Maine Worker’s Compensation Conference
NECOEM Members Present on Causation and Multifactorial Cases: Plantar Fasciitis, Low Back Pain with Emotional Overlay, and Carpal Tunnel Syndrome

by Susan Upham, MD, MPH, FACOEM

The annual Maine Worker’s Compensation Conference otherwise known as the “Comp Summit” was held at the Samoset Resort, Rockport, ME on August 27 – 29. This annual event is attended by various members of the worker’s compensation community, including medical providers, the legal community, insurers, adjusters, case managers, rehabilitation providers, private investigators, and Maine employers. Their mission is defined as “…the pursuit of common ground for injured workers, Maine employers and the Workers’ Compensation Board.

We analyze the law’s impact on a tactical “day to day” basis and its strategic impact on employee rights, the business climate in Maine, and the grand bargain that created workers’ compensation systems in the first place.”

One of the many sessions held was “The Doctor’s Perspective – Occupational Medicine and Causation in Multifactorial Cases.” NECOEM members Drs. K. Saito, J. Torres, S. Upham, and A. Mesrobian, all practicing occupational medicine providers in Maine, presented topics relevant to this issue and ended with a Q&A session directed by the Worker’s Compensation Board Executive Director Paul Sighinolfi, Esq.

The following are summaries of these physician’s presentations.

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Ron and Jay’s Truck Stop, and Go: Part III
By Drs. Ron Blum and Jay Poliner

To all our Commercial Driver Medical Examiners...this column is for you. Have an interesting question or problem CDME case to share in a future newsletter? Do you have any other thoughts or opinions about these cases? Send them to Newsletter Editor, S. Upham, MD, MPH, FACOEM at suspham@roadrunner.com

Case 1: SLEEP APNEA A 48-year-old obese man presented for a commercial motor vehicle (CMV) recertification exam. He acknowledged snoring, and readily falling asleep when sitting in front of a television, but he denied any history of motor vehicle accidents and had regularly received a two-year medical recertification. His neck circumference was 17 ½ inches. He is not taking any medications and had an otherwise benign history and examination.

He was given a ninety-day card, to allow adequate time to schedule a sleep evaluation. However, the evaluation was delayed due to slow insurance clearance, and he completed the sleep study just over a week before returning to the office, five days before his card expired. It was determined that he indeed had Obstructive Sleep Apnea and he was placed on CPAP. He reported feeling and sleeping much better in the few days under treatment, placed on CPAP. He reported feeling and sleeping much better in the few days under treatment, much better in the few days under treatment, much better in the few days under treatment, much better in the few days under treatment, much better in the few days under treatment, much better in the few days under treatment, much better in the few days under treatment, much better in the few days under treatment, much better in the few days under treatment, much better in the few days under treatment, much better in the few days under treatment, much better in the few days under treatment, much better in the few days under treatment, much better in the few days under treatment, much better in the few days under treatment, much better in the few days under treatment.

Question: The examiner asks if she can offer an extension to the ninety-day card?

R & J’s Analysis: The CDME has three options, but extending a prior certification is not one of them.
1) She could have him return for a new examination once he can schedule a CPAP, but he denied any history of motor vehicle accidents and

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Most physicians who are asked to take care of workers’ compensation claimants often do not understand that judges and attorneys view “causation” quite differently than do members of the medical community. In many disability/injury/illness-compensation systems, it is essential for doctors to identify the cause of the problem to determine whether it is “compensable.” Vehicle-accident compensation only covers payments if the problem came from a specific vehicle accident. Workers’ compensation only covers payments if the condition “arose out of and in the course of” one’s work activities. Identification of causation from a legal perspective may differ from identification of causation from a medical perspective.

The statutory requirements for legal causation require that there be a causal relationship between the accident and the work being performed. A claimant must prove that the accident was within the time, place and circumstance of the employment. Legal causation focuses primarily on the accident itself. The employer’s investigation and documentation of the accident and the type(s) of injury or injuries involved is the focus. Medical causation, on the other hand, requires a connection between the accident and the type of injury or injuries. Medical causation is provided by the medical providers involved and can be questioned throughout the life of the claim given the injury or injuries involved.

