

# Bulletin de veille n° 67

*1<sup>er</sup> mai 2024 – 30 juin 2024*

## ***Surveillance biologique de l'exposition professionnelle aux médicaments cytotoxiques. Etude de terrain.***

Objectif : *Disposer d'une connaissance actualisée du sujet en accompagnement des demandes d'assistance qui découlent de la valorisation de l'étude sur la surveillance biologique de l'exposition aux médicaments cytotoxiques en milieu hospitalier.*

*La validation des informations fournies (exactitude, fiabilité, pertinence par rapport aux principes de prévention, etc.) est du ressort des auteurs des articles signalés dans la veille. Les informations ne sont pas le reflet de la position de l'INRS. Les éléments issus de cette veille sont fournis sans garantie d'exhaustivité.*

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- **Articles de périodique (PREPRINT)**

Nguyen N., Vallet V., Bouchoud L., Falaschi L., Rudaz S., Bonnabry P., Fleury-Souverain S.  
**Assessment of the surface contamination of the primary packaging of oral antineoplastic drugs and secondary packaging of chemotherapy preparations at a Swiss hospital.**  
Journal of Oncology Pharmacy Practice, 15 mai 2024

Résumé : **INTRODUCTION:** Due to the high toxicity of antineoplastic drugs, handling their packaging could lead to the chemical contamination of hospital environments and exposure risks to healthcare professionals and patients. This study aimed to assess the contamination of two main surfaces: the outer primary packaging of oral antineoplastic drug formulations ( $n = 36$ ) available on the Swiss market and the surface of secondary packaging of injectable antineoplastic drug preparations ( $n = 60$ ) produced by the pharmacy of a Swiss hospital and carriers used for transport ( $n = 5$ ). **METHODS:** Samples were collected using a validated wipe sampling method. The simultaneous analysis of 24 antineoplastic drugs: 5-fluorouracil, busulfan, carboplatin, cyclophosphamide, cytarabine, dacarbazine, daunorubicin, docetaxel, doxorubicin, epirubicin, etoposide, gemcitabine, idarubicin, ifosfamide, irinotecan, methotrexate, oxaliplatin, paclitaxel, pemetrexed, raltitrexed, topotecan, treosulfan, vinblastine, vincristine) and 1 antiviral compound (ganciclovir) was performed by UHPLC-MS/MS. **RESULTS:** A total of 58% and 90% positive results were obtained for the primary packaging of oral chemotherapies and for the secondary packaging of injectable preparations, respectively. The highest quantities found on the primary packaging for oral chemotherapies and on the surface of closed leak-proof bags were 111 ng of methotrexate and 19 ng of gemcitabine, respectively. Gemcitabine (69%) and cyclophosphamide (38%) were the two most common contaminants found on the packaging of injectable preparations and carriers, regardless of the chemotherapy preparations. **CONCLUSION:** Trace levels (ng) of antineoplastic drugs can be found on most surfaces of all evaluated pharmaceutical products. Thus, suitable personal protective equipment is mandatory for healthcare professional handling antineoplastic drugs.

<https://doi.org/10.1177/10781552241250010>

Leeman M., Wetterling M., Kåredal M., Hedmer M.  
**Development and validation of a quantitative wipe sampling method to determine platinum contamination from antineoplastic drugs on surfaces in workplaces at Swedish hospitals.**  
Journal of Oncology Pharmacy Practice, 5 juin 2024

Résumé : **INTRODUCTION:** Antineoplastic drugs (ADs) are frequently used pharmaceuticals in the healthcare, and healthcare workers can be occupationally exposed to ADs. Monitoring of surface contamination is a common way to assess occupational exposure to ADs. The objective was to develop and validate a sensitive and quantitative monitoring method to determine surface contaminations of Pt as a marker for Pt-containing ADs. The surface contaminations of Pt-containing ADs were monitored at four Swedish hospital workplaces. **METHODS:** An analytical method was developed based on inductively coupled plasma mass spectrometry. The wipe sampling procedure was validated regarding different surface materials. The stability of collected wipe samples was investigated. Workplace surfaces were monitored by wipe sampling to determine contaminations of Pt-containing ADs. **RESULTS:** A wipe sampling and analytical method with a limit of detection of 0.1 pg Pt/cm<sup>2</sup> was developed. Pt was detected in 67% of the wipe samples collected from four workplaces, and the concentrations ranged from <0.10 to 21100 pg/cm<sup>2</sup>. In 4% of samples, the detected surface contaminations of Pt in three hospital wards were above proposed hygienic guidance value (HGV) of Pt. In the hospital pharmacy, 9% of the detected surface contaminations of Pt were above lowest proposed HGV. **CONCLUSIONS:** A user-friendly, specific, and sensitive method for determination of surface contaminations of Pt from ADs in

work environments was developed and validated. A large variation of contaminations was observed between detected surface contaminations of Pt in samples collected in wards, and it likely reflects differences in amounts handled and work practices between the wards.

<https://doi.org/10.1177/10781552241259405>

Jung W., Park M., Park S.J., Lee E.J., Kim H.S., Kim S., Yoon C.

