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Nisin - A useful biopreservative

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Nisin, abbreviated as group N Streptococcus inhibitory substance, is a bacteriocin discovered in England. It is an antimicrobial peptide produced by the microbe Lactococcus lactis subsp. lactis. Structurally, it is a thirty-four amino acid polypeptide with a mass of 3500 Da. It is an effective bactericidal agent against Gram-positive bacteria like Streptococcus, Staphylococcus and Mycobacterium. Nisin can form pores that disrupt proton motive force and cause leakage of ions. Additionally, the hydrolysis of adenosine triphosphate (ATP) results in cell death and interferes with cell synthesis as it binds to lipid II, which is a precursor molecule to the synthesis of cell walls in bacteria. It is also used as a food additive for the preservation of dairy products like processed cheese. Nowadays, consumers prefer foods without chemical preservatives, with long shelf life and foods of high safety and quality. Therefore, due to nisin’s good acid tolerance, thermostability at low pH and specific bactericidal mode of action, there is a need for its production in large quantities. Industrially, it can be manufactured by the fermentation of fluid milk or whey using strains of Lactococcus lactis subsp. lactis. The resulting broth is subsequently concentrated and separated, spray-dried and milled to yield small particles. Optimal nisin production usually requires complex media and well-controlled parameters. Therefore, commercial media is mostly recommended as it contains excess proteins, such as tryptone, peptone, meat or yeast extract. It is then purified by using bed ion exchange chromatography, immunoaffinity chromatography and reversed-phase high-performance liquid chromatography (RP-HPLC). Further research on the biomedical applications of nisin will be critical in understanding the mechanism of nisin resistance.

Keywords: Bacteriocin, Antimicrobial, Tryptone, Immunoaffinity Chromatography, Fermentation

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