Bulletin de veille n° 78

1er mai 2026 – 30 juin 2026

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)***

Rocca L.M., Gordiani A., Dalla Torre B. and Carbone M.
Modern solution for antineoplastic drugs occupational monitoring: a green analytical chemistry approach.
International Journal of Environmental Analytical Chemistry, 1er mai 2026

Résumé: *Occupational exposure to antineoplastic agents (AAs) poses significant health risks even today, but current biological monitoring strategies are limited, particularly in terms of sensitivity and environmental impact. This study presents a novel and green analytical method for the determination of different classes of AAs in whole blood using the Dried Blood Spot (DBS) technique combined with the sensitivity of an ultra-performance liquid chromatography-tandem mass spectrometry (UPLC-MS/MS). The described method minimises sample volume, eliminates complex pre-treatment, and reduces solvent use, adhering to the principles of Green Analytical Chemistry (GAC). Haematocrit variability was addressed by withdrawing a known volume of whole blood and analysing the entire spot, while capillary versus venous blood unknown differences were addressed approximating correlation factors to 1. The greenness of the method was evaluated using the Green Analytical Procedure Index (GAPI) and White Analytical Chemistry (WAC) metrics, confirming a low environmental impact compared to conventional urine-based methods. Moreover, its validation demonstrated low limits of detection (0.2-8.3 pg/& micro;L) and quantification (0.7-25.0 pg/& micro;L), satisfactory recoveries (70-98%), and acceptable intra- and inter-day precision. The proposed approach provides a reliable and environmentally sustainable tool for occupational monitoring of antineoplastic drug exposure, offering the undeniable advantage of assessing the risks of healthcare workers while protecting the health of those conducting the assessments. To the best of our knowledge, this is the first biological monitoring method for occupational exposure to antineoplastic drugs explicitly designed in accordance with Green Analytical Chemistry principles.*

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- ***Articles de périodique***

Ladeira C., Azqueta A., Giovannelli L., Gajski G., Gerić M., Haveric A., Stopper H., Bankoglu E.E., Collins A. and Møller P.
The comet assay as a tool in human biomonitoring exposure to antineoplastic drugs - A systematic review and meta-analysis.
Mutation Research – Reviews in Mutation Research, Volume 797, janvier-juin 2026, article108590

Résumé: *Antineoplastic agents are toxic compounds, generally used in the treatment of cancers, which are recognized as carrying a cancer development risk. In this systematic review and meta-analysis of human biomonitoring studies, we have assessed the effects of exposure to antineoplastic drugs on levels of DNA strand breaks in leukocytes, measured by the comet assay. Focusing on the application of the comet assay in human biomonitoring of occupational exposure to antineoplastic agents, we have analyzed 458 original research studies which used this assay, following the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA-ScR). The systematic review led to 23 studies, of*

which 20 studies met the criteria for inclusion in the meta-analysis. Using standardized mean difference and 95% confidence interval (CI), the meta-analyses show increased levels of DNA strand breaks in subjects exposed to antineoplastic drugs (1.26, 95% CI: 0.78, 1.73). Results originate mainly from studies on healthcare workers, with only one study in an industrial setting. Subgroup analysis indicates that all studies combined from middle-income countries have a higher effect size (1.77, 95% CI: 1.00, 2.55) than studies from high-income countries (0.49, 95% CI: 0.09, 0.90). This difference between middle- and high-income countries may be attributable in part to differences in exposure levels or exposure assessment. Additionally, sensitivity analysis indicates that studies with moderate/high risk of comet assay measurement bias have higher effect size (2.07, 95% CI: 0.82, 3.31) than studies with low risk of bias (0.73, 95% CI: 0.34, 1.13); and that studies with high risk of exposure misclassification have higher effect size (1.47, 95% CI: 0.89, 2.06) than studies with low/moderate risk (0.13, 955 CI: -0.08, 0.33). Most studies have low/moderate risk of bias related to the comet assay procedure (15 out of 20 studies), absence of reporting the use of assay controls (1 out of 20 studies), blinded analysis of samples (7 out 20 studies); exposure assessment (16 out of 20 studies). In conclusion, this systematic review and meta-analysis shows that exposure to antineoplastic drugs is associated with increased levels of DNA strand breaks in human leukocytes.

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