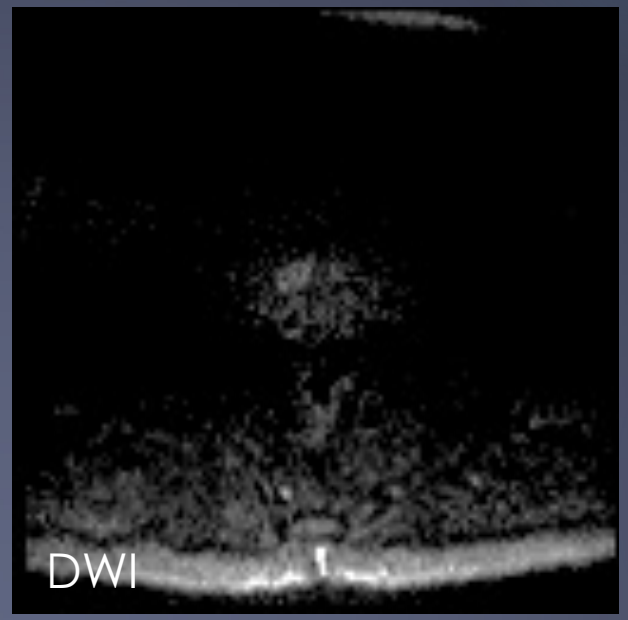
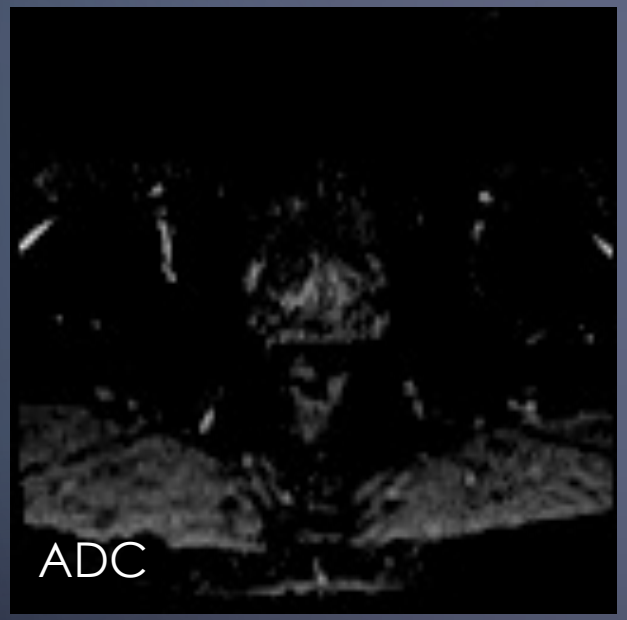
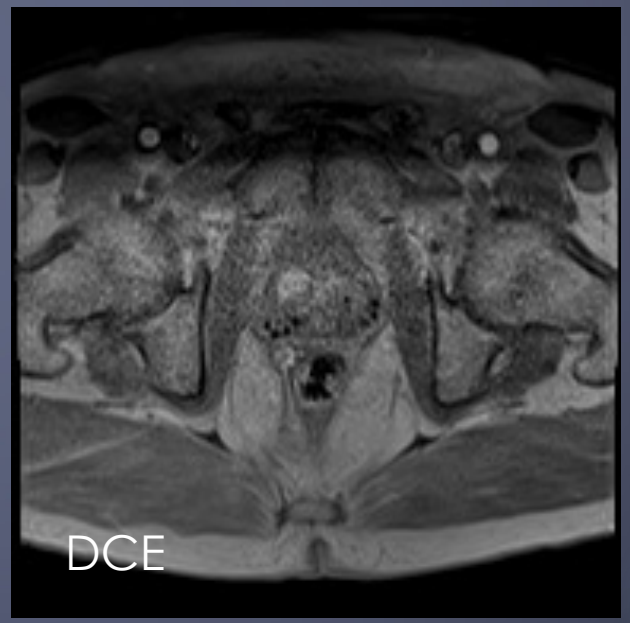
Post Brachytherapy Recurrence: Assessment with PI-RR

Silvia D. Chang, MD, FRCPC, FSAR
Associate Professor
Department of Radiology
University of British Columbia
Vancouver, B.C., Canada

Post Brachytherapy with rising PSA. Is there recurrence? What is the PI-RR score?







Priors not available for comparison

Prostate Imaging for Recurrence Reporting PI-RR Assessment Categories

Likelihood of recurrent prostate cancer to be present

- PI-RR 1 – Very low
- PI-RR 2 – Low
- PI-RR 3 – Uncertain
- PI-RR 4 – High
- PI-RR 5 – Very high

Panebianco V, et al. Eur Urol Oncol. 2021 Feb 10:S2588-9311(21)00027-4. doi: 10.1016/j.euo.2021.01.003. Epub ahead of print. PMID: 33582104.

