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LETTER TO THE EDITOR

LIST DO REDAKCJI

BEYOND SWEETNESS: THE IMMUNOMODULATORY EFFECTS OF SUCRALOSE AND ITS IMPLICATIONS IN AUTOIMMUNE DISEASES TREATMENT

POZA SŁODYCZĄ: IMMUNOMODULUJĄCE DZIAŁANIE SUKRALOZY I JEJ IMPLIKACJE W LECZENIU CHORÓB AUTOIMMUNOLOGICZNYCH

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Dear Editor,

As a result of intensive marketing efforts by the food industry in response to the growing epidemic of obesity, non-nutritive sweeteners (NNS) have appeared on the market and have begun to be viewed not only as sugar substitutes but also as health-promoting products, especially for diabetics and body-conscious individuals [1]. Controversy over the safety profile, coupled with reports of beneficial metabolic effects, means that the topic of NNS effects on human health and metabolism remains a challenge for modern science. Recent studies continue to expand our understanding of the potential effects of these substances on human health.

A study published in Nature in 2023 by Zani et al. revealed an unexpected aspect of sucralose, an artificial sweetener, which exhibited immunomodulatory effects at high doses [2].

The sucralose was found to reduce the effector function of T cells by decreasing their proliferation and differentiation into interferon-γ-producing subsets, without affecting their viability in a mouse model [2]. The mechanism underlying this effect is attributed to a reduction in T-cell membrane organization involving lipid rafts with a compartmentalizing function, which selectively enables or avoids the activation of specific signaling cascades [2,3]. This is associated with reduced T cell receptor signaling efficiency and intracellular calcium mobilization [2].

The authors evaluated the effects of sucralose on T-cell response and function in the context of infection, autoimmune disease, and cancer. Sucralose treatment resulted in reduced antigen-specific CD8+ T cell responses in models of subcutaneous cancer and bacterial infection, as well as reduced T cell function during autoimmunity. Notably, sucralose delayed the onset of type 1 diabetes, independent of weight loss, and reduced the number of T cells in colitis [2]. These findings have raised hopes for a potential cure for patients suffering from autoimmune diseases [2,3].

A letter to the editor published by Kränkel and Rauch-Kroehnert, commenting on this study, highlights that sucralose produces such effects at extremely high concentrations [3]. Despite the study authors' claims that these effects can be achieved by consuming the maximum allowable daily dose [2], this is not achievable through a diet consisting solely of artificially sweetened products, particularly given the enormous sweetness of sucralose, which is approximately 600 times that of glucose [3]. Considering the risk of infection and tumorigenesis, the authors suggest that the potential clinical use of sucralose may be as a short-term treatment to reduce acute autoimmune exacerbations, rather than as a long-term preventive treatment. The authors note the need for further studies to investigate whether the cell membrane composition of T cells is particularly sensitive to sucralose, or whether other cell types are similarly affected [3].

This potential discovery opens a new avenue of potential uses for NNSs, which are often lumped together by attributing generalized effects to them. Each substance within this group is distinct, with a potentially different mechanism of action [4]. Most studies focus on either the harmful aspects of NNS or their beneficial effects in terms of weight loss and metabolic effects. However, another pathway of potential uses for these substances may also prove to be groundbreaking.

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