In assessing causation, doctors need to express opinions to a “reasonable degree of medical probability.” This means there must be more than a 50 percent likelihood that our doctors’ opinions are accurate. This is more than a 50/50 coin-toss likelihood—but anything even just barely better than that 50/50 coin-toss likelihood counts. Doctors must determine if the patient’s problems can be linked, with that “reasonable degree of medical probability,” to a specific cause.

Usually what caused the problem will not change the treatment and as such, most doctors are not specifically trained in assessing causation. Because medical treatment focuses on health problems and usually not so much on how or what caused it in the first place, the study of “causation” is not a major element of most medical training. Causation determination is usually straightforward for discrete and severe problems such as a broken bone. It is much more challenging for chronic problems. Even for initially sudden and severe problems such as those caused by a motor vehicle accident, it may not be easy for us or for others to determine if that initial event is continuing to cause problems over time. Causation of chronic problems which may, or may not, relate to our work, is often difficult for anyone to assess.

Review of the seven PF cases seen at BEHC in 2016, a general OEM practice, provides the reader a glimpse into their typical presentation. The onset of all but one was atraumatic. The cases involved 3 males and 4 females with BMIs ranging from low weight to obese, though 4 had BMIs in the obese range. One smoked cigarettes and none had second jobs. Three had pes planus and 3 engaged in vigorous recreational activities – running, walking, gym workouts, exercise classes and weight lifting.

There is widespread information about numerous alleged causes of PF available to the public and medical professionals alike. However, the systematic reviews of the research find few strong associations. UpToDate, a very common and widely used evidence-based clinical decision support resource, states that this disorder is “poorly understood and probably multifactorial.” They report that there is strong evidence to suggest a relationship between PF and runners, ballet dancers and participation in aerobic dance exercise. Some association is noted with fibromyalgia, autoimmune disorders such as reactive arthritis and spondylarthritides, fluorode used in the treatment of osteoporosis and nutritional osteomalacia. Beeson in 2014 opined that no clear consensus exists as to the relative strength of the risk factors reported. Van Leeuwen in 2016 performed a systematic review of 51 studies and looked at 104 factors. They concluded that the only significant clinical association was with a BMI > 27, this being most strongly associated with

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non athletes. Tahriiran in 2012 reviewed 42 articles, including 9 review articles from multiple databases and found strong associations with obesity, heel spurs, and excess ankle pronation and weak association with increasing age, prolonged standing, decreased 1st MTP joint extension and decreased ankle dorsiflexion.

Referencing the misperception that “prolonged standing causes PF,” Wacławski in 2015 performed a systematic review of the literature pertaining to PF and standing. Only 4 studies were found and from this, it was concluded that there was “low quality evidence of an association between PF and weight bearing tasks such as walking and standing on hard surfaces.”

In contrast to the opinion of Tahriiran regarding heels spurs, various other studies seem to suggest that PF is not caused by heel spurs. Moroney in 2014 conducted a study of 137 people with heel spurs and found that the prevalence of plantar fasciitis was similar in those with and without heel spurs. They concluded, “although heel spurs often coexist with PF, it is unclear whether they have a causal role and may instead represent a secondary response to an inflammatory reaction.”

In summary, the OEM clinician should be aware that PF is primarily a degenerative disorder of the plantar fascia that may or may not involve inflammation. Acute WR force on the foot may be reason to determine causation as work related. Gradual onset of PF is likely not work related and multifactorial in nature.

References
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Jonathan Torres, MD, MPH, FACOEM
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Back Pain and Psychological Overlay

The patient with back pain and psychological overlay, or “Yellow Flags,” poses a significant challenge for treating medical providers, not only with regards to causation determination, but also for effective medical management and disability prevention. Such patients in delayed recovery should have attention directed towards psychosocial factors, as these may be affecting recovery and require specific strategies and approaches to prevent further delayed recovery and disability. Yellow flags have been characterized by attitudes, behaviors, beliefs, and emotions [Shaw].