Post Radiation Therapy PI-RR: T2 Score

1	No abnormal signal intensity compared to background
2	Linear/wedge-shaped or diffuse moderate hypointensity or residual BPH nodules
3	Focal or mass-like mild hypointensity not at the primary tumor site: includes others that do not quality as 2,4 or 5
4	Focal or mass-like moderate hypointensity not at the same site as the primary tumor, or location of the primary tumor not known.
5	Focal or mass-like mark hypointensity at the same site as the primary tumor

Panebianco V, et al. Eur Urol Oncol. 2021 Feb 10:S2588-9311(21)00027-4. doi: 10.1016/j.euo.2021.01.003. Epub ahead of print. PMID: 33582104.

Post Radiation Therapy PI-RR: DWI Score

1	No abnormality on high b-value DWI and ADC map
2	Diffuse moderate hyperintensity high b-value DWI and/or diffuse moderate hypointensity on the ADC map
3	Focal marked hyperintensity high b-value DWI or marked hypointensity on the ADC map, but not on both
4	Focal marked hyperintensity high b-value DWI and marked hypointensity on the ADC map not at the same site as the primary tumor, or site of the primary tumor not known.
5	Focal marked hyperintensity high b-value DWI and marked hypointensity on the ADC map at the same site as the primary tumor

Panebianco V, et al. Eur Urol Oncol. 2021 Feb 10:S2588-9311(21)00027-4. doi: 10.1016/j.euo.2021.01.003. Epub ahead of print. PMID: 33582104.

Post Radiation Therapy PI-RR: DCE Score

1	No enhancement
2	Diffuse or heterogeneous enhancement
3	Focal or mass-like late enhancement
4	Focal or mass-like early enhancement not at the same site as the primary tumor, or tumor site not known.
5	Focal or mass-like early enhancement at the same site as the primary tumor

Panebianco V, et al. Eur Urol Oncol. 2021 Feb 10:S2588-9311(21)00027-4. doi: 10.1016/j.euo.2021.01.003. Epub ahead of print. PMID: 33582104.

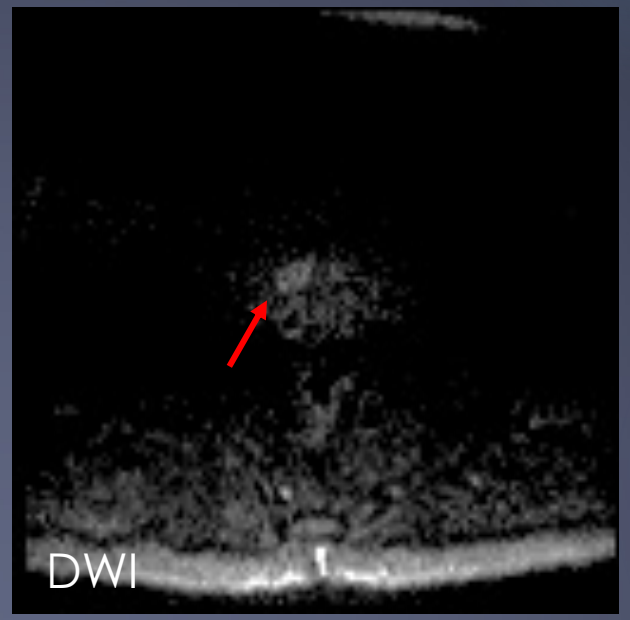
Overall PI-RR: DCE Score

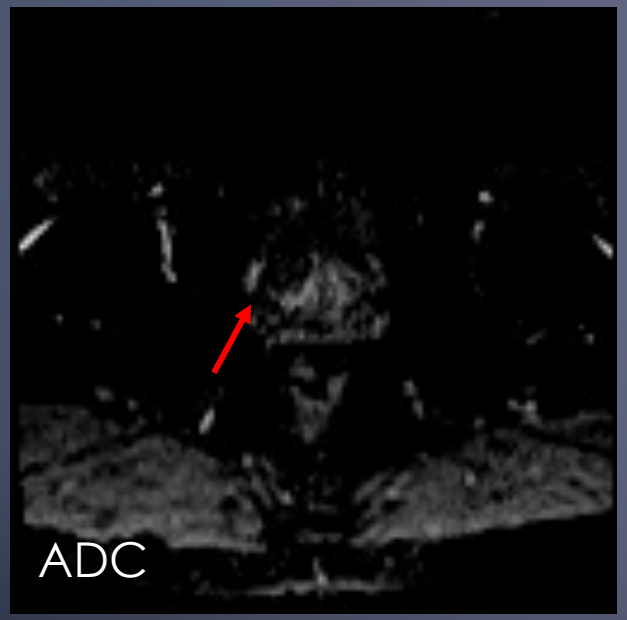
DWI	DCE	Overall PI-RR
1	1	**1**
2	1 or 2	**2**
3	1-3	**3**
4	1-3	**4**
4	4	**5**
5	5	**5**

