

Exposure of healthcare professionals to antineoplastic drugs

Results of research project CYTO

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Contents

- **Introduction**
(description of workplace, system of drug preparation and administration)
- **Methods**
(monitoring and analytical methods)
- **Results of monitoring studies**
(comparison of contamination of three basic hospital workplaces by cyclophosphamide)

Wladislawowo



Brno





Masaryk Memorial Cancer Institute

- 1/29 hospitals providing oncology healthcare in the Czech Rep.
- 23000 preparations of cytostatics per year

Preparation of cytostatic drugs - national standards

- Preparation centralised in hospital pharmacy (isolators in a clean room with aseptic working environment)
- High quality of prepared drugs / safety for operators



Preparation of cytostatic drugs - alternatives, exceptions

Flow boxes no more acceptable



Administration of drugs

- Outpatient and nursing clinic



Research activities

Project



- Monitoring of contamination and workers' exposure at workplaces, where drugs are intensively handled

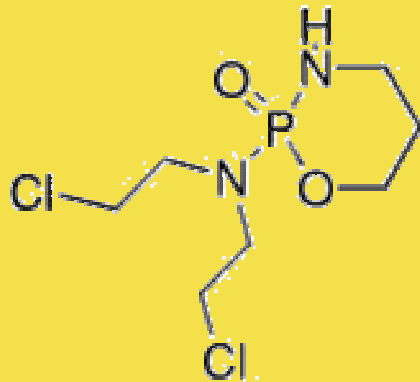


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Marker drugs

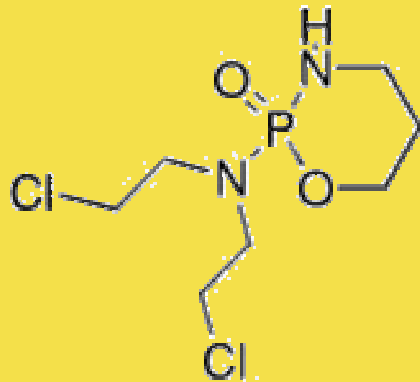
Cyclophosphamide (CP)



frequent usage,
stable at laboratory conditions,
analytical equipment available

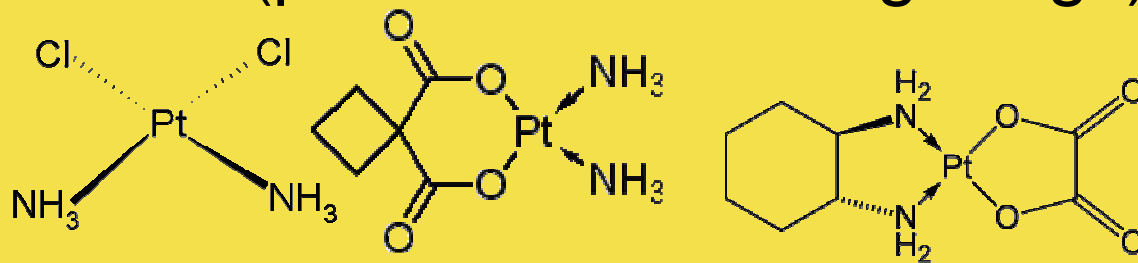
Marker drugs

Cyclophosphamide (CP)



frequent usage,
stable at laboratory conditions,
analytical equipment available

Platinum (platinum containing drugs)



Monitoring of environmental contamination

Envimonitoring (contamination of working environment)

- surface contamination (wipe samples)
- air contamination (filters, sorbent samples)



Monitoring of environmental contamination

Envimonitoring (contamination of working environment)

- surface contamination (wipe samples)



Surfaces monitored

Working tables, floors and some frequently manipulated objects (handle of refrigerator, phone, display of infusion pump)

Envimonitoring (contamination of working environment)

- ## Pumping of the air through the sampling media:

