Agent Orange and Dioxin in Vietnam

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Agent Orange

- Was a phenoxyherbicide
- Was half 2,4-D and half 2,4,5-T
- Was used in Vietnam 1962-1971
- Purpose: Forest defoliation and food destruction
- 2,3,7,8-TCDD or “dioxin” is the persistent toxic contaminant

Agent Orange Sprayed by Aircraft

85 % was sprayed from fixed wing aircraft

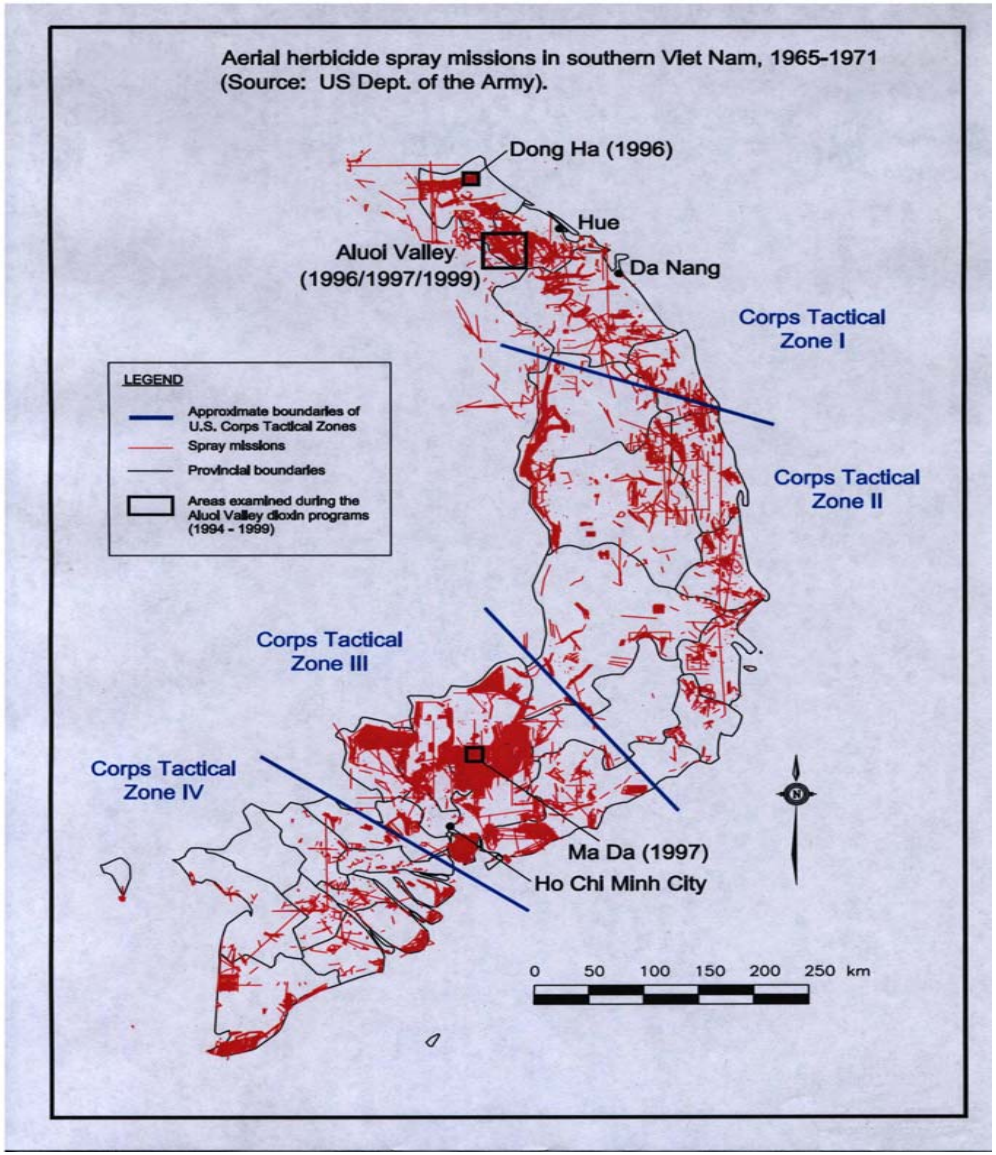
Agent Orange Spraying

15 % - sprayed from back packs, naval vessels and helicopters

- Dioxins are persistent, fat soluble and bioaccumulate
- Dioxins can last decades to centuries in the environment
- In Vietnam, Agent Orange contaminated with dioxins was used to destroy vegetation in about 15 % of the south of Vietnam
- 2,4,5-T was contaminated with the most toxic dioxin, 2,3,7,8-tetrachlorodibenzo-para-dioxin or 2,3,7,8-TCDD or “dioxin”

Vietnam map: North and South

Spraying missions, red for sprayed area



