

The Early Years of American Agent Orange Research in Vietnam; 1970 to 1983

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The recent (2002) Non-Governmental Organization (NGO) meeting in Stockholm that was convened in order to evaluate the long term ecological and health effects of the war in Indochina was still unable to identify scientifically convincing evidence of the effects on the Vietnamese and Lao population of the dioxin in Agent Orange. This meeting some thirty years after the end of the herbicide program and twenty years after the 1983 Congress on the effects of herbicides in war, which took place in Saigon.

It seems worthwhile to review the history of some of the efforts that were made to try and elucidate the important problem of the health consequences of Agent Orange in Vietnam.

Almost as soon as the herbicide program started in Vietnam in the early sixties, there was concern as to possible toxic effects of the defoliants over and above their value in defoliation and in crop destruction. Interest soon centered on 2,3,7,8-tetrachlorodibenzo-p-dioxin, the very poisonous incidental contaminant of Agent Orange. Originally, human health effects from other herbicides were suspected but over time these have appeared to be inconsequential compared to the possible effects of Agent Orange and most subsequent studies have focused on this toxin.

By 1965 Vietnamese scientists were expressing great concern as to the health effects of the herbicide program. Perhaps the most respected of these critics was Dr. Thon That Tung, a world-renowned liver surgeon from Hanoi and physician to Ho Chi Minh, who believed that he was seeing a significant increase in the incidence of hepatic carcinoma and in unfortunate outcomes of pregnancy as a result of the herbicides. To my knowledge, these early reports were not published in any journal widely available but several manuscripts, were circulated in the West.

At the end of the 1960s there was enough concern in the United States for the American Association for the Advancement of Science (AAAS) to commission Mathew Meselson of Harvard University to undertake a study of the ecological, economic and medical effects of the herbicide program in Vietnam. Critical to this effort was the development in his laboratories of the ability to determine the level of dioxin in the lipids of those who had been exposed and also in fish and other foods^{1,2}. Because the half-life of dioxin in humans is several years, exposure could be determined even if it

had taken place several years previously. It is significant that the level of accuracy of these initial determinations by Baughman, validated by J.J. Ryan's recent re-analyses of archived specimens, have yet to be improved³.

Although for this initial assessment access to herbicide damaged or destroyed upland forests was very limited, subsequent studies have shown that this brief survey completed in about 3 weeks was correct in most of its general conclusions. I will confine my attention to the health aspects.

As regards the increase in liver cancer it was agreed, and Ton That Tung eventually concurred, that this was the result of personal increased numbers of referrals to him carried out because of his surgical fame and not was connected with herbicides.

The most critical study that Ton That Tung was to try in order to demonstrate the adverse effects of exposure to Agent Orange on the offspring of exposed fathers whose wives had never been exposed. This was a very large study of some four thousand births. All the fathers though mostly of northern origin, had served in the south of the hence were considered to be at risk of Agent Orange exposure. All the mothers were villagers and, being in the north, had not been sprayed. In most cases there would have been no sexual intercourse for at least three months after the last possible exposure of the fathers since marriages were mostly arranged only after the men's return. No factors such as age different medications, or marital infidelity seemed to affect the statistics. He showed a significant increase in spontaneous abortions, stillbirths and congenital anomalies in the children of "exposed fathers". Different teams interviewed the mothers and fathers and at that time the villagers had no chance of appreciating the object of the survey. It should be noted that although it has never been possible to repeat this study, and conditions today would make it impossible, the findings have not been confirmed by similar investigations.

Meselson and colleagues were confined to the relatively secure areas of the South Vietnam and had no time for prolonged studies but were able to make use of Vietnamese doctoral theses that recorded congenital anomalies and seem to suggest that spina bifida, anencephaly, and cleft palate without cleft lip were more common in exposed mothers. Tissue dioxin levels could not be done to clarify these historical reviews. Extensive comparative reviews of midwives records were carried out but it was not possible to definitively confirm increased unfortunate outcomes of pregnancy in sprayed mothers. In addition to food samples some human surgical from specimens taken incidentally during surgery and especially mothers milk from lactating women in two villages where there had been spraying but which were selected because the diet of the villagers included very much fish from maximally sprayed watersheds were analyzed. These samples showed levels as high as 1850 parts per trillion (ppt), of TCDD, the highest levels of reported to date from mothers milk. At present, 2 ppt is the background TCDD level in Vietnamese. These high levels earmarked these villages as

having a generation of children who had been very heavily exposed as a result of a prolonged diet of mother's milk and whose health could be followed over the next decades.

The fixed wing aircraft spraying of herbicides was suspended by the U.S. military immediately before Meselson reported his conclusions and his concerns.

Armed with the positive results of analysis in both food, principally fish and other animals, and in people; additional studies were then undertaken with a number of different Vietnamese colleagues and by a variety of Western investigators which were particularly focused on the toxic effects adumbrated by the earlier studies. Enough had been done that in 1983 an international congress was convened by the Vietnamese government in Saigon in the now reunited Vietnam to evaluate the effects of herbicides in war. Most of the conclusions of this meeting as to the ecologic and economic effect on the mangrove and upland forest were fairly straightforward and minimally controversial. Studies on human health effects were much less conclusive and it was the general, but by no means unanimous, conclusion that although several papers were suggestive or even highly suggestive, none met current standards of scientific proof of an association of health problems and exposure to Agent Orange in Vietnam. It was abundantly clear that there were many leads that needed to be followed up.

It should be emphasized that the presentations made in Saigon, and those carried out in the subsequent years were supported with very limited funds and were therefore especially restricted in being able to afford determinations of dioxin levels which are very expensive (perhaps 1,000 \$US each) and which could be competently performed by only a handful of laboratories. Beginning in 1984, joint American-Vietnamese research analyzed human tissue from over 3,200 Vietnamese, from northern Vietnam and non-sprayed Hanoi, through the former demilitarized zone including Hue and Danang, and many parts of the former South Vietnam.

The reproductive health effects presented in Saigon included several expanding on the work of Ton That Tung as discussed above but which added little to the previous results. There were several reports from different locations in the South comparing the rates of abortion and/or congenital anomalies among sprayed and unsprayed women. Of necessity the determination as to exposure was by history alone. The memories of the mothers could be bolstered by the military records of herbicide flights but these were not very accurate and the population in the sprayed areas was much more mobile than in the North. As a result of this and many epidemiologic problems and anomalies all of these presentations could only be considered as the basis for more work with tighter protocols. Spray records alone do not, of course, indicate where TCDD was actually absorbed by humans.

I present one study that all of the participants found very impressive in a little more detail. Dr. Phuong, chief of the principal obstetrical and gynecological hospital in Saigon, TuDu Hospital, compared the rate of hydatidiform mole and choriocarcinoma in exposed and unexposed women. It should be noted that molar pregnancies are more common in all of the countries of Indochina than in the West. Dr. Phuong compared the frequency of herbicide exposure, determined by history only, among 100 women with molar pregnancies and 284 women with normal placentas. Of the 85 out of the 100 molar pregnancies for which exposure could be estimated 48 or 56% were considered exposed whereas of the controls only 27 or 9.8% reported potential exposure. Even considering a number of ways in which the two groups were not strictly comparable this seemed to be a very neat study with a statistically significant result. However the future proved otherwise. I have been told that the opportunity arose some time later for a sufficient number of dioxin analyses were made available to reconfirm the previous determinations of exposure. When this was done the chemical analysis did not confirm the historical determination and the study no longer proved the association of dioxin and molar pregnancy.

So the conference of 1983 still left us with a great many questions, which subsequent studies are still following up.

References

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