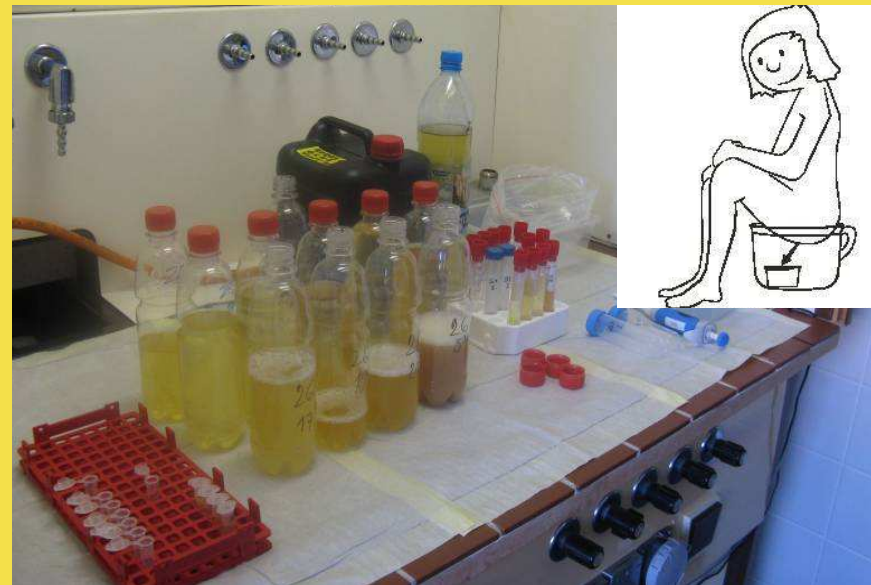
Solid sorbent



Monitoring of biological exposure

Biomonitoring

- handwash samples
- urine samples (24-hrs excretion)



Analytical determination



Research Centre for Toxic Compounds in the Environment

- Masaryk University
- Environmental chemistry and Ecotoxicology of the organic pollutants

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Monitoring of MMCI

	LoD ¹	Storage area			Prepar. room			Outpatient clinic		
		Pd ²	Med	Max	Pd ²	Med	Max	Pd ²	Med	Max
Surface cont. (pg/cm²)										
Working table	3	3/12	<LoD	9	12/12	65	490	12/12	58	270
Floor	3	4/12	<LoD	14	12/12	67	210	11/12	2700	15500
Telephone	9	0/9	<LoD	<LoD	7/9	56	400	9/9	230	820
Air contamin. (ng/m³)	0,1	0/5	<LoD	<LoD	0/5	<LoD	<LoD	5/5	0,8	4
Hands (ng/hands)	5	4/12	<LoD	100	0/12	<LoD	<LoD	7/13	12	360
Urine (ng/24hrs.)	30 ³			1/13	<LoD	100	⁴	2/8	<LoD	140

¹ limit of detection; ² number of positive/total number of samples; ³ designed for urine excretion 1,5L/24h;

⁴ workers from storage area and prep. room serve both workplaces, therefore they are not distinguished



Monitoring of surface contamination at other hospitals

4 sampling campaigns
(2008 – 2010)

