American Osteopathic College of Occupational and Preventive Medicine

Basic Course in Occupational & Environmental Medicine, Part III

P. Lance Walker, DO, MPH and Heather Gjorgjievski, DO
Program Co-Chairs

Sunday, October 30, 2011, Orlando Orange County Convention Center Room W-224-G

Basic Course Lecture Handouts

A. 7:15 a.m. Overview of the Basic Course in Occupational and Environmental Medicine and pretest
Lance Walker, DO, MPH
B. 7:45 a.m. Occupational Cardiovascular Disorders
Liz Clark, DO, MPH&TM, FAOCOPM
C. 8:45 a.m. Occupational Cancer Risk, *Julianne Cyr, MPH*
D. 9:45 a.m. Occupational Psychiatry, *Mimms Mabee, DO, MPH, FAOCOPM*
E. 10:45 a.m. Reproductive Issues in the Workplace, *Michael MacDonald, DO, MBA, MPH, FAOCOPM*
F. 11:45 a.m. Disability/Impairment Evaluation, *Richard Vatt, DO, MPH, FAOCOPM*
G. 12:45 p.m. Substance Abuse and Testing, *Charles Werntz, DO, MPH, FAOCOPM*
H. 1:45· p.m. Occupational Pulmonary Disorders, *Lance Walker, DO, MPH*
I. 2:45 p.m. Noise-Induced Hearing Loss, *Lance Walker, DO, MPH*
3:45 pm Post test
4:15 pm Adjournment

Greivance Procedure
Please let Jeffrey LeBoeuf, CAE or one of the AOCOPM Officers know immediately if you have any problems with facilities, hand-outs, program content, or any other issue with this conference. Concerns about the CME program's compliance with the AOA "Uniform Guidelines" may be expressed to the accredited sponsor—American Osteopathic College of Occupational and Preventive Medicine (AOCOPM) during the conference or after by calling AOCOPM at (800) 558-8686. Copies of these guidelines are available upon request. Unresolved issues regarding compliance with the AOA "Uniform Guidelines" can be brought to the attention of the AOA Division of CME, (800) 621-1773 x 8053 or (312) 202-8053 or via mail at 142 East Ontario Street; Chicago, IL 60611-2864.

Elizabeth Clark, DO, MPH&TM, FAOCOPM

Dr. Elizabeth Clark recently retired from the USAF where she was COL, MC, CFS, and Chief, International Education &Training Division. She is currently employed in New Braunfels, TX in a weight loss and cosmetic clinic. She is currently working on her certification in Acupuncture.

Dr. Clark earned her medical degree at the University of Health Sciences, Kansas City followed by the MPH & TM from Tulane's School of Public Health and Tropical Medicine. She completed Flexible Internship at Orlando General Hospital and her residency in Aerospace and Preventive Medicine through the USAFSAM program.

Dr. Clark is board certified by AOBPM in Aerospace Medicine, Occupational Medicine, and Preventive Medicine, by AOBFP, and holds a Certificate of Additional Knowledge in Tropical and Travel Medicine. She is a fellow of the college.

Julianne M. Cyr, MPH, CPH

Ms. Cyr received her Master of Public Health degree from Saint Louis University with dual concentrations in Epidemiology and Behavioral Science & Health Education. Her Bachelors degrees in Psychology and Religious Studies with a minor in Biology were received from North Carolina Wesleyan College.

Prior to and during school, Ms. Cyr has worked for the U.S. Food and Drug Administration in a laboratory specializing in anthrax research in immunology. Working at the Center for Tobacco Policy, her research has focused on cancer services organizations, evaluation of tobacco prevention and cessation programs, secondhand smoke in the workplace, and point of sale practices. She also serves as a Teaching Assistant to graduate level biostatistics students studying Applied Linear Modeling and an Instructor to students and faculty learning SPSS (Statistical Package for the Social Sciences).

Heather Gjorgjievski, DO

Dr. Heather Gjorgjievski practices occupational medicine at Concentra Medical Centers in St. Louis, Missouri. She is a graduate of the Arizona College of Osteopathic Medicine and completed her rotating internship and family medicine residency at Mesa Family Medical Center in Mesa, Arizona. She is Board Certified by the American Osteopathic Board of Family Practice. Dr. Gjorgjievski has completed the basic course in occupational and environmental medicine.

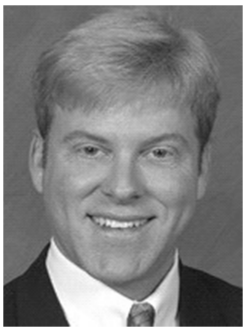
Mimms Mabee, MA, DO, MPH, FAOCOPM

COL Mimms Mabee has practiced many years in private industry while serving in the US Army Reserves before joining the Active Duty forces in 2005 where she currently serves as the Chief, Preventive Medicine at Fort Bliss, Texas.

Having lived in a war zone on two separate occasions for 9 and 10 months, she is no stranger to stress and psychiatric illness in the work place

COL Mabee has a Master's degree in Psychology from California State University, Los Angeles, an M.P.H from the Medical College of Wisconsin and her D.O. degree from Kirksville College of Osteopathic Medicine.

Michael J. MacDonald, DO, MPH, MBA, FAOCOPM



Dr. Michael MacDonald is the Co-Medical Director of Health First Occupational Medicine in Melbourne, Florida. He also serves as the Administrative Medical Director for Health First Corporate Partners, a State of Florida Certified Workers' Compensation Managed Care Arrangement, consisting of a multi-specialty group of providers dedicated to the evaluation and treatment of work related injuries and illnesses.

He received his Doctor of Osteopathic Medicine Degree from The Southeastern University of the Health Sciences ~ College of Osteopathic Medicine in Davie, Florida. He served an Internship in Family Practice at the Naval Hospital Jacksonville, Florida followed by Aerospace Medicine / Flight Surgeon Training at the Naval Aerospace Medicine Institute in Pensacola, Florida. After serving a tour as the Senior Medical Officer and Head, Department of Aerospace Medicine, at the Naval Hospital Branch Clinic, Naval Air Station, South Weymouth, MA, Dr. MacDonald then entered the Occupational and Environmental Medicine Residency Program at The Harvard University, Boston, Massachusetts. He has been awarded a Master of Public Health Degree from The Harvard University School of Public Health in Occupational and Environmental Health, and Health Care Management as well as a Master of Business Administration Degree in Health Care Administration from The Florida Institute of Technology, Melbourne, Florida.

