Ring in the New Year

New prospects for development, aging and longevity

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The excitement and enthusiasm for the New Year brings with it new thoughts and innovative promises for pioneering avenues of drug discovery and new treatment strategies for a host of disorders. Such thinking is not only optimistic, but also necessary considering the economic costs healthcare brings to any country. For example, the US devotes approximately 16% of the gross domestic product to healthcare, and spending for each individual in the US exceeds \$7,000, a level that is the highest in the world. Yet, it is clear that monetary contributions alone do not offer the most effective healthcare to foster survival for individuals. For example, life expectancy in years in the US equals 78.1 years. Yet, this life expectancy trails behind other developed countries. If one compares the US to Japan, this country expends 8% of the gross domestic product on healthcare, allots approximately \$2,500 for each citizen, and exceeds the life expectancy in the US by 4.5 years. Of course, many factors play a role in these statistics as well as cultural and life style differences. The US is ranked as having the highest level of obesity in the population at 34.3% while countries such as Japan have a 3.4% level of obesity. Differences in population characteristics can then yield changes in the prevalence of a specific disease for a particular country, such as leading to more individuals with diabetes mellitus in one country versus another and subsequently raising healthcare costs with an associated diminished life expectancy.

As a result, a strong argument can be made to strengthen healthcare on a number of fronts that involve improvements in preventative care and diagnosis, appropriate lifestyle modifications, and the initiation of new investigative platforms to understand the complexities of specific disorders as well as foster new avenues that can promote growth and maturation, mitigate aging-related disorders, and extend longevity. In this first issue of *Oxidative Medicine and Cellular Longevity* for the New Year, we offer such a New Year's resolution with our present papers. In a paper by Pandey and Rizvi, the authors describe for us how oxidative stress affects the aging process and the vital need to be able to measure and follow the aging process on clinically relevant terms. They propose a number of biomarker systems for early detection and the insightful use of erythrocytes to act as model cells for the study of aging and age-related diseases. Kovacic and Somanathan next discuss the use of dizocilpine (MK-801), an extensively investigated agent that can have applications for multiple disorders. Yet, their discussion brings a unique perspective to the subject as they delve into the biological mechanisms of MK-801, examine its oxidant metabolites, and outline the biological effects of this agent in the nervous system that involve memory formation and pain sensation with similarities to other agents such as cocaine and phencyclidine. In the next paper, Acharya et al. highlight for us the fascinating role oxidant stress plays in cancer and the targets to consider for future treatments. However through their work, we learn to appreciate the intricate nature reactive oxygen species hold in neoplastic systems, such as straddling a fine line between the promotion of apoptotic cell death in tumors versus the induction of cancer stem cell proliferation and allowing tumor growth. Makpol et al. in their original work address oxidative stress-induced cellular aging in skin fibroblasts of individuals and provide provocative evidence at the cellular level that agents, such as γ -tocotrienol, can control telomere length and telomerase activity to potentially protect against cellular aging. Next, Verma et al. tackle a sensitive problem frequently encountered with radiotherapy treatments: "How can normal tissues be protected from the detrimental effects of radiotherapy and other exposures to radiation?" These authors have identified the aqueous extract of *Piper betle* leaf (PBL) as a potential agent to prevent or reduce radiation-induced injury since they demonstrate that PBL possesses a high antioxidant potential without significant toxicity in mice. Krance et al. in their exciting work take us to the other end of the spectrum with cell development and differentiation. They show in a cell system with HL-60 cells that glutathione has a significant role in determining the course of differentiation in these cells and may have important implications for disorders associated with cell differentiation such as aging-related diseases, cancer, and immune system dysfunction. In the following paper using a model of Ehrlich ascites carcinoma tumor in mice, Choudhury et al. outline the use of the mycotoxins (fungal toxins) MT81 and its structural analogue with reported reduced toxicity, acetic acid MT81, for cancer strategies. The authors show that these agents are effective and robust as anti-neoplastic agents, since they not only increase survival and reduce tumor load, but they also restore normal hematological and anti-oxidant parameters. Our last article is an Extra View paper by Lianqin et al. that extends their highly relevant clinical work with pre-eclampsia. Here they show that the peroxiredoxin family member PrxIII is critical for the scavenging of reactive oxygen species in the placenta and suggest that PrxIII is an important biological target for future strategies that are designed to inhibit the progression of pre-eclampsia. So as we bring in the New Year of 2010 with this issue of *Oxidative Medicine and Cellular Longevity*, our papers bring to light a broad spectrum of innovative advances for healthcare that will hopefully shape strategies for developmental, age-related, and longevity care not only throughout the coming year, but also for a number of years on the horizon.

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