



Reply: Prediction of the Left Ventricular Functional Outcome by Myocardial Extracellular Volume Fraction Measured Using Magnetic Resonance Imaging; Methodological Issue

Yinyin Chen, PhD, Mengsu Zeng, MD, PhD

All authors: Department of Radiology, Zhongshan Hospital, Fudan University, Shanghai, China; Department of Medical Imaging, Shanghai Medical School, Fudan University and Shanghai Institute of Medical Imaging, Shanghai, China

Keywords: *Extracellular volume fraction; Functional recovery; Prognostic research; Clinical prediction models*

Dear Editor,

Thank you for your comments (1). According to your comments and those mentioned by Moons et al. (2), performing multivariable prognostic research and establishing clinical prediction models is a complex process that requires careful statistical analyses and sound clinical judgement. Our study was based on a hypothesis proposed by our team, that is, myocardial extracellular volume fraction (ECV) may be used as an indicator of functional outcome after revascularization of coronary total

occlusion (CTO). Therefore, the study aimed at investigating whether a single variable (e.g., ECV) can be used to predict prognosis rather than predicting outcomes from multiple variables (3). The area under the curve of receiver operator characteristic curve analysis, the most common discrimination measure, confirmed that the discriminating performance of ECV was better than that of other markers. As for the candidate predictors, imaging predictors require subjective interpretation. Therefore, there is a risk of studying the predictive ability of the reviewer rather than that of the predictors (2). To avoid this issue, we assessed the intra- and inter-observer reproducibility of imaging markers. We also performed regression analysis with a backward elimination approach and collinearity diagnostics to evaluate the effect of different variables on each other. I agree that it would be more convincing if we validated the performance of ECV in another cohort (4), or at least in the same cohort, using the bootstrap resampling technique (5, 6). However, due to the small sample size, we have not yet performed the validation process. Further studies recruiting more CTO patients to validate the transportability and generalizability of the ECV role are warranted.

ORCID iDs

Mengsu Zeng

<https://orcid.org/0000-0001-6054-0824>

Yinyin Chen

<https://orcid.org/0000-0002-1192-671X>

REFERENCES

1. Karimi S, Pourmehdi M, Naderi M. RE: prediction of the left ventricular functional outcome by myocardial extracellular volume fraction measured using magnetic resonance imaging: methodological issue. *Korean J Radiol* 2019;20:1001-1002
2. Moons KG, Royston P, Vergouwe Y, Grobbee DE, Altman DG. Prognosis and prognostic research: what, why, and how? *BMJ* 2009;338:b375
3. Chen Y, Zheng X, Jin H, Deng S, Ren D, Greiser A, et al. Role of myocardial extracellular volume fraction measured with magnetic resonance imaging in the prediction of left ventricular functional outcome after revascularization of chronic total occlusion of coronary arteries. *Korean J Radiol* 2019;20:83-93
4. Lee YH, Bang H, Park YM, Bae JC, Lee BW, Kang ES, et al. Non-laboratory-based self-assessment screening score for

Received March 2, 2019; accepted after revision March 5, 2019.

Corresponding author: Mengsu Zeng, MD, PhD, Department of Radiology, Zhongshan Hospital, Fudan University, No. 180 Fenglin Road, Shanghai 200032, China.

• Tel: (86) 64041990-2130 • Fax: (86) 64439906

• E-mail: zengmengsu@outlook.com

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

- non-alcoholic fatty liver disease: development, validation and comparison with other scores. *PLoS One* 2014;9:e107584
5. Lim NK, Park SH, Choi SJ, Lee KS, Park HY. A risk score for predicting the incidence of type 2 diabetes in a middle-aged Korean cohort: the Korean genome and epidemiology study. *Circ J* 2012;76:1904-1910
 6. Abbasi M, Naderi M. What does need to know about developing clinical prediction models? *J Geriatr Oncol* 2019;10:369