DCE	DWI	Overall PI-RR
1	1	**1**
2	1 or 2	**2**
3	1-3	**3**
4	1-3	**4**
4	4	**5**
5	5	**5**

Panebianco V, et al. Eur Urol Oncol. 2021 Feb 10:S2588-9311(21)00027-4. doi: 10.1016/j.euo.2021.01.003. Epub ahead of print. PMID: 33582104.

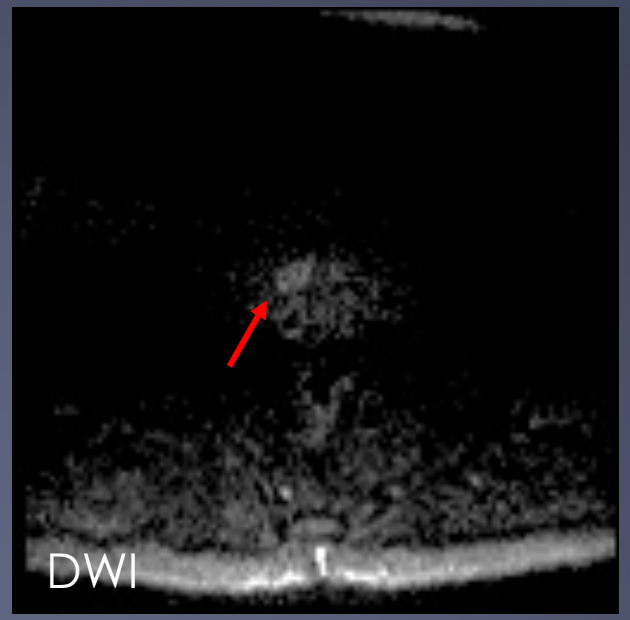
Post Brachytherapy Recurrence

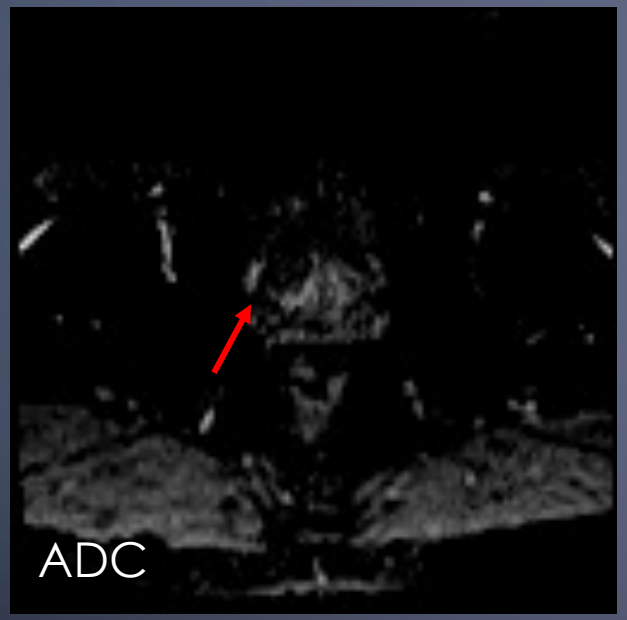




Focal area of restricted diffusion in the right base anterior TZ with focal area of corresponding early enhancement

Post Brachytherapy Recurrence





DCE	DWI	Overall PI-RR
1	1	**1**
2	1 or 2	**2**
3	1-3	**3**
4	1-3	**4**
4	4	**5**
5	5	**5**

PI-RR 5

Teaching points

- Recurrence in patients with post radiation usually occurs at site of previous tumor.
- T2 hypointense but difficult to visualize due to post treatment effects rendering the entire gland hypointense
- Demonstrates restrictive diffusion and early enhancement, therefore DWI and DCE are important sequences for evaluating recurrence
- Brachytherapy seed implants may cause artifact on DWI, thus DCE is the most important sequence in these cases

Cellini N et al Int J Radiat Oncol Biol Phys 2002;53(3):595–599
Pucar D et al. Int J Radiat Oncol Biol Phys 2007;69(1):62–69
Sala E et al. Radiology 2006;238(1):176–183
Haider M et al. Int J Radiat Oncol Biol Phys 2008;70(2):425–430