Dioxins in Chinese Pentacholorophenol

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Schistosomiasis is one of the main epidemiologic disceases caused by parasite, it once created severe harmful effects to the health of many peasants who lived in the middle and lower valleys of Yangtze River. Since 1949, Chinese government has cured most of patients. Moreover, fruitful preventive measures have been taken. Schistosomiasis is no longer the main disease in some areas. Killing off oncomelania is the key link of the precaution against schistosomiasis. In view of the facts that sodium pentachlorophenol (Na-PCP) is powerful in killing of oncomelania and its cheapness on price, a large amount of Na-PCP has been spread over vast areas since 1960's in China. However, due to their potenital harmful effects on ecological environment, Chinese government has worked out a plan to replace Na-PCP with a new molluscacide by the support of World Bank in recent years. Although the use of dioxin-containing products has been significantly reduced in many industrialized countries, China produces about 6000 tons of Na-PCP annually. Being by-products of technical Na-PCP, dioxins may enter the environment and contribute to human exposure.

Our laboratory has been engaged in investigation to evaluate the potential environmental hazard and human health effects caused by Na-PCP which has been used for as long as 30 years in some areas. The information about the utilization of Na-PCP has been obtained, which includes the area, the pattern of spraying and the amount used over the years. In addition, we have selected typical regions to determine the dioxin residues in commercial Na-PCP and the samples like soil, sludge, aquatic samples. Moreover, the human blood and milk are included. The PCDD / PCDFs patterns and levels measured in the exposure samples are compared with the background levels data, so that we can make a potential risk assessment of dioxins.

The technical products of Na-PCP were made in Dagu chemical factory in Tianjin. In this department of the fatory, non-gamma isomers of hexachlorocyclohexane are processed into Na-PCP. In our analytical procedures for PCDDs / PCDFs, [^{13}C]2,3,7,8-TCDD was spiked as internal standard prior to extraction. The extract was applied to a multi-adsorbent column which contained acid / base silica, followed by alumina and activated carbon chromatography. Final analysis was accomplished by HRGC / HRMS for the identification and quantification of PCDDs / PCDFs congeners.

The results of PCDD / PCDF in human blood in the area of schistosomiasis are shown in the Table. These data demonstrate an obvious difference between young and old which is the usual case. The contents of total PCDD / PCDF in Na-PCP exposure population are higher than average. However, further reasearch is necessary for the establishment of a definite causal relations.

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well as some advanced laboratories abroad. Due to the difficulty and challengingness of this task, we are in great need for assistance from high-leveled laboratories and co-operation in doing research.

PCDD / PCDF in Human Blood in the Areas of Schistosomiasis (ppt,lipid)

Congener	Contact with Na-PCP -predominantly male	Schistosomiasis areas (old)	Schistosomiasis areas (young)
Dioxins (PCDDs)			
2,3,7,8-Tetra-CDD	3.0	4.6	2.2
1,2,3,7,8-Penda-CDD	7.2	9.5	5.3
1,2,3,4,7,8-Hexa-CDD	22.1	27.8	14.0
1,2,3,6,7,8-Hexa-CDD	9.0	8.9	4.2
1,2,3,7,8,9-Hexa-CDD	2.9	2.3	1.7
Total Hexa-CDD	33.9	36.6	20.0
1,2,3,4,6,7,8-Hepta-CDD	24.1	15.7	15.2
Octa-CDD	1148	748	568
Dibenzofurans (PCDFs)			
2,3,7,8-Tetra-CDF	1.5	1.4	2.1
1,2,3,7,8-Penta-CDF	n.d.(1.0)	n.d.(1.0)	n.d.(1.0)
2,3,4,7,8-Penta-CDF	2.4	1.9	1.1
Total Penta-CDF	2.4	1.9	1.1
1,2,3,4,7,8-Hexa-CDF	16.4	4.9	3.1
1,2,3,6,7,8-Hexa-CDF	2.3	2.1	1.5
1,2,3,7,8,9-Hexa-CDF	n.d.(1.0)	n.d.(1.1)	n.d.(1.0)
2,3,4,6,7,8-Hexa-CDF	1.2	2.0	1.0
Total Hexa-CDF	20.0	9.0	5.6
1,2,3,4,6,7,8-Hepta-CDF	4.9	4.1	3.6
1,2,3,4,7,8,9-Hepta-CDF	n.d.(1.6)	n.d.(2.4)	n.d.(1.3)
Total Hepta-CDF	4.9	4.1	3.6
Octa-CDF	5.2	7.5	5.9
Total PCDD	1216.3	814.9	610.8
Total PCDF	28.8	16.5	18.3
Total PCDD / PCDF	1245.1	831.4	629.1
I-TEQ (NATO / CCMS)	14.8	16.5	9.0

n.d. = not detected, detection limit in ( ); Values with < contribute with 50%