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Regarding "Computer-Extracted Texture Features to Distinguish Cerebral Radionecrosis from Recurrent Brain Tumors on Multiparametric MRI: A Feasibility Study"

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Regarding "Computer-Extracted Texture Features to Distinguish Cerebral Radionecrosis from Recurrent Brain Tumors on Multiparametric MRI: A Feasibility Study"

We read with great interest the recently published article by Tiwari et al[1] regarding automated radiomic features for distinguishing radiation necrosis and recurrent tumor. Because our neuro-oncologists and neurosurgeons frequently ask us to make this distinction for clinical management, we find this subject deserving of attention.

However, we found that the authors' provided limitations in the "Discussion" did not acknowledge several important points that we believe should be addressed. First, the 2 neuroradiologists performed their interpretations without standard-of-care imaging; contrast-enhanced T1-weighted imaging was absent in 5/15 patients, and T2-weighted imaging was absent in 8/15 patients. Furthermore, other routine imaging sequences such as diffusion-weighted imaging, which can be helpful particularly with bevacizumab therapy, were not available to the radiologists. Second, the neuroradiologists were not allowed to view prior imaging, including pretreatment, postoperative, and the most recent prior images, which is also below the current standard of care. Third, no MR perfusion was performed. At both of our institutions with high-volume brain tumor centers and at many other academic centers, this is considered routine for differentiating tumor recurrence from treatment-related change. In our experience and in the literature,[2-5] dynamic contrast-enhanced MR perfusion is reliable, reproducible, and only adds a short time to the examination. No published data exist to support the authors' suggestion that including MR perfusion increases cost or diminishes cost-effectiveness. Finally, FDG-PET was not performed, which again is often used to confirm cases that remain equivocal by MR imaging.[6]

We were further surprised that the authors included mixed pathologies in their small test sample: Four of the 15 cases were metastases. It is known that T2 hyperintensity in metastases reflects vasogenic edema, whereas in gliomas, it may reflect a combination of nonenhancing tumor and treatment change. Because the computer algorithm and neuroradiologists were basing their interpretations primarily on the T2 FLAIR sequence, it is inappropriate for these 2 entities to be considered together.

Finally, we would be interested to hear the authors' basis for their suggestion that radiomics is more readily available than advanced imaging because it is our impression that the opposite is true by a wide margin when considering the availability of human (computer scientists, computational biologists, physicists), hardware (servers, workstations), and software (non-FDA-approved, nonstandardized analysis tools) resources.

We believe that the authors' conclusion that "radiomic features may provide complementary diagnostic information on routine MR imaging sequences," while probably correct, is not supported by their limited data, and further work is required to prove the utility of radiomics in addition to the current standard of care.

Unfortunately, social media outlets have taken the next step in reporting headings such as "Neuroradiologists Beaten by Computer at Making a Key Diagnostic Distinction on MR Imaging" (http://www.healthimaging.com/topics/advanced-visualization/neuroradiologists-beaten-computer-making-key-diagnostic-distinction-mri; HealthImaging link included in the American College of Radiology Daily News Scan). Furthermore, the Twitter statement of the American Society of Neuroradiology[7] that "computer program outperforms #neurorads at differentiating radiation necrosis from recurrent tumor on MR imaging" is unsubstantiated given the evidence and is counterproductive to the advancement of neuroradiology as a field. One of the concerns among bright medical students in choosing radiology versus another field is that the work radiologists do is threatened by computers, and such judgments erroneously support that narrative.

We agree with the authors that further study is needed to determine whether there is an MR imaging texture "signature" for radiation necrosis, and we applaud the authors' effort in pushing this research forward. We look forward to future research and discussion.

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