- Dioxins are synthetic chemicals
- Dioxins are unwanted contaminants
- Almost no dioxins existed before the 20th century
- They are almost exclusively from industrial sources
- Agent Orange is called Agent Orange because of an orange stripe painted on the 55 gallon barrels in which it was stored

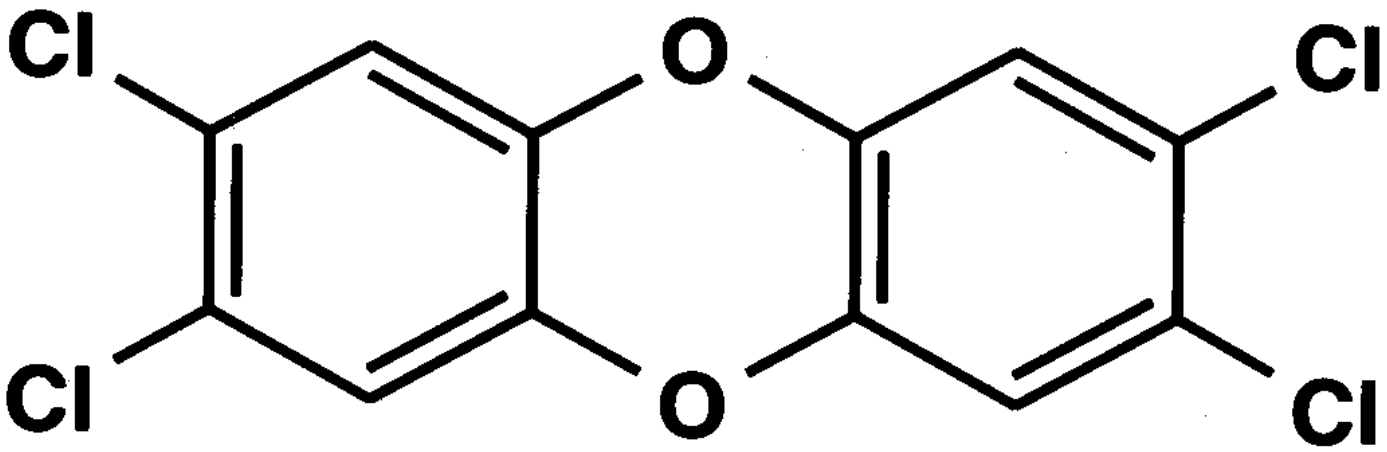
Agent Orange

- Dioxins can be formed by incineration
- Incineration can be from municipal solid waste incinerators
- Incineration can be from toxic waste incineration
- Incineration can be from hospital waste incinerators
- Dioxins can be contaminants of herbicides, such as Agent Orange

Dioxins, Dibenzofurans & PCBs

- 75 possible chlorinated dioxins - 7 in people (unwanted contaminants)
- 135 possible chlorinated dibenzofurans - 10 in people (unwanted contaminants)
- 209 PCBs
  Formerly manufactured for electrical transformers, hydraulic fluid, paint, other uses.

