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Project Number: 1ZIAES049030-19

NIDB ANNUAL REPORT

Contact PI / Project Leader: [CHEN, HONGLEI](#)

Title: HEALTH EFFECTS OF EXPOSURES IN AGRICULTURE

Awardee Organization: NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES

Abstract Text:

The Agricultural Health Study (AHS) is a long-term prospective study of potential health effects associated with pesticides and other agricultural exposures. The study is funded by the National Cancer Institute and the National Institute of Environmental Health Sciences, with collaboration from the US Environmental Protection Agency and the National Institute for Occupational Safety and Health. We are examining cancer incidence and other health endpoints in licensed pesticide applicators, spouses and children from North Carolina (NC) and Iowa (IA). Between 1993 and 1997, we enrolled more than 57,000 licensed applicators, representing 82% of eligible private pesticide applicators (largely farmers) in IA and NC and 43% of commercial applicators from Iowa. About 40% of the private applicators also completed a more detailed take-home questionnaire covering farming practices and health. Nearly 32,000 spouses of farmer applicators enrolled and two-third also provided data on reproductive health, including information on all children under age 21 at time of enrollment. After enrollment, many study participants completed in three follow-up surveys in 1999-2003, 2005-2010, and 2013-2015 respectively. At each follow-up survey, study participants updated farming exposures and lifestyle and reported the occurrence of cancer, Parkinsons disease, and other chronic conditions. In addition to active follow-ups, the cohort is linked to population-based cancer registries in IA and NC and vital statistics to identify cancer cases and deaths. We also collected buccal-cell samples for genetic research from about 40% of the study participants and conducted a dietary survey as part of the 1999-2003 follow-up. Additionally, we have been collecting DNA samples on a regular basis from participants who developed cancers and other conditions. Finally, we conducted in-depth pesticide exposure assessment for selected chemicals in targeted samples of the cohort. Results have been used to validate study questionnaires and inform exposure classification. In addition to cancer, the AHS has been investigating farming exposures in relation to neurological diseases and symptoms (Parkinson's disease, Alzheimers disease, hearing loss, depression, neurobehavioral function, and suicide, amyotrophic lateral sclerosis), respiratory and allergic outcomes (asthma, rhinitis, and chronic bronchitis), cardiovascular disease (heart attack, stroke), diabetes (gestational and adult onset), autoimmune diseases (rheumatoid arthritis, lupus, and Sjogren's syndrome), age-related macular degeneration, fatal injury, and adverse reproductive outcomes (infertility, fibroids and endometriosis). NIEHS investigators have also been conducting sub-studies within AHS. In the Growth and Puberty (GAP) Study, a pilot study to assess the feasibility of measuring early puberty markers (hormone levels in urine and saliva, height velocity, Tanner staging), we enrolled and followed 60 children. Hormone assays were recently completed and their use in predicting puberty onset is being explored. Data analysis continues for the Farming and Movement Evaluation (FAME) study while new cases of Parkinson's disease continue to be captured (see report by F Kamel). Data collection for an in-depth study of respiratory diseases (The Lung Health Study) was recently completed (see report by S London). In 2015, the AHS started a new sub-study to investigate potential associations of pesticide exposures with dementia and Alzheimers disease. This study expects to screen the cognitive function of 2500 elderly participants and identify 150 patients with Alzheimers disease. This collaboration is led by Dr. Plassman at Duke University and Drs. Chen and Kamel at NIEHS. The AHS cohort continues to participate in large data pooling projects through the NCI-sponsored Cohort Consortium. In addition, the Agricultural Health Study is one of the founding members of the Agricultural cohort consortium (AGRICOH) and we hope to use this collaboration to enhance our ability to assess rare exposures and outcomes. To date, the Agricultural Health Study has published more than 200 scientific papers and NIEHS investigators contributed to 10 in the past year. These publications cover a range of health conditions such as cancer, Parkinsons disease, and end-stage renal disease. For example, we reported that the use of protective gloves and better hygiene practices modified the association of pesticides with Parkinsons disease and therefore potentially offered a practical way to reduce Parkinsons risk among farmers (Furlong et al. Environ Int 2015). Via linkage to the US Renal Data System, we identified 320 patients with end-stage renal disease in AHS, and reported potential links between chronic exposures to several pesticides or high exposure events to pesticides and the risk of end-stage renal disease (Lebov et al. Occup Environ Med, 2015). In addition, the AHS continuously reported findings on cancer outcomes either independently or as part of large international consortium. Over the years, the Agricultural Health Study has contributed to our knowledge on potential health effects of exposures that are associated with pesticides use and other farming activities. This continuously serves our ultimate goal to improve the health of US farmers and their family members.

NIH Spending Category:

Acquired Cognitive Impairment; Aging; Brain Disorders; Clinical Research; Dementia; Neurodegenerative; Neurosciences; Prevention; Rural Health

Project Terms:

21 year old; Adult; Age related macular degeneration; Agriculture; Allergic; Alzheimer's Disease; Amyotrophic Lateral Sclerosis; Asthma; Autoimmune Diseases; base; Biological Assay; cancer risk; cancer type; Cardiovascular Diseases; Cells; Cessation of life; Chemicals; Child; Chronic; Chronic Bronchitis; Classification; cognitive function; cohort; Cohort Studies; Collaborations; Data; Data Analyses; Data Collection; Dementia; Diabetes Mellitus; Diet; DNA; Elderly; End stage renal failure; endometriosis; Enrollment; Evaluation Studies; Event; Exposure to; Family; Family member; farmer; Farming environment; Fibroid Tumor; follow-up; Funding; Genetic Research; Gestational Diabetes; Goals; Growth; hazard; Health; hearing impairment; Height; high risk; Home environment; Hormones; Hygiene; improved; Incidence; Infertility; Information Systems; Injury; International; Iowa; Kidney; Licensing; Life Style; Link; London; Lung; Lung diseases; Lupus; Malignant Neoplasms; Measures; member; Mental Depression; Meta-Analysis; Movement; Myocardial Infarction; National Cancer Institute; National Institute for Occupational Safety and Health; National Institute of Environmental Health Sciences; neoplasm registry; nervous system disorder; neurobehavioral; Neurodegenerative Disorders; North Carolina; Outcome; Paper; Parkinson Disease; Participant; Patients; pesticide exposure; Pesticides; Pilot Projects; Population; population based; Prospective Studies; Protective gloves; Puberty; Publications; Publishing; Questionnaires; Reporting; reproductive; Reproductive Health; Research Personnel; respiratory; Rheumatoid Arthritis; Rhinitis; Risk; Saliva; Sampling; Sjogren's Syndrome; Spouses; Staging; stroke; Suicide; Surveys; Symptoms; Thyroid Diseases; Time; United States Environmental Protection Agency; Universities; Update; Urine; Vital Statistics

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