Dr. MacDonald is Board Certified in Occupational Medicine by the American Board of Preventive Medicine; Occupational and Environmental Medicine, and Aerospace Medicine, by the American Osteopathic Board of Preventive Medicine; Health Care Quality and Management by the American Board of Quality Assurance and Utilization Review Physicians; Forensic Medicine by the American Board of Forensic Medicine; Managed Care Medicine by the American Board of Managed Care Medicine; Pain Management by the American Academy of Pain Management; Healthcare Management by the American College of Healthcare Executives; and Medical Management by the American College of Physician Executives. In addition, he is Certified as an Independent Medical Examiner by the American Board of Independent Medical Examiners; a Certified Medical Review Officer by the Medical Review Officer Certification Council; and a Certified Senior Aviation Medical Examiner by the Federal Aviation Administration.

Dr. MacDonald is a Fellow of the American College of Occupational and Environmental Medicine; a Fellow of the American Osteopathic College of Occupational and Preventive Medicine; a Fellow of the American College of Preventive Medicine; a Fellow of The American College of Healthcare Executives; a Fellow of The American College of Forensic Examiners; and a Fellow of the American Institute for Healthcare Quality.

Dr. MacDonald is Past-President of the Florida Association of Occupational and Environmental Medicine and in addition, presently holds the Rank of Captain in the United States Navy Reserve.

Richard Vatt, DO, MPH, FAOCOPM

Richard D. Vatt, DO, MPH is a Medical Director for CIGNA Disability Management Solutions. Dr. Vatt is a 1987 graduate of the Chicago College of Osteopathic Medicine. He earned a Masters in Public Health degree from the University of Texas Health Science Center of Houston, Texas and completed Residency training at the United States Air Force School of Aerospace Medicine at Brooks Air Force Base in San Antonio, Texas. He is Board Certified in both Aerospace Medicine and Occupational Medicine.

Dr.Vatt's medical experience includes almost twelve years in disability and workers compensation insurance, military service in the United States Air Force and Air National Guard, and clinical practice in community clinic/hospital programs and occupational medicine for a Fortune 500 company.

P. Lance Walker, DO, MPH

Dr. Walker is currently a partner in SiteMed North America, LLC, which provides on-site occupational medical services to industry. He is the Associate Medical Director of Georgia Power Corporation. He is also a partner in PointMed Inc. which provides MRO and IME services.

Dr. Walker completed undergraduate training in Biology at William Jewell College in Liberty, Missouri. He received a Doctorate Degree in Osteopathic Medicine from the Oklahoma State University College of Osteopathic Medicine. His residency was completed in Family Medicine at Floyd Medical Center in Rome, Georgia where he served as Chief Resident.

After residency he entered private practice in North Carolina where he co-founded and managed three successful practices in the Raleigh-Durham area. He received a Masters Degree in Public Health from the University of North Carolina in 2005. Dr. Walker has been practicing in the Atlanta area since 2006. He is board certified in Family and Osteopathic Medicine. He is an Aviation Medical Examiner, a Certified Medical Review Officer and holds a Certificate in Added Qualifications in Occupational Medicine.

Charles Livingston Werntz, III, DO, MPH, FACOEM

Dr. Carl Werntz currently serves as An Associate Professor of West Virginia University and is the Program Director of the Osteopathic Occupational Medicine Residency program in Morgantown West Virginia. Dr. Werntz is a 1996 graduate of the Kirksville College of Osteopathic Medicine and received his Master's of Public Health from West Virginia University in 2002. He completed his Residency in Occupational Medicine at the West Virginia University in 2002. Dr. Werntz has provided numerous professional lectures throughout his career. He is a fellow of the American College of Occupational and Environmental Medicine.

Learning Objectives

A. Overview

At the end of the presentation the attendee will:

- Know members of the College, know about the CAQ and the Board of Preventive Medicine
- Understand the outline of the Basic Course in Occupational and Preventive Medicine
- Learn about Occupational Medicine as a Career
- Have taken a pre and post test over the material covered in the presentations

B. Occupational Cardiovascular Disorders

At the end of the presentation the attendee will be able to:

- Define key terms, phrases and exposures relevant to occupational induced Cardiovascular disorders
- Discuss the health impact and the major causes of morbidity and mortality due to Cardiovascular occupational diseases
- Describe the features of Cardiovascular diseases: burden of illness, risk factors/etiology, prevention strategies
- Discuss the key components of an occupation evaluation and demonstrate the ability to utilize screening, diagnostic and monitoring modalities

C. Occupational Cancer Risk

At the end of the presentation the attendee will be able to:

- Calculate risk difference, population attributable risk, risk ratio, and odds ratio.
- Explain each of the above epidemiological measures.
- Define criteria for causal links between exposure and disease.
- Identify occupational exposures for specific cancers.
- Explain why not all individuals exposed to occupational carcinogens develop cancer.

D. Psychiatric Aspects of Occupational Medicine

At the end of the presentation the attendee will be able to:

- Relate the biopsychosocial model of psychiatric disease to occupational medicine.
- Discuss the epidemiological implications of the work environment, industrial organization, and cultural relationships.
- Examine the spectrum of occupational psychiatric disease
- Identify areas of controversy in occupational psychiatric disorders
- Offer relevant management/treatment strategies

E. Reproductive Issues in the Workplace

At the end of the presentation the attendee will be able to:

- To cite some important court decisions regarding reproductive health issues in the workplace
- Describe the difference between reproductive hazards and teratogens
- Describe background rates of infertility and sub-fertility, miscarriage and stillbirths, birth defects, low birth weight and premature birth, developmental disorders, and childhood cancers
- List some suspected reproductive hazards and the suspected consequences of their exposures
- Detail some prevention strategies to minimize exposure to workplace reproductive hazards

F. Disability/Impairment Evaluations

At the end of the presentation the attendee will be able to:

- Compare and contrast three types of disability or income replacement programs
- Review the Physician's role in the disability process
- Effectively participate in the three different programs
- Appropriately utilize Independent Medical Examiner (IME)
- Recognize the characteristics of a good IME