19 hospital pharmacies

10 outpatient clinics



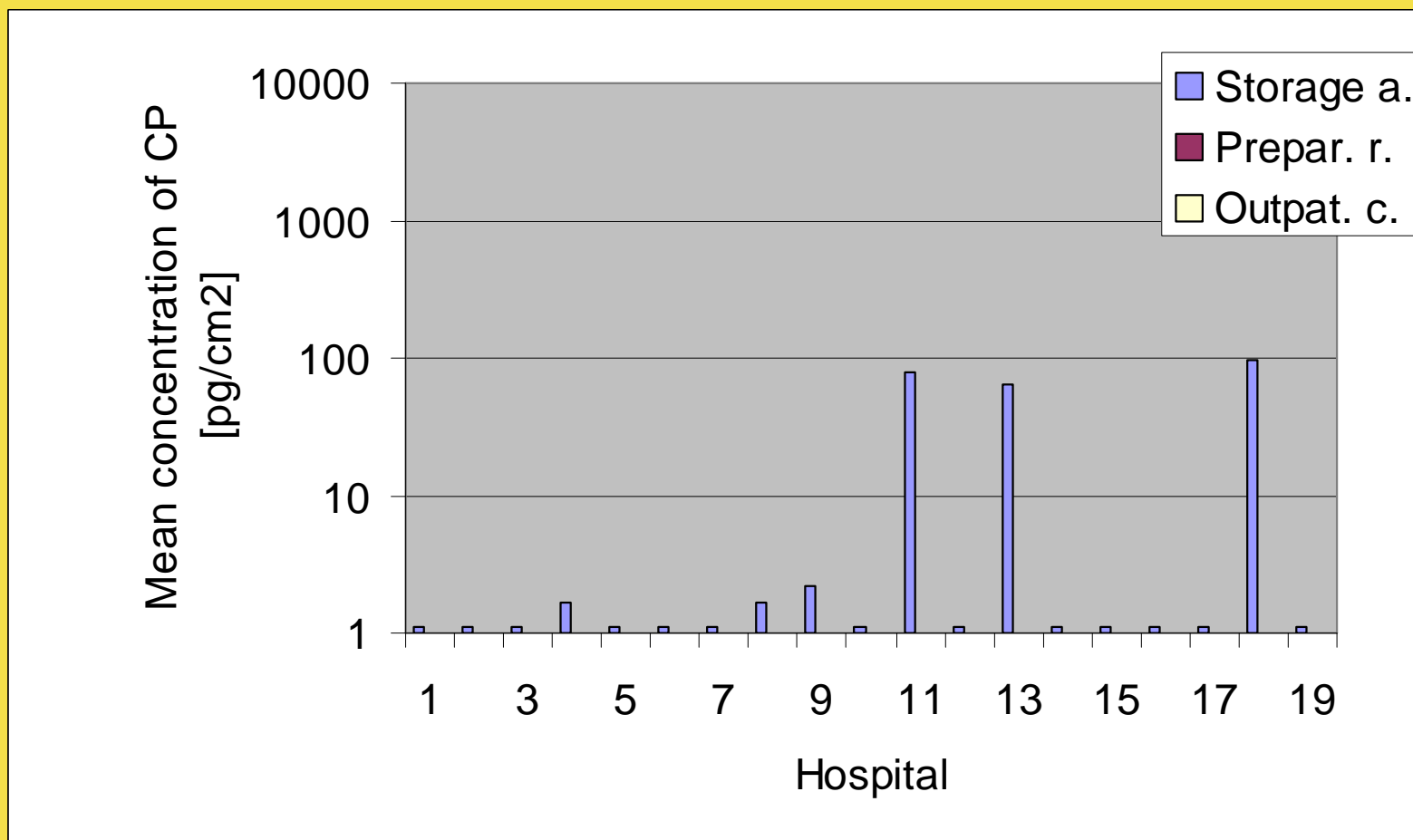
Surfaces monitored

Hospital pharmacy (both storage area and prep. room): working table, floor and handle of refrigerator

Outpatient clinic: working table, floor and display of infusion pump

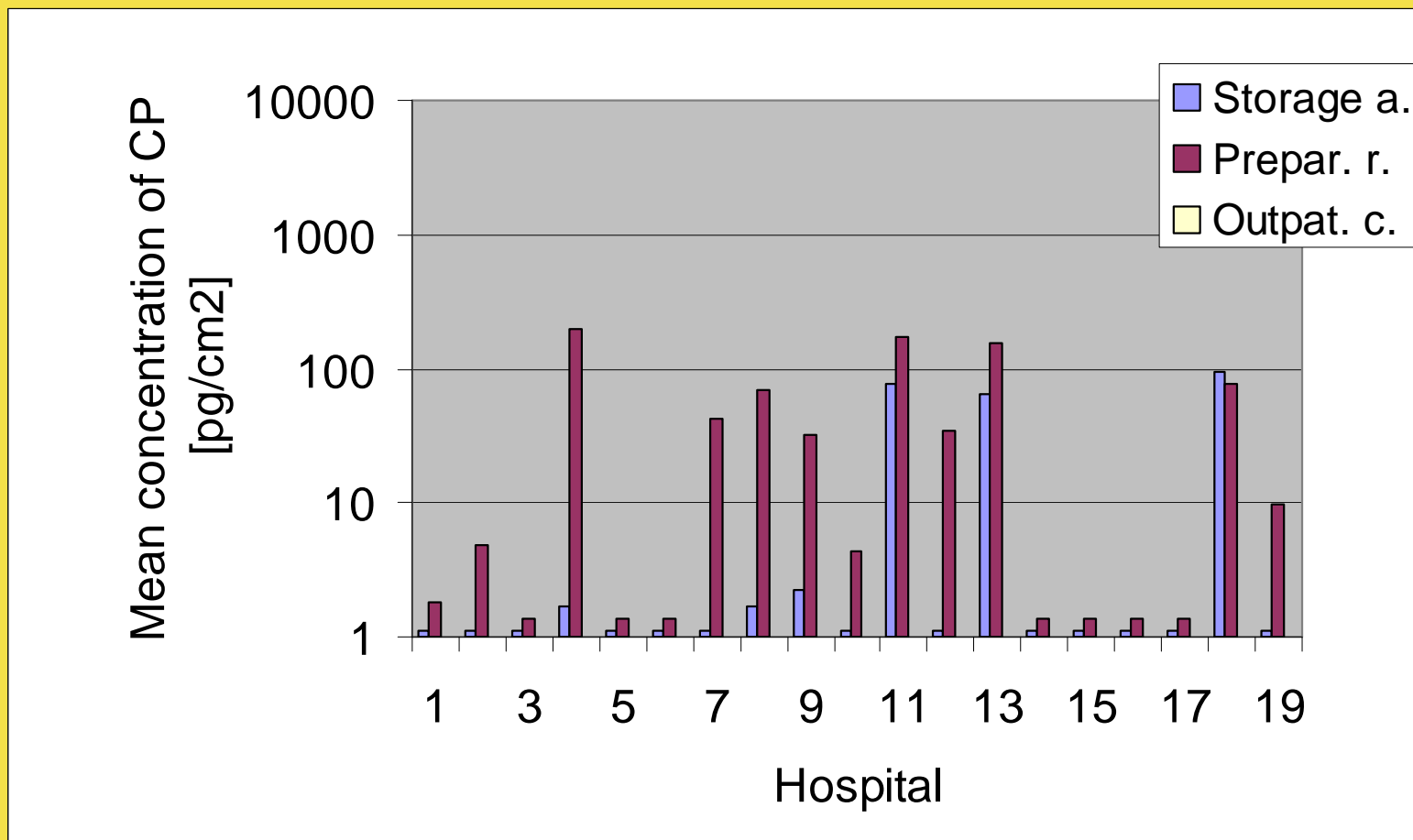
Comparative study of the hospitals in the Czech Republic

