ADVANCEMENT IN DNA REPAIR ENZYMES: EXTREMOZYMES®

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EXTREMOZYMES AND EXTREMOPHILES

Extremozymes are enzymes developed by plants living in extreme environments that assist survival and adaptability. Organisms able to not only survive but thrive in harsh planetary locations are called "extremophiles", a term that literally means "extreme loving." Scientists have been fascinated with extremophiles for many years and have studied their adaptive mechanisms.

Many of these extremophiles are micro-organisms, but even more complex organisms, such as plants, have been able to adapt to the extent required to survive at planetary extremes. These organisms, some of which date back more than 40 million years, use powerful biologic processes to protect themselves against extreme cold, heat, salinity, pH balance, dehydration and radiation.

Varieties of extremophiles include hypoliths from cold, dry deserts; cryophyles found in polar ice; piezophiles from pressurized deep ocean trenches; thermophiles from very hot areas; and polyextremophiles from environments containing multiple adversities. A number of polyextremophiles originate from marine environments where there may be extremes of temperature, pressure, salinity and darkness.

EXTREMOZYMES IN NATURE

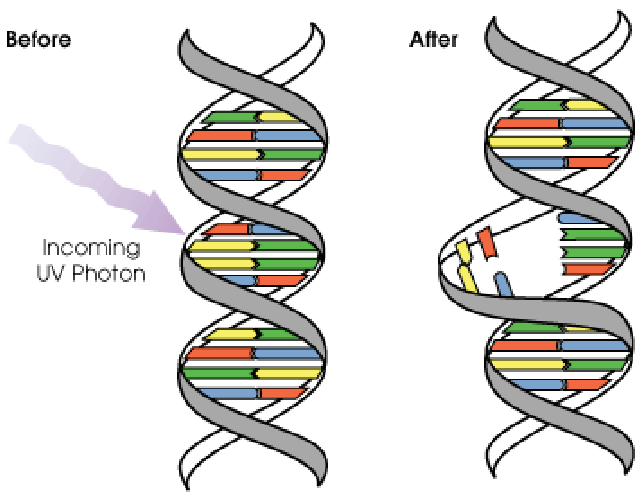
Extremophiles have developed a variety of ingenious survival strategies allowing them to regenerate, metabolize and reproduce in spite of very difficult environmental conditions. Their enzyme systems, Extremozymes, protect vital biological macromolecules, cells and chromosomal DNA from damage by external stresses. In addition to protein structural components, an organisms's DNA genetic blueprint is one of the most important elements that every organism must conserve for survival. Methods of protection include unique configurations of protein folding, protection from dehydration by incorporation of sugar molecules, and biochemical means of cushioning and shielding DNA. An example of this ability is prevention of thymine dimer formation when DNA is exposed to oxidative stress and radiation in these extreme environments. These unique, natural enzymes scavenge free radicals and destroy radical oxygen species.

Some of the harsh environments in which extremophiles thrive include extreme cold, heat, dryness, and deep ocean trenches.

EXTREMOZYMES FOR SKIN

Human skin also experiences environmental extremes. The power of Extremozymes may be harnessed for skin protection against environmental damage including dryness, wind, radiation (solar UVA and UVB), heat, cold, salinity (saltiness from sweating) and irritation (e.g. from soaps). Exposure of structural proteins including collagen and elastin to moisture loss, radiation, heat, cold, and free radical damage as well as exposure of essential genetic DNA to environmental stresses causes aging with loss of elasticity, resilience, immune function, and cancer resistance.

Exposure of skin to solar rays causes photoaging. Thymine dimers form abnormal cross-bridges in DNA as intranuclear DNA experiences oxidative stress. Measurement of thymine dimers as well as other DNA damage markers such as sunburn cell formation can be measured scientifically. Quantification of thymine dimer and sunburn cell formation is a key parameter of sun damage. Just as Extremozymes® shield extremophilic organisms from damaging environmental radiation, the ravages of solar radiation on skin can be lessened by incorporating Extremozymes technology into skin care.



UV Radiation causes the formation of thymine dimers, a form of DNA damage.

The genetic adaptations of extremophiles and their Extremozymes have profound functional applications to skin care. Over time, environmental conditions have a very noticeable and disastrous effect on our skin. Nature's miracles of adaptation can also be used to protect human skin from damage caused by environmental extremes. INNOVATIVE SKINCARE® has drawn from the natural selection processes of specialized extremophilic organisms, pioneering the future of skin care in terms of ultimate protection for healthy skin.

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