The audience was surveyed at this conference and found that a high percentage of attendees supported the provider addressing not only the musculoskeletal injury but also the psychological factors present (56% at the first visit and 87% if the patient is in delayed recovery).

In cases where the patient has a psychiatric presentation with little or no objective findings and without a medically reasonable mechanism of injury, the causation opinion is likely to be “not work-related” and a referral will be made for psychological treatment outside of the Workers’ Compensation system. More commonly seen, however, is a patient with a clear work-related back injury with psychological overlay or “yellow flags”. In these patients, the causation determination is usually “work-related”, however all too often, the medical treatment is focused on the physical back injury with little, if any, assessment or treatment of important psychosocial factors affecting the patient and his/her recovery. Unfortunately, this traditional approach can increase the likelihood for poor recovery outcomes and disability. Several conceptual models are helpful in clarifying the important factors associated with patients who present with yellow flags and these models can be helpful in developing effective disability prevention approaches. There are screening tools specifically for patients presenting with low back pain that can be considered to stratify risk and target interventions based on risk. [Hill].

Models for understanding the psychological impact on injury recovery have been developed and may lead to improved management of injury cases. Collidge and Johnson proposed that patients who present with physical discomfort or pain with minimal social and psychological problems, typically recover as expected through medical intervention, and subsequent disability is avoided. In contrast, patients who present with significant psychosocial problems find pain unacceptable, medical care is sought, there is minimal resolution of symptoms, and the result is disability. Waddell et. al. (1993) proposed a model for understanding the major cognitive, affective and behavioral pathways between low back pain and disability. This included coping strategies, fear-avoidance beliefs, psychological distress and illness behavior as determinants for disability. A cognitive behavioral model was presented by Vlaeyen et al. (1995) highlighting the importance of catastrophizing, fear of movement/re-injury and avoidance in the disability pathway.

A publication based on the “Decade of the Flags” Working Group discussed “Red Flags” – serious spinal pathology, “Yellow Flags” - including attitudes, behaviors, beliefs, emotions and family, “Blue Flags” – individual perceptions about work whether accurate or inaccurate, and “Black Flags” – employer and insurance characteristics as well as physical demands and job characteristics [Shaw]. These numerous categories of “Flags” highlight the challenges that medical providers face when treating a patient in delayed recovery.

Nicholas et. al. (2011) reviewed evidence from 28 publications relevant to low back pain patients and psychological factors and published the following conclusions:

“Overall, the evidence showed that the studies that targeted interventions on known psychological risk factors for disability seemed to report more consistently positive results...The evidence shows a consistent picture that Yellow flags are prominent in the development of disability due to musculoskeletal pain.”

“The yellow flag proposition carries with it promise of early intervention that might avert the development of disability.”

“Tomorrow’s challenge is to build upon this base to offer timely and feasible interventions...facilitated by integrating such interventions into primary care practice...especially occupational factors...”

In addition, depression has been found to be related to the onset of back pain, higher levels of pain, poor treatment outcomes, and chronicity [Bair].

Utilized at St. Mary’s WorkMed, “The Integrated Disability Prevention Evaluation” (I.D.P. Eval) for patients in delayed recovery and/or with “yellow flags” is characterized by the following:
► An extended office visit: Biopsychosocial Approach
► Primarily directed toward disability prevention.
► Represents a Clinical Paradigm Shift in
Dr. Stefanos Kales, an associate professor of medicine at Harvard Medical School and associate professor and director of the OEM Residency at HSPH, has been researching factors influencing the health of firefighters and other public safety professionals for over 20 years. He is currently engaged in research surrounding the use of Mediterranean-based dietary interventions to improve the health of firefighters. “The ultimate purpose of our study is to lower firefighters’ risks for cardiovascular disease and cancers, by getting more firefighters and their families to incorporate the healthy eating principles behind the Mediterranean Diet,” said Dr. Kales. Part of his efforts includes the development of a new healthy eating guide for meetings and conferences based on these principles called the Guide to Healthy Fire Service Meetings, and a proposal has been submitted to disseminate these guidelines nationally. He has also broadened the reach of these research efforts beyond career firefighters, by initiating a second phase of the study to incorporate volunteer firefighters and their families, and expanding the approach to law enforcement, working with the Broward County Sheriff’s office, and automobile manufacturing with SEAT in Spain.

