

**American College of Occupational and Preventive Medicine
2011 Annual Meeting, Orlando, Florida, November 2, 2011**

**EVALUATION OF ILLNESSES
ASSOCIATED WITH INDOOR
ENVIRONMENTS**

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**TOPICS: CLINICAL;
ENVIRONMENTAL; LEGAL**

- CLINICAL ASSESSMENT
- ENVIRONMENTAL ASSESSMENTS
- DETERMINATION OF CAUSALITY
- MANAGING THE WORKERS
- LEGAL ISSUES
- REPRESENTATIVE DISORDERS, e.g.,
 - ASTHMA
 - MCS/IEI: MOLD

TO EXEMPLIFY THE ISSUES

- MACRO/ MICRO LEVEL REVIEWS
 - OF THE WORKER
 - OF THE ENVIRONMENT
- OBJECTIFIABLE DISORDERS: e.g.,
 - ASTHMA
 - ALLERGIES
- SUBJECTIVE, NON-OBJECTIFIABLE DISORDERS: e.g.,
 - MCS/IEI
 - BUILDING ASSOCIATED COMPLAINTS
 - NON-SPECIFIC MOLD-ASSOCIATED SYMPTOMS

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**CLINICAL AND WORKPLACE
ASSESSMENT (MACRO) ISSUES**

- FACTORS AFFECTING ALL WORKERS

- COMMUNICATING TO ALL

**CLINICAL AND WORKPLACE
ASSESSMENT MICRO (INDIVIDUAL)
ISSUES**

- OBJECTIVE ASSESSEMENT OF ILLNESSES
- ASSOCIATING ILLNESSES WITH
WORKPLACE
- DIFFERENTIAL DIAGNOSIS FIRST
- CAUSATION ASSESSMENT NEXT
- SEPARATING PSYCHODYNAMIC FROM
TOXICODYNAMIC

CAUSATION ISSUES

- DETERMINING CAUSE

- THE RELEVANCE OF CAUSATION
 - *IN* PATIENT MANAGEMENT
 - *IN* WORKERS' COMPENSATION AND
IN LIABILITY

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**ASSESSING AND MANAGING THE
WORKPLACE ENVIRONMENT**

■ *Example:*

INDOOR ENVIRONMENTAL, NON-
MANUFACTURING

WORKER EVALUATION

- CLINICAL EXAMINATION/ EVALUATION
 - SH, FH, HOBBIES, HOME ENVIRONMENT, RECORDS REVIEW
- PRELIMINARY DIAGNOSTIC WORK UP
- COMORBIDITY/ SUSCEPTIBILITY/ PSYCHOSOCIAL ISSUES/ AGENDA
- DIFFERENTIAL DIAGNOSIS
- TREATMENT
- RTW CONSIDERATIONS
 - DISCUSSIONS WITH H.R./ RISK MANAGEMENT

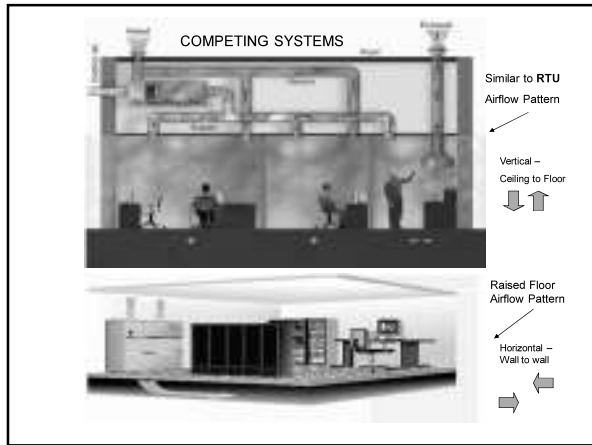
WORKER EVALUATION

- FURTHER WORK UP OR CONSULTATIONS
- SITE VISIT/ INVESTIGATION
- CAUSAL ANALYSIS –
 - POTENTIAL EXPOSURES, DOSE & DURATION, CAN IT & DID IT?
- TREATMENT
- CASE MANAGEMENT
- MMI
 - WC/ LEGAL
 - FUTURE ACCOMMODATION/ ADA ISSUES/ JAN (<http://www.jan.wvu.edu/>)

