The subject of Ngo et al.’s review has been in the news since the 1960s: exposure to Agent Orange sprayed in Vietnam between 1962 and 1971, or its dioxin contaminant 2,3,7,8-tetrachlorodibenzo-p-dioxin (or TCDD), resulted in an increased incidence of congenital malformations in Vietnam? Since 1983 there have been a number of Vietnamese conference presentations, which support the belief that Agent Orange exposure is linked to birth defects in Vietnam.\(^{50}\)  


\(^{60}\) Couture LA, Harris MW. Characterization of the peak period of sensitivity for the induction of hydronephrosis in C57BL/6N mice following exposure to 2,3,7,8-tetrachlorodibenzo-p-dioxin. Fundam Appl Toxicol 1990;15:142–50.


1994, the most recent of which is 'Veterans and Agent Orange, Update 2004', conclude that, with the exception of spina bifida and anencephaly, the published peer-reviewed literature does not convincingly support an association between herbicide or dioxin exposure and birth defects in humans.

At a March 2005 Agent Orange meeting held under the auspices of The French–Vietnam Friendship Society in Paris the Final Manifesto of the Congress concluded that some of the Vietnamese population in the South had been exposed to dioxin, which presents a risk of severe medical effects but without specific effects being satisfactorily proven. The toxicological literature, on the other hand, shows fetal damage, including hydronephrosis, cleft palate, changes in hormonal development, and nervous system changes as a result of maternal exposure to dioxin in rodents.5,6

In an admirable attempt to determine whether Vietnamese research over the last decades might shed a brighter light on this question, the authors reviewed many published and unpublished papers including abstracts, submitted or presented at meetings, and posters. Very little of this material, which they then used for their meta-analysis, has undergone any significant peer review. These papers include all the Vietnamese reproductive studies presented in 1983 at the International Herbicide conference held in Ho Chi Minh City in 1983.7 The material was subsequently published, with extensive editorial comment and some revision, so as to make the information available to the scientific world.7 It is critical to point out that Western scientists in attendance were joined unanimously by their Vietnamese colleagues at the conference in concluding that, although several of these papers were suggestive, or even very suggestive, none of them proved, to international standards, a connection between herbicide exposure and unfortunate outcomes of pregnancy including congenital anomalies.

This very inclusive approach of Ngo and co-authors gives similar weight to essentially unreviewed abstracts presented years ago as well as to current, and much more detailed, investigations subject to scientific peer review. This review fails to inform the reader as to the social and political aspect of their argument. The possible human health effects in Vietnam of exposure to dioxin are intertwined with concerns about, and revulsion at, ‘chemical and ecological warfare’. Accordingly visitors to Vietnam are taken to ‘Peace Villages’ where they are shown malformed children whose problems are ascribed to herbicide exposure without any sort of scientific proof. At Tu Du Obstetrical hospital in Ho Chi Minh City there is a large collection of preserved ‘monsters’, such a collection can commonly be found in similar institutions throughout the world. It is widely believed that these fetal deformities are the result of herbicide exposure but again without any sound scientific evidence. Vietnamese ‘Victims of Agent Orange’ are currently in court in the US and the herbicide aetiology of their specific injuries is assumed without any good scientific basis. The case was dismissed on legal grounds and is currently on appeal.8

We are of the opinion, based on research beginning even before 1970, that there is no doubt as to the toxicity of the dioxin contaminant of Agent Orange.5,6,9–11 This dioxin has resulted in serious health effects in humans. We, and many others, have shown elevated levels of TCDD in some Vietnamese, although none of them are now as high as they were in 1970.12–18 At some locations in the south of Vietnam small populations are still being poisoned by the continued consumption of residual dioxin in their diet. There is no doubt that during and after the war, many Vietnamese absorbed this very toxic material. It is our belief from toxicological research and epidemiological studies from many countries that this dioxin probably resulted in significant health effects in Vietnam. However we are not convinced that Vietnamese investigations linking congenital malformations to dioxin are, as yet, more than suggestive. We know of no non-Vietnamese studies linking herbicide or dioxin exposure to congenital malformations other than spina bifida and anencephaly. Earlier Vietnamese studies or case reports suggested a link to liver cancer and to hydatidiform mole and choriocarcinoma, but these did not hold up after more rigorous subsequent research by Vietnamese and Western scientists.19,20 This article and its novel approach confirm the need for continued rigorously controlled research to definitively answer the question posed at the opening of this commentary. To date the answer is, at best, scientifically equivocal and, at worst, without valid positive scientific evidence.

References