In addition to the firefighter study, Dr. Kales organized what has become a series of conferences on the Mediterranean Diet and Workplace Health, first held in September 2014, and recently followed up by a dinner event at HSPH on May 5, 2017. This event was a celebration of the ongoing collaboration between Dr. Kales and renowned chef and author Maria Loi, a distinguished Greek Food Ambassador who donated her time to create culturally-friendly and accessible recipes for firefighters and their families as part of the federally-funded research initiative “Feeding America’s Bravest: Firefighter’s Mediterranean Diet Intervention,” led by Dr. Kales. The conferences seek to promote the Mediterranean Diet for improving the health and well-being of working people, students and the public at large.

The event day began with Chef Loi working with the cafeteria chef and staff of HSPH to offer healthy, traditional Greek cuisine to students, staff and faculty at the school. The healthy food options proved extremely popular, and by mid-afternoon had completely sold out. In the evening, Dr. Kales and Chef Loi hosted an event for invited faculty, guests, physicians and the Boston Fire Department Battalion Chiefs with their medical director, Dr. Teehan. The night began with hor d’oeuvres (“mezedakia” in Greek) by Chef Loi and a Greek sparkling wine. This was followed by family-style Mediterranean cuisine, featuring savory, aromatic dishes from Chef Loi’s repertoire of Greek recipes and select Greek wines from the island of Santorini.

Dr. Kales lectured on the benefits of the Mediterranean Diet, which emphasizes the dietary use of olive oil, fish, fruit, vegetables, whole grains, legumes and moderate intake of wine, along with a reduced consumption of red meat, refined carbs and sweets. The established benefits of this diet result in a reduced risk of heart disease, cancer, type 2 diabetes and other chronic diseases, along with increased energy and longevity and improved overall quality of life. Spotlighted was the work of Dr. Frank Hu, Nutrition Department Chair at HSPH. He was in attendance and shared that “evidence [of the Mediterranean Diet] is very encouraging because, even among older people, when they improve their diet quality, the risks of acquiring chronic diseases and mortality can be reduced, and longevity can be improved.”

Chef Loi shared with the group her life story which began on a village farm in rural Greece and transitioned to work as a corporate lobbyist. Though this was lucrative employment and brought her high social status, accompanying it was a diminished sense of well-being and health. This dissatisfaction led her away from this career and back to the “ancient traditions of family, food, balance and nature” and a determination to make the world a better place “one healthy Greek bite at a time”. She now owns and operates two award winning restaurants, one in Greece and the other in Manhattan, NY and engages in charity work for children with cancer and education for the underserved. She is an international champion of Greek cuisine and values, seeking to share the transformation she experiences with everyone she meets. She capped the evening by donating and signing her latest book, The Greek Diet, to all in attendance.

This event was an informative and memorable evening full of fine Mediterranean food and inspiring stories promoting healthier and more meaningful living. The response from the audience was positive and encouraging, with several sharing that the experience was transformative. One physician attendee shared that he was inspired to give up butter and add olive oil to the family diet. “This evening highlighted the necessity to encourage people to adopt the Mediterranean lifestyle for the prevention of major chronic disease and to stress the need for increased awareness of better well-being through healthy eating, frequent physical activity and adequate sleep,” said Dr. Kales.