G. Substance Abuse and Testing

At the end of the presentation the attendee will be able to:

- Define vocabulary words common in drug testing
- Distinguish between regulated vs non-regulated tests and discuss the issues surrounding each
- Know the reasons for testing (Donor Selection)
- Understand and design an appropriate Collection Process
- Critically appraise a lab analysis
- Understand lab outcomes and MRO outcomes and findings

H. Occupational Pulmonary Disorders

At the end of the presentation the attendee will be able to:

- Define key terms, phrases and exposures relevant to Occupational induced Pulmonary disorders
- Discuss the health impact and the major causes of morbidity and mortality due to Cardiopulmonary Occupational diseases
- Describe the features of Cardiopulmonary diseases: burden of illness, risk factors/etiology, prevention strategies
- Discuss the key components of an occupation evaluation and demonstrate the ability to utilize screening, diagnostic and monitoring modalities

I. Noise Induced Hearing Loss

At the end of the presentation the attendee will be able to:

- Discuss the costs of hearing loss
- Describe the basics of hearing
- Identify the Types of hearing loss
- Understand the essentials of a good hearing conservation program
    - Noise Monitoring
    - Periodic Audiometric evaluation
    - Engineering Controls
    - Worker Education
    - Selection of appropriate HPDs
    - Administrative Controls

Ionizing and Non-Ionizing Radiation

At the end of independent study, the physician will be able to:

- Apply epidemiological principles in the approach to assessing exposures to radiation.
- Understand the concepts & definitions of various types of ionizing radiation (IR) and non-ionizing radiation (NIR) and distinguish the differences between the various types of exposure.
- Diagnose the biologic effects of IR in man.
- Diagnose the biologic effects of NIR in man.
- Utilize therapeutics strategies for radiation exposures

American Osteopathic College of Occupational and Preventive Medicine
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Products and Publications

	Price	Quantity	Total
AOCOPM Basic Coarse Review CD and Resource List	**$45**		
Preventive Medicine Board Essentials (2nd Edition) Study Guide and CD by Les R. Folio, DO, MPH	**$30**		
Occupational Medicine Board Essentials (2nd Edition) Study Guide and CD by Les R. Folio, DO, MPH	**$30**		
Aerospace Medicine Board Essentials (2nd Edition) and CD Study Guide and CD by Les R. Folio, DO, MPH	**$30**		
Fundamentals of Aerospace Medicine (4th Edition) by Jeffrey R. Davis, Robert Johnson, Jan Stepanek and Jennifer A. Fogarty	~~**$189**~~ **$159**		
Healthcare Solved, by Debra Smith	**$10**		
Beyond Nam Dong, by Donlon (signed copies)	**$32**		
		Total:	

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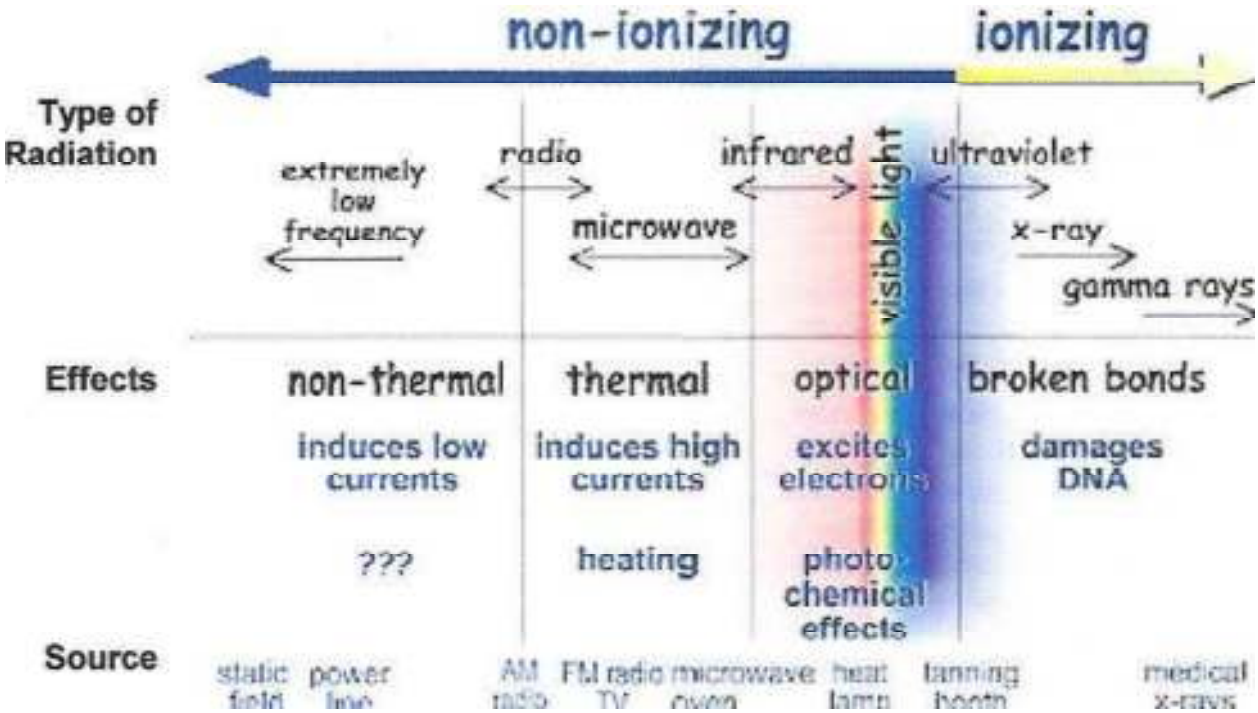
Ionizing and Non-Ionizing Radiation Study Guide

Radiation- Energy emitted from a body or source that is transmitted through an intervening medium or space and absorbed by another body. Transmission is in the form of waves but wave/particle duality under quantum physics.

Radiation is classified as being either **non-ionizing** or **ionizing**. Non-ionizing radiation is longer wavelength/lower frequency lower energy. While ionizing radiation is short wavelength/high frequency higher energy.

Ionizing Radiation has sufficient energy to produce ions in matter at the molecular level. If that matter is a human significant damage can result including damage to DNA and denaturation of proteins. This is not to say that **non-ionizing radiation** can't cause injury to humans but the injury is generally limited to thermal damage i.e. burns.



