

# Surface contamination by Antineoplastic drugs inside a healthcare service

Atg  B<sup>1</sup>, L ger C<sup>2</sup>, Da Silva Ca o O<sup>3</sup>, Verdun-Esquer C<sup>2,4</sup>, Molimard M<sup>3</sup>, Villa A<sup>5</sup>, Canal-Raffin M<sup>2,3,4</sup>

<sup>1</sup> AH133, Service de Sant  au Travail, Bordeaux, France <sup>2</sup> Service de M decine du Travail et Pathologies Professionnelles, CHU de Bordeaux, France <sup>3</sup> Laboratoire de Pharmacologie Clinique et de Toxicologie, CHU Bordeaux, France  
<sup>4</sup> INSERM U1219, Equipe EPIC NE, Universit  de Bordeaux, France <sup>5</sup> Consultation de pathologie professionnelle, H pital la Timone (AP-HM), Marseille, France

Mireille Canal-Raffin  
mireille.canal-raffin@u-bordeaux.fr

## Introduction

Cancers treatment involve drugs classified as « **dangerous to handle** » leading to health risks to exposed workers. Staff contamination occurs mainly by the dermal route:

- directly by contact with antineoplastic drugs (AD) or treated patients,
- indirectly by contact with contaminated work surfaces

In addition to biological monitoring of occupational exposure which evaluate internal contamination of workers, an evaluation of surfaces contamination in working environment could be performed.

**Objective:** assess surfaces contamination by AD inside a healthcare service whose alarming nurses internal contamination rate (>80%)

- To understand workers internal contamination ways inside the service,
- To identify sources of environmental contamination

## Materials and Method

### Surface sampling kit & quantification method

- developed by the CHU of Bordeaux (Figure 1)
- by ultra high performance liquid chromatography coupled with tandem mass spectrometry (UHPLC-MS/MS)
- high sensitive and specific method (Table 1):
  - low limits of quantification (LOQ)
  - detection and quantification of 15 MAC

### AD Life cycle and workplaces study

- Activity study of each professional category
- Collection of protocols (healthcare, cleaning, wearing protection equipment)
- AD life cycle and patchway inside the healthcare service

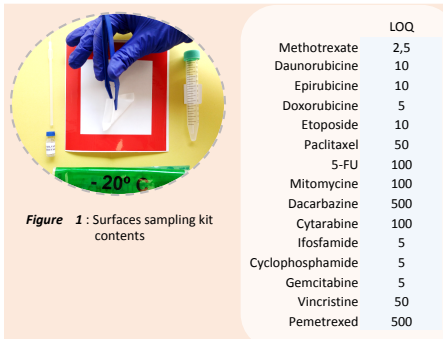


Figure 1: Surfaces sampling kit contents

Table 1: Limits of quantification (LOQ) of the method (pg/wipe)

### Sampling areas spotting (n = 24)

- On the map of the healthcare service (Figure 2)
- Areas are divided in four categories:
  - « patient rooms », « care », « reception » and « office »



Figure 2 : Healthcare service map

## Results

### Results by sample

- 100% of samples (n=24/24) showed the presence of at least one AD
- **Qualitative analysis** : molecules mainly founded :
  - Methotrexate (n = 22/24)
  - Ifosfamide (n = 22/24)
  - Cyclophosphamide (n = 20/24)
- **Quantitative analysis** (In terms of concentration levels)
  - Ifosfamide ► Cyclophosphamide ► Methotrexate

### Analysis by areas inside the healthcare service (Figure 3)

- area « patient rooms »
  - 0,5 – 24ng/wipe
  - corresponding to 5 – 240pg/cm<sup>2</sup>
- area « reception and Office »
  - 0,09 – 2,7ng/wipe
  - corresponding to 0,9 – 27pg/cm<sup>2</sup>
- area « care »
  - 0,02 – 1,6ng/wipe
  - corresponding to 0,2 – 16pg/cm<sup>2</sup>

Concentrated area

Less concentrated area

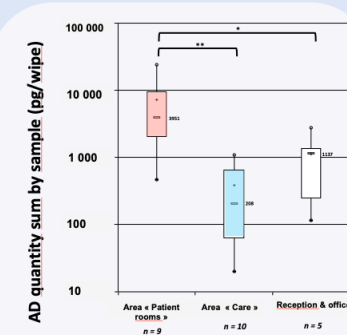


Figure 3: contamination by area (median;\*p<0,05;\*\*p<0,01; Student)

## Discussion - Conclusion

### Differences of the contamination levels between areas

- Surfaces with direct contact with treated patients seem to be more contaminated:

- Dispersive contamination linked to patient (sweat, urine, vomit...)
- Lower cleaning frequency (n=1/day) compared to others areas

- Healthcare surfaces and places close to AD manipulation during its lifecycle seem to be less contaminated:

- Higher frequency of cleaning
- More information and vigilance of workers about AD

### Recommendations

- Reinforcement of
  - Information to workers (booklet)
  - Patient rooms cleaning process
- Extension of individual protection equipments wearing dedicated to AD manipulation and AD direct contact to in the cleaning and healthcare activities,
- Patient role in the prevention of the contamination of his environment