

The Clinical Importance of Oxidative Stress Biomarkers

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Abstract

Oxidative stress is thought to be a major contributor to a variety of diseases. A plethora of methods for measuring the extent and nature of oxidative stress have been developed and used in virtually all diseases, ranging from DNA oxidation to proteins, lipids and free amino acids. Increased understanding of disease biology and redox biology has resulted in more specific and sensitive tools for measuring oxidative stress markers, which are very diverse and sometimes very low in abundance. The literature is extremely diverse. It is often difficult to draw broad conclusions about the significance of oxidative stress biomarkers because only a small proportion of diseases have used a variety of different biomarkers and different biomarkers have been studied.

Keywords: Cardiovascular risk factors • Dietary intervention • Inflammation • Polyphenols

Introduction

Since it was discovered that vitamin D receptors are expressed not only in tissues related to bone metabolism, but also in many other tissues such as the brain, prostate, breasts, immune cells and so on, there has been a growing interest in the extra-skeletal effects of vitamin D. Vitamin D has been linked to a variety of chronic diseases, including cancer, heart disease, metabolic syndrome, prediabetes, diabetes, inflammatory and autoimmune diseases [1].

Description

Patients with type 2 diabetes mellitus (T2DM) typically have low vitamin D levels, but it is unclear whether this is a coincidence or whether low vitamin D levels contribute to the disease's appearance. Recent research suggests that vitamin D deficiency may play an important role in T2DM pathogenesis by altering several critical processes in the development of diabetes and its complications, including pancreatic insulin secretion, peripheral insulin resistance, insulin receptor gene down-regulation, systemic "sterile" inflammation and immune activation [2,3]. Patients with type 2 diabetes mellitus (T2DM) have low vitamin D levels, but it is unclear whether this is a coincidence or if low vitamin D levels contribute to the disease's emergence. According to recent research, vitamin D deficiency may play an important role in the pathogenesis of T2DM by altering several critical processes in the development of diabetes and its complications, including pancreatic insulin secretion, peripheral insulin resistance, insulin receptor gene down-regulation, systemic "sterile" inflammation and immune activation [4].

SASP factors are involved in several acute and chronic pathological processes, including CVDs, acute and chronic kidney disease (CKD), neurodegenerative diseases (NDs), macular degeneration (MD), biliary diseases and cancer. Obesity, diabetes, hypertension and atherosclerosis are all associated with the inflammatory pathway mediated by IL-1, IL-6 and IL-8, as well as increased cellular senescence. Furthermore, SASP-driven

osteoblastic transdifferentiation of senescent smooth muscle cells is linked to vascular calcification [5].

Conclusion

The markers discussed here have been studied in a variety of disease settings and with varying degrees of rigour, ranging from meta-analyses of multiple clinical studies to promising evidence from preclinical studies. Even when the strongest evidence is available, their specificity as an oxidative stress biomarker, as in the case of oxLDL, may be called into question. Although oxidative stress is likely to play a role in several diseases, very few oxidative stress markers have made it into routine clinical use for a variety of reasons. The oxidative modifications' properties, such as their labile nature or low abundance, pose significant challenges in translating them into a high-throughput, cost-effective clinical diagnostic.

Acknowledgement

None.

Conflict of Interest

There are no conflicts of interest by author.

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