

Preface

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

has come from genome research projects carried out in these organisms.

In view of this, the National Institute of Radiological Sciences (NIRS) organized the "International Symposium on Biodefence Mechanisms: Search for Novel Functions in Biodefence against Environmental Stress" to promote the exchange of state-of-the art information among specialists working in various life sciences and to delineate a perspective for future research on biodefence mechanisms. The symposium focused on five related topics: 1) protection against oxidative stress-induced damages, 2) stress-induced signal transduction systems for biodefence, 3) apoptosis as a biodefence mechanism, 4) radiation-induced DNA damages, repair and mutagenesis, and 5) repair of UV-induced DNA damages.

The Proceedings include three Special Lectures and sixteen papers from the symposium. It is our hope that this volume will contribute to the advancement of science and technology of biodefence against environmental stress. We are confident that fundamental research of this kind will provide information that will help prevent and treat diseases caused by environmental stress.

On behalf of the organizing committee, we would like to express our heartfelt thanks to Japan International Science and Technology Exchange Center (JISTEC) for its co-sponsorship and also to the members of the program committee, chairpersons, panelists, invited speakers, and all other participants.

October 1997

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