Beware! Some crucial information is left unattended on our myocardial perfusion scans!

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Received Jun 5, 2019; accepted Jun 5, 2019
doi:10.1007/s12350-019-01803-y

See related article, <https://doi.org/10.1007/s12350-019-01802-z>.

In this issue of the Journal of Nuclear Cardiology, Fiechter *et al.* lead us off the road and focus our attention on invaluable information which is almost systematically ignored by most of us. And their conclusions are triply perplexing: bone mineral density is significantly correlated to cardiovascular disease; moreover, this relationship is sex-dependent; and it can be assessed using a low-dose CT-scan. These statements will probably seem astonishing or even counterintuitive for many readers, at least partially.

Correlation between BMD and LVEF is rather easily conceivable. It does make sense that heart failure can rapidly have a negative impact on weight-bearing activities, which will eventually lead to a decrease in bone density. The observation that muscular mass is an important factor for BMD preservation in heart failure patients supports this hypothesis.¹ Unfortunately, it is not that simple. Pfister *et al.*² reported that low BMD could also predict prospectively heart failure, thus precede it, which strongly suggests that there must be other mechanisms to explain the link between osteoporosis and heart failure, or even that they share some common factors.

Even though some relationship between cardiac failure and bone mineral density has already been documented for at least a few years, as Laudisio *et al.*³ among others reported an association between left

ventricular ejection fraction (LVEF) and bone mineral density (BMD) as soon as 2008, it has not gain very much attention in nuclear cardiology departments in day-to-day clinical practice. This could be related to the lack of strong evidence or the presence of conflicting results in the literature. In fact, as opposed to Fiechter *et al.*, Laudisio *et al.*³ reported a significant relationship between LVEF and BMD in women only, not in men, just as Wang *et al.*⁴ identified an association between LV diastolic dysfunction and BMD for women only. On the other hand, Fohtung *et al.* observed that low hip BMD was linked with higher heart failure risk in non-black men, but not in black men nor in women. There is clearly a lack of consensus on that point...

From a technical point of view, evaluation of BMD using low-dose CT has been used for a few years already^{5,6} intra-observer and inter-examination variability acceptable as well as its correlation with *T*-scores obtained from dual X-ray absorptiometry. Some of our colleagues from other medical specialties have already identified some potential applications of CT evaluation of BMD such as evaluation of periprosthetic fracture risk in orthopedics,⁷ or used it as an independent predictor of non-cancer death in patients with prostate cancer⁸ or of all-cause mortality in lung cancer patients. Some simple things such as the size of the region of interest used to determine bone mineral density for example could account for a gender difference if not chosen appropriately.

Thus, a few more steps are probably needed before low-dose CT BMD measurements can get general acceptance from the global nuclear medicine community and be incorporated into daily practice. With a sample size of 491 patients, the study from Fiechter certainly provides high-quality additional data despite its retrospective design but the concept still needs to be further validated by a few other retrospective studies or preferably prospective trials. Notably, the discrepancies observed between some studies about gender specificity

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J Nucl Cardiol 2021;28:2642–3.

1071-3581/\$34.00

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are particularly doubtful. It will be interesting to determine if those conflicting results persist with further prospective validation. Even though the technique has been well described in detail by some authors,⁹ further standardization (CT acquisition parameters, processing) as advocated by Gausden *et al.*¹⁰ should be beneficial. Automating the process, following the example of by Pickhardt *et al.*¹¹ should also contribute to make the technique more user friendly and increase its reproducibility some more.

Hopefully, this article from Fiechter *et al.* should be more than enough to trigger further research on this very interesting topic and eventually allow to better understand the relationship between bone mineral density and heart failure which remains unclear. It should also be convincing enough to stimulate more people to start applying this relatively simple technique, thus improving screening of this underdiagnosed and too often neglected but unarguably meaningful health condition.

Disclosure

Sylvain Prevost declares that he has no conflict of interest.

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