How grain dust impacts lungs

BY CURT ARENS

REATHING easy is something most folks take for granted. But chronic respiratory problems are all too common among farmers. Jane Shuh, North Dakota State University microbiology researcher and associate professor of immunology in the department of veterinary and microbial sciences, grew up on a Sheldon, N.D., farm and saw first-hand the impact of grain dust and moldy grain on family members.

That’s why Shuh’s work is so important. Supported initially by seed money from the Central States Center for Agriculture Safety and Health based at the University of Nebraska Medical Center in Omaha, the research looked at grain dust from corn and soybeans, gathered at a grain elevator.

“Because the dust we are studying was gathered high in the rafters of a grain storage facility at an elevator, the research is also applicable to someone working in an elevator or grain facility.”

Shuh used a mouse model, basically researching human respiratory interactions in miniature. “It was an interesting comparison between corn and soybean dust,” she says. “The dust from both is very fine, but the soybean dust is light and powdery, and a little finer than grain dust.”

For the sake of her studies, the research team gave their mice asthma, so they had an allergic lung that was susceptible to dust and other potential allergens. This would simulate conditions found when someone is cleaning out a grain bin, or loading and handling grain.

In Shuh’s study, there was not a huge impact on the allergic lung when mice were exposed to grain dust by itself. “But, if the animals were sensitized to something like fungus, if the sample had fungal spores, they had respiratory responses like an asthma attack,” she explains. “If you extrapolate this to farmers and ranchers, grain samples could be carrying all kinds of particulates, mold and bacteria, posing an increased risk.” The take-home message from Shuh is that farmers should wear dust masks when working with grain.

“Once you get sensitized or are allergic to different types of proteins, you have a sensitized airway and are more prone to other respiratory allergens and irritants,” Shuh says. “As for an allergic response, genetics also play a huge role.”

CS-CASH helps respiratory studies

ELLEN Duysen, coordinator at the University of Nebraska Medical Center CS-CASH, says that since 2011, CS-CASH has helped fund 21 pilot projects in its seven-state region, with five new projects this year. Grants range from $10,000 to $20,000 over an 18-month period.

Research like Jane Shuh’s work ties directly with respiratory health and protection, one of the major efforts of CS-CASH projects, Duysen says. “This study complements work being done at the UNMC looking at chronic obstructive pulmonary disease.” Respiratory issues are not like other injuries, Duysen says. “As farmers get older, we look at the chronic effects of COPD, asthma and farmers’ lung. Then, we take that into our outreach program that looks at the types of respirators and different masks of all kinds. We’re just trying to get the word out!”

Get more information online at unmc.edu/publichealth/cs-cas.

MOUSE MODEL: NDSU microbiology researcher Jane Shuh uses a mouse model to test exposure responses to grain dust in an allergic lung.

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