

BUILDING HEALTH SCIENCES, INC.



A Division of The NMAS Group



White Coats and Hard Hats...Bringing Medical and Scientific Principles to Building Diagnostics

Chinese Drywall Litigation – a health-based perspective

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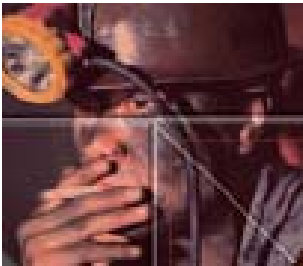
Experience: Twenty Years of Professional Activity in Environmental Toxicology Including:

350 HOMES in Reno, Nevada



- Evaluation of homes, occupant health effects, remediation protocols and oversight

732 INDIVIDUALS claiming illness from groundwater contamination as a result of coal mining operations:



- Toxicological Analysis of 15 chemicals in coal mining waste
- In-house medical records review
- Causation Analysis

40,000 EMPLOYEES/12 BUILDINGS at NSA campus/4 million data points



- Health Hazard Evaluation and Environmental Sampling
- One of largest Indoor Epidemiological Studies ever performed

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Chinese Drywall: what is needed?

- Identification of what is emitted and how much?
- What can the emissions do to people and to metallic elements found in the home?
- In a given home, how can we:
 - » Detect whether Chinese drywall is present?
 - » Detect when emissions occur and accurately measure them?
 - » Determine occupant exposure dose?





Chinese Drywall: State of the Knowledge

- **Bulk Samples**

- **Composition:** carbonyl sulfide, carbon disulfide, methyl mercaptan, hydrogen sulfide, iron disulfide, strontium sulfide, sulfur dioxide

- **Air Samples**

- **Real time:** negative
- **Integrated:** carbon disulfide, carbonyl sulfide, methyl mercaptan, VOC
- **Other:** hydrogen sulfide

- **Testing by:** CTEH, Environ, Florida Dept of Health (Unified Engineering), USEPA



Human Health Concerns

- **Potential Exposure Pathways**

- Inhalation
- Ingestion
- Dermal



- **Determination of a toxicologically-relevant dose**

- Concentration and duration

The Dose Makes The Poison



Non-Toxic

Toxic

Aspirin



vs.



2 Tablets

100 Tablets

Saccharine



vs.



1 Diet Soda

200 Diet Sodas per Day

Alcohol



vs.



1 Drink

1 Fifth

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Symptoms and Exposure

WHY SYMPTOMS ALONE OFTEN DO NOT INFORM CAUSATION

- Reporter Bias
- Observer Bias
- Attribution Bias
- Alternate Explanations-- Non-specificity



SYMPTOMS AND DISORDERS COMMONLY ATTRIBUTED TO THE ENVIRONMENT: A CHAOTIC MIXTURE

HEADACHE **FAINTING** **ITCHY EYES & THROAT**

NOSEBLEEDS **RASH** **MISCARRIAGES**

TROUBLE CONCENTRATING **ASTHMA**

UPPER RESPIRATORY **CANCER**

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POSSIBLE CAUSES OF SYMPTOMS AND DISORDERS OFTEN ATTRIBUTED TO IEAQ

SYMPTOMS or DISORDERS	COMMON CAUSES	POSSIBLE CAUSES	RESIDENTIAL IEAQ POSSIBLE CAUSES
ITCHY EYES	CONTACT LENS ALLERGIES INFECTION	EYE STRAIN	LOW HUMIDITY MOLD CHEMICALS DUST FIBERGLASS
NOSE BLEEDS	ALLERGIES INFECTIONS TRAUMA		ALLERGIES LOW HUMIDITY
FATIGUE	MANY DISEASES DEPRESSION SLEEP DISORDER CHRONIC FATIGUE SYNDROME	BOREDOM STRESS OVERWORK	ALLERGIES



