The plight of the modern coalminer

December 17 2013, by Angela Herring

Open pit coal miners experience a unique version of whole body vibration using extremely large equipment. Credit: Thinkstock.

Open-pit coalminers face a unique set of occupational hazards. The dozers, dump trucks, and shovels they operate stand five or six stories tall and often sport tires two or three times their height.

Yes, the equipment allows the miners to move hundreds of tons of material at a time from the comfort of their ostensibly safe seats inside the cab. But the effect of the whole-body vibration caused by operating

heavy-duty vehicles has not been thoroughly studied, said Jack Dennerlein, a professor in the Department of Physical Therapy with an engineering background.

Significant data has already shown that people who sit in a vibrating environment for long periods of time are at higher risk for low back pain, which accounts for one of the largest disability claims in the United States. Understanding the mechanisms of the injury, and how to prevent it, Dennerlein said, is a critical public health concern.

"What we're doing is taking that knowledge and applying it to open pit mines, which have a very different type of whole body exposure," Dennerlein explained. "Miners are driving over roads that have just been made, they're getting dumped on, so the whole truck shakes, they're getting shock impulses—a whole different kind of vibration that people haven't studied before."

Backed by funding from the Alpha Foundation, a nonprofit that supports research to promote the health, wellness, and safety of miners, Dennerlein is hoping to change that. He and his team will add vibration sensors to the floors and seats of these heavy-duty vehicles to see how different seats respond to the stimuli.

Dennerlein will be looking at both active vibration cancelling systems and passive seat suspensions, with the hope of identifying one that is most successful at limiting whole body exposure, and thereby reducing low back pain.

In a pilot study, Dennerlein looked at the average overall vibration reaching the operator using standard techniques applied to drivers and pilots. This data strongly suggested what he expected—more exposure to vibration causes more injury. "But we really want to look at the peak, acute exposures," said Dennerlein, noting that the miner is more prone to

experience shock impulses than someone driving on the freeway for a few hours.

With data from his forthcoming study, in addition to the driving and health records of the miners, Dennerlein hopes to build a model that could predict future health outcomes based on their exposure to whole-body vibration.

Provided by Northeastern University