Dibenzo-p-dioxins



2,3,7,8-tetrachlorodibenzo-p-dioxin

Dioxin Toxic Equivalency Factor (TEF) = 1

- Dioxin was measured in nursing mothers milk from Vietnam at very high levels in the 1970s, the highest ever in human milk, 1,820 parts per trillion (PPT), lipid (Usual 1-2 PPT)

- It was measured at very high levels in fish collected in the 1970s, up to over 1,000 parts per trillion, whole weight. (Usually less than 1 PPT)

- Elevated TCDD was found from the 1980s to 2000+ in milk, fat, blood, and wildlife in Vietnam.

- Very high levels of TCDD (up to 400 ppt) were found in some people near airbases where Agent Orange was stored and where it may have leaked. (Usually 1-2 ppt found in USA or Vietnam)
- Very high levels of TCDD, up to 1 million ppt, were found in some soil in the same area (Usually, less than 1 ppt found in USA or Vietnam)
- Very high levels were found in some food, duck and fish from this area
- So eating certain foods in some locations in Vietnam is now causing new dioxin exposure

Health effects of Dioxin

A. Increase in **cancers**

B. **Immune deficiency**-inability to fight cancer or infections

C. **Endocrine disruption**-diabetes, thyroid abnormalities, sex hormones

D. **Reproductive disturbances**-altered menstrual cycles, spontaneous abortions

E. **Developmental effects** such as malformations including spina bifida and anencephaly, lower IQ, feminization of male children

Health effects of Dioxin (cont.)

F. **Nervous system damage-**insomnia, irritability, lowers IQ, emotional lability, peripheral nervous system damage

G. **Skin lesions**-redness frequent, acne rarely

H. **Liver damage**, usually temporary or transient

I. Elevated blood lipids and liver enzymes, transient

J. Increase in **heart attack deaths** with high exposure

[Health effects of dioxins determined by studies on animals and cells in culture (toxicology) and humans (epidemiology)]

In the Vietnam:

- Suspected birth defects, not proven at this time
- Suspected increase in cancers, not proven at this time
- Hydatidiform moles and choriocarcinoma, not proven at this time
- But there is a probable increase in illness in Vietnam from dioxin exposure

- It is easy but expensive to document exposure to dioxins by dioxin blood tests done by gas chromatography-mass spectroscopy (GC-MS) ($1,000 US)
- It is difficult to determine if a person is sick because of dioxin exposure
- Not certain at this time of the amount of illness from Agent Orange in Vietnamese or others also exposed
- Estimates in Vietnam 30,000-3,5000,000 affected persons

In the US:

- US government compensates Vietnam veterans for certain illnesses presumed due to Agent Orange exposure. These include:
  - Soft tissue sarcoma
  - Hodgkins lymphoma
  - Non-Hodgkins lymphoma
  - Chronic lymphocytic leukemia
  - Spina bifida in offspring of Vietnam veterans
  - Others, based on both literature review and policy decisions

Much has been learned about dioxins and health in the past few decades

But much remains to be learned about dioxins' health effects especially in Vietnam

URGENT CURRENT ISSUES AND CHALLENGES: 1

- The 20+ year Air Force (Ranch Hand) study has been closed by the Air Force
- This studied the health of all Ranch Hand sprayers of Agent Orange
- It funded health research some of which the VA uses for compensation
- The Institute of Medicine, National Academy of Sciences now has this study
- They have no money to continue this research
- Money is urgently needed for research at IOM and at universities
- Congress should fund for at least $3 million per year for good research
- Congress has funded $3 million for Agent Orange remediation in Vietnam

URGENT CURRENT ISSUES AND CHALLENGES: 2

- Congress (Sen. Leahy et al) funded $3 million for Vietnam AO remediation
- There is no US Vietnam veteran input
- There is no US university health professional input
- There is no US Oversight or Advisory Committee
- There is no attempt to see that information found used to also help US Vietnam veterans such as reporting dioxin levels in soil, sediment, food, wildlife and people.
- There is no plan to determine dioxin levels in Vietnamese where US veterans served-which could help determine where US vets were exposed.

CONCLUSION:

- This should be changed so there is US health and veteran ongoing input into this already funded program, now at the State Dept level