Imaging for the Detection of Locoregional Recurrences in Biochemical Progression After Radical Prostatectomy—A Systematic Review.


CONTEXT: Local and regional recurrence after radical prostatectomy (RP) can be treated using salvage radiotherapy (SRT). If the recurrence can be delineated on diagnostic imaging, this could allow for increasingly individualized SRT.

OBJECTIVE: This systematic review aimed at evaluating the evidence regarding the usefulness of positron emission tomography (PET) and magnetic resonance imaging (MRI) in identifying local and regional recurrences, with the aim to further individualize the SRT treatment.

EVIDENCE ACQUISITION: A systematic PubMed/Medline search was conducted in December 2015. Studies included were imaging studies of post-RP patients focusing on local and/or regional recurrence where sensitivity and specificity of MRI or PET were the primary end points. Only studies using biopsy, other histological analysis, and/or treatment follow-up as reference standard were included. Quality Assessment of Diagnostic Accuracy Studies-2 was used to score the study quality. Twenty-five articles were deemed of sufficient quality and included in the review.

EVIDENCE SYNTHESIS: $[^{11}C]Acetate$ had the highest pooled sensitivity (92%), while $[^{11}C]choline$ and $[^{18}F]choline$ had pooled sensitivities of 71% and 84%, respectively. The PET tracer with highest pooled specificity was $[^{11}C]choline$ (86%). Regarding MRI, MR spectroscopy combined with dynamic contrast enhanced (DCE) MRI showed the highest pooled sensitivity (89%). High pooled sensitivities were also seen using multiparametric MRI (84%), diffusion-weighted MRI combined with T2-weighted (T2w) imaging (82%), and DCE MRI combined with T2w imaging (82%). These also showed high pooled specificities (85%, 89%, and 92%, respectively).

CONCLUSIONS: Both MRI and PET have adequate sensitivity and specificity for the detection of prostate cancer recurrences post-RP. Multiparametric MRI, using diffusion-weighted and/or DCE imaging, and the choline-labeled tracers showed high pooled sensitivity and specificity, although their ranges were broad.

PATIENT SUMMARY: After reviewing imaging studies of recurrent prostate cancer after prostatectomy, we concluded that choline positron emission tomography and diffusion-weighted magnetic resonance imaging can be proposed as the current standard, with high
sensitivity and specificity.

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**KEYWORDS:** Magnetic resonance imaging; Positron emission tomography; Prostate cancer; Recurrence; Salvage radiotherapy