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Correspondence

In response to Grivas et al

We appreciate the comments made by Grivas et al regarding our article on automated contouring of neurovascular structures on prostate MRI [1]. We are thankful for recognizing the potential of our artificial intelligence model beyond MR-guided radiotherapy (MRgRT). In line with our article, we contend that automated contouring of the neurovascular bundles (NVBs) holds potential for patients undergoing robot-assisted radical prostatectomy (RARP), facilitating nerve-sparing indications and their integration into three-dimensional prostate models.

For men undergoing neurovascular-sparing MRgRT, the NVBs and internal pudendal arteries are considered clinically relevant structures to spare as they are important for erectile function. A major challenge is that these structures lie in close proximity to the prostate and are therefore subjected to relatively high doses of radiation [2]. It is yet unknown whether complete contouring of the fascia would decrease the chance of erectile dysfunction in MRgRT. Given a median fascia thickness of 3.8 mm on MRI, as reported in your previous work [3], sparing the entire fascia proves challenging with a 2 mm margin from clinical target volume to planning target volume around the prostate in MRgRT with the MR-Linac system. Perhaps dose de-escalation to the fascia may be an option for men with non-high-risk prostate cancer in the future. The prostate would receive a relatively lower dose but a dose escalation (boost) could be administered to the dominant index lesion as tumor recurrence often occurs infield after primary radiotherapy. This approach may improve tumor control and allow better sparing of erectile function.

If the complete fascia, including the NVBs, proves to be of greater interest than the NVBs alone for patients undergoing RARP, we suggest applying transfer learning. This is a technique that involves reusing parts of our pre-trained model for a new, related task [4]. The fascia could be added to our nnU-Net model. Our model was trained using high resolution MRI data with a 2 mm slice thickness, in contrast to the 3 mm slice thickness on T2-weighted imaging described in the PI-RADSv2 MRI acquisition guideline [5]. A finer slice thickness enables more precise contouring and more accurate assessment of the NVBs and fascia. To create a robust artificial intelligence model, we would suggest to include MRI data from patients undergoing RARP compliant to PI-RADSv2 guidelines and high-resolution MRI data from patients undergoing MRgRT.

Finally, we believe the nnU-Net model can be employed for segmenting the complete fascia, followed by post-processing steps to calculate fascia thickness and surface area. Predicting erectile dysfunction after radiotherapy and RARP could be accomplished by integrating clinical and MRI-based variables from both patient groups. The assessment of erectile function can be performed using the IIEF-5 questionnaire. A combined radiotherapy and RARP data-driven prediction model can aid clinicians and patients in determining the suitability of neurovascular-sparing therapy and selecting the most appropriate treatment approach. Before routine clinical use, a segmentation and prediction model should be externally validated.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Ingeborg van den Berg[a,b,*], Mark H.F. Savenije[a], Frederik R. Teunissen[a], Sandrine M.G. van de Pol[a], Marnix J.A. Rasing[a], Harm H.E. van Melick[b], Wyger M. Brink[c], Johannes C.J. de Boer[a], Cornelis A.T. van den Berg[a], Jochem R.N. van der Voort van Zyp[a]

[a] *Department of Radiation Oncology, Division of Imaging & Oncology, University Medical Center Utrecht, Utrecht, The Netherlands*

[b] *Department of Urology, St. Antonius Hospital, Nieuwegein/Utrecht, The Netherlands*

[c] *Magnetic Detection and Imaging Group, Technical Medical Centre, University of Twente, Enschede, The Netherlands*

[*] Corresponding author at: Department of Radiation Oncology, University Medical Center Utrecht. Heidelberglaan 100, 3584 CZ Utrecht, The Netherlands.

E-mail address: I.vandenBerg-8@umcutrecht.nl (I. van den Berg).

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