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ORIGINAL ARTICLE

Antioxidant enzymes activities and plasma levels of oxidative stress markers in B-chronic lymphocytic leukemia patients

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Summary

Purpose: *Overproduction of reactive oxygen species (ROS) intermediates above the functional capability of cellular antioxidants may result in instability of important macromolecules and represents the molecular basis of many diseases including inflammation processes, cardiovascular alterations, cancer etc. The purpose of this study was to determine plasma level of superoxide anion, hydrogen-peroxide and malondialdehyde (MDA) as markers of oxidative stress and activities of superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPx) as antioxidant enzymes in B-chronic lymphocytic leukemia (B-CLL) patients.*

Methods: *The study included 29 untreated B-CLL patients in stage A, and 21 in stages B and C, classified according to the Binet system; 31 healthy volunteers formed the control group. After centrifugation of heparinized peripheral blood, plasma levels of all investigated parameters were determined using spectrophotometric methods.*

Results: *Plasma CAT activity was increased in B-CLL patients compared with control subjects, also, progression of disease was related with significantly higher plasma activity of CAT. Also, B-CLL patients showed significantly higher plasma concentration of MDA compared with controls. No statistically significant differences of superoxide anion and hydrogen peroxide as well as plasma activity of SOD and GPx between the tested groups were noted.*

Conclusion: *Increase of CAT activity in B-CLL patients indicates that there is stimulation of the antioxidant enzyme system, while the increase of MDA concentration shows increased lipid peroxidation level. According to these results it could be concluded that an imbalance exists between oxidants and antioxidants in the plasma of B-CLL patients.*

Key words: catalase, chronic lymphocytic leukemia, glutathione peroxidase, malondialdehyde, reactive oxygen species, superoxide dismutase

Introduction

CLL is a predominantly clonal B cell neoplasm of small, resting, long-living B-cells. Despite recent advances in the understanding of the genetics [1], biology [2], clinical behavior [3] and treatment [4], there is no established treatment for CLL and its progression and outcome are highly unpredictable. Expansion of malignant cells leads to their accumulation in the peripheral blood, bone marrow and many tissues. These cells are functionally defective and immunologically distinct from normal B cells [5]. The clinical course of B-CLL is highly heterogeneous, ranging from less than 2 years in symptomatic patients with advanced disease to more than 20 years for patients with an early stage and non-progressive disease [6]. Although the pathogenesis of B-CLL is not fully elucidated, the progressive increase of lymphocyte count coupled with the very low proportion of proliferating cells has led to the notion that B-CLL may be determined by defective apoptosis [7]. The precise mechanisms underlying apoptosis still remain largely unknown. Dysregulation of p53, c-myc and bcl-2 oncogenes can be a cause of defective apoptosis in B-CLL [8]. And, even though the B-CLL cells molecular alterations involving different oncogenes and tumor suppressor genes have been established, the role of oxidative stress in the pathogenesis of this disease is poorly understood and remains a matter of research [9].

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