

## Occupational and Environmental Health



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### My goals for this lecture:

- Understand the relevance of exposure in the workplace and elsewhere to your patient's health problems.
- Be able to take a good occupational history.
- Recognize the contribution you can make as a health care worker towards your health and safety at work and that of others.

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How do occupation and environment affect health?

**EXPOSURE  
TO  
HAZARDS**

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## Hazards which cause illness or injury:

- Physical
  - Non-ionizing radiation (microwaves, infra red, visible and UV light)
  - Ionizing radiation (X-rays, gamma rays, beta particles, alpha particles)
  - Noise and vibration
  - Temperature, humidity, etc.
  - Ergonomic: Posture, movement (keyboard operation), load bearing (patient handling)
- Chemical
  - Inorganic (lead, arsenic, silica)
  - Organic (solvents, resins, glues, vapors, gases)
- Biological
  - Allergens of biological origin
  - Infections (bacteria, viruses and fungi)
- Psychological

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## Occupational/Environmental Causes of Medical Problems

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Rescue workers remove a man from the World Trade Center shortly after the terrorist attack on Sept. 11, 2001.

Reuters file photo/Shannon Stapleton

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Agricultural Workers are exposed to pesticides, extremes of weather and heavy physical workload.

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Depending on the welding process, potential hazards include exposure to metal fumes, nitrogen dioxide, carbon monoxide, noise, infrared and ultraviolet radiation, ozone, burns and explosions.

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A magnified view of fiberglass insulation fibers which are potential respiratory irritants.

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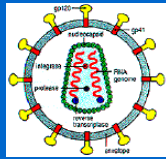
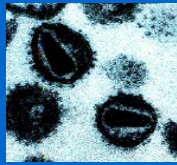
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Human Immunodeficiency Virus

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## Examples of environmental causes of medical problems

### Immediate or short-term effects

Dermatoses (allergic or irritant)

Headache

Acute psychoses

Asthma or dry cough

Pulmonary edema, pneumonitis

Angina

Abdominal pain

Hepatitis (may become a long-term effect)

### Agent

Metals (chromium, nickel), fibrous glass, epoxy resins, cutting oils, solvents, caustic alkali, soaps  
Carbon monoxide, solvents

Lead (especially organic), mercury, carbon disulfide  
Formaldehyde, toluene diisocyanate, animal dander  
Nitrogen oxides, phosgene, halogen gases, cadmium  
Carbon monoxide

Lead

Halogenated hydrocarbons (carbon tetrachloride), virus

### Potential Exposures

Electroplating, metal cleaning, plastics, machining, leather tanning, housekeeping

Firefighting, automobile exhaust, foundry, wood finishing, dry cleaning  
Seed handling, fungicide, wood preserving, viscose rayon industry  
Textiles, plastics, polyurethane kits, lacquer use, animal handler

Metal cleaning, solvents use, refrigerator maintenance  
Car repair, traffic exhaust, foundry, wood finishing  
Battery making, enameling, smelting, painting, welding, ceramics, plumbing

Solvent use, lacquer use, hospital workers

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## Examples of environmental causes of medical problems (cont'd)

### Latent or long-term effects

Chronic dyspnea  
Pulmonary fibrosis

Chronic bronchitis, emphysema  
Lung cancer

Bladder cancer

Peripheral neuropathy

Behavioral changes

Extrapyramidal syndrome

Aplastic anemia, leukemia

### Agent

Asbestos, silica, beryllium, coal, aluminum

Cotton dust, cadmium, coal dust, organic solvents, cigarettes  
Asbestos, arsenic, uranium, coke oven emissions

$\alpha$ -Naphthylamine, benzidine dyes

Lead, arsenic, *n*-hexane, methyl butylketone, acrylamide

Lead, carbon disulfide, solvents, mercury, manganese

Carbon disulfide, manganese

Benzene, ionizing radiation

### Potential Exposures

Mining, insulation, pipefitting, sandblasting, quarrying, metal alloy work, aircraft or electrical parts

Textile industry, battery production, soldering, mining, solvent use  
Insulation, pipefitting, smelting, coke ovens, shipyard workers, nickel refining, uranium mining

Dye industry, leather, rubber-working chemists  
Battery production, plumbing, smelting, painting, shoemaking, solvent use, insecticides

Battery makers, smelting, viscose rayon industry, mfg/repair of scientific instruments, dental amalgam workers  
Viscose rayon industry, steel production, battery production, foundry  
Chemists, furniture refinishing, cleaning, degreasing, radiation workers

Source: From R. H. Goldman and J. M. Peters. The occupational and environmental health history. J.A.M.A. 246:2831, 1981.