There is a great deal of information on the above chart. One of the most interesting things is that the visible spectrum is essentially the divide between ionizing and non-ionizing radiation. This makes sense clinically when we think of UV radiation causing skin cancer.

Types of Non-Ionizing Radiation and Their Clinical Effects-

Referring again to the chart above we can see that Non-Ionizing radiation comes in the forms of:

1. ELF (extremely low frequency)
2. Radio Frequencies
3. Microwave Frequencies
4. Lasers
5. Infrared
6. Visible Spectrum
7. Ultraviolet

This list is in order of lowest to highest frequency.

1. ELF

Power plant or line workers

Inconclusive evidence of leukemia link

2. 3. Radiofrequency and Microwave Frequency Exposures-

Occupational Exposures-

Radar and communications equipment, industrial and commercial ovens

Other Exposures

Cell Phones

Clinical Effects-

There is a great deal of controversy regarding potential cancer risks, particularly with cell phone use. We know that exposure to radio and microwave frequency sources can cause burns and clinically this is what you are most likely to see.

4. LASER (Light Amplification by Stimulated Emission of Radiation)

Beams of coherent light with single wavelength and frequency

May be in the IR, Visible or UV spectrum

Eye is most sensitive to injury from LASER

Four classes by risk of injury:

1. No damage
2. Low chance for damage due to blink
3. A)Cause injury with direct exposure
   B)Cause injury even when reflected
4. Requires controls to prevent injury

5. Infrared

Penetrates superficial layers of the skin, causes thermal injury, potential for damage to the cornea, iris, lens of the eye

Welding, glassmaking, heating and dehydrating processes

6. Visible Spectrum

400 to 750nm wavelengths

ROYGBIV (Red, Orange, Yellow, Green, Blue, Indigo, Violet)

Possibility of retinal injury from 400-500 nm blue frequencies

8. Ultraviolet Radiation

200nm to 400 nm

Bridge between Non-Ionizing and Ionizing Radiation

Three regions

UV-A 315nm-400nm

UV-B 280nm-315nm

UV-C ‹280nm

A and B bands produce biologic effects on the skin and the eyes. Photokeratitis, conjunctivitis, sunburn, photosensitization reactions, skin cancers

Majority of exposures are to outdoor workers, other exposures include welders, people who work in drying and curing industries and laboratory, kitchen or medical industries exposed to germicidal ultraviolet

Types of Ionizing Radiation and Their Clinical Effects-

Ionizing radiation is emitted from radioactive atomic structures as high energy electromagnetic waves (gamma and x-rays) or as actual particles (alpha, beta, neutrons)

1. Gamma Rays
2. X-Rays
3. Alpha Particles
4. Beta Particles
5. Neutrons

Penetration of Radiation

Gamma Rays, Xrays and Neutrons Penetrate Body Easily, Need lead to shield for gamma and x-rays, massive shielding for Neutrons

Alpha and Beta Particles are essentially blocked by the skin with Beta Particles penetrating more deeply with the potential to cause burns. Alpha particles can be stopped by paper, Beta by plastic

Alpha Particles can cause significant damage if taken internally, see former Soviet Spy

Radiation Measurement

Roentgen (R)- Describes a radiation field in terms of the amount of ionizations produced in air, not in common use today

Rad- Conventional unit of absorbed dose of radiation per unit mass.

Gray (Gy) – 1 Gray=100 Rads

Rem- Absorption measure to whole body or specified organ, takes into account radiation quality, Rem=rads x quality factor, each type of ionizing radiation has a different quality factor

Sievert (Sv)- 1SV=100 Rem

Ionizing Radiation Exposure Limits

Occupational- National Council on Radiation Protection (NCRP) annual exposure 5 rem

Background Exposure for a US resident is 360mrem

Common Occupational Exposures-

- Medicine- Radionuclides, X-Ray
- Nuclear Power Industry

- Document Dating
- Food Preservation
- Airplane/Space Flight
- Transportation of Radioactive Material

Four Ionizing Radiation Exposure Categories-

1. Radioactive Contaminates on Intact Skin
2. Local Radiation Injuries
3. Whole Body Exposure
4. Internal Deposition

Acute Radiation Syndrome

Over 100 rad in a single exposure or within 24-48 hours, progressive predictable series of signs and symptoms developing over a period ranging between a few hours to several weeks

Clinical response and prognosis generally depends on damage sustained by hematopoietic system.

Lethal dose for 50% of healthy humans is 350 to 450 rad (3.5 to 4.5 Gy)

Prodromal Period- 1 to 6 hours after exposure

Anorexia, Nausea, Vomiting, Diarrhea

Initial Symptoms subside after a few hours to two days

Ominous signs include diarrhea, skin erythema, lymphocyte count less than 1000, short or no latent period

Latent Period- Variable in duration hours to 30 days

Manifest Illness

Fatigue, GI symptoms, desquamation, deep ulcerations, bone marrow depression, Stomatitis, hemorrhagic phenomena

Death or Recovery

CBC normalizes in six months to a few years, Clinical recovery within 6 months, persistent fatigue

Long Term Effects

- Chronic Radiodermatitis
- Cataracts
- Sterility
- Prenatal Effects
- Cancer
- Genetic Effects
- Shortened Life Span

Management of Radiation Exposures

1. Radioactive Contaminates on Intact Skin- Wash skin, do not break skin
2. Local Radiation Injuries- Estimate whole body exposure, wound care, nutritional support, analgesics, infection control, consultation
3. Whole Body Exposure
    - 100 rem or less-
        - Complete history for record
        - Advise regarding potential late effects (cancers)
        - Follow as outpatient, counseling
    - 100 rem to 200 rem
        - Complete exposure history radiation source and strength
        - Consider Lab testing CBC with diff
    - 200 rem to 300 rem
        - Hospitalize
    - 300 rem or more
        - Transfer to Tertiary Care Center
    - Supralethal exposure of more than 5000 rem
        - Supportive care at any hospital will do will die in a few days
4. Internal Deposition
    - Reduce Absorption- Binding Agents, Antacids
    - Expedite Elimination- Cathartics
    - Organ Saturation- Potassium Iodide
    - Displacement- Calcium, Iodide
    - Chelation

About the CAQ

The Certificate of Added Qualifications (CAQ) in Occupational/ Environmental Medicine represents credentialing in the field of medicine. The CAQ is approved by the American Osteopathic Association (AOA) through established criteria and a written exam administered by the American Osteopathic Board of Preventive Medicine (AOBPM).