Monitoring of surface contamination 4. campaign



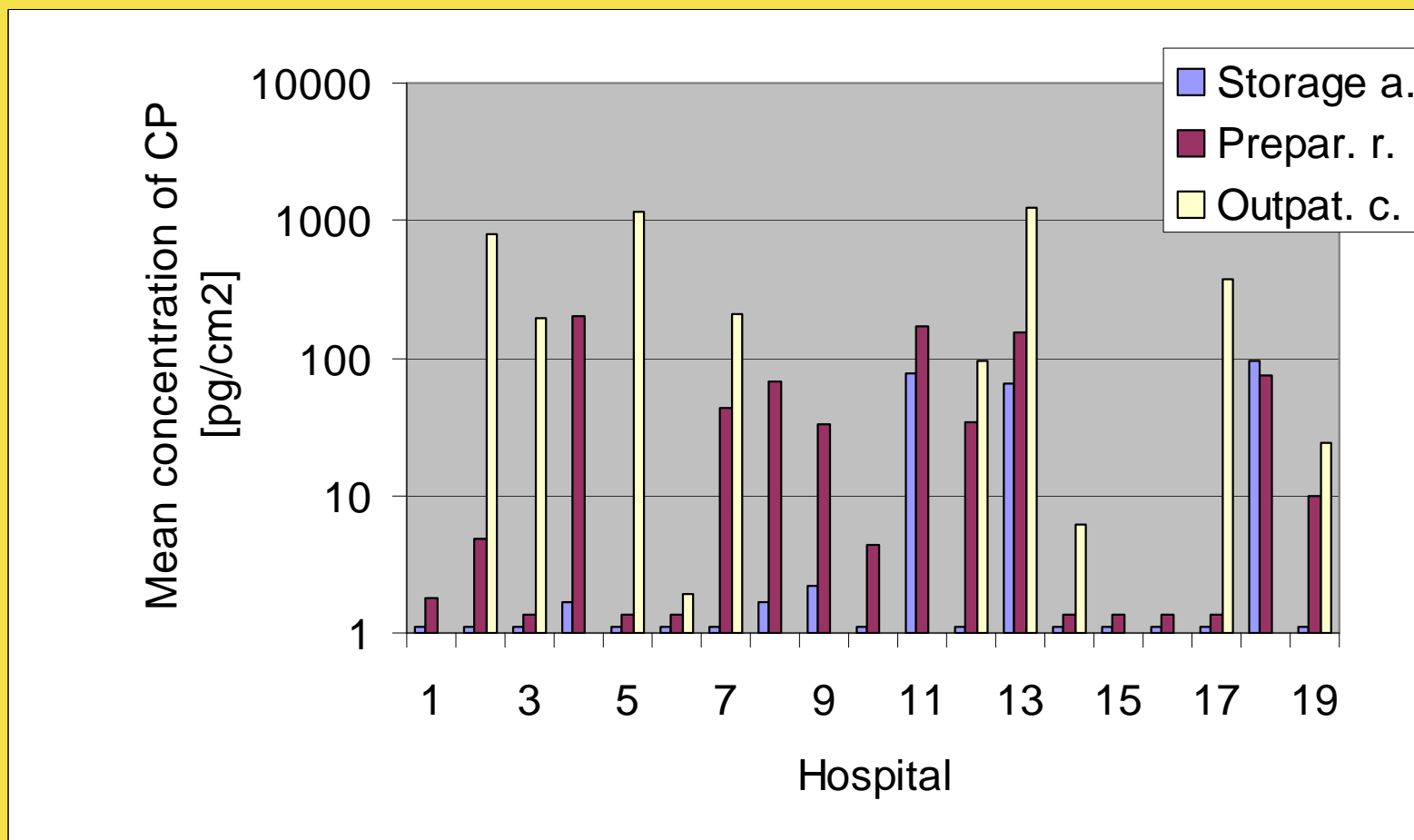
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Comparative study of the hospitals in the Czech Republic

Monitoring of surface contamination 4. campaign



Conclusions

- We developed analytical methods for monitoring of cytostatic drugs in the working area
- The main source of exposure: Open handling with cytostatic drugs
- The main exposure route: Dermal contact with surface contamination
- The most contaminated workplaces: Outpatient clinics

Thank you for your attention

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