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## Examples of common dangerous household products

### Product

Disinfectants  
 Cleaning agents and solvents  
 Bleaches  
 Window cleaner  
 Carpet cleaner  
 Oven and drain cleaners  
 Dry cleaning fluids, spot removers  
 Paint and varnish solvents  
 Pesticides  
 Emissions from heating or cooling devices  
 Gas stove pilot light  
 Indoor use of charcoal grill  
 Leaks from refrigerator or air conditioner cooling systems  
 Microwave ovens  
 Sun lamps

### Potentially hazardous agents

Cresol; phenol; hexachlorophene  
 Sodium hypochlorite (Clorox)  
 Ammonia  
 Ammonia, turpentine, naphthalene: 1,1,1-trichloroethane  
 Potassium hydroxide, sodium hydroxide  
 1,1,1-trichloroethane, perchloroethylene, petroleum distillates  
 Turpentine, xylene, toluene, methanol, methylene chloride, acetone  
 Malathion, dichlorvos, carbaryl, methoxychlor  
 Nitrogen oxides  
 Carbon monoxide  
 Freon  
 Microwave radiation  
 Ultraviolet radiation

Source: From R. H. Goldman and J. M. Peters. The occupational and environmental health history. J.A.M.A. 246:2031, 1981.

## Examples of hazards in hobbies

### Activity

Painting  
 Ceramics  
 Raw materials  
 Firing  
 Gas-fired kilns  
 Sculpture and casting  
 Grinding silica-containing stone  
 Serpentine rock with asbestos  
 Woodworking  
 Metal casting  
 Welding  
 Plastics  
 Woodworking  
 Photography  
 Developer  
 Stop bath  
 Stop hardener  
 Fixer  
 Hardeners and stabilizers

### Potential Hazard

Toxic pigments, e.g. arsenic (emerald green), cadmium, chromium, lead, mercury, acrylic emulsions, solvents  
 Cadmium  
 Colors and glazes containing barium carbonate, lead, chromium, uranium, cadmium  
 Fumes of fluoride, chlorine, sulfur dioxide  
 Carbon monoxide  
 Silica (silicon dioxide)  
 Asbestos  
 Wood dust  
 Metal fume, sand (silica) from molding, binders of phenol formaldehyde or urea formaldehyde  
 Metal fume, ultraviolet light exposure, welding fumes, carbon dioxide, carbon monoxide, nitrogen dioxide, ozone or phosgene (if solvents nearby)  
 Monomers released during heating (polyvinyl chloride), methyl methacrylate, acrylic glass, polyurethane (toluene 2,4-diisocyanate), polystyrene (methyl chloride release), fiber glass, polyester or epoxy resin  
 Solvents, especially methylene chloride  
 Hydroquinone, metal  
 Weak acetic acid  
 Potassium chrome alum (chromium)  
 Sodium sulfite, acetic acid, sulfuric acid  
 Formaldehyde

Source: From R. H. Goldman and J. M. Peters. The occupational and environmental health history. J.A.M.A. 246:2031, 1981.

