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Preface

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PREFACE

The next two issues of the journal *Dose Response* feature 17 papers that were originally presented at the 14th Pacific Basin Nuclear Conference (PBNC), March 21–25, 2004, in Hawaii. The PBNC is organized every two years by the Pacific Nuclear Council (PNC), which is composed of the nuclear societies around the Pacific Rim. Two of the objectives of the PNC are to "provide a strong voice as an internationally recognized, regional, non-government organization at important regional and international forums" and to "identify nuclear-related topics of interest warranting consideration by the PNC members." The papers published in this issue represent a biological "topic of interest" for nuclear societies, and this publication in the Journal aids the PNC in providing that "strong voice" to the international community. The topics discussed in these papers represent the leading edge of radiobiological science research, by some of the world's leading researchers in this area.

Currently, all radiation protection regulations and practices are based on the assumption that any exposure, no matter how small, can damage the cell that is hit, and increase the risk of cancer and non-cancer diseases. This assumption has been effectively communicated over many decades to the general public. While many persons in the nuclear field acknowledge that at the low doses, typical of public and occupational exposures, this premise is an assumption not based on scientific data, that fact has not been communicated to the public. The reluctance of the public to accept nuclear technologies is therefore understandable.

Until relatively recently, biological techniques have lacked the ability to accurately measure and actually test the biological effects and risks of low radiation doses, but that has now changed. In this collected set of papers the reader will discover that the long held assumptions about low dose radiation risk are failing the tests of science. The reader will find that cells and tissues behave very differently if exposed to low doses rather than high doses. As has been known for a very long time, high doses can increase the risk of cancer and other diseases. However, cells hit by a low dose of radiation can communicate that occurrence to other unexposed cells, and initiate adaptive responses that protect the cellular community, not only reducing the risk of any subsequent exposure but also reducing the spontaneous risk of cancer in both tissues and whole animals. The various papers describe the mechanisms responsible for these protective effects, including improved DNA repair, increased death of aberrant

cells, increased levels of anti-oxidants and stimulated immune responses. Several of the papers examine social attitudes toward radiation and identify anti-nuclear political activity, which may have encouraged non-scientific behaviour.

The information provided in this issue has a large potential to influence radiation protection practices as well as policy decisions on the future of nuclear technologies in general, including those relating to energy and medicine. These new findings can similarly have profound implications for public acceptance of nuclear technologies.

It will be interesting, however, to observe the timeframe of these changes, which will reflect the difficulties of reversing decades of governmental policy and public fear.

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