

DIOXIN LEVELS IN VIETNAMESE SUGGEST CURRENT CONTAMINATION WITH TCDD FROM AGENT ORANGE

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INTRODUCTION

Previous studies by our group and others revealed elevated TCDD levels in the blood and milk of Vietnamese exposed to Agent Orange¹⁻⁴. Findings were highest in 1970, the last full year of Agent Orange spraying, with human milk TCDD concentrations as high as 1,850 ppt lipid in one nursing mother from an Agent Orange sprayed village, Tan Uyen Village, in the south of Vietnam. In 1973, three years after the spraying ended, the highest measured levels of TCDD in nursing mothers breast milk was between 400 to 500 ppt^{1,4}. Our studies from 1982 through 1995 found levels of TCDD in milk, adipose tissue or blood, of up to 102 ppt. These latter values included individual and pooled samples from over 2,000 persons living in the south of Vietnam, where Agent Orange was sprayed. Levels of TCDD in northerners were much lower, averaging approximately 1-2 ppt. Levels clearly appeared to be declining in people with the passage of time^{1,2}. Our findings from 20 individuals from the south of Vietnam obtained in 1999 showed the first markedly elevated levels we have seen in decades, with levels as high as 271 ppt of TCDD. This suggests current contamination of humans with TCDD sprayed or spilled from 1962-1970.

MATERIALS AND METHODS

On two field trips to Vietnam in March and June of 1999, two of us (AS, LCD) collected a pooled sample of blood in Hanoi and 20 blood samples from the south of Vietnam, where we had previously found elevated blood TCDD levels in pooled and individual blood samples. (Samples were pooled for economic reasons plus limited World Health Organization (WHO) certified laboratories worldwide. Persons were sampled who lived in Bien Hoa Village, Dong Nai Province. It was also learned recently from newly released U.S. Department of Defense documents that there was a spill nearby at the Bien Hoa airbase during wartime from the Bien Hoa airfield used for Agent Orange spraying missions by the American Air Force. It was suspected that some discharged into nearby rivers, contaminating silt and fish. Hence, fish eaters in this region were, we believed, at higher risk than others for having elevated dioxin levels. We chose families with heavy consumption of fish to sample, as part of a Vietnam Red Cross inquiry. We knew from our previous research in Vietnam that some silt from rivers in the south of Vietnam had

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elevated TCDD levels. Elevation of other dioxin/dibenzofuran congeners was also noted⁵. This was not the case in silt from northern Vietnam⁶.

The blood was collected in chemically cleaned glass bottles, frozen, and sent on dry ice to ERGO Laboratory in Hamburg, Germany. There, high-resolution gas chromatography-mass spectroscopy was performed as previous described⁷. ERGO has been certified by the World Health Organization for dioxin analyses of food as well as human milk and blood.

RESULTS AND DISCUSSION

Very elevated TCDD levels were found in these newly collected samples, in blood of most persons sampled. A family of subsistence fish eaters catching fish from downstream of the airbase were found to all have elevated TCDD levels, including the mother, with 271 ppt. Another family, from northern Vietnam, moved to the south after Agent Orange spraying ended. All members of the family who were tested had elevated TCDD. These data suggest that elevated TCDD from Agent Orange can arise from contamination, most likely at least from fish, long after spraying ended.

Of the 20 southerners, some did not have elevated TCDD, with blood levels as low as 2 ppt, lipid, but most did have elevated blood TCDD. The level of TCDD in the northern pooled blood samples was low, approximately 2.0 ppt (N=100).

These data suggest localized or generalized contamination of parts of the environment in the south of Vietnam with TCDD from Agent Orange, that the TCDD is entering the food supply, and contaminating southern Vietnamese. The extent of the public health problem needs systematic environmental surveys and systematic surveys of human blood levels. Then, remediation or cleanup of the contaminated areas seems indicated, and public health measures taken to prevent further intake of contaminated food. In addition, careful medical monitoring and education seem indicated for those found to be contaminated, or who live in contaminated villages. Fish advisories may be indicated in some locations and other sources of food provided to substitute for dioxin-contaminated food. Additional health care seems to us appropriate where risk is elevated by dioxin contamination. This remains a policy issue to be resolved between the governments and people of Vietnam and the USA.

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