

Ag Health Study Update; 2008



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Agricultural Health Study (AHS)

- AHS a joint effort of:
 - National Cancer Institute,
 - National Institute of Environmental Health Sciences, and
 - Environmental Protection Agency



AHS

- 90,000 pesticide applicators and their spouses in Iowa and North Carolina are being followed from 1993 to 2008.
- The goal is to see what factors around the farm are related to sickness **in farmers and their families.**



How the Study was done, Reminders

- Self-reported exposure and disease by survey
- Exposure measures
 - Total number of days applying pesticides (lifetime exposure days)
 - More points given to higher use days (weighted total days)
- Accounting for confounders like smoking, drinking and age
- Cancer confirmed with the state's Cancer Registry



More Reminders

- Epidemiologist look at associations:
 - Statistically significant differences
 - Statistically significant trends
 - Suggested associations
 - Suggested trends
 - No association
- These are first reports of associations and trends that need to be confirmed before making conclusions



Pesticides in AHS

- 11 Fungicides (3 EBDCs etc. and Benomyl (NR))
- 4 Fumigants
- 15 Herbicides; 2,4-D, Glyphosate, Atrazine, Alachlor, Metolachlor, Paraquat etc.; 2,4,5-T and Silvex (NR)
- 21 Insecticides
 - 10 organophosphates (2 NR)
 - 7 organochlorines (all NR)
 - 3 carbamates and permethrin

RESULTS



Cancer Studies



Organophosphates (Cancer)

- Chlorpyrifos [Dursban, Lorsban]
 - Trend for lung cancer (24) (40)
 - Lifetime exposure days
 - Using no exposure and low exposure as reference + trend for rectal (41)
 - Statistical interaction with family history and prostate cancer (16)
- EPA rank = E, no evidence

Organophosphates (Cancer)

- Coumaphos [Cor-Ral]
 - Statistical interaction with family history and prostate cancer (16)
 - EPA Rank = Not likely
- DDVP [Vapona; Dichlorvos]
 - No clear association for total and specific tumors (44)
 - EPA rank = suggestive



Organophosphates (Cancer)

➤ Malathion

- No clear association for total and specific tumors (42)
- EPA = suggestive



➤ Phorate [Thimet]

- Trend for prostate cancer if it runs in the family (34)
- Statistical interaction with family history and prostate cancer (16)
- EPA = E, no evidence

Organophosphates (Cancer)

➤ Diazinon

- Trends for lung cancer and leukemia (38)
 - Lifetime exposure days (only)
 - Highest exposure group only
- Trend for lung cancer (40)
 - Lifetime exposure days
 - Using no exposure and low exposure as reference
- EPA = Not likely





Organophosphates (Cancer)

- Fonofos [Dyfonate]
 - Trend for leukemia (29)
 - Trend for prostate cancer if it runs in the family (29)
 - Statistical interaction with family history and prostate cancer (16)
 - EPA = E, no evidence



Others (Cancer)

- Aldicarb [Temik]
 - Trend for colon cancer (41)
 - EPA = E, no evidence
- Permethrin (animal use) [Pounce]
 - Statistical interaction with family history and prostate cancer (16)
 - EPA = Likely



Others (Cancer)

- Organochlorines and 2,4,5-T/ Silvex
 - Prostate cancer and age > 50 (16)
 - EPA rank
 - Insecticides = B2, probable
 - 2,4,5-T/Silvex = D, not classifiable
- Methyl Bromide
 - Trend for prostate cancer (16)
 - EPA = Not likely

Herbicides (Cancer)



- Atrazine [Aatrex]
 - Suggested trends for lung cancer, bladder cancer, multiple myeloma and non-Hodgkins Lymphoma (23)
 - EPA = Not likely
- Dicamba [Banvel]
 - Trend for lung cancer using the lowest exposure level as reference and lifetime days (32)
 - Trend for colon cancer using lifetime days as exposure factor (32)
 - EPA = D, not classifiable

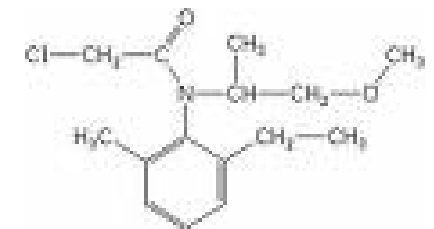


Herbicides (Cancer)