The AOBPM is the AOA-approved examining entity, which administers exams for:
(1) Full Board certification in occupational/environmental medicine, aerospace medicine, and public health/general preventive medicine for the osteopathic profession.

(2) A Certificate of Added Qualification (CAQ) in occupational/environmental medicine.

The AOCOPM CME Conferences offer didactics designed to provide the most up-to-date information for doctors who practice in occupational/environmental medicine, disability/impairment evaluations, public health/general preventive medicine, and aerospace medicine.

In addition, the College sponsor a basic course in occupational and environmental medicine designed to provide a basic understanding and expertise in the areas of occupational and environmental medicine while preparing participants to take a written examination qualifying for an AOA-approved, Certificate of Added Qualification (CAQ).

The Course is presented in three (3) parts; physicians *do not* need to take the parts in sequence. For the convenience of the faculty and participants, one part is provided at each of the two (2) conferences presented by the AOCOPM each year (usually in March and October). Each part is a full day didactic program, requires separate registration to the AOCOPM, and provides seven to nine (7 - 9) hours of 1-A CME credits (Attendance at the AOCOPM conferences in the spring and fall will provide a total of approximately fifty (50) hours of AOA Category 1 CME credits each year).

Study Text: It is suggested that study include such volumes as: "The National Medical Series for Independent Study of Preventive Medicine and Public Health," by Brett J. Cassens, Harvard Publishing; "Occupational and Environmental Medicine," 2nd Edition, Lange Series, by Joseph LaDou; "A Practical Approach to Occupational and Environmental Medicine," 2nd Edition, by Robert J. McCunney, Little, Brown and Company, and "Occupational Medicine" the 3rd Edition by Carl Zenz.

AOCOPM Membership

Membership: For information on membership in the American Osteopathic College of Occupational & Preventive Medicine, please call 800-558-8686 or email jeffrey@aocopm.org. Please visit www.aocopm.org for further information or to see about future conferences.

Eligibility Requirements

- Must be Board Certified by the AOA in an AOA- approved primary certification;
- Hold a valid, unrestricted license to practice medicine in a state or territory of the United States or a province of Canada;
- Show evidence of completion of a basic review course comparable to the one provided through the AOCOPM or document an initial 100 hours of postgraduate training within the past five (5) years in the area of special interest. At a minimum, 50 hours must be in Category 1 and 50 hours in Category II.
- Submit practice documents verifying current practice in area of special interest (i.e., letters of agreement from companies, schools, hospitals and/or clinics contracted with or performing service for).
- Submit two (2) letters of recommendations from persons competent in the area of special interest.
- Submit the required application, fees, and supporting documents to the Executive Secretary of the AOBPM by January 1 prior to sitting for the CAQ examination.
- Pass appropriate examination designed to evaluate applicant's understanding of the scientific bases of the problems involved in the field of interest and demonstrate current knowledge, sound judgment and a high degree of skill. An oral interview and a written multiple choice examination will be personally conducted, supervised and reviewed by members of the AOBPM.

The application to take the CAQ exam must be obtained from the Executive Secretary of the AOBPM - not from the College. You may contact the AOBPM Executive Secretary:

Michael Shelden, D.O, MPH
Executive Secretary
American Osteopathic Board of Preventive Medicine
142 East Ontario Street, Floor 4
Chicago, Illinois 60611
Phone 800-621-1773, Ext 8103 - Fax 312-202-8224
email aobpm@osteopathic.org
web page http://www.aobpm.org

The Certificate of Added Qualification (CAQ) is valid from the date of issuance, provided a minimum of 50 hours of Category 1-A in occupational / environmental / preventive medicine is documented every three years.

To prepare for the CAQ examination, it is recommended that in addition to completing a basic review course in occupational medicine, the applicant contact the AOBPM for a list of study materials.

The AOCOPM presents a three-part basic course designed to educate primary care physicians to deal with occupational and environmental medicine issues as they occur in the course of their practices and to assist in the preparation for the CAQ exam.

For more information on the basic course, contact the AOCOPM at 800.558.8686 or e-mail to: jeffrey@aocopm.org.

Noise Induced Hearing Loss and Hearing Conservation

AOCOPM Basic Course in Occupational Medicine

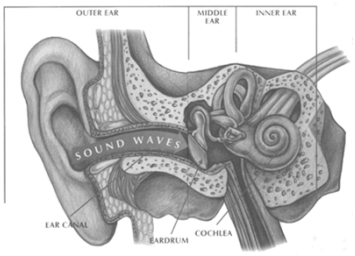
AOA Annual Osteopathic Medical Conference

Orlando, Florida
Sunday, October 30, 2011

Objectives

- Develop an understanding of hearing.
- Learn how noise causes hearing loss.
- Learn about how workers can be protected from hearing loss.
- Learn about the OSHA standard regarding hearing loss.
- Learn the basics of an effective hearing conservation program.

The Human Ear



Effects of High Noise

- May cause stress and anxiety
- Interferes with speech and ability to communicate
- May cause sleep difficulties
- Temporary hearing shifts
- Pain (very high levels)
- Can damage hearing

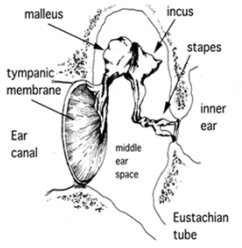
Hearing Loss

Types of Hearing Loss:

- **CONDUCTIVE**
- **SENSORI-NEURAL**
- **MIXED**
- **NON-ORGANIC**

Conductive

Occurs from a dysfunction of the outer or middle ear that can usually be treated with medicine or surgery; a deficit of loudness only.

