

PROSTATE CANCER

Bio-barcode PSA assay—an early warning system for biochemical recurrence?

Researchers at Northwestern University have developed and piloted an ultrasensitive, automated immunoassay that is capable of detecting serum PSA at concentrations as low as 330 fg/ml—approximately 300 times more sensitive than commercially available immunoassays.

Biochemical recurrence, which is defined as a rise in PSA level from

<0.1 ng/ml—the lower detection limit of commercially available PSA immunoassays—to consistently >0.2 ng/ml, is a common occurrence after radical prostatectomy for prostate cancer. Studies have suggested that early initiation of adjuvant or salvage radiotherapy is associated with improved postprostatectomy outcomes. Thus, the ability to detect, with high sensitivity, increases in PSA level postprostatectomy can provide vital lead times in which to implement remedial therapy with a higher chance of success.

Thaxton and colleagues retrospectively tested the capability of the gold nanoparticle-based bio-barcode assay to detect PSA in serial serum samples from 18 patients who had undergone radical prostatectomy for prostate cancer. PSA was detected in 102 (86%) of the 118 serum samples tested using the bio-barcode assay, compared with just 30 (25%) when commercial assays were used. In the majority of patients whose cancer did not recur, bio-barcode-

detected PSA levels remained fairly consistently below 5 pg/ml. In patients with recurrent cancer, a sharp rise in serum PSA was detected at some point postprostatectomy, sometimes over 1 year before PSA levels became detectable with conventional assays.

The authors conclude that frequent, regular postprostatectomy PSA sampling and assessment with the gold nanoparticle-based bio-barcode assay might allow clinicians to inform patients with more certainty that their cancer will not recur, and may also facilitate earlier identification of biochemical recurrence and more-sensitive monitoring of response to salvage or adjuvant therapy than is possible with conventional PSA immunoassays.

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Original article Thaxton, C. S. *et al.* Nanoparticle-based bio-barcode assay redefines “undetectable” PSA and biochemical recurrence after radical prostatectomy. *Proc. Natl Acad. Sci. USA* **106**, 18437–18442 (2009).

