

## Selenium: an element for life.

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### Abstract

This review aims to illustrate the importance of selenium (Se) for maintenance of overall health, especially for the thyroid, immunity, and homeostasis.

Furthermore, it outlines the role of Se in reproduction and in virology and discusses the effects of Se supplementation in critical illness. The multifaceted aspects of this essential nutrient have attracted worldwide clinical and research interest in the last few decades. Se exerts its activity in the form of the amino acid selenocysteine incorporated in selenoproteins. The impact of Se administration should be considered in relation to its apparent U shaped effects, i.e., exhibiting major advantages in Se-deficient individuals but specific health risks in those with Se excess. Addition of selenium to the administration of levothyroxine may be useful in patients with low Se intake and with mild-form or early-stage Hashimoto's thyroiditis (HT). Serum Se concentration (possibly also at tissue level) decreases in inflammatory conditions and may vary with the severity and duration of the inflammatory process. In such cases, the effect of Se supplementation seems to be useful and rational. Meanwhile, Se's ability to improve the activity of T cells and the cytotoxicity of natural killer cells could render it effective in viral disease. However, the evidence, and this should be stressed, is at present conflicting as to whether Se supplementation is of benefit in patients with HT, though there are indications that it is advantageous in cases of mild/moderate Graves' Orbitopathy. The role of Se in type 2 diabetes mellitus (T2DM) is ambiguous, driven by both Se intake and serum levels. The evidence that insulin and glycaemia influence the transport and activity of Se, via regulatory activity on selenoproteins, and that high serum Se may have a diabetogenic effect suggests a 'Janus-effect' of Se in T2DM. Though the evidence is not as yet clear-cut, the organic form (selenomethionine), due to its pharmacokinetics, is likely to be more advantageous in long-term prevention, and supplementation efforts, while the inorganic form (sodium selenite) has proven effective in an acute, e.g., sepsis, clinical setting. Recent data indicate that functional selenoprotein single-nucleotide polymorphisms (SNPs) may interfere with Se utilization and effectiveness.