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Since life was first spawned on earth, all living cells have been engaged in the development of a network of biodefence systems to protect against the deleterious effects of various environmental stress. Besides exposures to so-called pollutants, human beings breathe oxygen and live in a world of unavoidable exposure to endogenous agents such as active oxygens and other free radicals, ionizing radiation, ultraviolet light and chemicals from such natural sources as normal metabolism. To minimize the harmful effects of these exposures, it is necessary to improve our understanding of fundamental life processes that preserve the genome.

A new and better understanding of biodefence mechanisms will contribute to practical fields such as risk assessment, identification of high risk groups and individuals, and the prevention and treatment of genetic diseases such as cancer caused by environmental stress. Besides direct effects on DNA, active oxygens and free radicals are believed to cause functional defects in living organisms by affecting signal transduction associated with the activation of specific genes, which can in turn lead to cancer and premature aging.

We are, however, beginning to unravel the complexity and understand the intricate details of the surveillance and repair systems that identify and repair damaged DNA. Progress has been made possible by the identification, cloning and characterization of many of the genes that participate in various repair pathways in humans and in other informative organisms such as bacteria, yeast and rodents. Much of this information