

Executive Summary, 2009-2010 Year End Report Pacific Northwest Agricultural Safety and Health Center

Pacific Northwest Agricultural Safety and Health Center (<http://depts.washington.edu/pnash>)

The Pacific Northwest Agricultural Safety and Health (PNASH) Center is located at the University of Washington's School of Public Health. We serve Alaska, Idaho, Oregon and Washington with the goal of reducing occupational disease and injury among agricultural operators, workers and their families. By focusing on safe and sustainable agricultural workplaces and communities with an emphasis on injury and illness prevention we strive to promote growth and innovation in the agriculture, forestry and fishing industries. Our approaches include:

- Working in partnership with employers, workers, agencies and other research and service organizations
- Developing innovative research and intervention programs that focus on problem solving
- Taking solutions to the workplace through training, outreach, and participatory research

All PNASH Center Projects (www.depts.washington.edu/pnash/research_summaries.php)

NIOSH Projects 09/10 Year-End Progress

Risk Factors for Cholinesterase (ChE) Depression Among Pesticide Handlers

This 5-year study works with Washington state's Cholinesterase Monitoring Program to identify key risk factors responsible for pesticide overexposure, including genetic susceptibility, as well as protective factors in preventing pesticide exposure. The ChE enzyme, which plays an essential role in the regulation of neural signaling, is inhibited by organophosphorous and carbamate pesticides. A participant's risk of ChE depression is evaluated with respect to workplace practices and genetic characteristics (paraoxonase or PON1 status). 265 agricultural pesticide handlers have participated in this study through collaborations with occupational medical clinics located throughout the state. During the 2009-10 year, 48 handlers participated in the study, with a total of 50 participant visits where self-reported information is collected. Findings thus far have identified the following risk factors being associated with BuChE inhibition (exposure): cleaning spray equipment, mixing/loading pesticides, and not using a locker to store PPE. Factors that protected handlers from exposure were: wearing a full-face respirator and wearing chemical-resistant footwear. During the next year, data will continue to be collected to investigate the study's initial findings.

Enhancements to Cholinesterase Monitoring: Oxime Reactivation and OP-ChE Adducts

Scientists at PNASH and the Centers for Disease Control (CDC) are working to improve the current ChE laboratory testing by increasing its accuracy to ensure that a ChE depression is due to pesticide exposure and identify the specific pesticide involved. Though some challenges exist, the oxime reactivation assay has been successfully applied to human and rat plasma samples providing kinetic information regarding ChE inhibition and reactivation. The second component of this project is the development of a process for tandem mass spectrometry of protein adducts in the blood of exposed workers. This tool helps health care providers to identify long term exposures, since the protein adducts last much longer than the actual pesticides or metabolites of pesticides.

Neurobehavioral Assessment of Pesticide Exposure in Children

There is increasing evidence that the widespread use of pesticides in agriculture may be affecting farmworker communities, specifically the children of pesticide handlers. Previous work has shown that pesticides are not confined to the workplace, but can be brought back into the homes and found in children of the people who apply pesticides. This study characterizes OP exposure in the homes of pesticide applicators and relates these exposures to neurobehavioral performance of their children. Over five hundred adults have completed a survey on pesticide knowledge and beliefs in either Spanish or English, and over two hundred children have participated in the neurobehavioral study, completing neurobehavioral tests, interviews with parents and collection of dust samples. Preliminary data has been analyzed and these results are being presented and submitted for publication.

Interventions to Minimize Worker and Family Pesticide Exposures

This field-based study identifies, evaluates and disseminates practical pesticide safety measures developed on farms and brainstormed by a team of industry experts that includes managers, workers, and pesticide safety educators. Direct community involvement is a key element of the project and the participation of experts in the day-to-day aspects of production. To date, almost thirty practical pesticide safety solutions have been identified, documented, and vetted. Participation in the identification and evaluation process has included 25 orchards and 95 individuals. In addition, we are developing: a prototype mixer-loader splash shield; PPE fit and cleaning procedures; and quantitative methods for testing pesticide residue on equipment. Recommended Practical Solutions for Pesticide Safety will be released nationally in September 2011 and are currently being regionally disseminated and evaluated for their use in the workplace.

Introducing a Cholinesterase Test Kit into Clinical Practice

We have shown the Test-mate™ kit to be an effective, cost-efficient test that can provide rapid results for workers – important if they are shown to have a ChE depression. At this point we are bringing this technology to clinical providers, allowing them to conduct ‘on-the-spot’ evaluations of workers, and assisting in the development of the use model for the kit. We have begun collecting baseline, periodic, and follow-up samples regarding the potential for the Test-mate to augment or replace laboratory-based ChE testing.

Storytelling to Translate Agriculture Health and Safety Research

Nicknamed ‘Reality tales,’ this project uses Northwest workers’ heat illness and ladder injury experiences to teach critical prevention strategies. Through the use of the oral tradition of storytelling we translate health and safety research and education for agriculture producers and workers on two critical issues: ladder injuries and heat stress. This strategy works because it persuades individuals based on personal experiences, influences them to change their behavior, facilitates remembering, enhances discussion, and engages individuals personally. Currently collected stories are being shared through radio and trade publication articles, and the reach of these methods of dissemination is being evaluated.

Advisory Boards and Outreach

PNASH’s advisory boards connect our project work to northwest stakeholders, ensuring that Center activities are relevant and useful and that key partners are informed of developments and results. The PNASH advisory board includes employer and workers in our industries as well as representatives from the public agencies, healthcare and education. In 2009-10 PNASH hosted a two-day research review, open to all interested attendees and broadcast live online. Proceedings of the Research Review are available at: http://depts.washington.edu/pnash/research_review10.php.

Outreach and education puts our research results and products into the hands of the agricultural community. PNASH provides in-service trainings for health care providers, safety professionals, service agencies and extension and disseminates results through community and trade media (print, radio and web) and events.

PNASH Pilot Project Program

Our Pilot Project program enhances the Center’s fulfillment of its goals to address emerging issues, provide outreach to new investigators, and address needs/industries not included in other projects. Projects funded for the coming year include vessel capsizing in the northwest Dungeness crab fleet and physiological load in the aging logging workforce and the evaluation of the use of synthetic rope to improve performance and health. The diverse contacts and researchers developed through this program continue to make the PNASH Center stronger each year.