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Is MRI-TRUS fusion biopsy ready for prime time?

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Unlike the paradigm for detecting cancer in most solid tumors by targeted biopsy of a radiologic or palpable abnormality, the standard methodology for prostate cancer detection in the PSA era has been a systematic biopsy of the entire gland. A major reason for this was the lack of reliable prostate imaging to enable a targeted approach. However, rapid advances in imaging technology have made targeted biopsy a real option, particularly multiparametric MRI. The critical question is how the performance of targeted biopsy using MRI-TRUS fusion compares to standard TRUS biopsy with respect to the detection of overall and clinically significant prostate cancer.

In this month's issue of *European Urology*, Valerio and colleagues performed a systematic review of MRI-TRUS fusion versus standard biopsy.[1] The data synthesis included 14 papers published through 2013 with a total of 2293 patients. Overall, MRI-TRUS fusion detected 6.8% more clinically significant cancers than standard biopsy. In most but not all studies, MRI-TRUS fusion also detected a greater number of total cancers. MRI-TRUS fusion was also more efficient, with fewer cores needed to detect one clinically significant cancer (9.2 versus 37.1). A limitation is that the individual studies were very heterogeneous, including 8 different fusion platforms, initial versus repeat biopsy patients, and different criteria used to define "clinically significant" disease.

Although these results are very promising, there are several important considerations before MRI-TRUS fusion biopsy is ready for "prime time" across the boards. As the authors nicely summarize, "the final outcome depends on a chain of events from image acquisition, image interpretation by experts in the field, software accuracy and finally biopsy operator ability, skill and expertise. Each of these steps is important for the following one to be successful and therefore for the final outcome."

Another important factor is cost, which was not considered in the review by Valerio et al. MRI-TRUS fusion software is expensive and is not available in all settings. A recent study suggested that in-gantry MRI-targeted biopsy was cost-effective compared to standard biopsy in the Dutch health system.[2] However, in that study men with normal MRI did not

receive a biopsy, and it is unknown whether the results would be similar for other healthcare systems or with MRI-TRUS fusion biopsy.

An alternative approach to software-based fusion is cognitive registration. In this method, the urologist uses previously obtained MRI images to visually estimate the location of abnormalities on TRUS during biopsy. The PROFUS trial from NYU showed no statistically significant difference in cancer detection rates between cognitive and software-based fusion biopsy.[3] However, the sample sizes were small and there was a trend in favor of software-based fusion. Moreover, the results of this study may not be generalizable to other centers with less experience in multiparametric MRI.

Overall, MRI-TRUS fusion appears to improve the efficiency of prostate biopsy, with potential applications in the setting of initial detection as well as active surveillance. Although factors such as learning curve and cost-effectiveness require further evaluation, the potential to move away from blind biopsies to a more specific, targeted approach is exciting.

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