

## Too much salt upsets the immune system

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*Several recent studies suggest that excessive consumption of salt can derange the immune system and promote the development of certain autoimmune disorders.*

On average, each Canadian consumes about 3400 mg of sodium daily, which is much more than the 2000-2400 mg recommended by most medical associations. This excess is concerning, because several studies have clearly shown that an elevated dietary intake of sodium strongly increases the risk of hypertension, the principal risk factor for cardiovascular diseases. It is estimated that an arterial pressure greater than normal ( $\geq 115$  mm Hg systolic) is itself responsible for about half of all heart attacks and strokes, which result in 10 million premature deaths worldwide each year. A reduction in the arterial pressure due to decreasing the intake of sodium could thus significantly reduce the mortality caused by these cardiovascular events.

### IMPACT ON IMMUNITY

Several studies have reported that excess sodium can also accumulate within the body tissues and disrupt the delicate equilibrium which permits our immune system to distinguish between self (our own cells) and non-self (bacteria, viruses, cancer cells). When this equilibrium is broken, the immunity is disturbed and can begin to attack the organism itself for no reason, which leads to the appearance of autoimmune disorders.

Studies have shown that elevated consumption of sodium can perturb the function of regulatory T lymphocytes (which prevent the immune system from being overactive) and, in parallel, activates the pro-inflammatory Th17 lymphocytes. This disequilibrium is accompanied by a hypersecretion into the blood of several pro-inflammatory cytokine molecules (GM-CSF, TNF and IL-2) and by a notable acceleration in the development of autoimmune disorders by model animals which are genetically predisposed to develop such diseases<sup>1</sup>. This effect of an elevated intake of sodium has been observed for several autoimmune disorders, including multiple sclerosis, lupus, rheumatoid arthritis and Crohn's disease<sup>2</sup>, which suggests that the excessive consumption of sodium could be a lifestyle factor that promotes the occurrence or aggravates the symptoms of several autoimmune disorders.

To this end, it is worth noting that the incidence of autoimmune disorders has considerably increased over the past 50 years, which coincides with the large-scale use of sodium by the food industry, particularly in fast food.



### SALT AND ARTHRITIS

In humans, studies of the effects of sodium on autoimmune disorders are in their early stages and few studies have addressed this issue. Results obtained from patients regarding arthritis tend to show that excess sodium can effectively increase the risk of developing this disease. For example, one study carried out with 18,555 Spanish subjects showed that people who reported the highest sodium consumption had a 40% greater risk of developing rheumatoid arthritis than did those who consumed less<sup>3</sup>. Other studies suggest that this increase in risk due to sodium is particularly significant (220%) in heavy smokers<sup>4</sup>.

More than 80% of consumed salt is from highly processed foods and it is thus consumed involuntarily. The only truly effective way to reduce salt intake is to diminish the consumption of prepared products and to cook for oneself as often as possible.

It should also be recalled that salt is certainly not the only way to season a dish: we are able to take advantage of hundreds of spices and seasonings derived from the four corners of the world and to use these uniquely flavoured ingredients as an excellent way to diminish our salt consumption and to explore new culinary horizons.

- (1) Kleinewietfeld M et al. Sodium chloride drives autoimmune disease by the induction of pathogenic TH17 cells. *Nature* 2013; 496: 518-22.
- (2) Toussiroit E et al. Could sodium chloride be an environmental trigger for immune-mediated diseases? An overview of the experimental and clinical evidence. *Frontiers in physiology* 2018; 9: 440.
- (3) Salgado E et al. High sodium intake is associated with self-reported rheumatoid arthritis: a cross sectional and case control analysis within the SUN cohort. *Medicine* 2015; 94: e0924.
- (4) Sundström B et al. Interaction between dietary sodium and smoking increases the risk for rheumatoid arthritis: results from a nested case-control study. *Rheumatology* 2015; 54: 487-93.