The Determination of Causation in Occupational & Environmental Medicine: Where Law and Logic Often Conflict

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Brief Introduction
Dr. Them
Order of Presentation

- Dr. Them – Brief Introduction
- Attorney Carlton - Goals
- Dr. Them - Objectives; Causation and Level of Certainty from a Medical Perspective
- Attorney Carlton - Causation and Level of Certainty from a Legal Perspective; Prima Facie Medical Evidence; IMEs; Acceleration/Aggravation/Exacerbation; “Idiosyncratic-Response” Arguments

Order of Presentation (cont.)

- Dr. Them – Creating and Rebutting Prima Facie Medical Evidence; Effective IMEs and Rebuttals
- Attorney Carlton – Peer and ALJ Respect and Effectively Disagreeing with Others
- Dr. Them and Attorney Carlton – Four (4) Cases
- Dr. Them – Medical Summary
- Attorney Carlton – Legal Summary
- Dr. Them and Attorney Carlton – Q&A

Goals

Attorney Carlton
Goals

• To educate and instruct on delivering professional, medical, legally defensible arguments as to causation in OEM cases
• To educate and instruct on effectively rebutting vulnerable causation arguments in OEM cases
• To educate and instruct regarding increasing the confidence and competence of attendees in such matters

Objectives

By the end of this presentation, the attendee should be able to:

• Define, in precise medical terms, "causation" in both occupational and environmental legal scenarios
• Repeat the precise methodologies and criteria by which to firmly establish causation in any given case or situation
Objectives (cont.)

• Recall precise, winning, defensible, evidence-based approaches to deconstructing and/or effectively rebutting vulnerable causation arguments
• Apply the principles of both statistics and dose calculations, where indicated, in establishing and/or refuting causation in legal venues

Objectives (cont.)

• Recount the critical components of both success and failure in applying the above principles and approaches to such cases in such venues, as exemplified in some historical, real-life cases
• Routinely apply these same, successful principles and practices to one's own future practice and cases in Occupational & Environmental Medicine

Causation: Medical Perspective

Dr. Them
A Sobering Thought …

Virtually all studies on the matter have concluded that over half of all workers' compensation cases do not belong in the workers' compensation arena, that is, the cases are truly not work-related.

Why is this so?

The Good News: Half of the physicians whom I meet and work with every day are ABOVE average.

The Bad News: (You figure it out!)

The Art and Science of Determining Causation

Type

Etiology

Injury

Work-related

Causal

Aggravated

Illness

Not

Work-related

Disease
The Reality… Practicing The OEM “Balancing Act”

Causation: Caveat

- Patient (or examinee) history alone is insufficient to reliably establish causation
  - Subjective in nature
  - Cannot always be corroborated
  - Often changes
    - Via patient/examinee
    - Via examiner - the “patient advocate”
  - Subject to (un)intentional memory lapse(s)/recall bias
    - Often excludes significant PMHx
    - Time between alleged injury and reporting often great
  - Secondary gains at stake
    - Malingering (ICD-10 Code Z76.5)
    - Faking
    - Lack of general health insurance

Armamentarium for Objective Arguments on Causation

- Medical literature – credible, peer-reviewed
- IH/IAQ data
- Dose calculations – biological, chemical, and physical
  - Inhalational
  - Ingestional
  - Dermal
  - Injected
- Biometrics
- Radiographic imaging
  - Doubling times – tumors
  - Edema for acuity (some injuries)
- PFTs, NCS/EMGs, etc.
A Radiographic Example

62 YOCM L hip X-ray interpreted as showing “no acute process, including Fr, subluxation, or dislocation” after alleged, unwitnessed fall at work.

Another Radiographic Example

28 YOCM alcoholic liquor-store owner presents with acute abdominal pain after inhaling what his doctor describes as “leaded gas.”

Causation – Three Tiers

• Exclusive cause
  – Usually objectively, medically obvious
  – Example: witnessed fall, with fracture

• Contributory cause
  – More complex medicolegal argument
  – Example: immediate flare in COPD from occupational exposure to burning garbage

• No/Nil cause
  – Usually objectively, medically obvious
  – Example: fall 30 years earlier → CTS
Exclusive and Contributory Causes: Hill’s Criteria of Causation

- Originally presented by Austin Bradford Hill (1897-1991)
  - British medical statistician
  - Basis for modern epidemiologic research
- Applicable to:
  - Medicine (in particular, diseases)
  - Sociology
  - Anthropology
  - Other social sciences

Hill’s Criteria (cont.)

- Temporal Relationship – cause precedes effect
- Strength - ↑ association ⇒ ↑ “A-to-B” correlation
- Dose-Response Relationship - ↑ exposure ⇒ ↑ risk
- Consistency – results replicated in different studies
- Plausibility - association agrees with current knowledge
- Consideration of Alternate Explanations – R/O alternatives
- Experiment – condition can be altered by experimental regimen
- Specificity – putative cause produces a specific effect
- Coherence – association compatible with existing knowledge

Modified Hill’s Criteria for “Everyday” Use

- **Statistical** association (”SCPD”)
  - Strength - ↑ association ⇒ ↑ “A-to-B” correlation
  - Consistency - results replicated in different studies
  - Plausibility - association agrees with current knowledge
  - Dose-Response relationship - ↑ exposure ⇒ ↑ risk
- **Temporal** association
  - Cause must precede effect
  - Δ cause → Δ effect
Application of Above: COPD

- 58 YOCM, single, groundskeeper for township, with PMHx COPD, still smoking
  - Mows lawns from enclosed tractor cab all week
  - Leaves work at noon on Friday for dental appt.
  - Monday a.m. – fever and productive cough
  - Hospitalized Monday night for *H. influenza* pneumonia
- Causation – occupational exposures as exclusive, contributory, or none/nil?
- How do (modified) Hill’s criteria apply?

Compensability Criteria

- WC or not WC case? (3 criteria)
  - Must be a covered employee (performing activities within the usual, assigned scope of duties)
  - Must be an “exposure” (to an unsafe condition, situation, etc.) or a specific “incident”
  - Must - to a reasonable degree of medical certainty (sometimes, depending upon jurisdiction; more later)- be an injury, disease, or illness arising out of the “exposure” or “incident” (some states [PA and NY] allow for aggravation of an underlying disease or illness but also consider the contributory cause by/of pre-existing disease/illness/injury)

Compensability/Work-Relatedness Criterion - Simplified

Would the patient have required the same treatment in the absence of the alleged occupational incident or exposure?

*If yes, then the case is not compensable/work-related from a medical viewpoint.*
Remember: A Sobering Thought …

Virtually all studies on the matter have concluded that over half of all workers’ compensation cases do not belong in the workers’ compensation arena, that is, the cases are truly not work-related.

Then, how does this happen?

What does “TARDMC” mean?

• If medical treatment is the issue, then is it the degree of certainty upon which one would base (appropriate) treatment?
• If workers’ compensation is the issue (causation question), then the answer lies in the related statute(s)
  – May vary by jurisdiction
  – More on this later

Causation: Legal Perspective

Attorney Carlton
Defining Causation in Legal Terms:
• The Jurisdiction matters
  – Different jurisdictions have different legal standards when it comes to causation
  – Different jurisdictions have different burdens of proof when in comes to causation
• We will look at NY & PA to highlight some of these differences

Sole Causation
– Sole Causation is usually obvious and seldom requires medical testimony
  • A clearly written medical report on Sole Causation will often result in no IME on causation
  • A clearly written medical report on Sole Causation will often result in no testimony on causation issues
  • Sole Causation usually will involve facts that make the medical reports and opinions perfectly reasonable
    – For example: Two witnesses see co-worker step into a hole and break his leg. Claimant transported immediately to hospital.