- Glyphosate [Roundup]
 - Suggested association (21)
 - EPA = E, no evidence



- Metolachlor [Bicep]
 - Trend for lung cancer (40)
 - Lifetime exposure days
 - Using no exposure and low exposure as reference
 - EPA = C, possible



Herbicides (Cancer)

- Pendimethalin [Prowl]
 - No association with total tumors or specific tumor types (37)
 - Trend for lung cancer (40)
 - Lifetime exposure days
 - Using no exposure and low exposure as reference
 - EPA = C, possible



Cancer in children of applicators

- “Modest” increase in total cancers in children of male certified private applicators in Iowa
- Link with not wearing chemical-resistant gloves
- Link with 3 products
 - Aldrin
 - DDVP
 - EPTC (Eptam™) (13)





Breast cancer

- Breast cancer in wives of applicators and/or female applicators
 - Some increased risk with use of Silvex (banned in 1985),
 - Modest association with how close the farmhouse was to treated fields
 - No association
 - Size of the farm
 - Laundering work clothes (17)

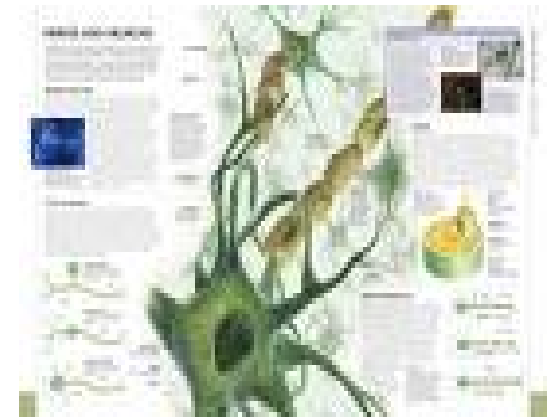
RESULTS



Non - Cancer Studies

Nervous system, Applicators

- Possible link to suicide and non-motor vehicle accidents (26)
- Symptoms related to insecticides and the lifetime number of days (25)
- Symptoms increased (39)
 - Cumulative exposure
 - High exposure events
 - Strongest associations for Organophosphates and Organochlorines





Nervous system, Applicators

- Parkinson's disease and two applicator groups
 - Group I, diagnosed at enrollment
 - Group II, diagnosed during follow-up
- Associated with
 - Pendimethalin, paraquat, cyanazine, EBDC fungicides or Rotenone
- Association group dependent; In no cases was an association seen in both groups



Nervous system, Female Spouses

- Depression (33)
 - History of pesticide poisonings
 - No association with lifetime exposure days or weighted lifetime days

Retinal degeneration



➤ Applicators (15)

- Associated with orchard fungicide use
- Less associated with organochlorine and carbamate insecticide use
- Organophosphates and herbicide use was too common to evaluate

Retinal degeneration



- Applicator wives (20)
 - Mancozeb, Maneb and Ziram
 - No association with
 - Other pesticides
 - Size of farm
 - Crop type
 - Livestock type



Respiratory, Wheezing

- Private applicators (14)
 - Related to use of paraquat (Gramoxone), EPTC (Eptam), parathion, malathion, chlorpyrifos (Lorsban), atrazine (Aatrex) and alachlor (Lasso)
- Commercial applicators (35)
 - May be produced by organophosphate exposure at doses less than cholinesterase inhibition thresholds



Respiratory, Farmers lung cancer

- Related to high pesticide exposure events
- The “ever” use of DDT, lindane or aldicarb.
- Suspected change in immunity and susceptibility to the moldy hay, etc.
(30)

Hormonal effects

- Pesticide use increased
 - Number of longer periods (19)
 - Number of missed periods (19)
 - Age of menopause by three months (36)
- Women who applied pesticides in agricultural production
 - doubled the risk of gestational diabetes (28)





Endocrine Disruption

- Hormonally active pesticides
 - Atrazine, carbaryl, carbon tetrachloride, lindane, EBDC fungicides
- Endocrine Disrupting Pesticides use increased
 - Longer periods; missed periods and inter-menstrual bleeding (19)
 - Age of menopause by five months (36)



Summary

- Studies are still in progress, more to come
- There have been first reports of pesticide exposure/individual cancer type trends
- Results need to be confirmed
- Protective clothing only protects if you use it correctly