Agricultural Health Study

Key Points

- In 1993, scientists from the National Cancer Institute, the National Institute of Environmental Health Sciences, and the U.S. Environmental Protection Agency began a study known as the Agricultural Health Study (AHS).
- Farmers in many countries, including the United States, have lower overall death rates and cancer rates than the general population. Lower death rates among farmers for heart disease and cancers of the lung, esophagus, bladder and colon, in particular, are thought to be due to lower smoking rates, as well as physically active lifestyles and dietary factors.
- The entire AHS cohort includes about 50,000 farmers, 32,000 wives of farmers, 2,000 nursery workers, and 5,000 commercial pesticide workers. Children of farm families are also included in some of the studies.
- The principal investigators of the Agricultural Health Study provided a detailed summary of the goals, methods, types of studies, advisory groups, recruitment efforts, and a description of the participants enrolled after the first year of recruitment.

In 1993, scientists from the National Cancer Institute, the National Institute of Environmental Health Sciences, and the U.S. Environmental Protection Agency began a study known as the Agricultural Health Study (AHS). Its goal is to follow a large population of men and women over time to evaluate the role of agricultural exposures in the development of cancer and other diseases in the farming community. (Agricultural Health Study homepage: http://www.aghealth.org)

The study also will provide an opportunity to assess the role that diet, cooking methods, and other lifestyle and genetic factors have on the cause of cancer and other diseases. The results of the study will provide information that can be used to create a safe work environment and healthy lifestyle for agricultural workers and their families.

Study Objectives

Specific research goals are to:

- Characterize the cancer risks among study participants who have direct exposure to pesticides and other agricultural agents;

- Characterize the non-cancer risks, such as asthma and other respiratory diseases; neurologic diseases including Parkinson's; reproductive defects including birth and developmental defects in children; kidney disease; and autoimmune diseases, including arthritis, among study participants who have direct exposure to pesticides and other agricultural agents;

- Characterize the disease risks among spouses and children of farmers that may arise from both direct and indirect contact with pesticides and agricultural chemicals used in the home;

- Define specific work practices associated with high levels of pesticide and other agricultural exposures;

- Define biomarkers that may be used to monitor exposure to pesticides and other agricultural agents;

- Measure the degree of pesticide exposure among farmers and their families, particularly children;

- Investigate interactions between specific gene alterations and pesticide exposures that lead to increased disease susceptibility;

- Characterize the role of diet and lifestyle factors in development of cancer and other diseases among this population.

Background

Farmers in many countries, including the United States, have lower overall death rates and cancer rates than the general population. Lower death rates among farmers for heart disease and cancers of the lung, esophagus, bladder and colon, in particular, are thought to be due to lower smoking rates, as well as physically active lifestyles and dietary factors.

However, compared to the general population, the rates for certain diseases appear to be higher among agricultural workers. For example, the rates of asthma, neurological diseases, and spontaneous abortions are higher, which may be related to agricultural exposures. Farming communities also often have higher rates of leukemia, non-Hodgkin's lymphoma, multiple myeloma, soft tissue sarcomas, and cancers of the skin, lip, stomach, brain, and prostate. The rates for several of these tumors (i.e., non-Hodgkin's lymphoma, multiple myeloma, skin, brain, and prostate) also appear to be increasing in the general population.

Even though no one set of risk factors explains the higher cancer rates, the range of environmental exposures in the farming community are of concern. Farmers, farm workers, and farm family members may be exposed to substances such as pesticides, engine exhausts, solvents, dusts, animal viruses, fertilizers, fuels, and specific microbes that may account for these elevated rates. However, human studies published to date have not allowed researchers to sort out which of these factors are linked to which cancers.

Study Population

The vast majority of the nearly 90,000 participants in the Agricultural Health Study are either farmers or wives of farmers; about 50,000 are farmers and 32,000 are wives of farmers. All were recruited in North Carolina or Iowa.

Those called "private pesticide applicators" are farmers or nursery workers; out of the approximately 52,000 private applicators, about 2,000 are nursery workers. The study includes a small percentage of "commercial pesticide applicators" from Iowa who work for pest control companies or for businesses such as warehouses or grain mills that use pesticides regularly; about 5,000 are commercial applicators.

The entire AHS cohort includes about 50,000 farmers, 32,000 wives of farmers, 2,000 nursery workers, and 5,000 commercial pesticide workers. Children of farm families are also included in some of the studies.

Data Collection

During the initial recruitment from 1993 through 1997 (Phase I), participants completed a questionnaire about pesticide use, crops grown, livestock raised, personal protective equipment used, pesticide application methods employed, other agricultural exposures such as solvents, grain dusts, and welding fumes, work practices that effect exposures, and non-farm activities that may affect either exposure or disease risks (e.g., diet, exercise, alcohol consumption, medical conditions, family history of cancer, other occupations, and smoking history).

Phase II of the study, from 1999-2003, consists of data collection and determination of mortality and cancer incidence among participants. The specific components are:

- Computer-assisted telephone interview (CATI): These interviews are designed to obtain information on pesticide use since enrollment, changes in health status, and detailed information on farming and work practices.

- Mailed Dietary Health Questionnaire: This questionnaire is designed to provide detailed information on cooking practices and diet.

- Buccal (cheek) cell collection: Buccal cell collection allows scientists to determine whether specific genetic alterations found in the DNA in cheek cells play a role in agricultural exposures and disease susceptibilities.

- Determining which participants developed cancer by contacting the cancer registries in each state.

- Determining which participants died by contacting the U.S. National Death Index (NDI), a computerized index of death record information collected from all state vital statistics offices and available to scientists for medical and health research.

Phase III follow-up began in 2004 and is scheduled to conclude in 2008. It will include the collection of additional data on diseases among the participants, additional agricultural exposures, and continued tracking of mortality and cancer incidence among participants. In addition, a series of smaller studies focus on the risk factors for specific diseases. These may involve additional questionnaires and the collection of blood, tumor, or urine samples.

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Related NCI materials and Web pages:

- Agricultural Health Study Home Page (http://www.aghealth.org)
- Cancer Causes and Risk Factors Home Page (http://www.cancer.gov/cancertopics/prevention-genetics-causes/causes)
- Understanding Cancer Series: Cancer and the Environment (http://www.cancer.gov/cancertopics/understandingcancer/environment)

For more help, contact:

NCI's Cancer Information Service
Telephone (toll-free): 1–800–4–CANCER (1–800–422–6237)
TTY (toll-free): 1–800–332–8615
LiveHelp® online chat: https://cissecure.nci.nih.gov/livehelp/welcome.asp

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