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Preface

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PREFACE

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Since the ground-breaking, land mark first conference was held in 1979 at Penarth, Wales, at the Medical Research Council Pneumoconiosis Unit, recognition of the important role played by active research in the field of pneumoconiosis elucidated exciting discoveries of molecular mechanistic events involved in early disease development and progression. Thereafter eight other conferences were held in North America and Europe. It is possible to foresee now the development of unique pharmacological agents to negate the enhanced activation and/or regulation of key signalling events involved in the development or amelioration of disease. The 9th International conference on fine particles including engineered nanopartcles of an atomic or molecular scale of less than 100 nm was held outside North America and Europe for the first time in Cape Town, South Africa on September 2-5, 2008.

For many decades the toxicity of mineral particles such as asbestos, crystalline silica, coal dust and several other occupational and industrial mineral dusts and fibers that cause toxicity and/or disease had been the major focus of numerous investigations. These investigations established that the physicochemical properties such as, particles size, surface area, surface charge, zeta potential, surface chemical composition and surface reactivity are important parameters involved in the in biologic toxicity and pathogenicity. In addition, cellular signalling events associated with particulate induced enhanced generation of reactive oxygen/nitrogen species (ROS/RNS) leading to the development of fibroprliferative diseases and carcinogenesis is well accepted to be involved in elaborating many signaling events that are key components of pathways leading inflammation, fibrogenesis and carcinogenesis. The enhanced generation of oxidants often associated with indestructible particles such as asbestos, crystalline silica and other particulate dusts is often referred as "frustrated phagocytosis" which continues to promote augmented production of ROS, inflammatory cytokines, chemokines and other factors involved in disease development. A paradigm consistent with asbestos, silica, coal and other indestructible inorganic mineral dusts is the generation of ROS which resulted in oxidative stress and activation of inflammation is encountered with most of the nanoparticles produced for industrial and biomedical applications. This enhanced generation of ROS was often reported to be associated with the nano size particles of less than 100 nm and/or the indestrutable nature of fibers and particles or due to the metal contamination often incorporated with nanoparticles during production.

Studies presented and discussed at the last two 7th and 8th conferences provided in depth discussions on the airborne ambient solid pollutants exposure and the risk associated with increased morbidity and mortality. These studies also provided collective evidence that exposure to fine ambient particles produce toxic insults outside respiratory tract such as cardiovascular dysfunction. The biological

We wish to thank the sponsors, cosponsors, conference organizers and attendees for their enthusiastic participation to make this conference a great success. Grateful thanks are also due to the members of the planning committee and the National Institute of Health. We have greatly enjoyed working with the authors in compiling these selected presentations of this peer reviewed proceedings.

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mechanisms involved in extra pulmonary effects were investigated in animal models showing the formation of thrombi, inflammation associated release of inflammatory cytokines and other factors upregulated in peripheral circulation. These studies demonstrated the potential human health effects caused by ambient particulate exposure was in the fore front at the 8th International conference held at the Environmental Protection Agency Conference Canter in Research Triangle Park, North Carolina, in October 2005. Evidence also showed that in addition to the pulmonary and cardiovascular system other organs such as the brain may be a major secondary target of ambient particle exposure induced toxic response. The pathologic mechanisms appear to be similar with the paradigm of oxidative stress and inflammation becoming orchestrated to promote molecular signaling and the disease development. Now despite the wealth of information and in depth understanding of the toxicology and pathobiology of mineral dust induced diseases many biologic responses specific to cause health effects remain unanswered. Now nanotechnology at the forefront of an industrial revolution producing engineered particles with diverse physicochemical and biological properties was reported to have certain features to cause adverse health effects through the enhanced generation of ROS. This was one the principal mechanisms elucidated in asbestos and crystalline silica induced disease development by activation of multiple signaling pathways involved in the transcription and activation of early response genes. With the advent of nanotechnology and their diverse industrial and biomedical uses unexpected adverse human health is a major concern. The advances that have been reported at these meetings and current toxicity models will contribute to the understanding of the toxicology of nanoparticles and their beneficial human health benefits and industrial uses.

During the 9th International Conference on Particles: Risks and Opportunities held in Cape Town, South Africa, we had a total of 48 presentations covering a vast area of occupational, environmental, nanotoxicology and risk assessment and few of these oral and poster presentations of diverse nature and different realm of scientific investigations representing unrelated areas of novel scientific data were selected for publication in this special issue of the Journal of Toxicology and Environmental Health and a brief highlight of these presentations are discussed below.