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ENVIRONMENTAL EVALUATION

- WALK THROUGH – TALK TO OCCUPANTS/ FACILITIES/ HOUSEKEEPING, LEARN THE FACILITY (POTENTIAL POLLUTANTS, MSDS) AND HOW IT BREATHES:
 - CONCEPT OF POLLUTANTS, PATHWAYS, PRESSURES
 - CONCEPT OF EXPOSURE, DURATION, DOSE
 - FUNDAMENTAL ENVIRONMENTAL/ TOXICOLOGIC PRINCIPLES – “THE DOSE MAKES THE POISON”



TYPICAL TYPES OF CASES

- SUBJECTIVE COMPLAINTS: OBJECTIFIABLE DISEASE
 - OCCUPATIONALLY-CAUSED/EXACERBATED
 - NON-OCCUPATIONALLY CAUSED
- SUBJECTIVE COMPLAINTS, NO OBJECTIFIABLE DISEASE
 - POSSIBLE OCCUPATIONAL/ENVIRONMENTAL CAUSE
- SUBJECTIVE COMPLAINTS
 - IDENTIFIABLE OCCUPATIONAL STRESS-RELATED CAUSE
 - NO IDENTIFIABLE CAUSE
- WORKFORCE “CONTAGION”

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SUBJECTIVE COMPLAINTS OBJECTIFIABLE
DISEASE

OCCUPATIONALLY-CAUSED AND

NON-OCCUPATIONALLY CAUSED

**CASE 1 (OCCUPATIONALLY-
CAUSED)**

- PATIENT COMPLAINING OF DIFFICULTY BREATHING AT WORK IN A PAINT MANUFACTURING FACILITY

**CASE 2 (NON-
OCCUPATIONALLY CAUSED)**

- TWO EMPLOYEES OF A REAL ESTATE FIRM WERE DIAGNOSED WITH ASTHMA.
- THE ENVIRONMENT IN WHICH THEY WORKED HAD A HISTORY OF WATER INTRUSIONS AND SOME LIMITED MOLD GROWTH.

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**CASE 3 (WORKPLACE
EXACERBATION)**

- AN ATOPIC INSTRUCTOR REPORTED ASTHMA-LIKE SYMPTOMS WHEN WORKING AT THE OFFICE. HE COMPLAINED OF "TOXIC MOLD" IN HIS CLASSROOM AND FORMALDEHYDE OFF-GASSING FROM FURNITURE AS THE CAUSE OF HIS PROBLEMS.

SUBJECTIVE COMPLAINTS, NO
OBJECTIFIABLE DISEASE

*POSSIBLE
OCCUPATIONAL/
ENVIRONMENTAL CAUSE*

CASE 4

- EXECUTIVE OF PAINT MANUFACTURING PLANT COMPAINING OF SENSITIVITY TO CHEMICALS AND MOLD IN HIS ADMINISTRATIVE OFFICE

CASE 4



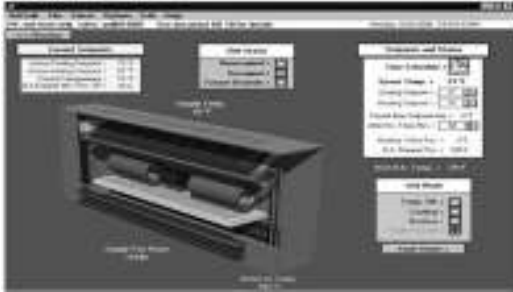
CASE 4



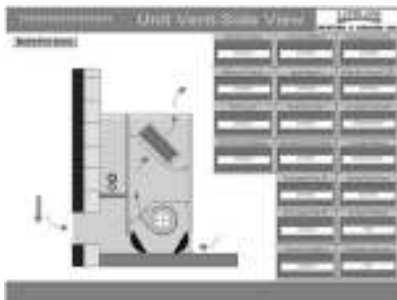
CASE 5 – POSSIBLE
ENVIRONMENTAL CAUSE/
EXACERBATION

- STUDENT DIAGNOSED WITH "MYCOTOXIN ILLNESS" AND "SICK BUILDING SYNDROME."
- 8 OTHER STUDENTS & STAFF MEMBERS C/O URT and EYE SYMPTOMS.
- SECOND OPINION SOUGHT FROM NEARBY ACADEMIC OCCUPATIONAL/ENVIRONMENTAL MEDICINE PROGRAM. OMP WANTED TO SEND AN "ENVIRONMENTAL INVESTIGATOR" OUT PRIOR TO HER EVALUATIONS OR INVOLVEMENT.
- AFTER EVALUATION and ENVIRONMENTAL REPORT, DX: "SICK BUILDING SYNDROME."
- STUDENT OUT FOR 6 mos. ONE YEAR LATER.....