Contributory Causation:
• In New York: Any contribution will do, even partial causation is enough
  – Legal standard in New York is just that the work be only a contributing factor in bringing about the work injury/medical condition
• This is because the law in New York presumes all claims are compensable and the employer must prove with substantial evidence to the contrary that the injury/medical condition is not work related.
• In Pennsylvania: The law says that "where there are alleged competing causes for disability or death, the claimant must establish that the work-related injury was a substantial, contributing factor to that disability or death." (Emphasis added)
  • “[W]here no medical testimony exists in the record characterizing claimant’s work-related injury as a substantial, contributing factor, the claimant cannot meet the requisite burden of proof as a matter of law.”
In nil-causation cases, usually the more/most credible medical opinion will prevail

- Where there is zero cause, there will be zero recovery!
  - Trouble is, most nil-causation cases will still involve an attending doctor who is supporting causation between work and the injury/medical condition
  - In order for work relatedness to be determined by an ALJ to be nil, the more/most credible medical evidence will have to convince the ALJ there is no causal relationship.
  - Where there is a dispute on causation, the ALJ will have to review the medical reports and hear medical testimony to resolve the dispute in the medical evidence based upon credibility
    - How the ALJ will do so can vary
      - Can vary state to state; or even, from judge to judge

Determinations of credibility are determinations made based on judicial discretion

As one Federal Judge observed when writing about the subject of judicial discretion, while “other Judges might reasonably make other choices if they faced a similar case, [the decision here] should stand. That, after all, is what discretion is all about.”

The Appellate Courts tend to agree. Discretion is seen as being a grey area, and appellate courts are reluctant, unless the error was blatant, to second guess the trial judge/ALJ. So you are far better off winning at the trial level than on appeal.

Strong medical evidence is the key in cases where there really was no causal connection to the employment.


Implied/Presumed Causation—The ALJ’s Perspective

NY WCL Sec. 21

&

In PA: 77 P.S. Sec. 411
How the Judges probably feel, at least sometimes, as they hear medical testimony:

NY WCL Sec. 21

The following is actual language of the New York Workers' Compensation Law (statutory language), as relevant to our discussion here today on causation. The title of this particular statute is: Presumptions

“In any proceeding for the enforcement of a claim for compensation under this chapter, it shall be presumed in the absence of substantial evidence to the contrary

1. That the claim comes within the provision of this chapter; . . .
4. That the injury did not result solely from the intoxication of the injured employee while on duty . . .
5. That the contents of medical and surgical reports introduced in evidence by claimants for compensation shall constitute prima facie evidence of fact as to the matter contained therein.”

Burden of Proof Very Low for Injured Workers in NY

• Produce a report from a medical doctor that there is a causal nexus, however slight
• Burden very high for employers:
  – Unless it is rebutted with substantial evidence to the contrary, no matter how crazy the claimant’s medical opinion might be, the claimant still wins!
Causation in Pennsylvania:
77 P.S. Sec. 411

• "(1) The terms "injury" and "personal injury," as used in this act, shall be construed to mean an injury to an employee, regardless of his previous physical condition ... arising in the course of his employment and related thereto, and such disease or infection as naturally results from the injury or is aggravated, reactivated or accelerated by the injury."

• "Provided, That whenever occupational disease is the basis for compensation, for disability or death under this act, it shall apply only to disability or death resulting from such disease and occurring within three hundred weeks after the last date of employment in an occupation or industry to which he was exposed to hazards of such disease. And provided further, That if the employee's compensable disability has occurred within such period, his subsequent death as a result of the disease shall likewise be compensable."

ALJ’s need medical experts:

• In PA:
  "the medical witness must testify, not that the injury or condition might have or possibly came from the assigned cause, but that in his professional opinion the result in question did come from the assigned cause."

• In NY:
  "In this regard, a medical opinion on the issue of causation must signify "a probability as to the underlying cause" of the claimant's injury which is supported by a rational basis."
  "(N)one assent, or general expressions of possibility, are not enough to support a finding of causal relationship."

Comparing Legal Standard in NY & PA

NY:
• "The Workers’ Compensation Law, however, does not require that medical opinions be expressed with absolute or reasonable medical certainty."
• "All that is required is that it be reasonably apparent that the expert meant to signify a probability as to the cause and that his opinion be supported by a rational basis."

PA:
• "In delivering a causation opinion in a workers' compensation case, a doctor or medical expert is not required to use magic words such as, 'cause in fact.' Rather, 'it is only necessary that the doctor's testimony permit a valid inference that such causation was present.'"
Prima Facie Medical Evidence

- Essentially means enough evidence to get in the front door and not have case dismissed. Or enough evidence that absent substantial evidence to the contrary the claim will be established.
  - *Prima facie* means: “so far as can be judged from the first disclosure; presumably; a fact presumed to be true unless disproved by some evidence to the contrary.”
  - *Prima facie evidence* (whether medical or otherwise) is: “Evidence good and sufficient on its face. Such evidence as, in the judgment of the law, is sufficient to establish a given fact . . . And which if not rebutted or contradicted, will remain sufficient.”

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Prima facie means: “so far as can be judged from the first disclosure; presumably; a fact presumed to be true unless disproved by some evidence to the contrary.”
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Prima facie evidence (whether medical or otherwise) is: “Evidence good and sufficient on its face. Such evidence as, in the judgment of the law, is sufficient to establish a given fact . . . And which if not rebutted or contradicted, will remain sufficient.”
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Acceleration, Aggravation, and/or Exacerbations

- As always, the jurisdiction you are in matters:
  - In New York, the law is very clear:
    - “[W]here causally related injuries from a claimant’s employment precipitate, aggravate or, accelerate a preexisting infirmity or disease, the resulting disability is compensable” (Emphasis added).

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Exacerbations in New York Are Much Less Clear:

- On the one hand, the Appellate Courts have held:
  - “The exacerbation of similar preexisting conditions by exposure to chemical fumes in the workplace can constitute an accidental injury entitling a claimant to an award of workers’ compensation benefits.”

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- On the other hand, in 2009, the same court held that because a prior condition was exacerbated there could not be a new work accident.

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**Acceleration, Exacerbations, and Aggravations in PA:**

- As a general matter the law is clear:
  - Specifically, included in the statutory conception of "injury" is the job-related aggravation, reactivation or acceleration of a pre-existing disease, even if the underlying disease itself was not caused by a work-related injury.

- However, common sense has not been thrown out the window:
  - Court denied because the claimant had asthma "which, she admitted, existed prior to the time that she started working" hence, the claimant's work exacerbated the condition but "did not cause the condition." So the court concluded that "The exacerbation of Claimant's symptoms that occurred as a result of his exposure to dust at work was the result of a progression of his underlying non-work-related lung disease, not because of any condition at work. Therefore, Claimant did not suffer an injury that is compensable under the Act."

- If an occupational disease cause been caused by the workplace, even where there is a preexisting non-work-related underlying condition that is aggravated by the workplace, it will be compensable under the Act.

- This is because you look the injured worker or just (e.g., the egg shell skull plaintiff)

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**Legally Defeating Prima Facie Medical Evidence:**

Effective Legal-Rebuttal Strategies Regarding Causation Claims

1. Look for errors or inconsistencies between the claim being asserted and the content of the medical report
2. Look for poor methodology by the attending doctor
   - Strange diagnosis that is not accepted by the medical community
   - Failing to ask, much less consider, non-work-related causes
   - False statements made to the doctor by the injured worker
   - Laziness or lack of medical curiosity (often can be detected by the lack of a differential diagnosis to get to the right diagnosis)

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Discrediting the Incredible:

3. Who is the doctor? Has he/she been sued for malpractice? Does he/she have other ethical problems?
4. Is the diagnosis and treatment appropriate given the medical specialty of the provider?
5. Is the history given in one medical report different from the history presented elsewhere?
6. Does the doctor explain how he/she reached his/her opinion?
7. Does the opinion deviate sharply from the medical literature?

What Legal Weight Does An IME Carry?

A Good IME:

- Reputation of the doctor always key
  - Good IME provides is like the good umpire, calls balls and strikes and is consistent!
- Good IME report is well written and opinions carefully offered based on the known facts, not assumptions
- Good IME treats people fairly and compassionately, but retains common sense, integrity and fidelity to science/evidence-based medicine
- Good IME is understandable if read by an attorney (remember your audience)
- Good IME uses science and medical literature to back up the opinions offered

"When events change, I change my mind. What do you do? When the facts change, I change my mind. What do you do, sir? When my information changes, I alter my conclusions. What do you do, sir? When someone persuades me that I am wrong, I change my mind. What do you do?"

