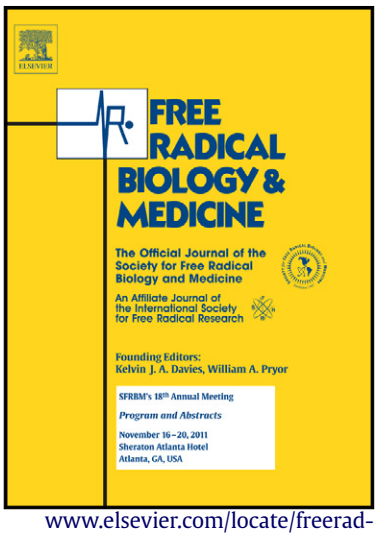

Revisiting an age-old question regarding oxidative stress

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Revisiting an age-old question regarding oxidative stress.

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ABSTRACT

Significant advances in maintaining health throughout life can be made through a clear understanding of the fundamental mechanisms that regulate aging. The Oxidative Stress Theory of Aging (OSTA) is likely the most well-studied mechanistic theory of aging and suggests that the rate of aging is controlled by accumulation of oxidative damage. To directly test the OSTA, aging has been measured in several lines of mice with genetic alteration of the expression of enzymatic antioxidants. Under its strictest interpretation, these studies do not support the OSTA, as modulation of antioxidant expression does not generally affect mouse lifespan. However, the incidence of many age-related diseases and pathologies is altered in these models suggesting that oxidative stress does significantly impact some aspects of the aging process. Further, oxidative stress may affect aging in disparate patterns among tissues or under different environmental conditions. In this review, we summarize the current literature regarding aging in antioxidant mutant mice and offer several interpretations on their support of the OSTA.

ASSESSING THE QUESTION

Over the last century, modern medicine has made major advances in treatment and eradication of several diseases. This has largely been due to an increased understanding of the mechanistic underpinnings of these diseases and implementation of this knowledge to develop treatment options. Vaccination development, insulin administration, heart medication and others have alleviated major health risks and allowed for healthier lives. However, while the incidence of many potentially fatal diseases has declined over the last few decades, the prevalence of age-related diseases and illness remains high due in part to increasing expected lifespans among the world's population (1). Frailty and detrimental changes to the organism that occur with age ultimately make that organism more prone to disease and death, but the process leading to aging itself is still not well understood. The lack of a unified definition for the term aging among the general population, biogerontologists and others reflects the lack of understanding of the phenomenon itself (2). For example, does aging affect the systems within the body separately, or the body as a whole? Why do some