CASE 5



CASE 5



SUBJECTIVE AILMENTS WITH
NO CLEAR AIRBORNE CAUSE,
BUT APPARENT STRESS-
RELATED CAUSE

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CASE 6

- SENIOR CORPORATE EXECUTIVE RESPONSIBLE FOR 5000 EMPLOYEES AND MAJOR SOFTWARE OVERHAUL OF TELEPHONE SWITCHING OPERATION. BUILDING UNDERGOING RENOVATION.
- DEVELOPS SYMPTOMS WHICH HAVE EXPANDED AND MIGRATED TO NON-WORKPLACE ENVIRONMENTS.

SUBJECTIVE COMPLAINTS NO
READILY-IDENTIFIABLE
ENVIRONMENTAL CAUSE

CASE 7 - Demolition?

- HR: A DANCE TEACHER REPORTS OCC. ASTHMA OF 2 MONTHS' DURATION. SHE REPORTS SX'S FROM HER DANCE FLOOR/STUDIO. SHE IS ON MULTIPLE ASTHMA MEDS. SHE HAS BEEN TOLD BY ED/ URGENT CARE/ FAMILY PRACTICE/TWO PULMONARY PHYSICIANS THAT SHE HAS OCC. ASTHMA. HER SUBJECTIVE HISTORY INCLUDES FATIGUE, LETHARGY, AND ALL PHYSICIANS' NOTES POINT TO THE STUDIO/ DANCE FLOOR.
- WHAT WAS RECOMMENDED: TEARING UP THE FLOOR/ STUDIO. TRANSFER?

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CASE 7

- THE PARENTS REPORT MANY SICK KIDS, OTHER STAFF ARE COMPLAINING & 2 REPORTERS ARE PRESENT AT A PTA MEETING.
- WHAT WOULD YOU DO NEXT?

WORKFORCE CONTAGION

CASE 8

- ONE PATIENT WITH ILLNESS
- ENTIRE WORKFORCE BECOMES "SICK"

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CASE 8

- NE IS A NURSE WITH HISTORY OF ASTHMA AND DIABETES WHO MISSED A SIGNIFICANT NUMBER OF WORKDAYS, COMPLAINING OF A REACTION TO "BAD AIR" AT THE WORKPLACE (OFFICE COMPLEX). HER REQUESTED ACCOMMODATIONS INCLUDING A ROTATING FAN TO CIRCULATE THE AIR WERE HONORED.

- SHE RETURNED TO WORK AND REPORTEDLY BECAME HYPOGLYCEMIC AND "LOST HER AIRWAY" FROM A SEVERE ASTHMA ATTACK.

CASE 8

- A CO-WORKER HAD TO ADMINISTER AN INHALER TO HER BEFORE SHE REGAINED CONSCIOUSNESS.
- THE UNION BEGAN PICKETING THE "UNSAFE" OFFICE COMPLEX. FOUR TELEVISION STATIONS WERE PRESENT TO REPORT THE UNION ACTION.
- A WORK EXCUSE FROM HER UNIVERSITY BASED PHYSICIAN ATTRIBUTED HER SYMPTOMS TO AGGRAVATION FROM THE WORKPLACE.
- SUDDENLY, 45 (OF 2000) OTHER BUILDING OCCUPANTS CAME FORWARD WITH VARIOUS NON-SPECIFIC SYMPTOMS.

