

Objectives and Study design

Our study was focused on the level of surface contamination by antineoplastic drugs (ADs) inside homes of patients with a diagnosis of breast cancer.

Sixteen female patients (age 34-73 years) received treatment containing anthracycline (15x doxorubicin, 1x epirubicin) and cyclophosphamide (CP), 12 of them subsequently underwent paclitaxel (PX) treatment.

Sampling sites were selected according to the interviews with the patients and represented places with potential contact with sweat, urine or vomit potentially contaminated with residues of ADs (i.e., sampling focused on floors in the bathroom and toilet, desktops in the kitchen and living room).

First sampling: 1 – 76 day after the chemotherapy cycle of CP (Table 1).

Second sampling: 6 months or later after the last cycle of CP chemotherapy (performed only at patients that were found positive in the first sampling). The exception were patients No. 12 and 15, where the second sampling was not possible because of their worsened prognoses (Table 1).

Methods

Surface wipe samples were obtained by the standardized procedure as described previously^{1,2}. Sampling sites were wiped with swabs moistened with acetate buffer from the marked spots (30x30cm) and analyzed by liquid chromatography with tandem mass spectrometry detection.

Results

Surface contamination by CP

- 70% of the samples from the first sampling were positive (above the Llimit of Detection, LOD; 1.1 pg/cm²).
- Median and average contamination during the first sampling were 3.4 and 21.1 pg/cm², respectively. Maximum value (512 pg/cm²) was found at the armchair and kitchen table of patient No 12.
- Higher level of contamination were observed during the first few days after patients received the CP chemotherapy (Figure 1).
- Contamination by CP close to the LOD was detected in the second sampling in 4 households (1.2 – 6.4 pg/cm²).

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Table 1: Study design (details of therapy, number of total and positive samples during the first sampling (after treatment) and the second sampling (6 or more months after treatment)).

Patient ID	Age	Total wipe samples	First sampling					Second sampling	
			ADs	Administered doses (mg)	Sampling day / the last cycle before sampling	Number of wipe samples	Positive sample s	Number of wipe samples	Positive samples
1	68	23	CP/DOX	1000/100	3/1, 6/2, 31/4	14	11	5	1
2	39	12	CP/DOX	858/86	3/4, 51/4	8	8	4	1
3	48	9	CP/DOX	1000/100	1/3	4	4	5	1
4	55	8	CP/DOX	990/99	1/3	4	4	4	1
5	49	8	CP/DOX	1090/109	10/3	4	3	4	0
6	35	8	CP/DOX	1100/110	4/2	4	3	4	1
7	43	8	CP/DOX	984/98	7/2	4	4	4	0
8	38	8	CP/DOX	1020/102	1/2	4	3	4	0
9	34	9	CP/DOX	918/92	1/3	5	3	4	0
10	40	5	CP/DOX	1128/113	76/4	5	0	-	-
11	40	6	CP/DOX	1140/114	24/4	4	2	2	0
12	73	5	CP/DOX	960/96	1/2	5	5	-	-
13	43	4	CP/EPI	1303/157	29/4	4	0	-	-
14	42	4	CP/DOX	900/90	44/4	4	0	-	-
15	37	4	CP/DOX	978/98	2/2	4	4	-	-
16	45	8	CP/DOX	1068/107	5/2	4	3	4	0

Conclusions

- Patients treated with chemotherapy may serve as a source of contamination for their households - precautions should be taken for manipulation with patients' body fluids during 7 days post-treatment.
- Sweat of the patient seems to be an importan medium for the spread of the contamination.
- Carcinogenic CP was found at relatively high concentrations but the exposure of family members to CP is only temporal, when compared to long-time occupational exposures to similar contamination.
- Long-time persisting low CP contamination was found on various desktops including kitchen tables.

References: 1) Odraska, et al., 2014. Arch. Environ. Occup. Health 693, 148–158. doi.org/10.1080/19338244.2013.763757; 2) Blahova et al., 2021. Int. Arch. Occup. Environ. Health. doi.org/10.1007/s00420-021-01671-5

Figure 1: CP contamination: A - floors in the bathroom and toilets; B - desktop samples (tables, chairs, desks) in living rooms and kitchens. Graphs show individual data points, median with 25-75 percentile range (box) and minimum-maximum (error bars).

