

Inherited variations in the SOD and GPX gene families and cancer risk.

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Abstract

Antioxidant defence enzymes are essential protectors of living organisms against oxidative stress. These enzymes are involved in the detoxification and decomposition of harmful chemical compounds called reactive oxygen species (ROS), which are, first and foremost, a source of intracellular oxidative stress. ROS directly promote the oxidative damage of genes resulting in aberrant regulation of many vital cell processes. As a consequence, the presence of ROS can lead to genomic instability, deregulation of transcription, induction of mitogenic signal transduction pathways and replication errors, all of which may increase the risk of cancer development. Single nucleotide polymorphisms of antioxidant defence genes may significantly modify the functional activity of the encoded proteins; therefore, certain alleles can be established as risk factors for particular cancer types. In the future, these risk alleles may be utilized as genomic markers of cancer predisposition to allow for early prevention measures among carriers of these alleles. The review is devoted to common single nucleotide polymorphisms of the superoxide dismutase (SOD) and glutathione peroxidase (GPX) gene families and their impact on carcinogenesis. The predictive significance of several polymorphisms was determined, and these polymorphisms were recommended for further in-depth research.