ADJUVANT ARTHRITIS IN RATS: OXIDATIVE STRESS AND OXIDATIVE METABOLISM IN THE BRAIN


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Introduction and objectives. Adjuvant-induced arthritis is an experimental immunopathology in rats often used as model for studying autoimmune chronic inflammation. The purpose of the present study was to evaluate the oxidative status of the brain of arthritic rats, based mainly on the observation that arthritis induces a pronounced oxidative stress in the serum and liver of arthritis rats, and that morphological alterations have been reported to occur in patients with rheumatoid arthritis.

Material and methods. Oxidative injury parameters, levels and production of reactive oxygen species (ROS) and antioxidant parameters were measured in the total homogenate, cytosol and mitochondria. Oxygen consumption was assessed in the isolated mitochondria.

Results. These animals presented higher levels of ROS in the total homogenate (25% higher) and in the mitochondria (+55%) when compared to healthy rats. The nitrite plus nitrate contents were increased in both mitochondria (+27%) and cytosol (+14%). Arthritic rats presented higher levels of protein carbonyl groups in the total homogenate (+43%), mitochondria (+69%) and cytosol (+145%). Arthritis caused a diminution of oxygen consumption in isolated brain mitochondria only when ascorbate was the electron donor. The disease diminished the mitochondrial cytochrome c oxidase activity by 55%, but increased the transmembrane potential by 16%. The pro-oxidant enzyme xanthine oxidase was 150%, 110% and 283% higher, respectively, in the brain homogenate, mitochondria and cytosol of arthritic animals. The same occurred with the calcium-independent NO-synthase activity that was higher in the brain homogenate (90%) and cytosol (122%) of arthritic rats. The catalase activity was diminished by arthritis in all cellular fractions (30 to 40%).

Conclusion. It is apparent that the brain of rats with adjuvant-induced arthritis presents a pronounced oxidative stress and a significant injury to lipids and proteins a situation that possibly contributes to the brain symptoms of the arthritis disease.

Key Words: Adjuvant-induced arthritis, cachexia, brain oxidative state.

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