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Dust-related Lung Disorders Post 9/11

More than six years after the bombing of New York's World Trade Center, evidence of lung disease in responders continues to mount. Some responders have already received compensation for their work-related disease; litigation continues for many others who may have been exposed through work or bystander proximity to the blast.

Although no data were collected immediately at the time of the initial explosion, soon after the blast, government agencies began collection of air samples to determine the chemical and particulate make-up of the substantial dust and smoke clouds that enveloped the area. Analyses of available dust samples have identified the presence of combustion products and building materials, including some asbestos and other carcinogens.

Assessments and follow-up of firefighters directly exposed during the initial blast period suggest that these workers are at increased risk of reactive airways disease, with one-year reductions in lung function 10 times as much as predicted for unexposed individuals. The general population was also exposed to the dust and gases releases as buildings collapsed. A health survey of those living in the vicinity has found higher rates of respiratory symptoms in those living close to the site than among individuals living elsewhere.

While at this point what is known regarding the dusts and chemicals present at the explosion is as well-characterized as will ever be possible, the full extent of human health consequences is not. It appears that some first responders have persistent respiratory abnormalities; and although they were exposed to inhaled carcinogens, it is too early to know their risk of future cancer. Similarly, long-term effects on the respiratory health of the general public are unknown. A World Trade Center Health Registry has been established, which will follow more than 71,000 potentially-exposed individuals through time to determine adverse health effects of their exposures. The registry includes rescue, recovery, and clean-up workers, survivors of the collapsed and damaged buildings in the vicinity of the blast, and students and staff at area schools. Their physical and mental health will be traced for 28 years. The potential for adverse health effects in these populations may exist for many years; compensation for their health care and other costs will remain an important issue in the aftermath of the blast.

Reference: Samet JM, Geyh AS, Utell MJ. The legacy of World Trade Center dust. New England Journal of Medicine 2007 356:2233-2236.

Spinal force measurement study supports biomechanical models used by forensic experts

A new study conducted in Germany provides support for common methods used in expert testimony for low back injury cases. Low back litigation can involve the role of biomechanical and psychosocial factors in causation. Biomechanics and human factors experts use mathematical models of the body and spine to estimate the forces acting on the vertebra, which are the bones that make up the spine, and intervertebral disks, which separate the vertebra. These models have been only indirectly verified in the past because of the extreme difficulty of making direct measurements of forces acting within the spine of a living human.

A research group in Germany has recently published a landmark study in which they made actual measurement of forces acting on the human spine in patients who underwent surgery to replace a vertebra with a mechanical prosthesis. The group, which was headed by Dr. Georg Bergmann in Berlin, customized a commercial vertebral replacement to measure spinal compression and shear forces. It used a miniaturized radio transmitter to send the measurements to a receiver outside the patient's body. The device was surgically implanted in three patients who gave their consent to be research subjects. Measurements were made within one month of surgery. The results supported the basic theory of spinal biomechanical models used by forensic experts. As a patient bent forward, spinal compression force increased. When a 3.4 pound weight was held in outstretched hands, the spinal compression force increased 43%.

The significance of this innovative study for the trial lawyer community is that it provides a direct validation of biomechanical models used by biomechanics experts in low back cases.

Reference: Clinical Biomechanics (Vol. 23, No. 2, February 2008).

Recent Federal Court Decision Awards Payment to Autism Case for Vaccine Effects

In November of 2007, the U.S. Court of Federal Claims conceded a case related to Autism Spectrum Disorder (ASD) potentially caused by exposure to routine childhood vaccinations. The U.S. Department of Health and Human Services Division of Vaccine Injury Compensation (DVIC) decided that compensation in this case was appropriate, despite the fact that for years, government and scientific researchers have insisted there is no evidence for an association between the two.

Why the apparent change in thinking? Recently researchers have identified an association between an underlying mitochondrial disorder and development of ASD. Mitochondria, energy-producing sub-units of human cells that have their own genetic material, are subject to mutations via either changes in the cell's nuclear DNA or its own mitochondrial DNA. Researchers have identified an association between a particular mitochondrial mutation and ASD. Their hypothesis is that it is possible that an intervening exposure (one that occurs *after* the original mutation, but *prior* to disease onset) to certain agents, including infectious organisms and chemicals, may precipitate the neurological symptoms now recognized as describing ASD. The ASD claimant in the conceded case was shown to have this mitochondrial genetic disorder and subsequent vaccine exposure, which DVIC found to be sufficient evidence of causation to award compensation.