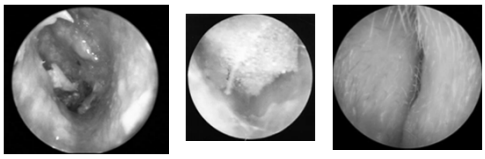


Characteristics

- Maintain soft speaking voice
- Excellent speech discrimination when speech is loud enough
- Typically either low frequency or flat hearing loss (equal at all frequencies)

Causes

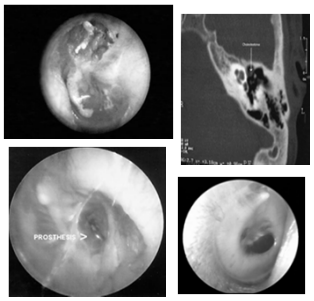
- **Outer Ear:**
  - Occlusion/foreign body
  - Congenital Atresia
  - External Otitis



Photo's courtesy of Dr. Roy F. Sullivan, Ph.D.

Causes

- Blocked Eustachian Tube, reduced middle ear pressure, TM retraction and eventual effusion
- Otitis Media
- TM Perforation
- Ossicular fixation
  - Otosclerosis
- Ossicular Disarticulation
- Cholesteatoma



Photo's courtesy of Dr. Roy F. Sullivan, Ph.D.

Treatment

- Conductive hearing losses are due to problems that occur in the outer and middle ear which are usually temporary and/or treatable with antibiotics or surgery
- For those few people who have uncorrectable conductive hearing losses, hearing aids are of significant benefit as sound remains clear if it is made loud enough

Sensori-Neural

- Dysfunction of the inner ear or auditory nerve, usually permanent and untreatable; results in loudness deficit and distorted hearing.

Characteristics of SNHL:

- Inappropriately loud voice
- Tinnitus
- High frequency loss common, but any configuration possible
- Speech sounds distorted
- Background noise makes listening more difficult
- Hearing aids may help

Causes

- Genetics/Congenital
- Disease
  - Mumps, measles
  - Meningitis, CMV
- Ototoxic drugs
- Head trauma
- Presbycusis
- Meniere's Disease
- Acoustic Neuroma
- Noise Exposure:
  - Prolonged exposure to hazardous noise causes hearing loss by the physical destruction of the hair cells in the cochlea.

The "4 P's"
Noise induced hearing loss is:

- **Painless**
- **Progressive**
- **Permanent**
- **Preventable!**

From Siemens Hearing Solutions

Noise Induced HL

- Loss can be sudden, as with acoustic trauma from an explosion
- More often gradual onset that may go unnoticed
  - NIHL also known as noise-induced permanent threshold shift (NIPTS), typically takes years of exposure, gradual erosion of hearing that eventually affects communication
- Amount of loss varies from person to person
- Risk of noise-induced progression stops if no longer noise exposed, but aging invariably worsens loss
  - For most, aging effects aren't significant before age 50+

Classic Symptoms

- Generally affects 3000-6000 Hz range first
- Typically bilateral and symmetrical
- Tinnitus common
- Reduced speech comprehension, particularly in background noise. Why?
  - Vowels are low frequency sounds that carry 90% of speech energy. ("I can hear you talking….)
  - Consonants are higher frequency sounds that carry most of the meaning of speech. NIHL begins in high frequencies. (but I can't understand what you are saying.")

Treatment

- Sensori-neural hearing loss is due to problems that occur in the inner ear and are almost always permanent and untreatable.
- Hearing aids will benefit most people with sensori-neural loss, but results can vary.

Other Types

- **Mixed**
  - Combination of Conductive and Sensori-neural
- **Central**
  - Occurring within central nervous system (cortex, brainstem, or ascending auditory pathways) as opposed to peripheral organs of hearing (cochlea and middle ear).
- **Non-Organic:**
  - No medical or physical reason for hearing loss; may be voluntary or involuntary
- **Malingering:**
  - Consciously faking or exaggerating a hearing impairment

Non-organic

Symptoms that should alert you to malingering:

- Substantial, equal hearing loss at all frequencies or no response to pure tones at all in one or both ears.
- Inconsistent results, or markedly different than prior results.
  - Unilateral "deafness" without significant medical history unlikely
- Exaggerated attention to test, may press on earphones, difficulty hearing you call them back for testing or to your directions (normal voice level is around 60 dB), but can hear you when your back is turned or when there are no visual cues.
- Unconscious development of a non-organic hearing loss – a compensatory protective device, a psychogenic problem -- the patient believes the impairment is real.

The Cost of Hearing Loss

- Over 30 million people with significant hearing loss
- 10 million attributed to noise
- 10 million people with debilitating tinnitus
- 242.2 million dollars is estimated to be paid out yearly for disability alone for NIHL
- Noise induced medical problems: hypertension, anxiety, elevated cortisol levels
- Contributes to: sleeplessness, fatigue, poor concentration, stress, poor productivity

Hearing Conservation Program

How to be successful

History of Hearing Conservation

- Air Force Standard 1949
- Civilian Standard, Walsh-Healey Public Contracts Act of 1935 gave Labor Department authority to regulate companies having contracts with Federal Government, Noise standard not released till 1969
- 1969 MSHA, 1970 OSHA regulatory agencies came into existence
- Regulation OSHA/ MSHA vs. Standards NIOSH/ANSI
- 1971 OSHA applied noise regulation to all companies in US
- 1972 OSHA publishes *Criteria for a Recommended Standard, Occupational Exposure to Noise*
- 1981 OSHA Hearing Conservation Amendment
- 1983 Revised Version 29 CFR 1910.95 is what we work under now

Who Needs a Hearing Conservation Program?

29 CFR 1910.95

"The employer shall administer a continuing, effective hearing conservation program whenever employee noise exposures equal or exceed an 8-hour time-weighted average sound level (TWA) of 85 decibels measured on the A scale"

OSHA Standard Requirements

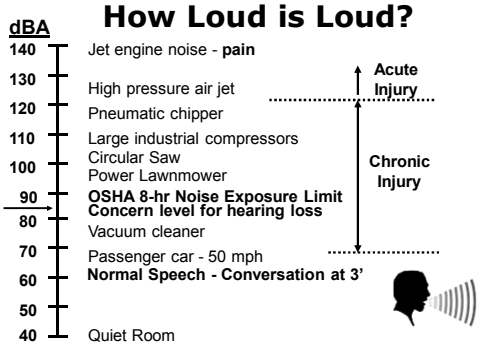
- **Employee exposures at/above AL *for even one workshift per year* requires:**
  - *Employees to be in a Hearing Conservation Program*
  - *Have initial/annual training and audiometric tests*
- **Exposures at/above PEL require:**
  - *Exposure Controls - engineered controls/hearing protectors*

Key elements to a good Hearing Conservation Program

- Noise Monitoring
- Engineering Controls
- Periodic Audiometric evaluation
- Worker Education
- Selection of appropriate HPDs
- Administrative Controls

Note: An audiologist or physician must be responsible for the program

How Loud is Loud?