## Examples of Occupational Diseases



Herpetic Whitlow

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Irritant Contact Dermatitis

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## Unnecessary disease in health care workers

ICD-9	Condition	Occupation	Agent
011	Pulmonary tuberculosis	Physicians, medical personnel, medical lab workers	<i>Mycobacterium tuberculosis</i>
054.6	Herpetic whitlow	Surgical residents, student nurses, nurses, dental assistants, physicians, orthopedic scrub nurses, psychiatric nurses	Herpes simplex virus
042	Human immunodeficiency virus	Health care workers	Human immunodeficiency virus
056	Rubella	Medical personnel, intensive care personnel	Rubella virus
070.0	Hepatitis A	Medical personnel	Hepatitis A virus
070.2	Hepatitis B	Nurses and aides, anesthesiologists, medical lab personnel, general dentists, oral surgeons, physicians	Hepatitis B virus
070.4	Hepatitis C	Nurses and aides, anesthesiologists, medical lab personnel, general dentists, oral surgeons, physicians	Hepatitis C virus
082.9	Rocky Mountain spotted fever	Physicians	<i>Rickettsia rickettsii</i>
204.0	Lymphoid Leukemia, acute	Radiologists	Ionizing radiation

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## Unnecessary disease in health care workers (cont'd)

ICD-9	Condition	Occupation	Agent
205.0	Myeloid leukemia, acute	Radiologists	Ionizing radiation
284.8	Aplastic anemia	Radiologists	Ionizing radiation
354.2	Mononeuritis	Dental technicians	Methyl methacrylate monomer
357.7	Inflammatory and toxic neuropathy	Dentists	Inorganic mercury
366.4	Cataract	Radiologists	Ionizing radiation
493.0	Extrinsic asthma	Hospital and geriatric department nurses	Psyllium dust
584.585	Acute or chronic renal failure	Dentists	Inorganic mercury

Source: From R. H. Goldman and J. M. Peters. The occupational and environmental health history. J.A.M.A. 246:2831, 1981.

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## What is the magnitude of the problem?

- An individual who works for forty years with two weeks of vacation annually will log 80,000 hours at work!!
- The only activity most people spend more time on than work is sleep.
- The BLS reports that 6.1 million work-related injuries and illnesses were reported in 1997.
- Of these, 430,000 were newly reported cases of occupational illness.
- Occupational factors implicated in >10% of cases presenting with a respiratory or musculoskeletal primary complaint.

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## How is the management of occupational injury/illness different?

- Workers' Compensation
- OSHA
- ADA
- FMLA

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Why is recognition of occupational/environmental disease important?

- Treatment
- Removal from exposure
- Prevention
- Compensation

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Why is occupational/environmental disease underreported?

- Insufficient physician education
- Lack of uniqueness
- Long latency

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BUT.....

- Lack of knowledge may cause some physicians -- like much of the public -- to presume that the vast majority of illnesses are caused by occupational exposure to toxic chemicals.

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What is the key to enhanced recognition of occupational disease?

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## The Occupational History

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## The Quick Survey (Everyone)

- What kind of work do you do?
- Do you think your health problems are related to your work?
- Are your symptoms better or worse when you're at home or at work?
- Are you now or have you previously been exposed to dusts, fumes, chemicals, radiation or loud noise?

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## Detailed Questioning

- If answers to the quick survey questions raise your suspicions that the patient's condition is related to an environmental or work exposure

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## Chronology of jobs

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## Exposure survey

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## Detailed description of current job activities and exposures

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## Review of job chronology and associated exposures

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## Clinical clues

- Job title or type of industry
- Description of work tasks
- Major employment opportunities in the region
- Most common toxic exposures in local industries
- coworkers who are sick
- past exposure to long-latency agents
- Pattern of disease onset
- Pattern of aggravation of symptoms
- Unusual combination of multiorgan sx's and signs
- Unusual distribution of disease within an organ
- Susceptible organ systems
- Demographically "wrong" patient
- "Usual suspects" are innocent
- Hesitate to call disease idiopathic
- Disease fails to respond to conventional medical therapy

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⋮  
Exploration of the temporal link  
in detail

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⋮  
“Do others at work have the same  
problems?”

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What next?

- Evaluate the worksite
- Take environmental measurements
- Search the literature
- Obtain additional information
- Consultation

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Understand the relevance of exposure in the workplace and elsewhere to the patient's health problems.

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**Be able to take a good occupational history.**

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Recognize the contribution you can make as a health care worker towards your health and safety at work and that of others.

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