--John Maynard Keynes
Challenging the Idiosyncratic Response

How to effectively challenge the medical opinion that relies on the “uniqueness” or idiosyncratic nature of the patient rather than on medical science:

1. Get a quality IME and use science to refute nonsense
   A. Judges trust science, but often cannot tell the difference between real science and junk science. A good IME, coupled with proper medical literature, can show them the difference.
   B. A great IME doctor will talk to the judge the same way he/she would a patient
      1. Counsel the judge like you would your patient
      a. Let him/her know what you have seen
      b. Explain to him/her what it means
      c. Explain to him/her how you came to your conclusions
      d. Address whatever fears and doubts the judge may have

2. See what other courts have said about the doctor who is presenting the Idiosyncratic Response rather than real evidence
   A. We have found that, in many cases, other courts have already sorted out the Idiosyncratic Response doctors from the reliable Physicians
      1. In one instance, we found more than 15 different cases ranging from administrative law judges’ decisions to Federal Appeals Court rulings which had found the claimant’s doctor to be incredible
   B. In another case, we found out from research that was done by our IME provider, that the attending doctor had been reprimanded by the FDA for giving veterinary medicine products to human patients without their informed consent
      a. The IME providers often know the reputations of the doctors who are treating the claimant or can find out from other professionals they trust if there are ethical lapses or other credibility problems with the attending doctor
      b. A good IME doctor will investigate the attending doctor if the opinion they are looking at is outlandish

3. Prepare an effective cross examination
4. Have your IME doctor or another medical doctor, to the extent it is ethically permitted, help you prepare your cross examination questions
Creating and Rebutting *Prima Facie* Medical Evidence

Dr. Them

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Creating Effective *Prima Facie* Medical Evidence

- **Prima facie**
  - Latin origin
  - “Plain or clear; self-evident; obvious”
  - Evidence that the ALJ generally accepts when and what a physician states, “to a reasonable degree of medical certainty,” is true, creates causation, or is evident/obvious

- *Any* MD can submit such
  - Not every MD can substantiate his/her claims
    - Often an *ipse dixit* argument ➔ very vulnerable
  - Many MDs not qualified to make such claim(s)
    - Recall that Daubert standard not always observed in WC

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Creating Effective *Prima Facie* Medical Evidence (cont.)

- **Creating**
  - Routinely inject the modified Hill’s criteria into your logic; reference key literature
    - Don’t divulge verbatim if expecting a deposition
    - Hold the formal argument for the deposition
    - Use the above-recommended armamentarium

- **Rebutting**
  - Routinely inject the modified Hill’s criteria into your logic; reference key literature
  - Simplify your arguments with charts and tables that the ALJ can understand
IMEs vs. Treating Physician’s Opinion

- IME legal weight varies by:
  - Jurisdiction (state)
    - Statute and/or case law
      - Despite contemporary medical literature
      - Despite failure to meet Hill’s criteria
  - Credibility (determined by ALJ)
  - Understandability (by ALJ)
  - Or, nothing immediately obvious or apparent
    - ALJ’s mission to deliver benefits, not justice
    - Ineffective content/rebuttal by IME author
- Hence, the divergence of, and conflict between, (medical) logic and law

Factoid
95% of the U.S. population actively avoid education in mathematics and the sciences
(For lawyers, I think, this approaches 100%. Use this to your advantage!)

What Should an Effective IME Contain and Convey?

- “I-M-E, Schem-M-E!
  (Unpunished “Prostitution, Rape, Pillage, and Plunder” in the Medical Community”)

  With title Δ to (for NYS WCB):

- “What Constitutes a Quality IME?”
**What is “Quality?”**

- In most CQI courses, “quality” = “meeting the needs of the customer”
- In an IME, who *is/are* the customer(s)?
  - WCB
  - ALJ
  - Employer(s)
  - Employee
  - Defense and prosecution attorneys
  - Insurance carrier(s)/TPA(s)
  - IME vendor(s)

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**How Should an IME be Conducted to Meet Stated Goals?**

- The “standard” approach
  - Typically, per a course (“Board”) “standard”
  - Direct involvement of IM Examiner at all stages - rarely
  - Comprehensive, accurate description of mechanism of injury – uncommonly
  - Comprehensive, integrated review of medical records – uncommonly
  - Comprehensive physical examination – rarely
  - Pain questionnaire – commonly
  - Psychological questionnaire - commonly
  - Discussion of differential diagnoses – rarely
  - Statements to a “reasonable degree of medical certainty” - always

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**What do Others, Elsewhere (WA), Think of the Current IME Situation?**

“Perhaps it comes from reading hundreds of them. While medical exams arranged by the Department of Labor & Industries or a self-insured employer may be called “independent”, they seem to be anything but “independent”. I generally refer to them as panel exams or defense medical exams. Whenever a dispute, question, concern or confusion arises in a claim, a medical exam is scheduled. The reports are often boilerplate, the same physicians show up time and time again. They seem to stall medical treatment rather than facilitate it.”

washingtonworkerscompensation.wordpress.com/2009/01/06/independent-medical-exams-or-ime%E2%80%99s/
What I Really Need to Know: The Basics (cont.)

What are the possible exposure sources?

- Air
- Food
- Soil
- Water
- Cigarettes/tobacco
  - 1st smoke
  - 2nd smoke
- Illicit drugs (and contaminants therein) and/or alcohol
- Various, complex mixtures of chemicals
  - Paints - Cements - Cleaning products
  - Pesticides - Adhesives - Rx medications
  - “Supplements” - OTC meds - Fluids/drinks
  - Pollutants - Other
- Other activities and exposures outside of work

References: This book is a “must.”


For more information, visit:
- [www.amazon.com/ChemicalComponentsTobaccoSmoke/dp/1420078836](http://www.amazon.com/ChemicalComponentsTobaccoSmoke/dp/1420078836) ($264.91)
I often have more “devious” plots in mind…

What is/are another potentially significant (how significant?) source(s) of non-occupational chemical burden(s) in this claimant?

References: A Valuable One

Walking the Fence of Medical Objectivity

Attorney Carlton
Maintaining Peer and ALJ Respect: Effectively Disagreeing with others on Causation

- Make concessions when appropriate
- Do the work
  - Prepare a fresh, well written report; do not recycle your written work product or take shortcuts
- Be courteous, even when treated disrespectfully.

"When events change, I change my mind. What do you do?"
"When the facts change, I change my mind. What do you do, sir?"
"When my information changes, I alter my conclusions. What do you do, sir?"
"When someone persuades me that I am wrong, I change my mind. What do you do?" ~John Maynard Keynes
Maintaining Peer and ALJ Respect:

• Do not change your mind if you know you are right. But never be afraid to change your mind when you know you are wrong or have been mistaken.
• Answer the questions you are asked
• Be prepared when you go to court or sit for a deposition

Case #1: Toxic Encephalopathy – Medical Summary
Dr. Them

• 54 YOCF, married, unemployed, former aircraft inspector
• Dx: Toxic encephalopathy
• Related IME 8 years S/P alleged, 10- to 15-minute inhalational exposure to primer paint (inside ventilated booth), without Sxs
• SB NP, CXR WNL; no related Txs
• Perfectly normal functioning for 8 years
• “Symptoms” when plant closing announced
Case #1: Toxic Encephalopathy
– Medical Summary (cont.)
• SB NP 8 years later; P.E./MMS WNL
• Claimant does not know diagnosis
• Complex PMHx and P.E., not mentioned:
  – History of anxiety/depression “nervousness” X13 Y (date of death of sister)
  – Morbid obesity for at least 13 years
  – Thirty-plus (30+) years of inhalational exposures to secondhand cigarette smoke (husband)
  – Hypothyroidism, currently treated
  – Hypertension, uncontrolled
  – Degenerative joint disease

PMHx (cont.)
– Peptic ulcer disease, symptomatic
– History of asthma, probably seasonal in nature, beginning 9 Y ago,
  previously treated with inhalers and Advair and Zyrtec
– Borderline hypercholesterolemia
– History of migraine HA for at least 13 years
– Dyspnea on exertion
– Peripheral cyanosis, reflective of possible coronary and/or pulmonary disease
– Probable OSA (not previously diagnosed or treated)
– Possible psoriatic arthritis
– Possible acute deep venous thrombosis (DVT) in left lower extremity
  from sedentary lifestyle
– Status post lateral meniscectomy, right knee, 1980
– Chronic athlete’s foot
– Bilateral retinopathy, hypertensive

Medications
• Medications
  – Albuterol inhaler two puffs four times a day as needed
  – Bupropion XL® 30 mg one by mouth every morning
  – Levothyroxine 88 mcg one by mouth every morning
  – Zyrtec® 10 mg one by mouth daily
  – Provias® 5 mg one tablet by mouth daily for seven days, as directed
  – Diclofenac® 50 mg one by mouth twice a day
  – Tramadol® 50 mg one by mouth every six hours as needed
  – Cymbalta® 30 mg one by mouth twice a day
  – Omeprazole 40 mg one by mouth daily
  – Lurasidone 0.5 mg one by mouth every morning and two by mouth every evening
  – Metoprolol 25 mg one by mouth every evening
SHx

- Tobacco: Cigarettes, less than one pack per day, for one year, quitting in 1975. Also describes 30+ years of direct, second-hand, inhalational exposure to husband’s cigarette smoke.
- Alcohol: Occasional use only. No history of abuse.
- Illicit Drug Use: Never.
- Military Service: None.
- Educational Level: Tenth grade, followed by Adult Diploma in 1995.
- Hobbies: Previously included horses, painting, and crafts. None presently.
- Occupational History: Prior Compensation claim at XXXX Corporation, ZZ/ZZ/12, for right elbow. The case is still open. Insurance carrier was YYY.