**DIFFERENTIAL DIAGNOSIS AND
CAUSATION ASSESSMENT**

- *DIFFERENTIAL DIAGNOSIS* IS THE CLINICIAN'S METHODOLOGY TO DETERMINE THE INTERNAL CAUSE OF SYMPTOMS (PATHOPHYSIOLOGY)
 - IS THE HEADACHE DUE TO A BRAIN TUMOR OR TO STRESS?
 - IS THE LEG PAIN DUE TO A TUMOR, A BROKEN BONE OR A STRAIN?
 - ARE THE SYMPTOMS DUE TO A DIAGNOSABLE DISEASE OR TO AN EMOTIONAL DISORDER?

DIFFERENTIAL DIAGNOSIS

- HISTORY BOTH CURRENT AND PAST
- PHYSICAL EXAMINATION
- DIAGNOSTIC TESTING

CAUSATION ANALYSIS

- DIFFERS FROM DIFFERENTIAL DIAGNOSIS BECAUSE IT *ASSUMES THAT A DIAGNOSIS HAS BEEN MADE AND LOOKS FOR RELATIONSHIP TO EXTERNAL CAUSE*
- TOXICOLOGICAL ISSUES DEPEND UPON EPIDEMIOLOGICAL AND TOXICOLOGICAL KNOWLEDGE
- CAN IT ?—GENERAL CAUSATION
- DID IT ? —SPECIFIC CAUSATION

CAUSATION ASSESSMENT

- *DID THE EXPOSURE CAUSE THE ASTHMA?*
 - THE DIAGNOSIS IS ASTHMA
 - CAUSATION IS A SEPARATE EXERCISE
- *DID THE EXPOSURE CAUSE THE...*
 - HEPATIC DISORDER
 - NEUROLOGICAL—CENTRAL OR PERIPHERAL—DISORDER
 - MALIGNANCY
 - APLASTIC ANEMIA
 - RESTRICTIVE LUNG DISEASE

GENERAL CAUSATION

- MUST **KNOW** THAT AGENT **CAN** CAUSE THE DISORDER
- IS A CAUSAL RELATIONSHIP SCIENTIFICALLY ESTABLISHED?
- GENERAL CAUSATION PRECEDES SPECIFIC CAUSATION
 - EPIDEMIOLOGY THE KEY EVIDENCE

SPECIFIC CAUSATION

- MUST KNOW THAT A PERSON WAS EXPOSED
- MUST KNOW THAT THE DOSE WAS SUFFICIENT
- CAN OCCASIONALLY (BUT RARELY) USE SYMPTOMS TO ASSERT DOSAGE

THE DOSE MAKES THE POISON



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**EXAMPLES OF GENERAL
CAUSATION KNOWLEDGE**

- CIGARETTE SMOKING CAN CAUSE LUNG CANCER
- ISOCYANATES CAN CAUSE ASTHMA
- LEAD POISONING CAN CAUSE BRAIN DYSFUNCTION
- N-HEXANE CAN CAUSE PERIPHERAL NEUROPATHY
- BENZENE CAN CAUSE APLASTIC ANEMIA

**SUPPORTABLE CAUSATION REASONING:
GENERAL AND SPECIFIC BOTH MET**

- HEAVY CIGARETTE SMOKER WITH LUNG CANCER
- ASTHMATIC WITH ISOCYANATE EXPOSURE
- SIGNIFICANTLY LEAD POISONED CHILD WITH BRAIN DYSFUNCTION
- N-HEXANE USER, SUFFICIENTLY EXPOSED, WITH PERIPHERAL NEUROPATHY

SPECIFIC CAUSATION

- TEMPORAL ELIGIBILITY
- SUFFICIENT DOSAGE
- RULE OUT ALTERNATE CAUSES
- CORRECT CLINICAL COURSE
- CORRECT LATENT PERIOD
- CORRECT MORPHOLOGY

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**UNSUPPORTABLE OR
UNSUPPORTED REASONING**

- GENERAL OR SPECIFIC CAUSATION DEFICIENT
 - BREAST IMPLANTS AND COLLAGEN-VASCULAR DISEASE (NEGATIVE EPIDEMIOLOGY)
 - "SICK BUILDINGS"
 - PATIENT FEELS SICK AT WORK, THEREFORE, BAD AIR
 - PRINTER AND CIRRHOSIS OF LIVER
 - WORKED WITH HEPATOTOXIC CHEMICALS
- (MUST R/O OTHER CAUSES, ETOH, VIRAL, PSYCHODYNAMIC, ETC.)

