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Use of buccal cytome assays in the occupational exposure studies

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So far about 200 studies have been published which concern the formation of micronuclei (MN) in buccal cells of different groups of workers. The first investigation with iron exposed workers was published already 30 years ago. Most studies (55) concern the impact of exposure to agricultural chemicals followed by workers that are exposed to petroleum and its derivatives (24). A similar number of investigations was conducted with medical staffs (exposed to anesthetic gases, cytostatics and radiation) (22). Further studies were conducted with medical students and anatomy laboratory staff which are exposed to formaldehyde (14). Less frequently studied groups are miners, electroplaters, welders, painters and carpenters.

We conducted in the last decade studies with the latter groups and found a clear positive result in individuals which work in the furniture production but not in electroplaters. Also with workers that are exposed to chicken manure (used for energy production) negative results were obtained. It is notable that in all these studies the number of nuclear anomalies which reflect acute cytotoxicity was significantly higher in exposed subjects. A clear increase of MN was found in cotton weavers (in Pakistan) that are exposed to cotton dust. Our latest study concerned the induction of DNA damage in street markers that are exposed to silica crystals and various chemicals. A clear increase of genotoxic effect with a duration of work was detected. This is the first study which demonstrated increased genetic damage in this occupational group.

In several investigations MN rates were comparatively studied in buccal and nasal cells and similar effects were detected in both cell types. Furthermore, in some occupational studies (in total 49) the MN frequencies were monitored in parallel in lymphocytes and buccal cells and significant correlations of the results were found.

The currently available data indicate that MN studies with buccal cells are a cost-effective, rapid and simple approach to find out if workers are exposed to genotoxic carcinogens. This method could complement the chemical exposure measurements which are currently used to control the safety of workers.

Keywords:

micronuclei, nuclear anomalies, occupational exposure, health risks.