See page 5 for an excerpt from the Guide to Healthy Fire Service Meetings.
Excerpt from the Guide to Healthy Fire Service Meetings

The traditional Mediterranean Diet pattern differs significantly from other eating patterns. First, olive oil is used generously for most cooking and is consumed as the primary dietary fat. Second, the MD has a high intake of various plant foods (fruits, vegetables, legumes, unrefined cereals, nuts, and seeds). At the same time, there is moderate consumption of fish, seafood, fermented dairy products (yogurt and cheese), poultry, and eggs; as well as alcohol use in moderation with meals (usually wine). Finally, the consumption of red and processed meats, and sweets is limited. Frequent physical activity, good rest and quality time with friends and family are encouraged.

*Use generously olive oil (extra virgin if possible) to cook and dress salads and food*

*Consume 3 or more servings per week of mixed nuts (including peanut butter made only with peanuts) - (e.g. a fist of nuts as a snack in substitution of other things)*

*Consume 2 or more servings per day of vegetables; consume 3 or more servings per day of whole fruit*

*Consume 3 or more servings per week of fish and seafood (including fatty fish, at least one serving)*

*Consume lean meats (turkey, chicken) instead of red and processed meats (hamburgers, sausages, meatballs, beef)*

*Consume 2 or more servings per week of “safrito,” a sauce made with tomato and onion and/or garlic slowly simmered with olive oil as a side of main courses (whole pasta, brown rice) and use fresh herbs and allium to cook*

*Limit commercial sweets and refined carbohydrates to less than 3 servings per week. Instead consume whole grains*

*Limit the consumption of soda and sugary drinks, spread fats (whole cream, butter), fast and processed (fried foods, chips) to 1 or less times per week*
the medical field.

 Identifies factors likely causing or contributing to delayed recovery and recommends an action plan for each.

This evaluation screens for the many causes or contributors to delayed recovery including sleep disorders, depression, anxiety, pain catastrophizing, perceived injustice, and fear of re-injury. The I.D.P. Eval office note will outline (1) identified factors for delayed recovery (clearly outlining work-related and non-work-related factors), and (2) an action plan for each factor. (Torres)

A case study of a patient in delayed recovery with major psychosocial contributing factors highlighted the importance of a comprehensive biopsychosocial approach for effectively treating patients who present with back pain with psychological factors or yellow flags [Torres]. The case study presented demonstrated how positive outcomes can be attained through treatment for work-related conditions within the Workers’ Compensation system and treatment outside of Workers’ Compensation for non-work-related contributing factors affecting recovery.*

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The audience provided their opinion about the issue of delayed recovery and the handling of yellow flags from a “live time” poll conducted during Dr. Torres’ lecture.

This presentation explores Carpal Tunnel Syndrome (CTS) - its definition, pathology, and NWR and WR risk factors - which aid in delineating causation in worker’s compensation cases. CTS is a syndrome of hand pain, paresthesia, and muscle wasting due to constriction or compression of the median nerve (MN). The origin of the MN starts in the cervical spine, primarily involving the C5-8 levels, which then intertwines through the brachial plexus, passing under the collar bone and out the axilla. The more superior nerves supply primarily sensory functions while the more inferior nerves supply mostly motor functions in terms of dermatomes or sensation. C6 involves primarily the thumb side of the hand, C7 the index and middle finger, and C8 the ring and small finger. The distribution of the median nerve component of the dermatomes is from the thumb to the radial side of the ring finger and into the palm.

The epidemiology of CTS in the general population shows an incidence of 1-5%. In comparison, the working population has an incidence of 5-15%. Women are 3x as prone to develop CTS based on gender alone. The highest risk populations are obese women, and the lowest risk are thin men.

Trauma/Surgical Induced Factors: CTS due to compressive effects can result from direct injury/trauama such as a complicated fracture, inflammation and compression of the perineural blood vessels, and from ischemia to the area. Sometimes, upon surgery, an actual indentation of the MN under the carpal ligament is found, called an hour glass deformity.

Non-occupational Factors: Obesity (i.e. a BMI > 30) is considered an independent risk factor. The increased risk for females can be amplified by pregnancy, a condition in which an increase in carpal tunnel pressure causes CTS symptoms transiently, and which frequently resolve after delivery.

