Braden Millan[1], Adam Kinnaird[2]

[1]Urologic Oncology Branch, National Cancer Institute, National Institutes of Health, Bethesda, MD, United States; [2]Division of Urology, University of Alberta, Edmonton, AB, Canada

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Micro-ultrasound in the Canadian prostate cancer diagnostic pathway

Recent Canadian data further reinforce the utility of micro-ultrasound (US) within our diagnostic ecosystem for prostate cancer. In a retrospective cohort, Black et al reported their experience with micro-US-guided transperineal (TP) biopsy.[1] They compared it to a cohort who underwent magnetic resonance imaging (MRI)–US fusion transrectal (TR) biopsy, showing a similar clinically significant prostate cancer (csPCa) detection, despite fewer biopsy cores, and demonstrating no cases of post-biopsy sepsis.[1]

Their findings mirror broader international evidence that micro-US offers high diagnostic accuracy and that using the TP approach reduces/eliminates the risk of infection. Notably, the study highlights that micro-US lesion targeting — performed without radiology involvement or MRI-compatible fusion equipment — can deliver outcomes comparable to those of software-based MRI–US fusion systems. Micro-US employs a 29-MHz transducer that provides real-time visualization with a 70-µm resolution, enabling identification of suspicious lesions with spatial resolution far superior to conventional US.[2]

Prospective cohort data summarized in a recent *Nature* review corroborate the conclusions made in the current study. In a large, single-center series involving over 1400 men, micro-US demonstrated an 85% sensitivity and 79% negative predictive value for csPCa. With a concordance between modalities of >95%, micro-US identified 25 cases of csPCa missed by multiparametric (mp)MRI, while multiparametric (mp) MRI identified only four missed by micro-US.[3]

Additional data show that when mpMRI and micro-US findings are discordant, micro-US-guided targeted biopsy detects more csPCa than MRI-targeted biopsy alone, and also suggest that combination targeted biopsies may support elimination of the systematic biopsy.[4] Meanwhile, whole-mount pathology co-registration work suggests that micro-US not only effectively detects index lesions but may also better characterize tumor extent than mpMRI.[5]

The OPTIMUM randomized controlled trial provides us with robust, prospective, randomized evidence supporting the use of micro-US in prostate cancer diagnosis.[6] In biopsy-naive men, micro-US-guided biopsy was non-inferior to MRI/conventional-US fusion biopsy for detecting csPCa. Detection rates were virtually identical, and targeted biopsy performance was comparable across modalities. Importantly, every patient still received a systematic biopsy, reflecting real-world practice. OPTIMUM provides evidence that micro-US can function confidently as a primary imaging modality — a critical finding for Canada, where MRI access still poses significant challenges.

Canadian implementation must also consider workflow advantages. Unlike mpMRI, micro-US is performed at the point of care by urologists, eliminating delays associated with MRI availability, reporting queues, and MRI-US fusion registration challenges, though the ExactVu™ platform does include fusion software, FusionVu™. Because micro-US integrates directly into the biopsy procedure, patients can undergo imaging and targeted sampling in the same session, removing the diagnostic uncertainty associated with the historical systematic prostate biopsy. In a public system, the marginal cost of micro-US is minimal once capital equipment has been acquired.

Micro-US is not without limitations, however. Operator expertise matters; interpretation requires structured training, and image quality attenuates with increasing depth, which may limit evaluation of large prostates or transition-zone lesions. Micro-US is not yet a replacement for mpMRI in all contexts. For local staging, specifically the pelvic lymph nodes and assessing extraprostatic extension (EPE), mpMRI retains value, although emerging micro-US-based nomograms show promise, with predictive accuracy of 85.9% for EPE on final pathology.[7]

Systematic, in addition to targeted, biopsies remain the standard of care; multiple studies demonstrate that targeted approaches alone would miss 20–25% of csPCa cases, though this was without the use of micro-US.[8] We must also consider that the diagnosis of csPCa is a surrogate endpoint in these studies, and

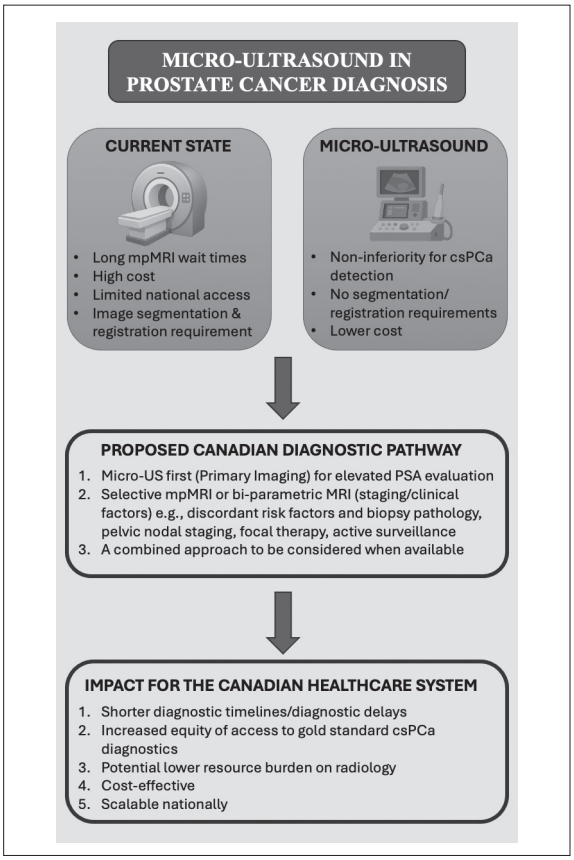

Figure 1. Rationale and potential impact of a micro-ultrasound first imaging strategy in prostate cancer diagnostics. csPCa: clinically significant prostate cancer; mpMRI: multiparametric magnetic resonance imaging; US: ultrasound.

we are still working on ways to improve prostate cancer outcomes while reducing the harms of overtreatment.

Nevertheless, micro-US should not be viewed as a competitor to mpMRI and should be considered a practical complement that has the potential to address Canada's most significant diagnostic bottleneck: MRI access (Figure 1). A micro-US-first pathway, with selective MRI reserved for equivocal cases, prior negative biopsies, staging considerations, and surgical planning, would dramatically improve diagnostic efficiency while maintaining oncologic safety.

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CORRESPONDENCE: Dr. Braden Millan, Urologic Oncology Branch, National Cancer Institute, National Institutes of Health, Bethesda, MD, United States; braden.millan@nih.gov