

Quantitative stress-redistribution sequential imaging optimises MPI with the lowest dose of radiation per patient

Richard M Fleming,¹ Matthew R Fleming,¹ Tapan K Chaudhuri,² Andrew McKusick³

To cite: Fleming RM, Fleming MR, Chaudhuri TK, *et al*. Quantitative stress-redistribution sequential imaging optimises MPI with the lowest dose of radiation per patient. *BMJ Open Quality* 2019;**8**:e000774. doi:10.1136/bmjopen-2019-000774

Received 15 July 2019

Accepted 24 July 2019

The authors wish to congratulate Winchester *et al*¹ for their recognition of increasing the use of a stress-only approach to myocardial perfusion imaging (MPI). Prior to the introduction of technetium-99m (Tc-99m) isotopes, it was common to inject a single dose of isotope and conduct serial images to look for redistribution to determine if ischaemia or infarction was present.

With the introduction of Tc-99m isotopes in the late 1980s, clinicians were told that the era of redistribution had passed and two doses of isotope would be required to conduct stress-rest² imaging. With the development of quantitative³ MPI (figure 1), it has become clear that even Tc-99m isotopes redistribute, making it possible to compare serial images following a single dose of Tc-99m isotopes given after stress.

Work by Winchester *et al*¹ demonstrates how we can further reduce the radiation dose United States patients and staff are exposed to achieving parity with the worldwide practice

of MPI.^{4 5} The incorporation of lower stress isotope dose and quantification of redistribution as shown in figure 1, provide optimal MPI with the least amount of radiation exposure.

Contributors RMF, MRF, TKC and AMK all participated in the preparation and writing of this paper.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors. Acorn Funding Group, LLC of Denver, CO, USA provided funding support for publication costs.

Competing interests FMTVDM was issued to the primary author. Figure reproduced with expressed consent.

Patient consent for publication Not required.

Provenance and peer review Not commissioned; internally peer reviewed.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.



© Author(s) (or their employer(s)) 2019. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

¹Cardiology, FHII-Omniflcmaging-Camelot, El Segundo, California, USA

²Radiology, Eastern Virginia Medical College, Norfolk, Virginia, USA

³Nuclear Imaging, Sebec Consulting & Media, Rock Hill, South Carolina, USA

Correspondence to

Dr Richard M Fleming; rmfmd7@yahoo.com

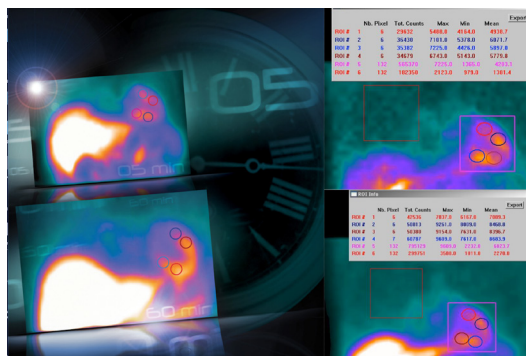


Figure 1 Quantification of Tc-99m isotope redistribution from 5 to 60 min post-stress allows a single dose of isotope to be given post-stress. Figure reproduced with the permission of the authors. Tc-99m, technetium-99m.

REFERENCES

- Winchester D, Jeffrey R, Wymer D, *et al*. Simplified approach to stress-first nuclear myocardial perfusion imaging: implementation of choosing wisely recommendations. *BMJ Open Qual* 2019;**8**:e000352.
- Fleming RM, Fleming MR, McKusick A, *et al*. FMTVDM® stress-first/stress-only imaging is here! but first we need to clarify the use of what (1) stress, (2) rest, (3) redistribution and (4) quantification, really mean. *J Nucl Med Radiat Ther* 2018;**9**:005.
- The Fleming method for tissue and vascular differentiation and metabolism (FMTVDM) using same state single or sequential quantification comparisons. Patent Number 9566037 2017.
- Mercuri M, Pascual TNB, Mahmarian JJ, *et al*. Estimating the reduction in the radiation burden from nuclear cardiology through use of stress-only imaging in the United States and worldwide. *JAMA Intern Med* 2016;**176**:269–73.
- Einstein AJ, Pascual TNB, Mercuri M, *et al*. Current worldwide nuclear cardiology practices and radiation exposure: results from the 65 country IAEA nuclear cardiology protocols cross-sectional study (INCAPS). *Eur Heart J* 2015;**36**:1689–96.