Not all Hearing Loss is Work Related




OSHA Noise Exposure Limits

Limits Vary with Length of Workshift

Shift Duration (Hours)	Permissible Exposure Limit - "PEL" (dBA)	Action Level - "AL" (dBA)
8	90	85
10	88	83
12	87	82

Permissible Exposure Limits

- OSHA PEL is 90dB over 8 hours TWA
  - Cut time in half for every 5dB increase.
    - 90dB= 4 hours, 95dB= 2 hours.
- NIOSH is different
  - Cut time in half for every 3dB
    - 88dB= 4 hours

Measuring Noise

- **Frequency-weighted Sound Pressure is measured in units of decibels (dB)**
- **For hearing protection, we measure the "A-weighted" frequency range**
  - Includes broad range of frequencies
  - Emphasizes the human speech frequencies
  - Expressed as "dBA"

Engineering Controls

- Anything done by the employer to reduce noise.
  - Maintenance
  - Modifying equipment
  - Substitution of equipment
  - Isolation
  - Acoustic material

Audiometric Testing Program

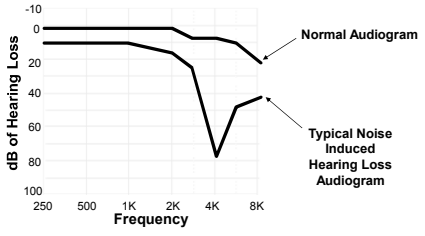
- Baseline Audiogram
- Annual Audiogram
- Standard Threshold Shift (STS)
- Follow-up Procedures
- Audiometric Test Requirements
- Monitor the effectiveness of the hearing conservation program

Definition of STS

Positive STS:
+ 10 dB average at 2000, 3000 and 4000 Hz
or
+ 15 dB at 1000, 2000, 3000 or 4000 Hz

Negative STS:
- 10 dB average at 2000, 3000 and 4000 Hz
or
- 15 dB at 1000, 2000, 3000 or 4000 Hz

Audiometric Hearing Tests

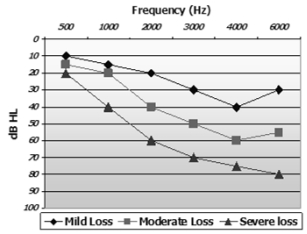


Degrees of Hearing Loss

• Normal Hearing	10 - 25 dB HL
• Mild Hearing Loss	30 - 45 dB HL
• Moderate Hearing Loss	50 - 65 dB HL
• Severe Hearing Loss	70 - 85 dB HL
• Profound Hearing Loss	> 90 dB HL

Audiogram Configurations:

Progressive noise-induced hearing loss



Referral Criteria

Two sources for Referral Criteria:

AMERICAN ACADEMY OF OTOLARYNGOLOGY–HEAD AND NECK SURGERY

U.S. Food and Drug Administration
Protecting and Promoting *Your* Health

Record Keeping Rule for Hearing Loss

- Hearing loss is reportable when:
  - A STS occurs (an average 10 dB or greater change for thresholds averaged at 2, 3, and 4 k Hz in either ear from the current baseline audiogram) and. . .
  - Hearing thresholds for the current audiogram show an average of 25 dB or greater at 2, 3, and 4 k Hz from audiometric zero for the shifted ear

Record Keeping Rule for Hearing Loss

CFR 1910.1020 (medical records standard)

Enacted in 1999 supersedes rules for records retention in 1910.95 (hearing conservation standard) revised in 1983

Length of employment plus 30 years

Worker Education

Worker Education

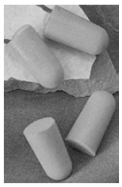
- Anyone exposed to 8 hours TWA of 85dB are required to have annual training.
  - Effects of noise
  - Advantage and Disadvantage of types of HPDs (hearing protection devices)
  - The selection, fit, and care of HPDs
- The requirements may be done by different folks at different times of the year, as long as it is done annually.

Hearing Protection Devices

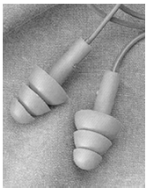
- Must be worn if 85dB TWA 8 hours, before baseline is done
- Employer must provide at least one variety of plug and one variety of muff
  - Someone must be available to fit and discuss care of product used
- Most employers use NRR (noise reduction rate) to select product

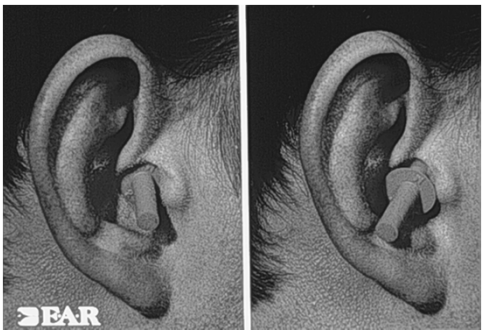
Hearing Protection Devices

Disposable or Re-Usable Ear Plugs are convenient and easiest to use



Use Earplugs with USEPA Noise Reduction Ratings (NRRs) 30 dB or higher





Hearing Protective Devices

Ear Muffs may also be used

However, templebars on safety glasses interfere with the sealing surfaces on ear muffs

Hearing Protective Devices

For Very High Noise Levels
- 100 dBA and Higher -
Use Double Hearing Protection

Hearing Protective Devices

Double the Device - Double the Protection?

NOPE

NRR of best device - 7 divided by two and subtract from TWA then subtract 5dB for second device

Example
TWA of 110 dB, two devices one 20NRR one 15 NRR, (20-7)/2=7
110-7= 103 -5 for second device =98 NOTGOOD ENOUGH!!!

