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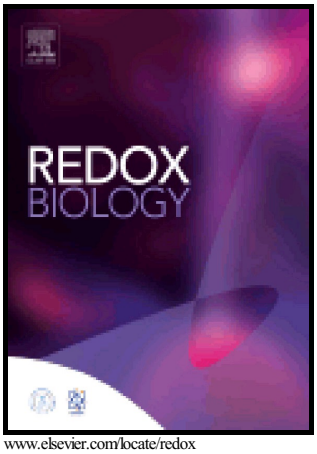

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Exercise, oxidants, and antioxidants change the shape of the bell-shaped hormesis curve

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Abstract

It is debated whether exercise-induced ROS production is obligatory to cause adaptive response. It is also claimed that antioxidant treatment could eliminate the adaptive response, which appears to be systemic and reportedly reduces the incidence of a wide range of diseases. Here we suggest that if the antioxidant treatment occurs before the physiological function-ROS dose-response curve reaches peak level, the antioxidants can attenuate function. On the other hand, if the antioxidant treatment takes place after the summit of the bell-shaped dose response curve, antioxidant treatment would have beneficial effects on function. We suggest that the effects of antioxidant treatment are dependent on the intensity of exercise, since the adaptive response, which is multi pathway dependent, is strongly influenced by exercise intensity. It is further suggested that levels of ROS concentration are associated with peak physiological function and can be extended by physical fitness level and this could be the basis for exercise pre-conditioning. Physical inactivity, aging or pathological disorders increase the sensitivity to oxidative stress by altering the bell-shaped dose response curve.

Introduction