SYMPTOMS AND EXPOSURE

- WHY THEY ALONE OFTEN DO NOT = CAUSATION
 - REPORTER BIAS
 - OBSERVER BIAS
 - ATTRIBUTION BIAS
 - ALTERNATE EXPLANATIONS--NON-SPECIFICITY

SYMPTOMS AND EXPOSURE

- COMMON EPISODES OF ERRONEOUS CAUSAL ATTRIBUTIONS
 - SICK BUILDINGS
 - WASTE SITE EXPOSURES
 - EXPOSURES FOLLOWING RELEASES OR FIRES
- "CAUSAL" EVIDENCE WHICH CAN MISLEAD
 - QUESTIONNAIRES
 - PROBLEMATIC EPIDEMIOLOGY

MEASURES OF EXPOSURE

- MEASUREMENTS
- MODELING: IH, GROUNDWATER, AIR DISPERSION
- EXTRAPOLATIONS FROM OTHER STUDIES
- BIOLOGICAL MONITORING
- OCCASIONALLY, BUT RARELY, SYMPTOMS

DISEASES AND EXPOSURE

- ONLY RARELY CAN A DISEASE PROVE EXPOSURE
 - ACUTE TOXIC EVENTS
 - HIGHLY SPECIFIC DISEASE ENDPOINTS

DISEASES AND EXPOSURE

- MOST DISEASES DO NOT ESTABLISH EXPOSURE
 - MANY WITH UNKNOWN (IDIOPATHIC) CAUSES, i.e., MALIGNANCIES
 - NON-SPECIFIC CAUSALLY

**CAUSATION REQUIREMENTS
IN MEDICINE AND THE LAW**

- DIFFERENTIAL DIAGNOSIS
- CAUSATION ASSESSMENT

PSYCHODYNAMIC vs. *TOXICODYNAMIC*:
A COMMON AND IMPORTANT CAUSATION
ACTIVITY IN EXPOSURE-RELATED ISSUES
SUCH AS

NON SPECIFIC SYMPTOMS ASSOCIATED WITH
CHEMICALS:

- MCS/EIE
- "INDOOR AIR"— "SICK BUILDINGS"
- MOLD
- CORROSIVE DRYWALL

COMMON TRIGGERS

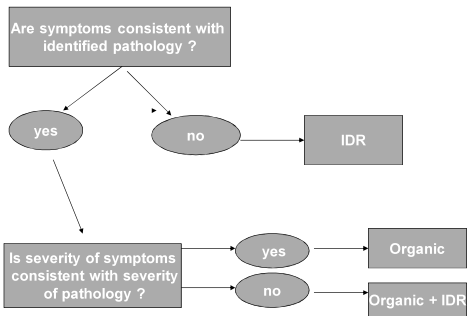
- ODORS
- PERCEPTION OF HAZARDS (I.E.
MOLD AND ODORS)
- INTERACTION WITH COLLEAGUES
- IATROGENICITY—NOCEBO EFFECT

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**DISORDERS WHICH ARE
PRIMARILY PSYCHODYNAMIC**

- MULTIPLE CHEMICAL SENSITIVITY
- DYSPHONIA
- BUILDING-ASSOCIATED SYMPTOMS
- "TOXIC MOLD" DISORDERS

**CLASSIFYING SYMPTOMS:
INDIVIDUALLY DETERMINED RESPONSE
(IDR) OR ORGANIC OR BOTH**



**IMPORTANCE OF DISTINGUISHING
PSYCHODYNAMIC from
TOXICODYNAMIC**

- AFFECTS TREATMENT
 - BEHAVIORAL, COGNITIVE AND PSYCHOPHARMACOLOGICAL
 - VERSUS AVOIDANCE AND ISOLATION
- AFFECTS LIABILITY AND LEGAL RESPONSES
 - IN TORT CLAIMS PARTICULARLY
 - MAY NOT AFFECT COMPENSABILITY UNDER WORKERS' COMPENSATION, DEPENDING UPON THE STATE
 - POSSIBLY, ACCOMMODATIONS UNDER ADA
