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Revisiting the obesity paradox in heart failure: percent body fat as predictor of biomarkers and outcome

A. Aimo¹, J. Januzzi², G. Vergaro³, R. Latini⁴, I.S. Anand⁵, J.N. Cohn⁵, J. Gravning⁶, H.P. Brunner-La Rocca⁷, A. Bayes-Genis⁸, R.A. De Boer⁹, M. Egstrup¹⁰, Y. Takeishi¹¹, K. Huber¹², C. Passino³, M. Emdin³

¹Azienda Ospedaliero-Universitaria Pisana, Pisa, Italy; ²Massachusetts General Hospital, Boston, United States of America; ³Fondazione Toscana Gabriele Monasterio, Pisa, Italy; ⁴IRCCS - Istituto di Ricerche Farmacologiche Mario Negri, Milan, Italy; ⁵University of Minnesota, Minneapolis, United States of America; ⁶Oslo University Hospital, Oslo, Norway; ⁷Maastricht University Medical Centre (MUMC), Maastricht, Netherlands (The); ⁸Germans Trias i Pujol Hospital, Badalona (Barcelona), Spain; ⁹University Medical Center Groningen, Groningen, Netherlands (The); ¹⁰Rigshospitalet - Copenhagen University Hospital, Copenhagen, Denmark; ¹¹Fukushima Medical University, Fukushima, Japan; ¹²Wilhelminen Hospital, Vienna, Austria

Background: Obesity defined by body mass index (BMI) is characterized by better prognosis and lower plasma N-terminal pro-B-type natriuretic peptide (NT-proBNP) in heart failure (HF). We assessed whether another anthropometric measure, percent body fat (PBF), reveals different associations with outcome and HF biomarkers (NT-proBNP, high-sensitivity troponin T [hs-TnT], soluble suppression of tumorigenesis-2 [sST2]).

Methods: In an individual patient dataset, BMI was calculated as weight (kg)/height (m)², and PBF through the Jackson-Pollock and Gallagher equations.

Results: Out of 6468 patients (median 68 years, 78% men, 76% ischaemic HF, 90% reduced EF), 24% died over 2.2 years (1.5–2.9), 17% from cardiovascular death. Median PBF was 26.9% (22.4–33.0%) with the Jackson-Pollock equation, and 28.0% (23.8–33.5%) with the Gallagher equation,

with an extremely strong correlation ($r=0.996$, $p<0.001$). Patients in the first PBF tertile had the worst prognosis, while patients in the second and third tertile had similar survival. The risks of all-cause and cardiovascular death decreased by up to 36% and 27%, respectively, per each doubling of PBF. Furthermore, prognosis was better in the second or third PBF tertiles than in the first tertile regardless of model variables. Both BMI and PBF were inverse predictors of NT-proBNP, but not hs-TnT. In obese patients (BMI ≥ 30 kg/m², third PBF tertile), hs-TnT and sST2, but not NT-proBNP, independently predicted outcome.

Conclusion: Patient prognosis improves with either BMI or PBF. Obesity, assessed with BMI or PBF, is associated with lower NT-proBNP but not hs-TnT or sST2. hs-TnT or sST2 are stronger prognostic predictors than NT-proBNP among obese patients.