REPORTED HEALTH COMPLAINTS	TOXICOLOGICALLY PLAUSIBLE HEALTH EFFECTS
<p data-bbox="243 532 852 574">RESPIRATORY “ISSUES”</p> <ul data-bbox="296 646 835 976" style="list-style-type: none">– Hoarseness– Nosebleeds / Runny Nose– Sore throat / Cough– Sinus irritation/infection– Chest tightness– Difficulty breathing– Asthma attacks [asthmatic] <p data-bbox="243 1040 590 1083">EYE “ISSUES”</p> <ul data-bbox="296 1101 590 1182" style="list-style-type: none">– Irritation– Blurred vision	<p data-bbox="1050 532 1598 574">RESPIRATORY TRACT</p> <ul data-bbox="1102 597 1661 976" style="list-style-type: none">– Mucous membrane irritation<ul data-bbox="1209 646 1360 873" style="list-style-type: none">• Mouth• Nasal• Throat• Sinus• Chest– Chest tightness– Bronchospasm <p data-bbox="1050 1040 1184 1083">EYES</p> <ul data-bbox="1102 1101 1734 1230" style="list-style-type: none">– Mucous membrane irritation<ul data-bbox="1209 1149 1734 1230" style="list-style-type: none">• Pain/tearing• Dryness/visual impairment



REPORTED HEALTH COMPLAINTS	TOXICOLOGICALLY PLAUSIBLE HEALTH EFFECTS
<p>NON-SPECIFIC</p> <ul style="list-style-type: none">- Headache- Nausea- Fatigue- Dizziness- Aches and pains <p>OTHER</p> <ul style="list-style-type: none">- Sleep apnea- Skin rashes- Coronary heart disease- Death of family pet	<p>NON-SPECIFIC - Odor-Induced</p> <ul style="list-style-type: none">- Headache- Nausea- Fatigue- Dizziness- Aches and pains- Malaise- Generalized feeling of ill health <p>NON-SPECIFIC - Psychological</p> <ul style="list-style-type: none">- Anxiety/panic attacks:<ul style="list-style-type: none">• respiratory• cardiac• neurological effects• CNS- Stress / Trauma



Human Health Concerns

“Vulnerable” Population Groups

Women

Children

Elderly

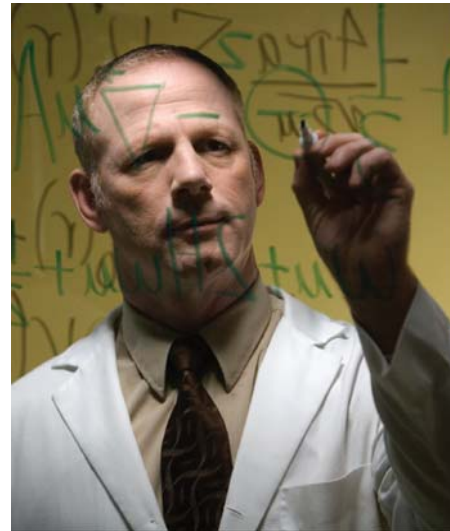
Chronically Ill





MEASURES OF EXPOSURE

- Measurements
- Modeling
- Extrapolations From Other Studies
- Biological Monitoring
- Occasionally, But Rarely, Symptoms



Systematic Evaluation of Health Effects: Part 1



- Clinical Evaluation
 - *Delineation of symptoms/signs*
 - *History/review of past medical records*
 - *Physical examination*
 - *Develop differential diagnoses*
 - *Diagnostic testing*