Occupation History

<table>
<thead>
<tr>
<th>YEAR</th>
<th>EMPLOYER</th>
<th>TITLE/DUTIES</th>
<th>CHEMICAL EXPOSURES</th>
<th>LOCATION</th>
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<tbody>
<tr>
<td>1978</td>
<td>AAA Corp, MA</td>
<td>Lead person, soldering and electronics assembly</td>
<td>Solder, flux, parts cleaner</td>
<td>MA</td>
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<td>1980</td>
<td>BBB Corp., MA</td>
<td>Blood-gas machines, quality inspector</td>
<td>None</td>
<td>MA</td>
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<tr>
<td>1986</td>
<td>Dairy farmer, NY</td>
<td>Washed milkers Clorox® bleach every Saturday</td>
<td>None</td>
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<td>1999</td>
<td>CCC Corp., NY</td>
<td>General merchandise associate</td>
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<td>2000</td>
<td>DDD Corp., NY</td>
<td>Testing and measurements/assembler</td>
<td>Cleaner, used under hood. No direct exposures</td>
<td>NY</td>
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<td>EEE Corp., NY</td>
<td>Inspector in BSFA Pigments for television screens. Wore respirator, gloves, apron, and other personal protective equipment</td>
<td>Always</td>
<td>NY</td>
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<td>2004</td>
<td>FFF Corp, NY</td>
<td>Temporary, testing Hydrofluoric acid, with appropriate personal protective equipment</td>
<td>Always</td>
<td>NY</td>
</tr>
<tr>
<td>2004</td>
<td>GGG Corp., NY</td>
<td>Inspector as above</td>
<td>None</td>
<td>NY</td>
</tr>
</tbody>
</table>

P.E.

- Arrives in wheelchair, with crutches, accompanied by daughter
  - Severe DJD
  - Anticipating bilateral TKRs 2° to DJD
- BP 170/108, RUE, seated, X2
- HR 72 and regular
- RR 14 to 16, mildly labored
- Weight 248 lbs
- Height was 5’ 5.5”
- BMI was 40.6
P.E. (cont.)

- Severe, bilateral Tinea pedis
- Mallampati class IV
- Neck circumference 15” (35 cm)
- S1 and S2 extremely loud, with poor physiologic split of S2
- Breath sounds distant
- Morbidly obese, with protuberant abdo; multiple striae
- Both feet and all toes exceptionally cyanotic and cold; capillary refill 3 secs, both feet
- Neuro, COMA/MMS all WNL

Case #1: Toxic Encephalopathy
– Legal Summary
Attorney Carlton

Case 1: Legal Summary:

- 8-year-old case had initially been accepted
  - One and only medical bill had been paid 8 years prior
  - No work restrictions or complaints about claim raised in over 7 years
  - No lost-time benefits had ever been paid, nor had any lost time due to this injury ever been alleged
Medical Opinions are Powerful!

With one medical report, the employer was suddenly defending against the alleged, suddenly re-emerging, injury from this (remote, one-time, long-forgotten-by-all relevant-witnesses) exposure, which was now alleged to be causing a permanent and total disability from any and all work!

Legal Strategy In Case 1

- Investigate the claim thoroughly
  - Talk to supervisors, co-workers, review performance reviews
  - Gather medical records in a comprehensive fashion
  - Talk to management to determine what might be motivating the claim
- Select a top-shelf IME provider
  - Prepare detailed IME cover letter and provide full medical chart to IME doctor
  - Carefully prepare for cross examination of the attending doctor
  - Carefully prepare for cross examination of the claimant
  - Prepare effective and persuasive direct examination with the help of the IME provider (script the questions)
Case #1: Toxic Encephalopathy – Medical Strategies and Tactics

Dr. Them

Apply the Modified Hill’s Criteria

- **Statistical** association (“SCPD”)
  - Strength - ↑ association ⇒ “A to B” correlation
  - Consistency - results replicated in different studies
  - Plausibility - association agrees with current knowledge
  - Dose-Response relationship - ↑ exposure ⇒ ↑ risk
- **Temporal** association
  - Cause must precede effect
  - Δ cause → Δ effect

Non-occupational Diseases in Claimant

- OSA (obstructive sleep apnea, suspected)
- HTN (high blood pressure)
- Asthma
- Hypothyroidism
- Peptic Ulcer Disease
- Migraine
- Headache
- Morbid Obesity
- DJD
- Beta-Blocker use
- Lorazepam Use
- Seasonal Allergies

Present Symptoms

- Fatigue, memory problems, confusion
- Headache
- Joint pains
- Retinopathy
- Wheezing/asthma
- Nausea and/or vomiting
- Insomnia

Table I. Current, non-occupational diseases in the claimant explaining all of her current symptomatology.
Case #1: Toxic Encephalopathy
– Legal Outcome and Critique
Attorney Carlton

Judge’s Decision: “No Further Lost
Time or Causally Related Disability”

• Things we did to reach this result:
  – Good IME
    • Used solid science presented from an IME doctor, who had no agenda
    • Used claimant’s own medical records to defeat the claim
  – Attacked the already lacking credibility of claimant’s doctor
    • Exposed the involvement of the claimant’s union, which had retained
      claimant’s doctor to speak to all union members—including the claimant—
      right before the plant closed (and only days before the claimant came under
      the care of the “good doctor”), wherein the doctor was allegedly soliciting
      the claimant and other union members to initiate treatment with his medical office
      with the objective of trying to revive stale/old workers’ compensation claims
    – Attacked the already lacking credibility of the claimant
    – Pointed out how insulting it was to the Court’s intelligence that the claimant would
      try to get the Court to accept her assertions in this case

Case #2: Occupational Lung
Cancer – Medical Summary
Dr. Them
The Case

- IME
- 32 YOCF, non-smoker, married, tissue-bank employee for 15 M
- Presented with claims of occupational CA lung
  - RUL adeno-CA of lung, S/P RU lobectomy
  - Asthma
- Above supported by treating MDs
  - Pulmonologist
  - Thoracic surgeon

The “Exposures”

- Routine workplace disinfectants, all below OSHA PELs; used same products at home
  - H₂O₂
  - Acetic acid
  - Peracetic acid
  - Ethyl alcohol
  - HCl
- Antibiotics
- Detergents
- Others

Sequence

- 2/06/13 evaluation by pulmonologist
  - 11/12
    - Cough → brown mucous, CP, chest tightness for 3 months, T² by PCP
    - Unresponsive to oral ABs from PCP
    - Fatigue, weight gain, insomnia
  - D₃: pleurisy, asthma
- 2/18/13 evaluation - pulmonologist
  - Chronic DOE
  - Nonspecific CXR abnormality, RUL
  - CT chest ⇒ 1.0-cm nodule, RUL
Sequence (cont.)

• 4/08/13 evaluation - pulmonologist
  - Positive methacholine challenge test (© MCT)
  - RT thoracic surgeon
  - Repeat CT chest recommended for 3M P last CT (claimant refused)
• 7/19/13 evaluation – thoracic surgeon
  - CT chest ⇒ 1.5-cm nodule, RUL (surgeon)
  - ⇒ 1.2-cm nodule, RUL (radiologist)
• 10/17/13 evaluation – surgeon
  - RU lobectomy
  - CA confirmed on Bx

Sequence (cont.)

