

C. Ladeira^{1,2}, S. Viegas, ^{1,2}, E. Carolino¹, M.C. Gomes³, M. Brito¹

1 - Escola Superior de Tecnologia da Saúde de Lisboa, Av. D. João II, lote 4.01.69, 1990-096 Lisboa, Portugal

2 - CMDT – Public Health and Policy, Escola Nacional de Saúde Pública, ENSP, Universidade Nova de Lisboa, 1600-560 Lisboa, Portugal

3 - Faculty of Sciences, University of Lisbon, Campo Grande, 1749-016 Lisboa, Portugal

Keywords: Biomonitoring, cytostatics drugs, occupational exposure, genotoxicity biomarkers

Introduction

Exposure in a hospital setting is normally due to the use of several antineoplastic drugs simultaneously. Nevertheless, the effects of such mixtures at the cell level and on human health in general are unpredictable and unique due to differences in practice of hospital oncology departments, in the number of patients, protection devices available, and the experience and safety procedures of medical staff. Health care workers who prepare or administer hazardous drugs or who work in areas where these drugs are used may be exposed to these agents in the air, on work surfaces, contaminated clothing, medical equipment, patient excreta, and other surfaces. These workers include specially pharmacists, pharmacy technicians, and nursing personnel. Exposures may occur through inhalation resulting from aerosolization of powder or liquid during reconstitution and spillage taking place while preparing or administering to patients, through Cytokinesis-block micronucleus test (CBMN) is extensively used in biomonitoring, since it determines several biomarkers of genotoxicity, such as micronuclei (MN), which are biomarkers of chromosomes breakage or loss, nucleoplasmic bridges (NPB), common biomarkers of chromosome rearrangement, poor repair and/or telomeres fusion, and nuclear buds (NBUD), biomarkers of elimination of amplified DNA.

Research Aims

The aim of this study is to compare the frequency of genotoxicity biomarkers, provided by CBMN assay in peripheral lymphocytes between pharmacists, pharmacy technicians, and nurses occupationally exposed to cytostatic drugs with a control group; understanding if there are some differences by job activity.

Methodology

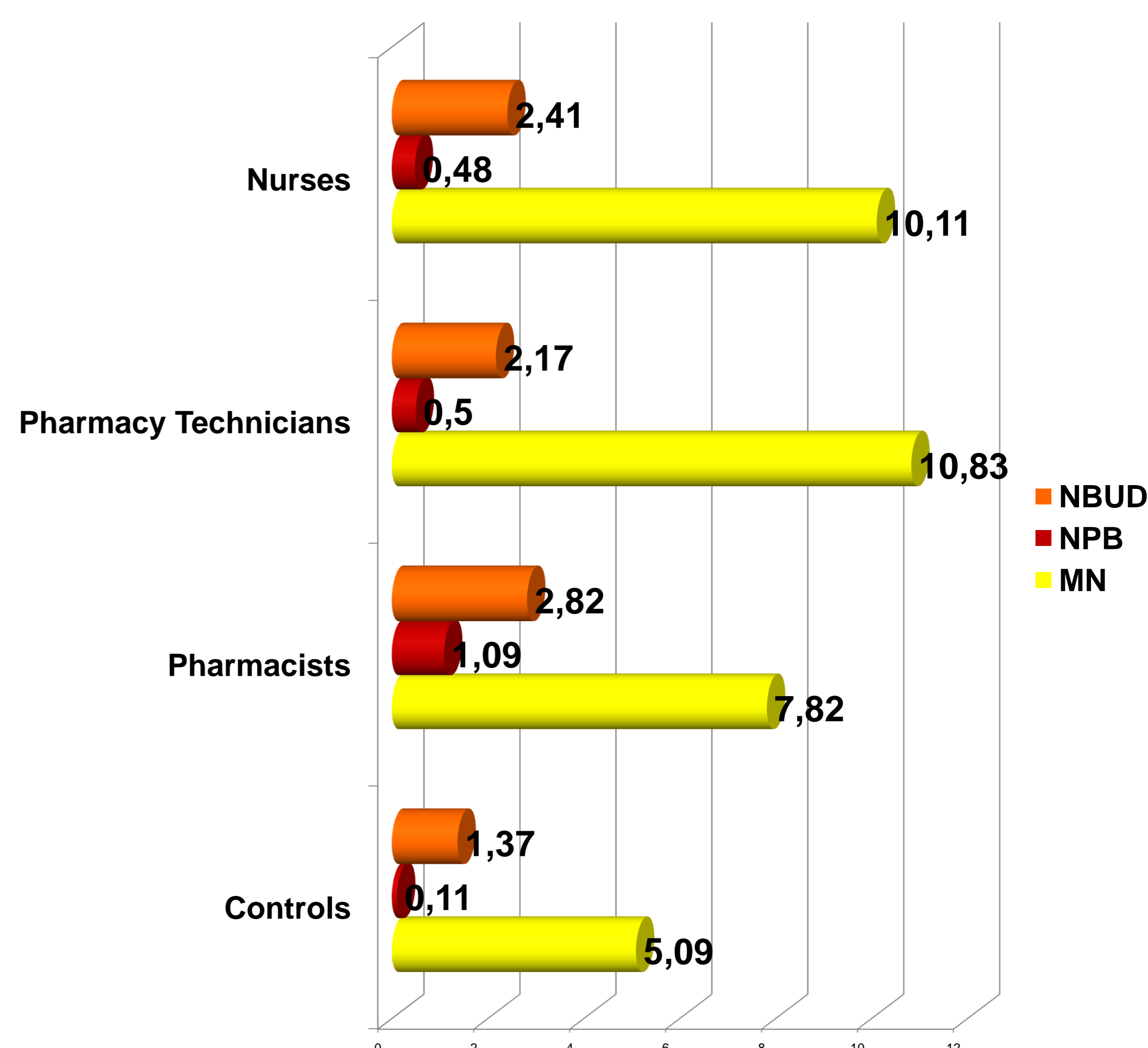
The group of cases was constituted by 46 workers exposed occupationally to cytostatics: 6 pharmacists, 13 pharmacy technician, and 27 nurses; and 46 unexposed individuals (controls), from whom both peripheral blood was collected in order to measure the genetic endpoints proposed in this study.

All samples were coded and analysed under blind conditions and the criterion of scoring the cells was the same as the described in *The Human MicroNucleus Project*. All statistical analysis was undertaken in SPSS software.

Results

The means of the genotoxicity biomarkers results by occupation are presented in Table 1.

Table 1 – Means of genotoxicity biomarkers: micronucleus (MN), nucleoplasmic bridges (NPB) and nuclear buds (NBUD) in workers by occupation, and controls.



All the genotoxicity biomarkers studied presented statistical significant differences between exposed and non-exposed subjects to cytostatics (Mann-Whitney test, $p \leq 0.05$). There were no significant differences in the genotoxicity biomarkers under study between the three categories of workers exposed occupationally to cytostatics (Kruskal-Wallis test, $p \geq 0.05$).

Main conclusions

Occupational exposure to cytostatics drugs is associated with genotoxic effects that can be evaluated by biomarkers. In this study, the results reveal that workers exposed occupationally to cytostatics showed increase frequency of genotoxicity biomarkers in comparison with non-exposed., however no differences were found in what concern to job categories, and therefore, tasks.