

Indoor contamination levels and health risks of antineoplastic drugs for hospital and pharmacy personnel in the Czech Republic

(Hladiny v prostředí a zdravotní rizika cytostatik pro pracovníky nemocnic a lékáren v ČR)

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Abstract:

Antineoplastic drugs are chemically diverse group of chemicals, which are used in medicine to treat cancer diseases. Cytostatic/cytotoxic effects of these drugs are mostly based on direct DNA damage. Due to their non-specific mode of action, which does not distinguish between tumor and health cells, cytotoxic drugs have many serious side effects such as genotoxicity, carcinogenicity, reproductive and developmental toxicity. With respect to their toxic properties, exposure of healthcare personnel handling these drugs is undesirable. This presentation summarises results of our studies focused on monitoring of occupational exposure to these drugs in the Czech Republic.

The monitoring of occupational exposure was based on analytical determination of two chosen drug markers (cyclophosphamide and platinum) in all relevant matrices (air, surfaces, hand washes and urine). Our studies showed that under the common working conditions, inhalation of drug containing aerosols and vapours is rather of minor importance. In contrast, contamination of hands and working surfaces was determined very frequently. Furthermore, biomonitoring of the markers in the workers' urine revealed that the workers' exposures range up to several micrograms of individual drugs per day. This exposure can be associated with low but not negligible risk of cancer. For example, cancer risk associated with the exposure to cyclophosphamide reached up to 8 extra cases per million exposed person per year for individual worker.

To support the occupational safety of the hospital workers, several additional safety measures targeted for reduction of indoor contamination were suggested and implemented into the Masaryk Memorial Cancer Institute, which was used as a model oncology hospital. Subsequent monitoring showed that some of them were significantly effective and therefore they can be recommended also to other hospitals.

In conclusions, our studies brings new insights into the levels and fate of widely used antineoplastic drugs in the working environment. The results may further serve for both exposure modelling and critical risk management of these hazardous drugs.

Acknowledgement:

Research was supported by Ministry of Education, Czech Republic (NPVII no. 2B06171), and by the INCHEMBIOL project MSM0021622412.