## Determination of the external contamination and crosscontamination by cytotoxic drugs on the surfaces of vials available on the Swiss market

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**Introduction**: The external contamination and cross-contamination by cytotoxic drugs on the surface (outside and septum) of 133 vials from various manufacturers and available on the Swiss market were evaluated. All of the tested vials contained one of the following active ingredients: cyclophosphamide, cytarabine, doxorubicin, epirubicin, etoposide phosphate, gemcitabine, ifosfamide, irinotecan, methotrexate or vincristine.

**Methods and materials**: The validated wiping liquid chromatography-mass spectrometry method used in this study allowed for the simultaneous determination of these 10 cytotoxic drugs in less than 30 min.

**Results**: External contamination by cytotoxic drugs was detected on 63% of tested vials (outside and septum). The highest contamination level was observed on etoposide phosphate vials with 1896.66 ng of active ingredient on the outside of the vial. Approximately 20% of the contaminated vials had greater than 10 ng of cytotoxic drugs. Chemical contamination on the septum was detected on 38% of the vials. No contamination or very low levels of cytotoxic drugs, less than 1 ng per vial, were detected on the vials protected by plastic shrink-wrap. Traces of cytotoxic drugs different from the active ingredient were detected on 35% of the tested vials.

**Conclusion**: Handling cytotoxic vials with gloves and having a procedure for the decontamination of vials are of the utmost importance for reducing exposure to cytotoxic drugs. Moreover, manufacturers must improve their procedures to provide products free from any contamination.

Published in : J Oncol Pharm Pract 2013; online. Contact: sandrine.fleury.souverain@hcuge.ch doi: 10.1177/1078155213482683