Adipose tissue plays a key role in cardiovascular disease (CVD) and metabolic syndrome [1]. Epicardial fat (EF) is a special visceral fat depot covering the surface of heart and the adventitia of coronary artery [2]. Both EF and heart share the same coronary blood stream and influence each other [3].

Anatomical and physiological studies revealed different characteristics of EF compared to other fat depots. EF has relative smaller size of adipocytes but higher activity of lipid uptake and adipokines secretion than other fat depots [2]. Moreover, EF contains higher protein level [4] and has capacity of lipolysis [5], but weaker oxidative level [4] than other fat depots. Accordingly, EF can maintain a stable lipid level and supply energy for myocardium [2].

The advancing tomographic technology supplied a better and accurate tool to measure EF. The tomographic measurement of EF can be used as direct or indirect biomarker for the diagnosis of metabolic syndrome. For example, based on echocardiographic study, EF thickness is the independent predictive factor for obesity diagnosed by body mass index calculation. However, EF mass is not associated to other fat depots [3,6-8]. EF thickness is also positively associated with insulin resistance in obese patients [9] and elderly people [10]. Moreover, EF thickness is found to be independently related to hypertension [8], higher level of low-density lipoprotein cholesterol (LDL) [8] and fasting glucose levels [11].

EF also actively produces both inflammatory cyto/chemokines such as tumor necrosis factor–α, monocyte chemoattractant protein–1, interleukin-6, nerve growth factor, resistin, etc. [12] and anti-inflammatory adipokines such as adiponectin and adrenomedullin [12,13]. Adiponectin inhibits insulin resistance, atherosclerosis and inflammation [12]. Adrenomedullin is an angiogenic factor and is able to dilate vessels [13]. The reason for the secretion of both protective and harmful adipokines in EF is still unclear. However, it is well known that EF impacts the local myocardium and even the heart through this particular function. Interestingly, adipokine-secretion was observed to be influenced by aging in a sexually-dimorphic manner, which may explain why aged women usually have more severe CVD than aged men [14].

EF mass has also relationship to CVD, and is positively correlated to carotid intima-media thickness and arterial stiffness [15]. EF thickness is significantly associated with the extent and degree of coronary artery diseases (CAD) [16,17]. EF was found to become greater in the case of hypertrophic cardiomyopathy due to hypertension [3].

Although we have known many features of EF as shown above, its function and role in CVD is not clear up until now. The measurement of EF mass is a valuable tool to evaluate the treatment of some diseases. For example, EF mass decreased after weight-loss in obese patients [18]. However, we don’t have more information about the role of EF in the treatment of CVD. More studies on this small tissue may explore a new area for a better understanding of CVD.

References


