Nuclear Medicine and Biomedical Imaging

Commentary

Is PSMA PET a necessity in oligo-metastatic recurrent prostate cancer?

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Positron Emission Tomography (PET) nuclear imaging is vital in the process of diagnosing recurrence of prostate cancer following radical therapy. The conventional PET modality uses Choline based tracers (11C or 18F), a phospholipid precursor that becomes concentrated in areas of high cell division and thus highlights areas of malignancy. This is the current form of gold standard imaging for prostate cancer recurrence, however, multiple studies have found that it's sensitivity and specificity vary significantly, with a reduced accuracy at PSA levels of less than 1ng/ml [1,2]. This can result in delays in salvage therapy or delayed diagnoses, and thus has driven research into alternative imaging modalities with the aim of improving patient care.

Although the first publication mentioning prostate-specific membrane antigen (PSMA) was in 1982, PSMA has only recently started to be used to aid imaging [3]. This cell surface antigen is highly specific for prostate cells and prostatic malignant tissue, and antibodies to PSMA have also been shown to have affinity to tumour vascular endothelium [4-6]. Radio-labelling PSMA with a positron emitting isotope of Gallium, has created a new tracer with the intention of improving the detection rates of PET scanning, especially at lower PSA levels [7].

Bluemel *et al.* [8] published an article in Clinical Nuclear Medicine Journal that looked at the detection rates of Gallium tracer PSMA PET scans compared with standard choline PET. Detection rates were higher in PSMA PET, finding that this modality detected recurrence sites in 43.8% of Choline negative PET investigations. This is especially significant as the sub-analysis for PSA level found 28.6% of these cases had PSA <1ng/ml [8].

Morigi *et al.* [9] showed statistically significant data proving that at <0.5ng/ml, PSMA PET was more accurate than 18F Choline PET, with a 37.5% improved detection rate (p=0.03).

Most importantly, PSMA PET scans are improving patient treatment. Morigi *et al.* [9] found PSMA PET positive scan in previous choline negative rates of 54%, and all of these patients then went on to have moderate-major management alterations to their clinical care.

The review by Pfister *et al.* [10] observing 5-year biochemical free survival rates, confirmed improved outcomes of salvage radiotherapy in patients treated with PSA <0.5ng/mL. This emphasises the requirement for early detection of prostatic recurrence at low PSA levels.

If we can detect oligo-metastatic recurrence of prostate cancer earlier and at lower PSA levels, then accurate and suitable treatment plans can be implemented sooner, giving the patient, and their treatment, a higher chance of success.

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