

Editorial

The Volunteers: The First Human Biopsy Studies of TCDD from Agent Orange Exposure

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I teach a graduate course at the University of Oklahoma on 'Risk Assessment and Risk Management'. Recently, one of my students asked if there was an event that had altered my thinking about risks. I thought about that as I prepared the Commentary for the May 2002 issue of ESPR, and my time as a volunteer for an unusual study came to mind.

Three of us United States Air Force Officers, two Majors and a Captain (that was me), volunteered to help our country find answers. We had all been repeatedly exposed to Agent Orange and its associated dioxin contaminant, 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). Was the dioxin accumulating in our tissues? If so, had we been placed at risk for cancer or some other health impairment? Was the dioxin a 'ticking' time bomb? We didn't know, nor did anyone else. So in the summer of 1978, we volunteered to be subjects in the first human adipose tissue study to be done by the Veterans Administration (now the Department of Veterans Affairs).

As a first step in preparing for the study, we were asked to document our routes and length of exposure to Agent Orange. As is typical of scientists and engineers involved in government-supported research, we had kept excellent records and trip reports of our projects and activities with Agent Orange. The three of us totaled almost 10,000 hours (primarily dermal with some inhalation exposure) of research and activities associated with Agent Orange. All three officers worked primarily with 'environmental materials', e.g., contaminated soil and sediments, biological tissue, and contaminated equipment. One Major had served as a Bioenvironmental Engineer in Vietnam during the Vietnam Conflict, and had been stationed at Bien Hoa, a base used by Operation RANCH HAND, the military operation for the aerial dissemination of the herbicide. The other Major was a veterinarian and had conducted numerous laboratory and field studies on animals exposed to Agent Orange. I had been involved in the development and testing of the aerial spray equipment for Vietnam. I had also served as Principal Investigator for the ecological studies conducted on a unique test site in Northwest Florida (Test Area C-52A) that had received massive quantities of Agent Orange (73,000 kg 2,4,5-T and 77,000 kg 2,4-D herbicides). See Young, Cockerham, and Thalken [1] for additional information on the site and ecological studies. All three of us had been involved in the final disposition of Agent Orange by incineration-at-sea the previous year [2], and in the clean up of the sites where the herbicide had been stored and maintained since 1972 [3].

On a late, fall afternoon in 1978, we arrived at the Hines Veterans Administration Hospital in Chicago, Illinois. At 6:00 am the next morning, nurses arrived with razors and iodine scrub to prep us for surgery. I was the first on the cold gurney and the

first to meet the Surgeons. Knowing that I was a scientist, they had rigged up a mirror so I could watch the operation. I watched with fear and fascination as they made a 15-cm incision in my abdominal area and removed gram after gram of adipose tissue. They complained that I was too lean, but they removed all the fat they could. With my stitches in place, they called for second and third 'subjects'.

After a brief recovery period, we dressed and had lunch with our Surgeons. That afternoon we talked with the hospital faculty and staff about the use of Agent Orange in Vietnam, about the toxic dioxin contaminant, and the need to confirm and measure the magnitude of exposure.

Our tissues became part of a large international, interlaboratory analytical study. Laboratories from all over the world received subsamples in the search for a standard method to analyze 2,3,7,8-TCDD at the parts-per-trillion (ppt) level. Our medical records were 'red tagged' and we were carefully monitored for the next two years. Yes, we had TCDD in our tissues, but at very low levels (5–7 ppt) – 'background' levels in industrial countries. Additional human studies of adipose from humans developing the 'hallmark' symptom (chloracne) of TCDD exposure (all from industrial accidents) showed that they contained orders of magnitude greater levels than did we [4].

Sometimes the answers to difficult environmental health issues require extra effort to ensure the quality of the science. But the answers are critical, because they provide us and our families with the comfort of knowing that the risks were acceptable. It was important for us, and the public, to put these risks into perspective. Twenty-three years later, I realized that being a volunteer for the dioxin biopsy was a turning point in how I would perceive and manage the risks that confront me in my every day life.

References

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