**Airborne and surface contamination after rotational intraperitoneal pressurized aerosol chemotherapy using cisplatin.**

Journal of Gynecologic Oncology, 5 juin 2024

Résumé : **OBJECTIVE:** We evaluated the occupational exposure levels of healthcare workers while conducting rotational pressurized intraperitoneal aerosol chemotherapy (RIPAC) using cisplatin in a large animal model. **METHODS:** We performed RIPAC using cisplatin in 6 female pigs and collected surface and air samples during the procedure. Surface samples were obtained from RIPAC devices and personal protective equipment (PPE) by wiping, and air samples were collected around the operating table. All samples were analyzed by inductively coupled plasma-mass spectrometry to detect platinum. **RESULTS:** Among all surface samples (n=44), platinum was detected in 41 samples (93.2%) but not in all air samples (n=16). Among samples collected from RIPAC devices (n=23), minimum and maximum cisplatin levels of 0.08 and 235.09 ng/cm<sup>2</sup> were detected, mainly because of direct aerosol exposure in the abdominal cavity. Among samples collected from healthcare workers' PPE (n=21), 18 samples (85.7%) showed contamination levels below the detection limit, with a maximum of 0.23 ng/cm<sup>2</sup>. There was no significant contamination among samples collected from masks, shoes, or gloves. **CONCLUSION:** During the RIPAC procedures, there is a potential risk of dermal exposure, as platinum, a surrogate material for cisplatin, was detected at low concentration levels in some surface samples. However, the respiratory exposure risk was not identified, as platinum was not detected in the airborne samples in this study.

<https://doi.org/10.3802/jgo.2025.36.e12>

- **Articles de périodique**

Sharp L., Fransson P., Fowler M., Ullgren H. (Préprint dans Bulletin n° 66)

**Aspects of occupational safety: a survey among European cancer nurses.**

European Journal of Oncology Nursing, Volume 70, juin 2024, article 102595

Résumé : **PURPOSE:** Nurses are particularly at risk for occupational exposure to hazardous cancer drugs, risking both acute and chronic health effects. Knowledge on the implemented safety precautions into minimizing these risks is limited. **METHODS:** The European Cancer Nursing Index (ECNI) was developed by the European Oncology Nursing Society (EONS) to illustrate the development and status of this profession. In this study, anonymous online survey data on occupational safety reported by European cancer nurses as part of the ECNI 2022, was analysed. **RESULTS:** A total of 630 cancer nurses from 29 countries responded to the survey. A majority reported that written guidelines (n = 553, 88%) on safe handling and administration of hazardous drugs, personal protection equipment (PPE) and cytotoxic spillage kits (n = 514, 82%) were available at their workplaces. 130 (21%) nurses reported that wipe testing to assess any residual hazardous drugs on workplace surfaces were conducted systematically at their workplaces. 185 (29%) nurses reported that nurses sometimes or always continued with their regular tasks (including handling hazardous cancer drugs) during pregnancy and breast feeding. 185 (29%) also responded that nurses at their workplaces did not receive an introductory education program before handling hazardous drugs. In total, 346 (55%) of the nurses reported that their workplace had a

freedom to speak-up guardian or whistle blower policy for members of staff. **CONCLUSIONS:** Even if most nurses report that there are safety routines in place at their workplaces, the results reveal several serious occupational risks for European nurses handling hazardous cancer drugs. Actions are needed to improve and optimize occupational safety for nursing staff.

<https://doi.org/10.1016/j.ejon.2024.102595>

Robison M., Bush N.J.

### **Clamp for Safety: Improving Intravesical Chemotherapy Practices**

AORN Journal, Volume 119, Numéro 6, juin 2024, Page 412-420

**Résumé :** *Processes for intravesical chemotherapy after transurethral resection of nonmuscle invasive bladder tumors may lack standardization. In 2019, at a large health care system in Los Angeles, California, five incident reports involving chemotherapeutic agent spills from urinary catheters after bladder tumor procedures necessitated a quality improvement project. The project lead determined that a cost-effective alternative device for securing the chemotherapeutic agent in the bladder was needed at four surgical locations of the health care system. In addition, a review of the literature and an observational assessment revealed lack of adherence to standard and recommended processes for using personal protective equipment (PPE) when handling hazardous medications. After revising existing processes, acquiring a cost-effective clamp and recommended chemotherapy PPE, instructing personnel on the clamping process and use of PPE, and implementing use of the clamp, there have been no spills associated with intravesical chemotherapy across the four surgical locations.*

<https://doi.org/10.1002/aorn.14142>

Crul M., Breukels O. (Préprint dans Bulletin n° 57)

### **Safe handling of cytostatic drugs: recommendations from independent science.**

European Journal of Hospital Pharmacy, Volume 31, Numéro 3, mai 2024, Page 191-196

**Résumé :** *Objectives: Due to their mechanism of action, most classical cytostatic drugs have carcinogenic, mutagenic and/or reprotoxic properties. Therefore, occupational exposure of healthcare staff to these drugs should be prevented. Our objective was to lay out European legislation on this topic and reflect on the process of revising the European CM-directive. We summarise independent European and Dutch studies, and give a concise set of basic recommendations for safe working with cytotoxic drugs in healthcare facilities. Methods: We were directly involved in the process of revising the CM-directive: first, through an EU commissioned workshop in the Netherlands, and after that by contributing to the pan-European stakeholder symposium. For this aim, we had to gather the relevant study data from the Netherlands and from Europe. We analysed all relevant industry-independent studies and collated a set of basic recommendations. Results: Independent studies show that the development of measures in recent years can lead to a safe work environment. Standardising the cleaning process leads to a significant improvement in environmental contamination in the majority of hospitals. In the Netherlands, exposure of workers was shown to be well beneath the limit value of 0.74 µg cyclophosphamide per week, therefore showing that the measures taken in recent years are adequate. Conclusions: The safety of healthcare workers is of the utmost importance. Current practice in the Netherlands show that measures taken in recent years are adequate. European legislation should be based on independent scientific research and practice. The first goal should be to bring countries with less safe working levels to a higher level instead of introducing measures that only increase healthcare budgets but not healthcare safety.*

<http://dx.doi.org/10.1136/ejhpharm-2022-003469>