Biotechnology applications of bioproducts isolated from extremophiles

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Excessive exposure to solar ultraviolet radiation can induce the formation of free radicals leading to skin damage such as photoaging and photocarcinogenesis. New source of antioxidants substances and solar protectors have been the target of world research in the cosmetics sector. In this context microorganisms such as extremophiles are a group of prokaryote rich in new bioproducts. The Antarctica is a continent with a broad perspective to study different ecosystems due to its unique diversity. In this region extremophile bacteria resistant to solar radiation have been isolated. These microorganisms have developed a complex adaptation of the cellular components to grow in cold environments. Bacteria isolated from Antarctica could present an increased synthesis of polar carotenoids to stabilize the membrane during growth at low temperatures. Numerous pigments produced by microorganisms resistant to ultraviolet radiation have been described. The production of carotenoids could be obtained in bioreactors under controlled conditions of nutrients, pH, temperature and aeration. The objective of this study is to select microorganisms resistant to ultraviolet radiation A and B (UVA and UVB) and pigment producers with antioxidant and/or solar protection from the environment of Antarctica. The radiation resistance test samples were done using samples named 3, 24, 30 and 67 and a positive control (*E.coli* K12A15). The cells were suspended in M9 solution, placed in Petri dishes and subjected to UVB radiation. An aliquot of 100 uL of suspension were withdrawn before and after irradiation and inoculated in LB solid medium for cell counting by the method of the microdrop. Cells were irradiated at 0, 2, 4, 8 and 16 KJ for 3 - 23 minutes with UVB light (312 nm). After the incubation period the plates were incubated at 37 ° C for 48 hours, and the colonies were counted to determine the survival curves. The experiment was performed in triplicate. In the trial of post-irradiation survival strain 67 was resistant. This strain produces a colored pigment that acts as a shield against UVB radiation, showing superior resistance to this radiation as compared with the standard strain*, E. coli*. This bacterium is resistant to UVB radiation due to its multiple repair mechanisms. Studies have been conducted in order to identify the pigment with solar protection activity and further formulations of sunscreen creams and skin tests will be done.

Keywords: Antarctica, bioproducts, carotenoids, extremophiles, solar protection.

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