• 10/17/13 – in hospital
  - P-op pneumonia
  - Followed by full recovery
• Never RTW
  - Prohibited by treating MDs
  - No residual symptoms after lobectomy
  - WC claim filed
    - Occupational lung CA
    - Occupational asthma
• Radon Θ both homes (childhood & adult)

PMHx - Benign

• Medical
  - Hypercholesterolemia
  - OW, benign
• Surgical
  - Tonsillectomy
  - L breast lumpectomy
  - WT extractions
• Trauma
  - F, L foot X2
• Allergies
  - Advair → oral ulcers
  - Sulfur → hives
• Medications
  - Alleve
  - Symbicort
  - Ventolin
  - Singular
  - MVT
Other Pertinent History

**FMH**
- Father, ex-smoker
  - 63, CAD & HTN
- Mother, nonsmoker
  - 76, well
- 2B
  - 39, well
  - 35, well
- OW, noncontributory

**SH**
- Tobacco - Θ
- Alcohol – occasional use
- Illicit drugs - Θ
- Military service – none
- Education – AD and BS
- Hobbies: none
- Occupational Hx – no other chemical exposures; no exposures from husband
- Family – divorced/renarried; 2 C

Other Findings

**ROS**
- Completely negative
- Wants to RTW

**Physical Examination**
- VS WNL
- R hemithyroid mildly enlarged
- No other abnormalities, head to toe

Case #2: Occupational Lung Cancer – Legal Summary

Attorney Carlton
Case #2: Occupational Lung Cancer – Legal Summary

- This is a case that we hoped would prove to be nil causation, but we feared Sole Causation or Substantial Contribution from work
  - The claimant’s own medical chart in the hands of a skilled IME doctor was the ONLY chance the employer had of getting to the truth

As an IME provider, demand the full medical chart!

Too often the IME doctor is provided limited medical records

Case #2: Occupational Lung Cancer – Medical Strategies and Tactics

Dr. Them
Apply the Modified Hill’s Criteria

- **Statistical** association (“SCPD”)
  - Strength - $\uparrow$ association $\Rightarrow$ “A to B” correlation
  - Consistency - results replicated in different studies
  - Plausibility - association agrees with current knowledge
  - Dose-Response relationship - $\uparrow$ exposure $\Rightarrow$ risk
- **Temporal** association
  - Cause must precede effect
  - $\Delta$ cause $\rightarrow$ $\Delta$ effect

Occupational Asthma: What to do?

1.) Accept diagnosis
2.) Contest diagnosis
3.) Blame home exposures
4.) Other

As all symptoms have resolved since the RU lobectomy, measure lung function again and complete another methacholine challenge test.

(Reactivity due to tumor presence, not workplace exposures?)
Occupational Lung Cancer: What to do?

1.) Accept diagnosis
2.) Argue dose/toxicity/carcinogenicity data
3.) Blame home exposures
4.) Other

Occupational Lung Cancer: What to do?

4.) Other

The claimant only worked at the site in question for 15 M. Could the tumor have been present before she actually started working there?

Calculating Tumor-Doubling Times

[Image of a table with data]

The Tumor: Roughly, a Sphere

\[ V_{sphere} = \frac{4}{3}\pi r^3 \]

\[ = \frac{4}{3} \times 3.14 \times (0.5 \text{ cm})^3 \]

\[ = 0.52 \text{ cc} \]

\[ 0.52 \text{ cc} = \frac{4}{3}\pi r^3 \times 2 \]

\[ = \frac{8}{3} (3.14) r^3 \]

\[ = 8.37 r^3 \]

Therefore, \[ r^3 = \frac{0.52}{8.37} \]

\[ r = 0.162, \text{ and} \]

\[ r = 0.39 \text{ cm} \]
Conclusions

- These figures suggest that, during the 15-month period in question, the tumor, at any of its sizes cited above, would have contained millions of cells, suggesting, based on growth-doubling times alone, that many, many 3- or 7-month cycles of tumor size-doubling would have preceded the beginning of employment by the claimant in the workplace in question.

- These figures, in turn, suggest that the tumor in this claimant was both present and detectable (by high-resolution or spiral CT scan) before the claimant actually began working at the XYZ Corporation in MMMMM, Pennsylvania, and that the chemicals in question in this case could not have caused the lung malignancy experienced by this claimant.

- Accordingly, it is my opinion that the lung cancer in this claimant is, indeed, not occupational in origin and that none of the chemicals to which the claimant was exposed in the occupation in question could have caused her lung cancer regardless of their respective toxicity profiles.

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Case #2: Occupational Lung Cancer – Legal Outcome and Critique
Attorney Carlton

• Giving the IME provider the full chart made all the difference
  – The attorneys did not assume they knew what would be important
  – That took medical knowledge and skill
  – It took time and attention to detail by the IME provider
  – It took trust that the IME provider would get it right, even if the employer/carrier might dislike the result

Case #2: Occupational Lung Cancer – Legal Outcome and Critique

Claim Disallowed
No Liability to the Insurance Company
Case #3: Occupational Testicular Cancer – Medical Summary

Dr. Them

Case #3: Occupational Testicular Cancer

• 61 YOCM, Asphalt-Compaction Technician
• Dx: Left-sided testicular cancer - S/P left orchietomy
  – WC claim filed – **IR signed by attorney!**
  – Operates nuclear-density device
    • Cesium source
    • Gamma-ray emitter
    • Claim for radiation-induced cancer at work

The Materials Being Tested

http://www.stlohio.com/inspection.html
The Testing Device

PMH

• Medical
  – History of insomnia
  – History of gastroesophageal reflux disease
  – History of diarrhea, etiology unknown
  – History of frequent cough, etiology unknown
  – History of colonic polyps
  – History of Lyme disease (denied by claimant), never treated

PMH (cont.)

• Medical (cont.)
  – Pneumonia times one as a child
  – History of right rotator cuff strain/sprain/partial tear
  – History of snoring, without diagnosis of sleep apnea
  – No HTN, CVA, DM, ASHD, PUD, hepatitis, arthritis, thyroid disease, COPD, bronchitis, asthma, hypercholesterolemia, or gout
PMH₁ (cont.)

- Surgical
  - Vasectomy
  - Left radical orchiectomy, with simultaneous inguinal herniorrhaphy
- Trauma
  - Right leg fracture while snow skiing as a child
  - Right arm fracture while riding a horse as a child
  - Multiple rib fractures from water skiing as a child

PMH₁ (cont.) and FH₁

- Allergies: NKDA
- Medications: Omeprazole OTC, one, QOD, PRN
- FH₁
  - Father alive at age 88, with history of CA prostate
  - Mother alive and well at age 83
  - One brother, alive and well at age 59
  - One sister, alive at age 57, with history of breast carcinoma
  - No other family history of carcinoma

SH₁

- Tobacco: One pack per day for 31 (not 29) years, quitting in 2005 (possible that the claimant actually smoked 32 years, but he does not recall whether he started smoking at age 19 or age 20)
- Alcohol:
  - Records reflect average intake of seven (7) drinks per day, which the claimant characterized as “beer”
  - Has reduced his daily intake, with that level of consumption dominating the weekends, “mainly”
SHx (cont.)

- Illicit Drug Use: Never
- Military Service: None
- Educational Level: High school, plus less than one year of Civil Engineering - Associate’s Degree not completed
- Hobbies: Hunting, fishing, and horseback riding

<table>
<thead>
<tr>
<th>EMPLOYER</th>
<th>YEARS</th>
<th>TITLE/DUTIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>XXXX Sand and Gravel</td>
<td>1971-2016</td>
<td>Laborer in gravel plant</td>
</tr>
<tr>
<td>XXXX Sand and Gravel</td>
<td>1971-2016</td>
<td>Foreman, working there and present in this capacity</td>
</tr>
<tr>
<td>XXXX Sand and Gravel</td>
<td>1998-Present</td>
<td>Nuclear-density technician (testing asphalt)</td>
</tr>
<tr>
<td>YYYY Construction, ZZ, NY</td>
<td>1996-1997</td>
<td>Foreman - Construction</td>
</tr>
</tbody>
</table>

Denies other sources of external radiation exposure in prior jobs.

SHx (cont.)