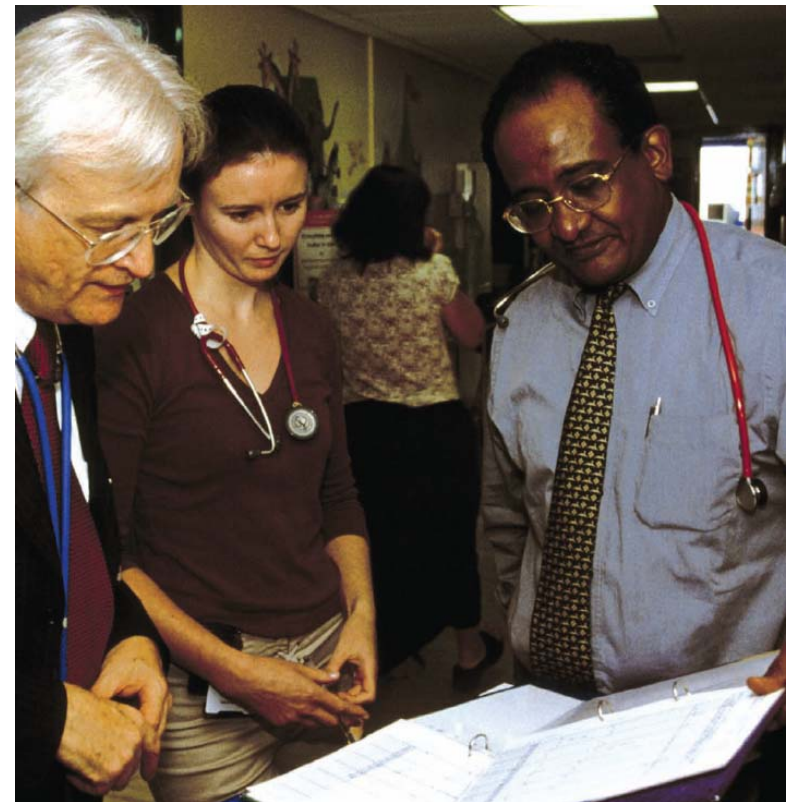
- Diagnosis





Systematic Evaluation of Health Effects: Part 2

- Diagnosis
- Determination of Cause
- Management





Differential Diagnosis and Causation Assessment

- **Differential Diagnosis:** *the clinician's methodology of determining the internal cause of symptoms (pathophysiology)*
 - Is the headache due to a brain tumor, stress, or an odor?
 - Are the symptoms from a physical illness or an emotional disorder?
- **Elements:**
 - HISTORY (both current and past)
 - PHYSICAL EXAMINATION
 - DIAGNOSTIC TESTING



CAUSATION ANALYSIS

- Differs from DIFFERENTIAL DIAGNOSIS
 - Assumes that a diagnosis has been made
 - Looks for relationship to external cause or aggravator of that diagnosed entity
 - For toxicological issues requires input from:
 - Epidemiology
 - Toxicology
 - Utilizes confirmed testing data for materials at issue
 - Utilizes known scientific information

ATSDR Toxicological Profile

Carbon Disulfide: Health Effects

TABLE 2-1. Levels of Significant Exposure to Carbon Disulfide - Inhalation (continued)

Key to ^a figure	Species (strain)	Exposure duration/ frequency	System	NOAEL (ppm)	LOAEL (effect)		Reference
					Less serious (ppm)	Serious (ppm)	
35	Human	12.1 yr occup			7.6 ^b M (decreased peroneal nerve MCV and sural nerve SVC)		Johnson et al. 1983

^aThe number corresponds to entries in Figure 2-1.