Genetics predisposes one to the development of CTS. Twin studies show a 50% risk at least in women and family history is likely a factor in cases of bilateral CTS. There is an increased risk in individuals with hereditary neuropathies such as HNP (hereditary neuropathy prone to pressure palsies), often called Charcot-Marie Tooth Disease.

Other disorders that can increase risk are pituitary diseases, such as acromegaly, which may be responsible for 1/3rd the incidences of CTS bilaterally in patients with these disorders. Diabetes and rheumatoid arthritis increase the risk of this disease by a factor of 2 and breast cancer patients on aromatase inhibitors have a fourfold increased risk, due to tendon thickening as a medica side effect. Hypothyroidism increases the risk by 40%.

Occupational Factors: Traditional workplace factors are thought to be sustained wrist and palm pressure, prolonged wrist flexion and extension, repetitive wrist and hand use, use of vibrating tools and cold exposure.

Computer work and clerical activities, in the past were assumed to be risk factors, but research sheds new light on their relationship with CTS. A Swedish study involving nearly 2500 keyboard workers (2007) did not find a positive association between keyboard use and the incidence of CTS. Another study, in 2003, involving 5000 Danish workers using the keyboard and mouse did not find a significant association but did find some positive association with repetitive mouse use. Mediouni Z et al. (2015) analyzed data from two large cohorts (1551 and 711 subjects) and determined that there was “no association between computer work and new cases of CTS among workers in diverse jobs with varying job exposures.” They further noted, “CTS is far more common among workers in non-computer related jobs.” In determining casualty

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between computing and CTS, one has to look at the ergonomics of the worksite. A proper configuration is known as neutral position from both the keyboard and the mouse. If the wrist position differs significantly from neutral position, that can, in fact, cause increased pressure within the carpal tunnel over time and increase the risk of developing CTS. An increased risk is not, however, clearly the case if ergonomics are adequate.

Studies report that hand/wrist repetitive motion combined with force increase the risk of developing CTS. A strain index for the hand has been developed and using this methodology, it has been found that there is no increased risk of CTS in low strain jobs. However, moderate strain jobs are associated with a fivefold increase and the highest strain jobs are associated with an increase of 30%. The reason for this high strain group having lower risk is not clear, but some speculate that it may be based on “survivor bias”, meaning that those people who have the anatomy and physiology to withstand difficult jobs stay in them and do not leave, resulting in the more fit group being analyzed.

Considering the above in determining causality and WC, in the United Kingdom there are certain criteria which need to be met before CTS is considered a compensable injury. These include frequent wrist flexion and extension in combination with vibrating tools. In addition, there must be at least 20 hours of this type of activity per week for a least a 12 month duration and a symptom onset less than 6 months after leaving that occupation. Specific job titles are not defined.

Regarding the risk imparted by vibration, prolonged and harsh vibration exposure, such as with chainsaw use, impact jack hammering, etc., increases the risk of not only CTS but also hand arm vibration syndrome, which causes more generalized neuropathy as well as other soft tissue and joint complaints. Periodic or moderate use of power tools, in general, results in a low risk of developing CTS. Other activities such as prolonged operation of a motorcycle, quarry drilling, and chainsaw use in the logging industry also expose the worker to vibration and may increase their risk of CTS.

The entity of highly repetitive hand work has been studied many times and there is conflicting evidence on whether it is an independent risk factor for CTS. However, the 2011 ACOEM guidelines indicate that symptom reduction for CTS can be achieved by restricting high force grip and pinch, high acceleration and vibration. Studies have also shown that a more definite risk factor is high repetition work in combination with other factors such as high velocity and high force. Also, the “extent of activity”, which might be a risk factor for CTS is defined as a cycle time of less than 30 seconds, performing that given activity for at least 50% of the time, 4 kg of force and greater than 45 degrees of either wrist flexion or extension.

