

Changes in immune phenotypes of peripheral blood lymphocytes (PBLs) among occupationally cytostatic exposed hospital employees.

Anna Tompa¹, Miklós Zrínyi² and Anna Biro²

¹Semmelweis University, Hungary

²National Public Health Institute, Hungary,

Abstract:

Health professionals who had been working in different health care units and who were chronically exposed to cytostatic drugs were examined during the last 25 years. In their working area of the oncology outpatient and hospital unit's cytostatic drug exposure regularly exceeded safety limits due to the lack of proper safety devices. Their health condition was annually investigated by clinics, and it was found that they developed more hematological, immunological and reproductive alterations. In the present study we assessed changes in immune phenotypes based on the CD4/CD8 T-cells ratio, B and NK cell amount measured by FACS methodology. The investigations were carried out in 550 subjects exposed to different cytostatic agents in oncology departments. Data were compared to age matched 83 healthy and non-exposed female controls. Biomarkers were measured by routine clinical laboratory tests, completed with immune phenotyping and measured in peripheral blood lymphocytes (PBL). Health personnel exposed to different agents showed an rate of CD4/CD8 T-cell and a decrease in activated T-cells. Beside these parameters we found an elevation of B-cells and a non-significant decrease in NK-cells. Within the exposed groups smokers showed even stronger decreased NK-cell counts compared to non-smokers. These changes in immune-phenotypes may give us a new biomarker immune suppression of PBL-cells among nurses after toxic exposures in their working environment.

Introduction:

It is widely accepted that cytostatic drugs for the treatment of cancer or autoimmune diseases have immunosuppressive effects on treated patients. However, much less is known about the effect of these drugs on the immune state of health care workers. Several studies are available which establish the importance of B, T and NK-cells in immune suppression caused by environmental or occupational stressors (1,7,10). Our investigations were carried out in 550 subjects exposed to cytostatic drugs, and their data were compared to 81 healthy, non-exposed controls. Biomarkers were measured by routine clinical laboratory tests, completed with immune phenotyping measured by FACS methods. The primary prevention of occupational diseases using a gene- and immune toxicological monitoring system was developed by our laboratory, recently the most powerful tool of health protection in occupational cancer prevention (4,17,18,19). In our previous studies, we have investigated the gene- and immune-toxicity of occupational exposures of different chemicals and drugs developing a follow-up monitoring study called "Hungarian Nurse Study" (2,3). Beside immune toxicity we have examined the chromosomal aberrations, as well as the reduction of DNA repair and increased apoptotic deletion of proliferating peripheral blood lymphocytes and clarified immune suppression caused by these agents (9,16,17). The purpose of the present study is to determine the

immunomodulatory effects of occupational cytostatic exposure among hospital nurses.

Material and methods:

Subjects: Altogether 550 subjects exposed to anesthetic gases were investigated. The results were compared to 83 healthy controls, occupationally not exposed to known substances. Cytostatic drugs were handled by staff only with gloves and surgical mask, but they have no more safety devices during the administration of cytostatic infusion containing Cyclophosphamide, cisplatin, Methotrexate, Adriamycin, Vincristine, Fluorouracil, Bleomycin, Etoposid and Mytomycin-C.

All subjects were interviewed by a physician to collect data on age, medication, smoking and drinking habits, as well as medical and work histories including exposure to known or suspected toxicants, occupational history including duration of exposure and use of protective devices during work. Active smoker and ex-smoker subjects were considered as "Ever smokers".