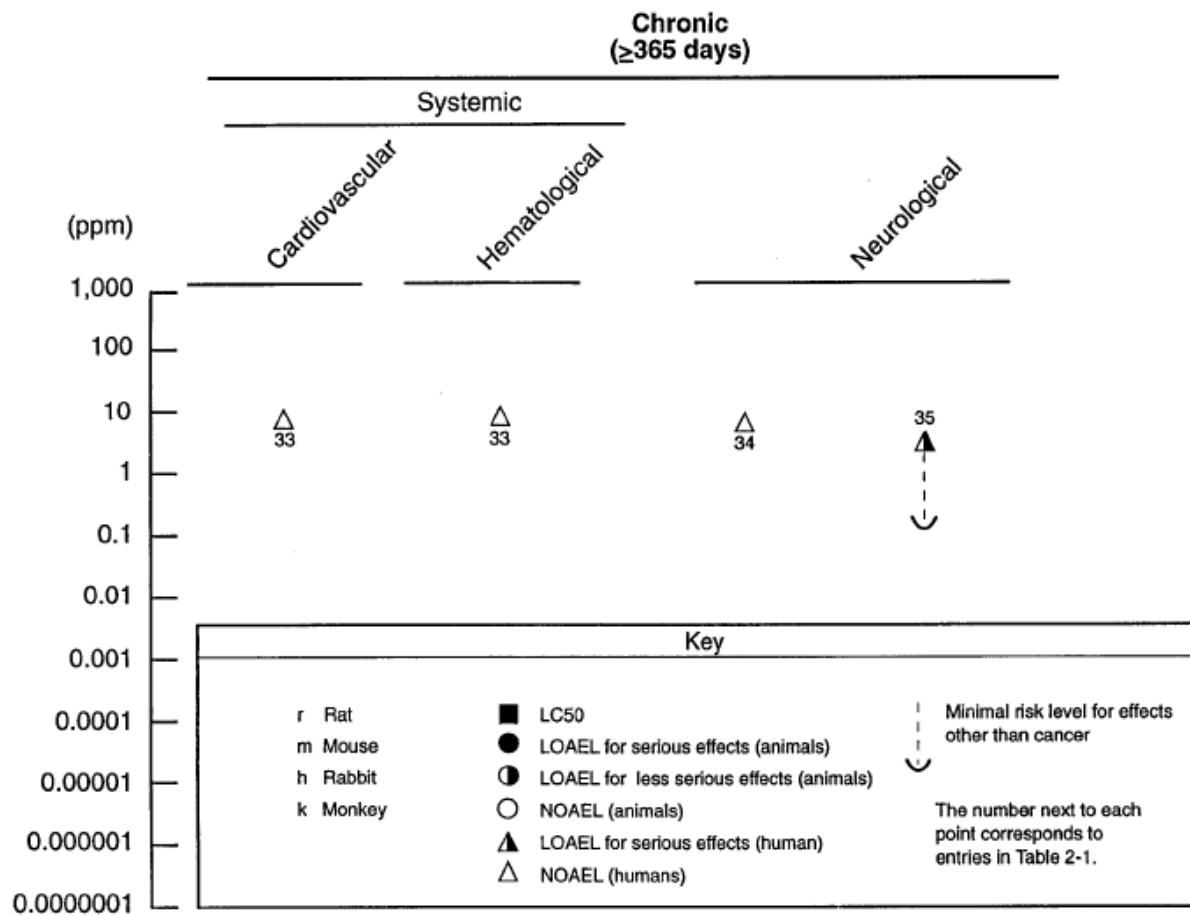
^bUsed to derive a chronic inhalation Minimal Risk Level (MRL) of 0.3 ppm for carbon disulfide; the LOAEL of 7.6 ppm was divided by an uncertainty factor of 30 (10 for human variability and 3 for use of a minimal LOAEL).

ATP = adenosine triphosphate; Bd Wt = body weight; Cardio = cardiovascular; d = day(s); F = female; Gd = gestational day; Hemato = hematological; hr = hour(s); LC₅₀ = lethal concentration, 50% kill; LOAEL = lowest-observed-adverse-effect level; M = male; MCV = motor nerve conduction velocity; min = minute(s); mo = month(s); NOAEL = no-observed-adverse-effect level; NS = not specified; occup = occupational; RBC = red blood cell; Resp = respiratory; SVC = sensory conduction velocity; wk = week(s); yr = year(s)

ATSDR Toxicological Profile

Carbon Disulfide: Health Effects

Figure 2-1. Levels of Significant Exposure to Carbon Disulfide – Inhalation (continued)



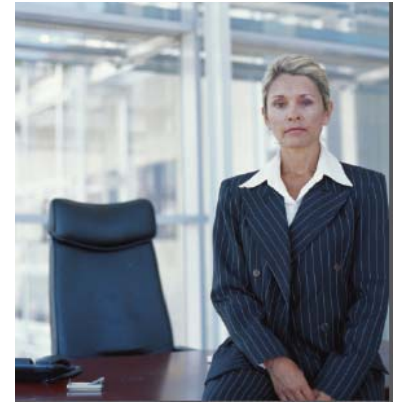


CAUSATION ANALYSIS

- **Does:** *What does the person have?*
- **Can:** *Can the substance(s) at issue cause the observed illness, effect, or symptom?* [General Causation]
 - Sufficiency of support for capability of agent at issue to
 - produce the endpoint in question.
- **Did:** *Did this exposure cause the observed illness, effect or symptom?* [Specific Causation]
 - Sufficiency of dose
 - Alternate causes considered and ruled out or prioritized in likelihood
 - Temporal and clinical courses appropriate
 - Latency, morphology and others



Some Cautions



- Research is in the early stages
- Exposure doses have not yet been defined
- Is occupant health actually affected?
- When does Chinese drywall need to be removed and how should this be done?
- Identify corrective measures and ways to verify their effectiveness
- Fraudulent testing companies (*“Chinese Drywall Testing Company”*)
- Nocebo Effect (*Alarmist professionals who prematurely spread fear, causing people to feel ill and leading, potentially, to serious disability.*)

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