Oxidized LDL and the connection to diabetes

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Patients with diabetes have an increased risk of developing cardiovascular diseases. An atherogenic blood lipid profile, characterized by low levels of high-density lipoprotein (HDL) particles, increased levels of triglycerides and a prevalence of small, dense low-density lipoprotein (LDL) particles is commonly present in diabetic patients. Small, dense LDL particles more easily penetrate the vessel walls, where they tend to get trapped and subjected to oxidative modifications. Oxidized LDL is interpreted by the cells as foreign and the immune system is activated. It is today widely accepted that oxidized LDL is atherogenic and directly involved in the initiation and progression of the atherosclerotic disease process. Mercodia Oxidized LDL ELISA assays have been used in several studies as a prognostic marker of developing atherosclerosis.

Background

Atherosclerosis is believed to be caused by a chronic inflammation in vessel walls and oxidized LDL is thought to play a key role in the inflammatory process. Due to the high blood pressure, plasma constituents continuously seep into the intima and at reasonable blood levels low density lipoprotein (LDL) particles may pass in and out of the vessel walls. When blood LDL levels increase, LDL particles tend to get trapped in the intima where they are subjected to oxidative modifications. Oxidized LDL is recognized by the cells as foreign, and originates an activation of the immune system and an inflammatory response.

Kopprasch and colleagues (2002) studied circulating levels of oxidized LDL in subjects with impaired glucose tolerance compared to control subjects with normal glucose tolerance. They found oxidized LDL levels to be significantly increased in subjects with impaired glucose tolerance compared to controls.

Oxidize LDL levels and the metabolic syndrome

Sigurdardottir et al. (2002) found a significant correlation of oxidized LDL levels with factors constituting the metabolic syndrome, like blood levels of triglycerides and insulin, body mass index, waist-to-hip ratio and HDL-cholesterol. They also found the underlying mechanisms to be linked to the occurrence of small LDL particles.

In addition, Lapointe et al. (2006) found an association of circulating oxidized LDL levels and factors of the metabolic syndrome in a study of postmenopausal women. They found women with the metabolic syndrome to have significantly higher levels of oxidized LDL than women without the metabolic syndrome.

The diabetes connection

Small, dense LDL particles are considered more atherogenic than larger LDL particles. Small, dense LDL particles pass more easily into the vessel walls and have a greater capacity to bind to proteoglycans in the intima, where the oxidative modifications take place.

Several studies have demonstrated a predominance of small, dense LDL particles in diabetic patients. Scheffer et al. (2003) studied the relationship of LDL size with circulating levels of oxidized LDL in type 2 diabetic patients. They found that the prevalence of small, dense LDL particles in diabetic patients is associated with high circulating levels of oxidized LDL. These findings provide additional evidence for the role of small, dense LDL particles in the development of atherosclerosis in diabetic patients.

The Mercodia Oxidized LDL ELISA assays

Mercodia is the first successful developer of commercially available oxidized ELISA assays. The Mercodia Oxidized LDL ELISA (cat# 10-1143-01) is based on the mouse monoclonal antibody 4E6 and was used in all the above studies.

References


Lapointe et al. (2006) Circulating oxidized LDL is associated with parameters of the metabolic syndrome in postmenopaual women. Atherosclerosis (Epub May 3)
