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Guest Editorial

Oxidative stress and the newborn

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Oxidative stress is the final common endpoint for a complex convergence of events and implies that the production of prooxidant free radical species exceeds the capacity of cells within an organ to neutralize or scavenge them. Small amounts of reactive oxygen species (ROS) are necessary to normal cell homeostasis and metabolism through their action as signaling molecules. However, overproduction of ROS as a result of tissue hypoxia – caused by hypoxemia, hypoperfusion, and/or ischemia-reperfusion is responsible for oxidative damage to biological macromolecules, such as carbohydrates, lipids, proteins and DNA, thus having a wide range of toxic biological effects. Therefore, they can participate in the mechanisms of many diseases. In this issue of the Journal of Pediatric Biochemistry we have underwent a review of the basic aspects about the main ROS produced in body metabolism and the mechanisms of antioxidant defense. Oxidative stress can occur early in pregnancy and continue until the first days of life. Due to the importance of ROS in critical periods of development the role of oxidative stress in intrauterine life and delivery has also been reviewed. Placental antioxidant defenses have a crucial role to mitigate the effects of highly reactive and potentially damaging radicals physiologically produced during gestation and healthy placental function is critical for optimal growth and development of the fetus. Biological plausibility and emerging evidence suggest that oxidative stress could be a key link in fetal or developmental programming of disease. It is also important to note that oxidative stress and proinflammatory processes are strongly related mainly in the oxygen related diseases of the newborn such as bronchopulmonary dysplasia. Two chapters are devoted to deal with these concepts. Antioxidant defense is suboptimal in newborn babies. Thus, it is fundamental that oxygen supply in the newborn period will be limited. This significant aspect about the adequate control of oxygenation and the use of oxygen in neonatal period is examined in another chapter. The importance of nutrition to improve the amount of antioxidants is well known. Therefore, feeding newborns with a complete system of antioxidants such as breast milk is mandatory, particularly in the babies at risk such as premature newborns. In this regard, two chapters are focused on the antioxidant characteristics of human milk, its leading role in preterm infant alimentation and the influence of storage.

The aim of this issue is to give a synthesis of the knowing about oxidant stress especially relevant to a vulnerable patient population such as the newborns. Increasing evidence suggests that providing antioxidant strategies may protect the developing baby from this type of injury and is critical for preventing adverse short- and long-term consequences.

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