COMMENTS AND RESPONSES

Pericardial Adipose Tissue, Atherosclerosis, and Cardiovascular Disease Risk Factors: The Jackson Heart Study

Comment on Liu et al.

We read the article by Liu et al. (1) with great interest. The investigators carefully stated that because it is difficult to distinguish pericardial from epicardial fat with computed tomography (CT), they measured pericardial adipose tissue by the combination of pericardial fat and epicardial fat. While they recognized this important misclassification, we also noted that they not only technically but conceptually discussed pericardial and epicardial fat as identical to adipose tissue.

This appears to be incorrect and misleading. Epicardial and pericardial adipose tissue are clearly different anatomically, embriologically, physiologically, biomolecularly, and clinically (2,3). Epicardial adipose tissue is the fat located between the myocardium and visceral pericardium, whereas pericardial adipose tissue is the fat depot outside the visceral pericardium and on the external surface of the parietal pericardium as defined by autopsy and imaging studies (2,3). Simply put, epicardial fat is the fat depot immediately adjacent to the heart, whereas pericardial fat is the outer fat accumulation of the heart. Under physiological conditions, epicardial fat serves as a source of energy to the myocardium and a buffer against the toxicity of free fatty acids (2). The physiological role of pericardial fat is partially unknown. Epicardial fat originates from the splanchnopleuric mesoderm, whereas pericardial fat originates from the primitive thoracic mesenchyme. Epicardial fat is supplied by branches of the coronary arteries, whereas the pericardial fat is supplied by noncoronary sources. In addition—and more important—because no muscle fascia separates the two tissues, the epicardial fat and the myocardium share the same microcirculation (2). This is not true for the pericardial fat. Hence, the intimal proximity to the coronary arteries and the underlying myocardium intuitively accounts for the epicardial fat rather than the pericardial fat as stated by Liu et al. (1). Because epicardial fat is metabolically active and the source of several adipokines, potential direct interactions through paracrine or vasocrine mechanisms between epicardial fat and myocardium are strongly suggested (4). This is clearly not true for the pericardial fat. Epicardial and pericardial fat are also clinically different. Echocardiographically, epicardial fat is identified as the echo-free space between the outer wall of the myocardium and the visceral layer of the pericardium, as we first proposed (3). Pericardial fat thickness can be identified as the hypoechoic space anterior to the epicardial fat and the parietal pericardium. Echocardiographic epicardial fat thickness reflects visceral and myocardial fat accumulation (5) and correlates well with cardio-metabolic risk factors (3). Differently to what is stated by Liu et al., cardiac CT or multi-detector CT can actually distinguish between epicardial and pericardial fat (3). However, because it is questionable if the study by Lui et al. really made a differentiation between epicardial and pericardial fat, the pathophysiological role of the latter is unclear. For all these reasons, the need to distinguish between epicardial and pericardial fat is compelling.

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References

1. Liu J, Fox CS, Hickson D, Sarpong D, Ekunwe L, May WD, Hundley GW, Carr JJ, Taylor HA. Pericardial adipose tissue, atherosclerosis, and cardiovascular disease risk factors: the Jackson Heart Study. Diabetes Care 2010;33:1635–1639
2. Iacobellis G, Corradi D, Sharma AM. Epicardial adipose tissue: anatomic, biomolecular and clinical relationships with the heart. Nat Clin Pract Cardiovasc Med 2005;2:536–543
3. Iacobellis G, Willens HJ. Echocardiographic epicardial fat: a review of research and clinical applications. J Am Soc Echocardiogr 2009;22:1311–1319
4. Iacobellis G, Barbaro G. The double role of epicardial adipose tissue as pro- and anti-inflammatory organ. Horm Metab Res 2008;40:442–445
5. Malavazos AE, Di Leo G, Secchi F, Lupo EN, Dogliotti G, Coman C, Morricone L, Corsi MM, Sardanelli F, Iacobellis G. Relation of echocardiographic epicardial fat thickness and myocardial fat. Am J Cardiol 2010;105:1831–1835