Letters to the Editor

^{68}Ga Scatter Correction to Eliminate Halo-Artifacts in PET Imaging

We read with interest the review by Hoffmann et al titled "The Impact of ^{68}Ga-PSMA PET/CT and PET/MRI on the Management of Prostate Cancer."[1] While the authors properly address many of the possible uses of this radiopharmaceutical in the various stages of prostate cancer, they inadvertently omit 2 recent publications from prospective[2] and retrospective[3] trials of ^{68}Ga-PSMA PET/MRI at initial diagnosis. These studies showed that the sensitivity of ^{68}Ga-PSMA-11 PET/MRI in the detection of prostate cancer is better than that of multiparametric MRI.

More importantly, one of the drawbacks discussed is that ^{68}Ga-PSMA accumulates in the bladder and kidneys. The high signal to background in these regions has been known to result in a halo-artifact in PET images, which lowers the diagnostic quality of the images. One solution the authors mentioned is novel radiopharmaceuticals with reduced urinary clearance. However, the paper unfortunately fails to mention other published methods that have been demonstrated to significantly reduce the halo-artifacts, including the use of diuretics or improved PET imaging algorithms. Wangerin et al showed that improvements to the PET scatter algorithm significantly decreased or completely eliminated halo-artifacts for ^{68}Ga-PSMA-11 and also for ^{68}Ga-RM2 in the kidneys and bladder regions.[4] The authors concluded that image reconstruction with the improved scatter correction algorithm mitigated washout artifacts and recovered diagnostic image quality in ^{68}Ga-PSMA-11, indicating that the use of diuretics may be avoided. The general statement that "the halo artifact effect is a common problem in PET/MRI-devices" does not apply to all scanners and therefore the record should be corrected.

We think that the journal readership will benefit from accurate information regarding the variability in performance characteristics of different PET/MRI machines.

Sincerely,

References

1. Hoffmann MA, Wieler HJ, Baues C, Kuntz NJ, Richardsen I, Schreckenberger M. The Impact of 68Ga-PSMA PET/CT and PET/MRI on the management of prostate cancer. *Urology*. 2019. https://doi.org/10.1016/j.urology.2019.04.004.
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3. Hicks RM, Simko JP, Westphalen AC, et al. Diagnostic accuracy of 68Ga-PSMA-11 PET/MRI compared with multiparametric mri in the detection of prostate cancer. *Radiology*. 2018;289:730–737. https://doi.org/10.1148/radiol.2018180788.
4. Wangerin KA, Baratto L, Khalighi MM, et al. Clinical evaluation of 68Ga-PSMA-II and 68Ga-RM2 PET images reconstructed with an improved scatter correction algorithm. *Am J Roentgenol*. 2018;211:655–660. https://doi.org/10.2214/AJR.17.19356.

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Reply: "The Impact of 68Ga-PSMA PET/CT and PET/MRI on the Management of Prostate Cancer"

"68Ga Scatter Correction to Eliminate Halo-Artifacts in PET Imaging"

We are grateful to the writer of the Letter-to-the-Editor entitled "68Ga Scatter Correction to Eliminate Halo-Artifacts in PET Imaging" for their careful reading of our article "The Impact of 68Ga-PSMA PET/CT and PET/MRI on the Management of Prostate Cancer."[1]

We appreciate that they point out more recent work in solving the problem of halo artifacts in 68Ga-PSMA PET/MRI, which was a major limitation in 2018.

Since then, several studies described the halo artifact as a common problem in PET/MRI-devices, which was also corroborated with our own experience.[2]

Indeed, the writer of the Letter-to-the-Editor referenced new publications,[3,4] that were unfortunately published after the writing of our review paper (mid 2018, asked for publication by the editors in September 2018, sent to the reviewers in November 2018, published online in April 2019), and thus were not included as a reference. This may be an example of the well-known problem of technology advancing faster than publication processes in a lot of high-ranked journals.

It is true, however, that development of new and better methods to suppress the artifacts has been achieved by most of the camera-producers, as shown by Lindemann et al[5] in 2019.

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Again, we appreciate the comments and update to the literature, as ultimately the entire journal readership and medical community will benefit from these updates.

Sincerely yours,

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