

Seeking safe levels of formaldehyde in humans

If you dissected a frog in high school biology, you may remember the eye-stinging fumes from the preservative chemical known as formaldehyde.

Scientists know that formaldehyde is a human carcinogen. But what's not well known among the public is that this important chemical is also naturally present in our own bodies – a fact that makes establishing safe exposure levels difficult.

“It’s an essential chemical in every living cell,” says James A. Swenberg, DVM, PhD, head of the Molecular Carcinogenesis and Mutagenesis Lab housed in UNC’s Gillings School of Global Public Health. “This seems to be lost on our regulatory agencies.”

While working with the Chemical Industry Institute of Toxicology in 1980, Swenberg helped discover that formaldehyde caused nasal cancer in rats. Today, his lab produces data to help regulators make science-based decisions about safe levels of formaldehyde exposure.

Formaldehyde is an important issue in North Carolina because the chemical is commonly used to produce furniture and

textiles – two of the state’s historically largest industries – which means that many workers have been exposed to it. Other sources include cigarette smoke, auto exhaust and cooking fumes. Government-issued trailers provided to victims of Hurricane Katrina also were found to have high levels of formaldehyde. The Environmental Protection Agency is now working to establish rules to set levels of exposure.

Kun Lu, a doctoral student in Swenberg’s lab, developed a formaldehyde biomarker – a way to measure the amount in the body. In the lab, Kun exposed animals to two types of formaldehyde molecules. Using mass spectrometry, he examined whether the molecules had an effect on distant tissues.

So far, their research has not shown that formaldehyde migrates to distant tissues in



PHOTO BY TOM FULDNER

Doctoral student Kun Lu has developed a formaldehyde biomarker to measure the amount of the chemical in the human body.

the body – which means there is less chance that it causes cancer anywhere other than in nasal cavities.

“We want to see if we can find it in the liver or the bone marrow,” Swenberg says. “We don’t know what the answer is. We just want to put some good science behind it.”

For his work, Lu won a 2009 Impact Award, given to UNC graduate students whose research provides special benefit to North Carolinians. In the recommendation letter to Impact Award judges, Swenberg wrote “Kun’s research ... will strongly drive cancer risk assessment for North Carolina, the USA, and the world.” ■

– By Sylvia Adcock

To learn more, see the National Cancer Institute’s fact sheet on “Formaldehyde and Cancer Risk” at www.cancer.gov/cancertopics/factsheet/Risk/formaldehyde.