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ARE YOU UP TO THE CHALLENGE –
the 2017 NECOEM / MaAOHN Annual Conference?
By Jay Poliner, MD, MPH, FACOEM, Conference Chair

What do climate change, sentinel events, marijuana, and traumatic workplace injury memories have in common? They are among the CHALLENGES that will be discussed during the 2017 NECOEM/MaAOHN Annual Conference (AC) titled “Challenges of a Changing Climate.” The AC will be held on Thursday, Nov 30 and Friday Dec 1, 2017 at the Boston Newton Marriott Hotel in Newton, MA. The Annual Conference announcement flyer (posted on the NECOEM website or in a flyer buried in your Inbox) includes all the details of conference offerings and registration information. The AC Planning Committee, which includes members from both NECOEM and MassAOHN, is pleased to announce this year’s special Presentations:

* Eileen Storey, MD, MPH, is this year’s Harriet Hardy award recipient. Her presentation “What Can Sentinel Events Tell Us” will draw on Dr. Storey’s experience leading the University of Connecticut OEM Program and the Surveillance Branch of the NIOSH Respiratory Health Division in Morgantown, WV.
* Barry Levy, MD, MPH will deliver the Patterson Memorial Lecture. Dr. Levy’s presentation “Climate Change and Public Health” is a thought-provoking exploration of the public health issues created by climate change.
* Marijuana and Work Forum: “Up in Smoke.” A multidisciplinary panel will join presenters in exploring medical perspectives on risks and fitness as well as legal issues related to the changing climate for recreational and medical marijuana use.
* On Wednesday, Nov 29 from 6:30-9:30PM there will be a special optional workshop “Reprocessing Traumatic Memories of Work Injuries: Practical Clinical Strategies for Trauma Recovery and Return to Work” at the Marriott. Organized by NECOEM member Dr. Karen Huyck from Dartmouth-Hitchcock, this pre-conference workshop is a new initiative for NECOEM that has been enthusiastically endorsed by the NECOEM Board of Directors.

In addition there will be exciting presentations and discussions about WORKER HEALTHCARE and WORKPLACE PROGRAM challenges. And yes, there will be great opportunities to earn CME, CCM, and/or ABHI continuing education credits. Back by popular demand will be the Thursday evening President’s Dinner Reception with great company, great food, informative posters, and, of course, all that jazz. While at the conference, enjoy networking with colleagues, check out the vendor exhibits, and enjoy early holiday festivities.

Don’t miss this great conference – register today and take advantage of the EARLY BIRD conference registration discount before October 31. And don’t forget to make your reservation at the Marriott! See you at the AC!
ANSWER TO LAST ISSUE’S “WHAT IS IT?”
by Abhijay Karandikar, MD, MPH, FACOEM

The two pictures accompanying the “What Is It” question show munition workers handling trinitrotoluene (TNT) that was incorporated into explosive shells during World War I. Repeated exposure to TNT can turn the skin orange-yellow, reminiscent of the plumage of a canary. Therefore, these workers were known as “canary girls”. They were also referred as munitionettes. In industry, TNT is usually produced by tri-nitration: treating toluene with sulfuric and nitric acids to produce mono-nitrotoluene (MNT) which is separated and re-nitrated to dinitrotoluene (DNT). The DNT is then treated with an anhydrous mixture of nitric acid and oleum to produce trinitrotoluene (TNT). The vasodilatory action of nitrates causes compensatory vasoconstriction, either through sympathetic stimulation or activation of the renin-angiotensin system. On cessation of nitrate exposure, the unopposed compensatory vasoconstriction predisposes an individual to coronary vasoconstriction with angina, myocardial infarction and sudden death.

Toluene itself is an industrial solvent and has other health effects seen with solvents in general and aromatics in particular. Trinitrotoluene is also associated with aplastic anemia.

Congratulations to Jay Poliner, MD, MPH, FACOEM, for sending in the correct response!!

Diagram/content credits: Wikipedia

This section is a series of trivia, facts, figures, etc. related to the field of occupational medicine. If you have any such interesting or fun-filled material, please e-mail it to the associate editor at dr_abhik@yahoo.com. All material should be related to the specialty of occupational and environmental medicine and have an educational, inspirational, historic or other relevant value.