7% (77.9-99.6) | 94.2 (76.5-99.2) |
| Urethra D30 | 132.9% (98.2-158.3) | 133.8 (94.5-172.6) |
| Rectal V100 | 0.7 cc (0-2.7) | 0.4 cc (0-2.2) |

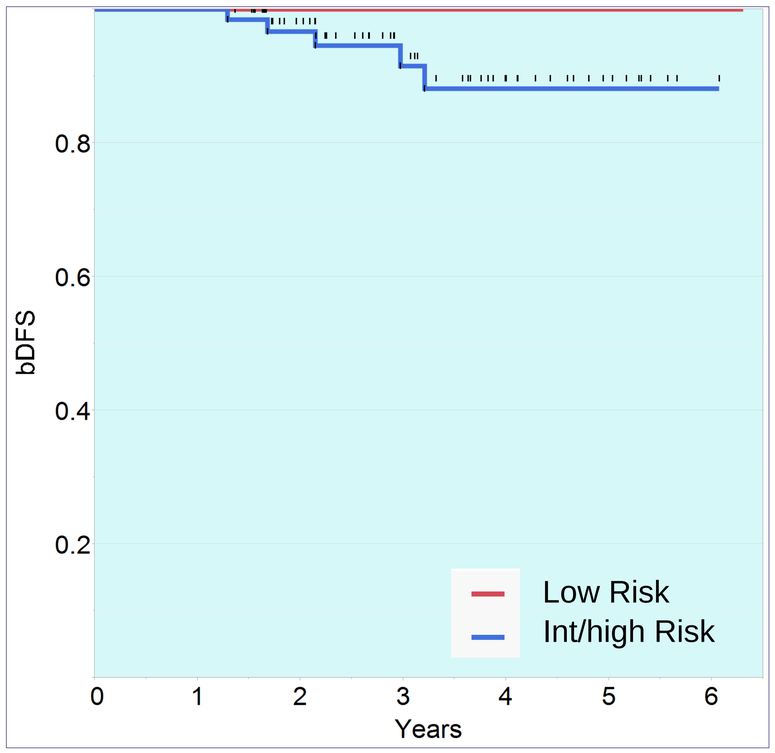
### Table 2

| Characteristics | No. of Patients (N=148) | % of Total |
|---|---|---|
| **Age – Range (Median)** | 45-77 (64.4) | |
| **Race** | | |
| White | 97 | 66 |
| African American | 48 | 32 |
| Other | 3 | 2 |
| **Gleason Total** | | |
| 6 | 79 | 53 |
| 7 | 58 | 39 |
| 8 | 9 | 6 |
| 9 | 2 | 1 |
| **Clinical Stage** | | |
| T1c | 124 | 84 |
| T2a | 15 | 10 |
| T2b | 8 | 5 |
| T3b | 1 | 1 |
| **PSA– Range (Median)** | 1.3-108 (5.73) | |
| **NCCN Risk Group** | | |
| Low | 67 | 45 |
| Intermediate | 68 | 46 |
| High | 13 | 9 |
| **Isotope** | | |
| I-125 | 73 | 51 |
| Pd-103 | 72 | 49 |
| **Hormonal Therapy** | | |
| Yes | 66 | 45 |
| No | 82 | 55 |
| **External Beam** | | |
| Yes | 71 | 48 |
| No | 77 | 52 |

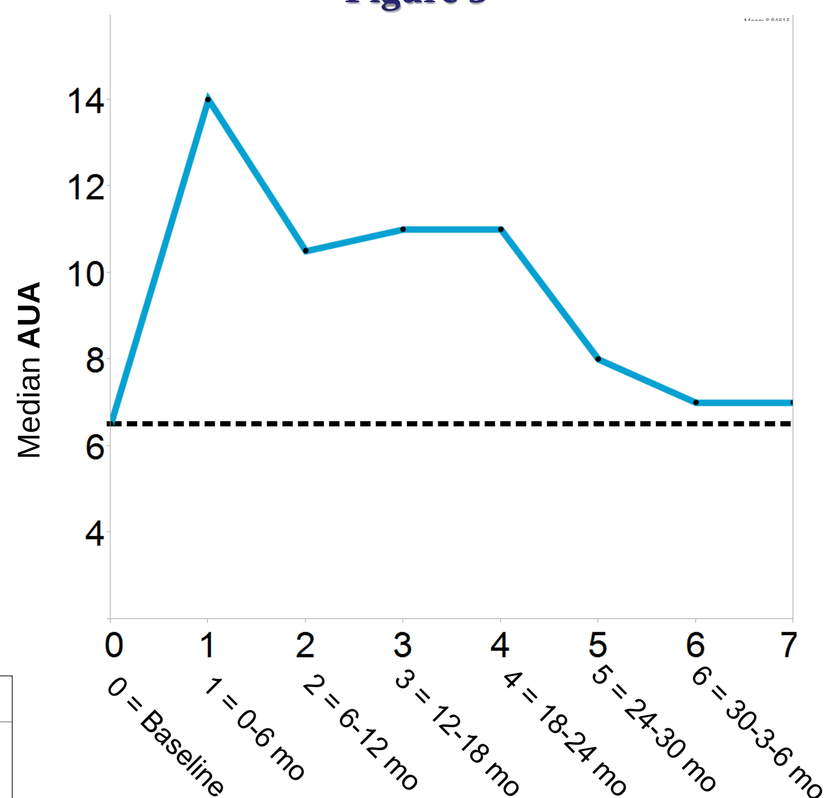
### Figure 1

| Kaplan-Meier Analyses | N | Events | 5-yr bDFS% (95 % CI) |
|---|---|---|---|
| **NCCN Risk Group** | | | |
| Low | 67 | 0 | 100 |
| Intermediate/High | 81 | 5 | 88.1 (77.6-98.7) |
| | **N** | **Events** | **5-yr toxicity% (95 % CI)** |
| **Toxicity** | 148 | | |
| ≥ Grade 3 | | 5 | 3.8 (0.4-7.15) |
| Catheterization | | 6 | 5.3 (0.6-10) |
| Any Hematuria | | 12 | 12.2 (4.6-19.9) |
| Any Rectal Bleeding | | 12 | 13.7 (4.6-22.8) |

### Figure 2




### Figure 3




## Conclusions

- With early follow-up, this novel approach for permanent prostate brachytherapy in patients with clinically localized prostate cancer is associated with low rates of biochemical failure and toxicity.

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