- Family:
  - Married
  - Two children, both alive and well
    - One son, age XX
    - One daughter, age ZZ
ROS
- **GENERAL:** Weight is stable. Appetite is good. Sleep is variable, with apparently loud snoring and restlessness.
- **CENTRAL NERVOUS SYSTEM/PERIPHERAL NERVOUS SYSTEM:** Negative.
- **GASTROINTESTINAL:** Positive for frequent diarrhea, unknown etiology.
- **GENITOURINARY:** History of testicular carcinoma, as above; OW negative.
- **CARDIOVASCULAR:** Negative.
- **RESPIRATORY:** Negative.
- **MUSCULOSKELETAL:** Negative.
- **ENDOCRINE:** Negative.
- **HEMATOLOGIC/IMMUNOLOGIC:** Negative.
- **DERMATOLOGIC:** Badly sun-damaged skin. This is mainly in the upper extremities, neck, face, and scalp.
- **PSYCHIATRIC:** Negative.

**Physical Exam**
- **MACM in no apparent distress**
  - Obvious smoker’s face
  - Grossly visible, multiple actinic keratoses
    - Face
    - Ears
    - Forehead
    - Forearms/hands
  - Obvious, multiple basal cell carcinomata in essentially the same distribution

**Physical Exam (cont.)**
- **VITAL SIGNS**
  - Blood pressure 140/80, right upper extremity, seated, times two
  - Heart rate 72 and regular
  - Respirations 12 and unlabored
  - Height and weight
    - six feet one inch
    - 225 pounds
    - BMI 29.5
Physical Exam (cont.)

- Skin – as above, plus
  - Significant rosacea to the cheeks and nasal areas, bilaterally
  - Scalp, face, posterior neck, and upper extremities (on the dorsal surfaces), from T-shirt sleeve level distally, is badly sun-damaged, with leathery, worn appearance
  - Moderate cyanosis of the inferior lip

Physical Exam (cont.)

- Other pertinent positives
  - Ears: Poor auditory acuity
  - Oropharynx: Mallampati score IV
  - NECK: Circumference 18 inches
- OW, essentially WNL

Case #3: Occupational Testicular Cancer – Legal Summary

Attorney Carlton
Case #3: Occupational Testicular Cancer – Legal Summary

- Claimant was not self-employed (although he held same surname as employer), so claim was against employer
  - Some superb help in terms of background information and other facts provided by the employer, especially radiation-dose badge readings
- Diagnosis very serious
  - If claim were to be established, the concern was the likely death claim, in addition to the lifetime claim for benefits, that was being asserted

Legal Summary

- Our only defensive action taken on the case was selection of a top shelf IME doctor, gathering full medical chart to provide IME doctor, and preparing IME cover letter
  - Objective in IME cover letter was to make sure the doctor would understand and appreciate the situation presented so that an honest, evidence based opinion, might be offered

Case #3: Occupational Testicular Cancer – Medical Strategies and Tactics

Dr. Them

- [Image of a medical symbol]
Apply the Modified Hill’s Criteria

- **Statistical** association (“SCPD”)
  - Strength - ↑ association ⇒ ↑ “A to B” correlation
  - Consistency - results replicated in different studies
  - Plausibility - association agrees with current knowledge
  - Dose-Response relationship - ↑ exposure ⇒ risk
- **Temporal** association
  - Cause must precede effect
  - Δ cause → Δ effect

Significant, Non-occupational Radiation Source(s)?

Non-occupational Radiation Source(s)

- **Smoked cigarettes** - rate of one (1) pack per day (PPD) for 31 years
- Latter is directly and significantly impactful with respect to two, significant cancer risks:
  - 100,000 chemicals found in cigarette smoke (see Attachment 1, A. Rodgman and T. Perfetti, *The Chemical Components of Tobacco and Tobacco Smoke*, CRC Press, Boca Raton, FL, 2009 [ISBN 13: 978-1-4200-7883-1], page 1257), of which only 6,000-7,000 chemical have yet been precisely identified, many of which are carcinogenic (cancer-causing) unto themselves, and
Non-occupational Radiation Source(s) (cont.)

- Relatively high, significant radioactivity of cigarette smoke (see Attachments 2, 3, 4, 5, 6, 7, 8, 9, and 10)

<table>
<thead>
<tr>
<th>Source</th>
<th>mrem (dose-equivalent)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cigarettes/cigarette smoke</td>
<td>1300 (per year)</td>
<td>Chronic exposure</td>
</tr>
<tr>
<td>Chest X-ray</td>
<td>10</td>
<td>Acute exposure</td>
</tr>
<tr>
<td>CT Scan of the abdomen</td>
<td>1000</td>
<td>Acute exposure. Claimant underwent such a CT scan as part of his medical workup.</td>
</tr>
</tbody>
</table>

Table 1: mrem dose-equivalents of smoking vs. chest X-rays and CT scans of the abdomen.

References: This book is a “must.”

www.amazon.com/Chemical-Components-Tobacco-Smoke/dp/142078836 ($264.91)

or

www.crcpress.com/product/isbn/9781420078831 ($319.95)


Radiation-Dose Calculations: Table 2
Radiation-Dose Calculations (cont.)

• Several of the attached references cite cigarette-smoking as equivalent to one chest X-ray per day with respect to radiation doses
  – 1 CXR = 10 mrem
  – Smoking = 10 mrem/D = 3,650 mrem/Y
  – 3,650 mrem/Y x 31 years = 113,150 mrem
  • vs. prior estimate of 40,300 mrem tobacco-related radioactivity dose using other method
  • Almost 3X higher radioactive dose vs. prior #s
Radiation-Dose Calculations (cont.)

- With respect to the testicular cancer risk from smoking alone (not considering, specifically, any associated, radioactivity-exposure risks), Attachment 11 states, “Research has found that long-term smokers (people who have been smoking a pack of 20 cigarettes a day for 12 years or 10 cigarettes a day for 24 years) are twice as likely to develop testicular cancer than non-smokers” (emphasis added).
  - Mr. X most certainly fits this smoking profile
  - Mr. X’s risk for testicular cancer is/was twice that of the nonsmoking population.
- Attachment 12 also bluntly lists smoking as a causative factor in testicular cancer

- Smoking at a rate of 1 pack per day (PPD) for 31 years (31 years X 365 days/year x 20 cigarettes/day = 226,300 cigarettes [nearly a quarter-million cigarettes] smoked by Mr. X, in total)
- Table 2 (above) reflects a compilation of the radiation-badge-dosimetry results included in the records reviewed for this report, covering the time span from May 1998 through November of 2014

- In fact, Mr. X’s dosimetry-badge results reflect a 10,178 mrem lifetime-equivalent dose of 10,178 mrem vs. a 31-year (relatively acute with respect to a lifetime, but nonetheless chronic) smoking history, resulting in 40,300 mrem dose-equivalent exposure
- Ratio of smoking-related radioactivity dose to the measured dosimetry-badge results is, therefore, 40,300/10,178, or 3.96 to 1
- In other words, Mr. X's directly experienced radioactivity dose-equivalent from smoking was virtually four (4) times that measured via his dosimetry badges from work!
Radiation-Dose Calculations (cont.)

- To put things into perspective:
  - Average, background radiation exposure of U.S. citizens is about 300 mrem according to many sources
  - Several sources also refer to occupations of several types which result in average, occupational exposures of 5 rem (5,000 mrem), or the equivalent of 77,500 mrem over the 15.5 years of Mr. X’s employment in the position of concern
    - That dwarfs the measured lifetime dose-equivalent of 10,178 mrem in his case

Radiation-Dose Calculations (cont.)

- Several sources in the literature reflect that the testicles are resistant to radiation-induced cancer and that up to 50 rem (50,000 mrem) dose-equivalent is the threshold for safety
  - Mr. X never even approached that level of radiation, and, in fact, was only roughly 20% of that figure
  - Given the 60-year lifespan of Mr. X at the time of his diagnosis of testicular cancer, his 10,178 mrem lifetime dose-equivalent from work is 10,178 mrem/60 = 170 mrem per year, or about only half of the natural, average, background radiation levels of 300 mrem per year to each U.S. citizen

Radiation-Dose Calculations (cont.)

