

Convolutional neural network algorithms for computed tomography scans of chronic rhinosinusitis subtypes

To the Editor:

I read with great interest the work by Beswick et al.,¹ “Machine learning evaluates improvement in sinus computed tomography opacification with CFTR modulator therapy,” in which the authors report their use of a convolutional neural network (CNN) algorithm to identify changes in radiographic sinus disease in a cystic fibrosis (CF) patient before and after the initiation of cystic fibrosis transmembrane conductance regulator (CFTR) modulator therapy. This group of investigators has recently published an outstanding study in the *International Forum of Allergy and Rhinology (IFAR)* validating their novel CNN technique in hundreds of chronic rhinosinusitis (CRS) and control sinus computed tomography (CT) scans.² The degree of radiographic sinus disease in patients with CF, as measured by Lund-Mackay score (LMS), has a poor correlation both to sinonasal symptoms and to various other clinical outcomes.³ Therefore, their novel approach using a CNN algorithm to quantify radiographic CF CRS severity has enormous potential.

The work by Beswick et al.¹ presents a patient with a new diagnosis of CF with relatively mild sinus disease on

baseline CT who is initiated on CFTR modulator therapy. In their previous CNN validation study,² CT sinus opacification percentage was found to be highly concordant with LMS. However, given the low LMS in the patient presented in their work, it is worth noting that in Figure 2 of their previous validation study,² opacification percentage does not seem to vary by their CNN methodology for CTs with LMS in this range. The authors also specify that the patient's nasal and medication regimen did not change with the new diagnosis, but one does wonder if any other treatments began in the context of a new CF diagnosis, such as using a high-frequency chest wall oscillation vest or changes in nutrition. The degree to which such ancillary interventions impact CRS is unknown, but there is reason to believe that improvements and exacerbations in sinonasal and pulmonary disease are temporally concordant.⁴

The authors' novel and creative CNN approach to quantifying radiographic sinus disease is exciting, and future research to validate this methodology in specific subtypes of CRS, including CF CRS, would be invaluable.

David A. Gudis, MD, FACS, FARS 

Rhinology & Anterior Skull Base Surgery, Department of Otolaryngology–Head & Neck Surgery, Columbia University Irving Medical Center, New York, NY

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Correspondence to: David A. Gudis, MD, FACS, FARS, Rhinology & Anterior Skull Base Surgery, Dept of Otolaryngology–Head & Neck Surgery, Columbia University Irving Medical Center, 180 Fort Washington Ave, Suite 850, New York, NY 10032; e-mail: dag62@cumc.columbia.edu

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