

Perivascular Adipose Tissue Inflammation in Cardiovascular Disease.

Prof. Tomasz Guzik MD PhD

Department of Internal and Agricultural Medicine, Jagiellonian University, Cracow,
Poland

Recent studies point to a particular role the perivascular adipose tissue plays in cardiovascular disease. Extra-medial thickness, related to perivascular adipose tissue appears to be related to cardiovascular prognosis and events as well as the classical measures such as intima-media thickness. The nature of these relationships and the pathogenetic role of perivascular adipose tissue remain however poorly defined on a mechanistic level. Virtually all arteries are surrounded by a significant amount of perivascular adipose tissue, which has long been considered to serve primarily a supportive, mechanical purpose. Recent studies that both visceral and perivascular fat is a very active endocrine and paracrine source of inflammatory cytokines and adipokines. The latter include beneficial adipocytokines such as adiponectin or so far unidentified adipocyte derived relaxing factor (ADRF) as the presence of perivascular AT may decrease contractile responses to vasoconstrictive agents. However, in pathological states such as obesity, hypertension, diabetes and other cardiovascular disorders perivascular tissue becomes dysfunctional and production of protective factors diminishes while detrimental adipocytokines such as leptin, resistin, IL-6, TNF-alpha or IL-17 increases. Moreover the dysfunction of perivascular fat can lead to imbalance between vascular nitric oxide (NO) and superoxide production. Adipokines also regulate immune system by chemokines (such as MIP-1 or RANTES) and inducing inflammation with infiltration of T cells and macrophages to the vessel wall . Interestingly central nervous system can affect vascular function through mediation of perivascular adipose tissue dysfunction. In particular sympathetic nervous system endings are present in both visceral and perivascular AT. This powerful relationship between the brain and the vessel can be termed "brain-vessel axis" in which perivascular adipose tissue may take center stage. The role of perivascular fat in the regulation of blood vessels depends on metabolic state, inflammation and clinical risk factors. In health protective and vasorelaxant properties of perivascular AT dominate, while in pathology damaging factors including neural stimulation of sympathetic nerve endings or humoral effects of certain hormones and adipocytokines dominate.