

Exosomes and Metabolic Diseases

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Editorial

Metabolic syndrome (MetS) is an arrangement of cardiovascular and metabolic risk factors that dramatically increase cardiovascular mortality and morbidity and type 2 diabetes [1-3]. MetS is characterized by central obesity, dyslipidemia, compromised fasting glucose, and hypertension [4]. However, the pathophysiological mechanisms that lead to MetS are complex and not yet completely comprehended. MetS is a systemic problem with multiple organs affected and involved in the pathophysiology. Obesity is a main risk factor of MetS. Adipose tissue plays an important role on the genesis and progression of a number of clinical complications in other cells and tissues. New research approaches have revealed several types of biomolecules through which adipocytes communicate with distant cells and tissues. Adipose tissue crosstalk with other cell types and organs regulates energy homeostasis and function. Among these new discovered biomolecules, extracellular vesicles have triggered a lot of interest [5,6]. Extracellular vesicles are small membrane-bound vesicles (100 nm-1 µm) secreted by cells into the extracellular space. The majority of EVs are considered exosomes for endosome-derived and microvesicles for plasma membrane-derived vesicles. EVs promote cell-cell crosstalk because they transport diverse bioactive molecules (lipids, proteins, small peptides, RNA and miRNA among others) [7]. It has been established that EVs interact with specific targets. Once released, EVs can interact with a target cell, deliver its cargo to the cytosol of the recipient cell, and modulate its phenotype. EVs such as exosomes can transfer functional protein and translatable mRNA, miRNA or siRNAs cargo that could activate or silence recipient target genes [8,9]. The mechanisms for EVs uptake is still matter of debate, however, an active uptake process with specialized intracellular transport machinery has been proposed [10]. EVs play an important physiological role on the integral communication between cells, tissues and distant organs. Therefore, is only logic to consider that these subcellular particles can also be involved in pathophysiological mechanisms in diseases. The role of EVs on MetS have recently been reviewed [5]. The emphasis has been to highlight the EVs as biomarkers in humans but also as determinants of metabolic diseases including MetS and potential therapeutic targets. Diabetes and MetS have been considered inflammatory diseases and macrophages play a key role in the pathophysiology. Macrophages-derived exosomes from adipose tissue are postulated to disseminate the disease to other tissues. However, macrophages seem to communicate with other cells in more sophisticated ways. Local macrophages exist in all tissues. It has been reported recently that macrophages located in the heart

facilitate electrical conduction interacting via Cx43-containing gap junctions [11]. The mechanisms or mediators of this interaction are to be discovered. However, these results stress the complexity of cell-cell crosstalk. Macrophages are susceptible to metabolic changes and signaling from other tissues such as adipose tissue. The questions are: how local macrophages in specific organs are affected by signaling from macrophages from adipose tissue? And how dysfunctional signaling, in MetS for instance, can affect these local macrophages that in turn impair function? Answers to these questions will provide knowledge to identify new therapeutic targets for metabolic diseases.

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