- While wearing the dosimeter badge on his chest, externally, 10-16 hours per day, 5 to 6 days per week, and storing the dosimetry badge when not using it, each of Mr. X’s yearly dosimetry badges was simultaneously exposed to natural, background radiation of about 300 mrem per year.
Radiation-Dose Calculations (cont.)

• 300 mrem per year X 15.5 years = 4650 mrem
  • Could be subtracted from the 10,178 mrem measured by those badges
  • Leaving 5,528 total, occupational mrem dose-equivalent exposure over a lifetime
    – Further reducing the validity of this claim
      • Especially given that about 1000 mrem of that total was probably artificially induced by improper storage of at least one dosimetry badge by the claimant
      • That would put his total, lifetime dose-equivalent occupational radiation exposure to about 4,500 mrem, or 54.9 mrem per year, for a projected 82-year lifespan of the claimant
      • That is roughly 1/8 the annual, natural, background radiation dose experienced by the average American

Radiation-Dose Calculations (cont.)

• In mathematics, probabilities are multiplicative, not additive
  – so, if Mr. X’s testicular cancer was caused by smoking (twice as probable as in a nonsmoker) and if Mr. X’s testicular cancer was caused by radiation exposure (4 times more from cigarettes in his case than from work), then the probability that both cigarette-smoking (via the chemicals involved) and radiation from smoking caused his testicular cancer is not 2 + 4, but 2 X 4, or 8 to 1 vs. a non-smoker (also exposed to 10,178 mrem of radiation at work over the course of 15.5 years).

Radiation-Dose Calculations (cont.)

• Taking into account Mr. X’s detected storage of at least one dosimetry badge near the occupational nuclear-density device in question, and taking into consideration all of the arguments cited above, that ratio would more than double, making it at least 16 times more likely that Mr. X’s testicular cancer derived from smoking than from occupational exposures to radioactivity.
Radiation-Dose Calculations (cont.)

• Literature reviewed as part of the records submitted to this examiner for related assessment points out that the human testicle is actually resistant to radiation-induced cancer, and the collective medical literature, as described above, suggests that about five times as much as the lifetime dose-equivalent radiation exposure of 10,178 mrem in this case is the threshold for testicular cancer (and actually would be about 10 times as much, based on the above arguments).

Radiation-Dose Calculations (cont.)

• One, particularly relevant publication by the U.S. Nuclear Regulatory Commission (see Attachment 13, page 8-3, Table of Occupational Limits) cites an annual limit of 5 rems (5,000 mrem) of radiation to the whole body as acceptable
  – Even if one includes the dosimetry-badge readings (1481 mrem; 7/15/00 – 9/14/00) resulting from Mr. X’s having left his dosimetry badge near the nuclear-density device and in the sunlight, then his maximum, annual, occupational radiation dose was 1910 mrem, or only 38% of the acceptable, annual limit cited by the U.S. Nuclear Regulatory Commission
  – That is simply nowhere near the threshold of concern, especially given that those particular readings are probably not reliable given the cited, improper dosimetry-badge storage by Mr. X

Radiation-Dose Calculations (cont.)

• Mr. X’s occupational radioactivity exposures in question, both individually and collectively speaking, were objectively far below any medical and/or scientific levels of concern, as supported by many scientific studies and regulatory limits
  • Based on all of the significant factors cited above:
    – The regular, voluntary, willful, and repeated cigarette-smoking by Mr. X – to a total of nearly a quarter-million cigarettes over 31 years – was, most likely, the causative etiology for Mr. X’s testicular cancer
    – While, thankfully, Mr. X quit smoking in 2005, the damage is done
Case #3: Occupational Testicular Cancer – Legal Outcome and Critique
Attorney Carlton

Legal Outcome

RETREAT!
Upon receipt of IME report Claimant and his attorney walked away and have never come back!
Claimant elected not to proceed any further with the claim.

Case #4: Environmental Benzene Exposure – Medical Summary
Dr. Them
Case #4: Environmental Benzene Exposure – Medical Summary

- 78 YO CM, married, currently unemployed/retired
- PCP has submitted *prima facie* medical evidence to the court, citing accidental, environmental benzene exposure as the *exclusive* cause of the claimant’s anemia
- IME question: Is the anemia a/the direct result of the claimed benzene exposure?
- Civil/tort case; not WC

Case #4: Environmental Benzene Exposure – Medical Summary (cont.)

- Scenario: Underground fuel leak at nearby gas station, eventually finding its way, partially, to claimant’s basement
- IH studies completed; low benzene levels measured in claimant’s basement
- Claimant convinced that he has been “poisoned”
- PCP cites related benzene inhalation as *exclusive cause* of anemia

PMHx

- PMH:
  - Anemia, with gastric antral vascular ectasia (GAVE syndrome)
  - PMR
  - Hypertension
  - Coronary artery disease
  - Sinus bradycardia
  - Hypercholesterolemia
  - Glucose intolerance
  - Gastritis, chronic
PMHx (cont.)

• PMH:
  – Gout
  – CVA 6 years earlier
  – Gastric foreign body (chicken bone)
  – Vitamin B12 deficiency
  – Iron deficiency
  – Skin cancer, including squamous cell carcinoma and melanoma
  – Pernicious anemia
  – Elevated PSA

PMHx (cont.)

• PMH:
  – CA prostate
  – RLE VV
  – Seborrhic keratoses
  – Vitamin D deficiency
  – Hyperlipidemia
  – Superficial phlebitis
  – Hearing loss (presbycusis or noise-onduced)
  – Sciatica
  – “Watermelon stomach”
  – Chicken bone in colon
  – Pneumonia as a child, with related scarring seen on CXR

PMHx (cont.)

• PMH:
  – ED
  – Serous otitis media
  – Seborrhea
  – Discopathy
  – Lumbar radicular pain
  – Keratoacanthoma
  – Solar lentigo
  – BPH, with obstruction and chronic prostatitis
  – Prostate intraepithelial neoplasia
  – Melanoma
PMHx (cont.)

- PMH;
  - Degenerative joint disease of the hands
  - Chronic corticosteroid use
  - SVT, PVCs, and PACs on EKG
  - Inferior MI
  - Non-STEMI, with severe stenosis of the posterolateral branch of the circumflex, and critical stenosis of the anterior descending coronary artery, treated with drug-eluting stent
  - Colonic diverticulosis, left-sided, mild
  - Hemorrhoids

PMHx (cont.)

- PMH;
  - Heme-positive stool
  - Squamous cell carcinoma of the right forearm
  - Verrucous keratosis
  - Hiatal hernia
  - GERD
  - Elevated CRP
  - Elevated ESR
  - DM II (not formally diagnosed)
  - Right posterior frontal-lobe infarct
  - Carotid stenosis

PMHx (cont.)

- PMH;
  - Pulmonary atelectasis
  - AFib, detected during IME
  - Probable mild dementia, with short-term memory deficits noticed by family (multifactorial, including age-related, atherosclerotic, and stroke-related causes)
Medications

• Medications
  – Ferrous sulfate 325 mg one tablet by mouth three times a day
  – Pantoprazole 40 mg one tablet by mouth every morning
  – Labetalol® 100 mg one tablet by mouth twice a day
  – Aggrenox® 25/200 mg one tablet by mouth twice a day
  – Allopurinol 300 mg one by mouth daily
  – Lisinopril 10 mg one by mouth daily
  – Hydrochlorothiazide 25 mg one by mouth daily
  – Atorvastatin 40 mg one by mouth after dinner
  – Prednisone 10 mg one by mouth daily
  – Vitamin D3 2000 International Units one by mouth daily

FHx, SHx, and Occ Hx

• FHx and SHx – NC
• Occ Hx

<table>
<thead>
<tr>
<th>EMPLOYER</th>
<th>YEARS OF EMPLOYMENT</th>
<th>TITLE/DUTIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>XXX Foods/ZZZ Food Store</td>
<td>1953-1995 (42 years)</td>
<td>Truck driver (pick-up truck to 18-wheelers)</td>
</tr>
<tr>
<td>Chauffeur</td>
<td></td>
<td>Chauffeur (Xerox), Alexandria, Virginia</td>
</tr>
</tbody>
</table>

Physical Exam

• P.E.
  – Elderly caucasian male, pleasant, in NAD
  – VS => irregularly irregular HR, ~ 78 BPM
  – Skin: multiple AKs and SKs; R temporal BCC
  – Eyes: R ptosis; A-V nicking (mild); pale conjunctivae
    - Extremities: 1+, bilateral, pitting edema
    - Neuro: mild left facial droop; MMS WNL except for recall of current POTUS
Case #4: Environmental Benzene Exposure – Legal Summary

Attorney Carlton

In discovery stages of the case, medical records revealed the plaintiff had a variety of pre-existing medical problems. It was unclear to what extent any of prior conditions were relevant.