Why is this decision interesting from a scientific and legal standpoint? Results of a substantial amount of past research examining relationships between ASD and vaccines have shown no relationships between the two, and until now the government position has consistently reflected this. The Division of Vaccine Injury Compensation has denied compensation for thousands of cases where vaccines were claimed to be the cause of ASD. Only now, in this individual case, has their position changed, based on the recent evidence suggesting that vaccine constituents may trigger ASD in those with an underlying mitochondrial disorder. Implications of this case are far-reaching: for those with ASD, there may be many more cases that can now be compensated for their medical expenses based on their mitochondrial mutation risk status. At this point, the Division of Vaccine Injury Compensation has not budgeted for a large increase in cases, and it is not clear what resources will be available for additional funds. It also opens up the possibility of compensation in other medical cases of potentially environmentally-related disease where a direct causal mechanism may not be known, but an intervening exposure that may trigger disease can be identified.

For most recent proceeding regarding this case: U.S Court of Federal Claims *Hannah Poling, a minor, by her Parents and Natural Guardians, Terry Poling…v. Secretary of Health and Human Services (02-1466V).*

Costs for Back and Neck Problems Increase, with no Evidence of Improved Health Status

Back disorders are recognized as one of the most frequent and costly of work-related injuries. A report published in the February 13, 2008 issue of JAMA utilized results of the nationally representative Medical Expenditure Panel Survey to examine rates and costs of spinal disorders from 1997-2005, along with accompanying measures for health status. While costs for spinal disorders, which combined self-reported complaints of back and neck pain, increased by 65% over the 9-year period, there was no corresponding improvement in health status measures related to activities of daily living, physical functioning, and social activities. The greatest relative increase among the expenditure categories that were studied was observed for medications, and prescription medicines in particular. Results demonstrated that patients may not be benefiting from current therapies as much as might be desired in terms of observable gains in everyday mobility and freedom from limitations.

Reference: Martin BI, Deyo RA, Mirza SK, et al. Expenditures and health status among adults with back and neck problems. JAMA 2008 299:656-664.

High Physical Activity Levels at Work are Associated with Atherosclerosis

Popular wisdom has consistently suggested that physical exercise helps to reduce signs of atherosclerotic heart disease. However, important research published in the December 2007 Scandinavian Journal of Work Environment and Health suggests that the opposite may be true for high levels of work-related physical activity.

The study examined 612 Finnish men over an 11-year period, assessing 5 measures of work-related energy expenditure and thickness of the carotid artery lining. This measure has been shown to be a reliable predictor of coronary heart disease (CHD). The authors found that higher job physical activity levels were associated with accelerated progression of carotid atherosclerosis, even after accounting for effects of "virtually all known cardiovascular risk factors" , such as individual characteristics, smoking, socioeconomic status, and leisure time

physical activity levels. Explanations for their results, which are contrary to strong epidemiological and laboratory evidence that *low* physical activity is a risk factor for CHD, include that the high energy demands of work often continue for hours, with little opportunity for worker control. Leisure time physical activity tends to be both shorter in duration and subject to individual preference with regard to type and frequency.

The results of this large and well-executed study were surprising in that they do not support the idea that heavy physical labor has ceased to be a health hazard in modern workplaces. The authors suggest that regulatory statutes dealing with work time and rest schedules continue to be important in assuring that workers are protected from overexposures.

Reference: Krause N, Brand RJ, Kaplan GA, et al. Occupational physical activity, energy expenditure and 11-year progression of carotid atherosclerosis. Scandinavian Journal of Work Environment and Health 2007 33:405-424.

Occupational Asthma

Recent reviews in the occupational health literature confirm that occupational asthma (OA) continues to be a serious workplace health problem. It is the most common occupational lung disease in developing countries and the second most common in underdeveloped countries, after pneumoconioses. The median proportion of population cases attributable to work ranges between 10 and 15 %.

Exposures that commonly trigger work-related asthma include cleaning agents, pesticides, isocyanates, grain, wood and other plant dusts, welding fumes, and hairdressing chemicals, among others. The latency period between first exposure and onset of symptoms varies, but generally, most cases develop symptoms within 1-2 years of exposure. Sensitization to low molecular weight agents requires a shorter interval than exposure to high molecular weight substances.

The disease remains poorly diagnosed, but case identification includes documentation of an appropriate exposure. The higher the exposure, the more likely disease will result. Symptoms upon exposure include evidence of wheezing, ocular-nasal itching, and non-specific bronchial hyperresponsiveness. With regard to pulmonary function testing, a peak expiratory flow rate data demonstrating a work-related decline, along with subsequent improvement when leaving the workplace, supports a diagnosis. Improvement in symptoms during evenings, weekends, and holidays are sensitive criteria in making a diagnosis. Specific bronchial challenge tests (to the suspected agent) represent the gold standard in the diagnosis of OA. Appropriate treatment involves removal from exposure as quickly as possible.

OA remains under-recognized, poorly managed, and under-compensated. Up to a third of workers with occupational asthma continue to work with exposure to causative agents.

Reference: *International Journal of Tuberculosis and Lung Diseases* 2007 11(2)122-133.

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