In discovery, claimant was found to be taking a variety of medications, both over-the-counter and Rx. It was unclear to what extent any of the medications were relevant.

Given volume of prior medical problems and medications, the attending doctor’s opinion on causation seemed to be too open and shut. Case was in dire need of an IME. But not just any IME; case needed a doctor who would wade through all prior medical records.

Case #4: Environmental Benzene Exposure – Medical Strategies and Tactics

Dr. Them

In discovery stages of the case, medical records revealed the plaintiff had a variety of pre-existing medical problems. It was unclear to what extent any of prior conditions were relevant.

In discovery, claimant was found to be taking a variety of medications, both over-the-counter and Rx. It was unclear to what extent any of the medications were relevant.

Given volume of prior medical problems and medications, the attending doctor’s opinion on causation seemed to be too open and shut. Case was in dire need of an IME. But not just any IME; case needed a doctor who would wade through all prior medical records.
Apply the Modified Hill’s Criteria

- **Statistical** association ("SCPD")
  - **Strength** - ↑ association ⇒ ↑ “A to B” correlation
  - **Consistency** - results replicated in different studies
  - **Plausibility** - association agrees with current knowledge
  - **Dose-Response** relationship - ↑ exposure ⇒ risk

- **Temporal** association
  - Cause must precede effect
  - Δ cause → Δ effect

Unrelated Causes of Anemia

- The anemia of chronic disease/inflammation, including (see Reference 1)
  - Diabetes mellitus, Type II (see Reference 2)
  - Polymyalgia rheumatic (PMR; see Reference 3)
  - Hypercholesterolemia (see Reference 4)
  - Chronic gastritis (see Reference 5)
  - Gout (see Reference 6)
  - Elevated C-reactive protein (CRP; see Reference 7)

Unrelated Causes of Anemia (cont.)

- Iron-deficiency anemia from gastrointestinal bleeding (see Reference 8)
  - Gastric antral vascular ectasia (GAVE) syndrome (see Reference 9)
  - Hemorrhoids (see Reference 10)
  - Diverticulosis (see Reference 11)
- Vitamin B12 deficiency/pernicious anemia (see Reference 18)
Unrelated Causes of Anemia (cont.)

- Cancers of at least four types (see Reference 12)
  - Prostate cancer (see Reference 13)
  - Squamous cell carcinoma of the skin (see Reference 14)
  - Basal cell carcinoma (see Reference 15)
  - Melanoma (see Reference 16)
  - Prior keratoacanthoma (see Reference 17)

Unrelated Causes of Anemia (cont.)

- Medications
  - Chronic prednisone, which can be associated with significant gastritis and associated gastrointestinal bleeding (see Reference 19)
  - Aggrenox®, a combination anticoagulant drug consisting of aspirin and timed-release dipyridamole (see Reference 20)

Remember This?

www.epa.gov/ncea/pdfs/efh/front.pdf
Q: How much time/day does a retired, elderly, American WM spend, on average, at a gas station?

A: 18 minutes

---

Dose Ratio

Benzene dose from gas station/benzene dose in basement =

\[
\frac{44.1 \text{ hours} \times 60 \text{ minutes/hour} \times \text{breaths/minute} \times \text{cc/breath} \times 1 \text{ cubic meter/1,000,000 cc} \times 3900 \text{ mcg/m}^3 \times \text{absorption efficiency}}{882 \text{ hours} \times 60 \text{ minutes/hour} \times \text{breaths/minute} \times \text{cc/breath} \times 1 \text{ cubic meter/1,000,000 cc} \times 6.1 \text{ mcg/m}^3 \times \text{absorption efficiency}}
\]

\[
= \frac{44.1 \times 3900}{882 \times 6.1}
\]

This means that, as an average American over the age of 64, Mr. VVVV’s inhalational benzene dose from gas stations, over the course of the same 147 days, would have been 32 times that of his inhalational dose of benzene in his basement.

---

Upstairs: Basement Benzene-Dose Ratio

The comparative doses, then, of Mr. VVVV’s inhalational exposure to background benzene in his home (not basement) for 18 hours/day vs. the same in his basement for 6 hours/day from the alleged gasoline leak in question is:

\[
\frac{2646 \text{ hours} \times 60 \text{ minutes/hour} \times \text{breaths/minute} \times \text{cc/breath} \times 1 \text{ cubic meter/1,000,000 cc} \times 7.0 \text{ mcg/m}^3 \times \text{absorption efficiency}}{882 \text{ hours} \times 60 \text{ minutes/hour} \times \text{breaths/minute} \times \text{cc/breath} \times 1 \text{ cubic meter/1,000,000 cc} \times 6.1 \text{ mcg/m}^3 \times \text{absorption efficiency}}
\]

\[
= \frac{2646 \times 7.0}{882 \times 6.1}
\]

= 3.4
Outdoors: Basement Benzene-Dose Ratio

\[
\begin{align*}
2646 \text{ hours} \times 60 \text{ minutes/hour} \times \text{breaths/minute} \times \text{cc/breath} \times 1 \text{ cubic meter/1,000,000 cc} \times 5.76 \text{ mcg/m}^3 \times \text{absorption efficiency} \\
882 \text{ hours} \times 60 \text{ minutes/hour} \times \text{breaths/minute} \times \text{cc/breath} \times 1 \text{ cubic meter/1,000,000 cc} \times 6.1 \text{ mcg/m}^3 \times \text{absorption efficiency} \\
\end{align*}
\]

\[
\begin{align*}
= 2646 \times 5.76 \\
= 882 \times 6.1 \\
= 2.8
\end{align*}
\]

That means that, as a simple consequence of being outdoors, in the “fresh air,” at his own home for 18 hours per day during the same 147 days, Mr. VVVV would have inhaled 2.8 times as much benzene as he did from spending 6 hours per day in his basement in the environment in question.

Case #4: Environmental Benzene Exposure – Legal Outcome and Critique

Attorney Carlton

Case Settled following plaintiff's counsel’s reviewing IME report

Value of Settlement: The amount defendant would have paid IME doctor to provide expert testimony (the value was much less than the cost of defense)
Effective Tools in Establishing and/or Rebutting Causation

- Don’t necessarily believe everything (or anything) in the "prima facie" medical evidence
  - Personally review records
  - Actively confirm or rebut
- Objective armamentarium
  - Medical literature – credible, peer-reviewed
  - HIS/AQ data
  - Dose calculations – biological, chemical, and physical
    - Inhalational
    - Dermal
    - Ingestional
    - Injected
  - Biometrics
  - Radiographic imaging
    - Drowning time – tumors
    - Echogram for acuity (visual injuries)
  - PFTs, NCS/EMGs, etc.

Effective Tools in Establishing and/or Rebutting Causation (cont.)

- Hill’s (or modified Hill’s) criteria
  - Routinely invoke – every case, every time
  - Every criterion must be met, or causation is not established
    - Can “crush” a faulty conclusion
    - Catches most attorneys “off guard”
    - Can elucidate the truth of the matter at hand
    - Can augment credibility as an expert
    - Can carry some legal “weight” with an astute ALJ
General Legal Summary
Attorney Carlton

General Legal Summary:
• Good science/medicine and good lawyering require hard work
• Causation is often not examined carefully or is conceded too quickly
• Lawyers may not like science, but many doctors will act very un-scientifically in order to opine causation
• The jurisdiction matters, but more so the quality of the doctors’ ability to communicate, explain, and persuade
• When preparing a medical report on causation, remember most judges and lawyers are not scientists, so explain things in terms that even lawyers and judges can understand
• Put in the work
  – Review all the records sent to you whether you are the attending or IME
  – Be open to all the possibilities until you figure out what is really going on (i.e., a differential diagnosis is not a bad thing)
• Testify clearly
  – Make concessions when you need to
  – Talk to the judge like you would your patient

Questions
Dr. Them and Attorney Carlton

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We hope that this has been a helpful, useful presentation.

Thank you for attending!