Recommendations

- Provide greater protection than OSHA Noise Standard requires
  - Employees should wear hearing protection when *entering or working* in areas where noise levels are at or above 85 dBA
  - Based on evidence that hearing damage occurs below OSHA noise limit

NIOSH recommends that the labeled NRRs be derated as follows:

- Earmuffs: Subtract 25% from the manufacturer's labeled NRR
- Foam earplugs and custom molded earplugs: Subtract 50% from the manufacturer's labeled NRR
- All other earplugs including semi-inserts: Subtract 70% from the manufacturer's labeled NRR

Summary

- Know Exposure Limits
- Perform Noise Monitoring
- Use feasible engineering or administrative controls
- HC Program if > AL
- Audiometric Testing
- STS notification and follow up
- Record on 300 log
- HPD for all at no cost
- Annual training
- Access to information and Training Materials
- Recordkeeping

Tips

- One of your jobs is to help your clients protect themselves and their workers
  - Consider taking the CAOHC course
  - Partner with a good Audiologist
  - Make sure your clients are administering good baseline testing
  - Make sure your clients are using a good hearing questionnaire for new hires
  - Make sure your clients are doing proper education of their workers
  - Don't forget to educate workers to protect hearing outside of work

Questions?

"It could be one of those things that crawl into your ear and lay eggs, and the eggs hatch and burrow into your—nope. It looks fine."

Occupational Cancer Risk: Exposure and Assessment

Basic Epidemiology Course

Julianne Cyr, MPH, CPH

Occupational Cancer Refresher

- Carcinogens
- Types of cancer
- Numbers

EPA: 2005 Classifications

Group	Classifications
A	Carcinogen to humans
B	Likely to be carcinogen to humans
C	Suggestive evidence of carcinogenic potential
D	Inadequate information to asses carcinogen potential
E	Not likely to be carcinogenic to humans

EPA : Carcinogenic

Criteria	Definition
1	there is strong evidence of an association between human exposure and either cancer or the key precursor events of the agent's mode of action but not enough for a causal association, *and*
2	there is extensive evidence of carcinogenicity in animals, *and*
3	the mode(s) of carcinogenic action and associated key precursor events have been identified in animals, *and*
4	there is strong evidence that the key precursor events that precede the cancer response in animals are anticipated to occur in humans and progress to tumors, based on available biological information

OSHA: 29 CFR 1990

Category	Definition
I	The substance meets the definition of a potential occupational carcinogen in (1) humans, or (2) in a single mammalian species in a long-term bioassay where the results are in concordance with some other scientifically evaluated evidence of a potential carcinogenic hazard, or (3) in a single mammalian species in an adequately conducted long-term bioassay, in appropriate circumstances where the Secretary determines the requirement for concordance is not necessary.
II	The substance meets the criteria set forth in 1990.112(a), but the evidence is found by the Secretary to be only "suggestive", or the substance meets the criteria set forth in 1990.112(a) in a single mammalian species without evidence of concordance.

OSHA Regulated Carcinogens

- asbestos
- 4-Nitrobiphenyl
- alpha-Naphthylamine
- Methyl chloromethyl ether
- 3,3'-Dichlorobenzidine (and its salts)
- bis-Chloromethyl ether
- beta-Naphthylamine
- Benzidine
- 4-Aminodiphenyl
- Ethyleneimine
- beta-Propiolactone
- 2-Acetylaminofluorene
- 4-Dimethylaminoazobenzene
- N-Nitrosodimethylamine
- Vinyl chloride
- Inorganic arsenic
- Cadmium
- Benzene
- Coke oven emissions
- 1,2-dibromo-3-chloropropane
- Acrylonitrile
- Ethylene oxide
- Formaldehyde
- Methylenedianiline
- 1,3-Butadiene
- Methylene Chloride

Preventing Exposure

- Levels of prevention in the workplace
  - Engineering controls
  - Work Practice controls
  - Administrative controls
  - Personal Protective Equipment (PPE)

Assessing Risk of Exposure

- Screening
  - Disease is serious, consequences are severe
  - Treatment is more effective in earlier stages
  - Detectable preclinical phase (DPCP)
  - DPCP is fairly long and prevalent
- Sensitivity
- Specificity

Assessing Risk of Exposure

- Personal risk assessment / Patient history
  - Occupations
    - Onset, Length
  - Chemicals / Processes
    - Carcinogenic?
  - Intensity of exposure
  - Other Explanations?

Assessment of the Exposed

- Observation
- Palpation
- Lab work
- Imaging
- Histology

Causality

- Hill's criteria
  - Strength of association
  - Consistency
  - Specificity
  - Temporality
  - Biological gradient
  - Plausibility
  - Coherence
  - Experiment
  - Analogy

Epidemiological Measures

MEASURES OF COMPARISON

- Absolute Measures
  - Risk Difference
  - Population Attributable Risk
- Relative Measures
  - Relative Risk

ESTIMATES OF COMPARISON

- Odds Ratio

Two-by-two table

		Outcome		
		Present	Absent	
Exposure	Present	A	B	A+B
	Absent	C	D	C+D
		A+C	B+D	A+B+C+D

Risk Difference

- Excess risk associated with exposure
- $RD = R_e - R_u$
- $RD = a/(a+b) - c/(c+d)$
- Interpretation: The probability of disease is x% higher among the exposed group.

Risk Difference

- $RD = a/(a+b) - c/(c+d)$

		Renal Cell Carcinoma		
		Present	Absent	
Lead	Present	71	63	134
	Absent	916	1235	2151
		987	1298	2285

Relative Risk

- Increased/decreased risk of disease for exposed compared to unexposed
- $RR = R_e/R_u$
- $RR = \frac{a/(a+b)}{c/(c+d)}$
- Interpretation: The risk of disease among the exposed group is x times higher than among the unexposed.

Relative Risk

- $RR = \frac{a/(a+b)}{c/(c+d)}$

		Lung cancer		
		Present	Absent	
Male Sex	Present	305	4108	4413
	Absent	9	280	289
		314	4388	4702

Population Attributable Risk

- Reduction in incidence given the exposure was removed from the population
- $PAR = \frac{RR-1}{RR}$
- Interpretation: If the exposure was eliminated, x% of cases would be prevented.

Population Attributable Risk

- PAR = $\frac{RR-1}{RR}$
- If RR = 1.30, calculate PAR.

Odds Ratio

- Increased/decreased risk of exposure for diseased compared to non-diseased
- OR = $odds_e/odds_u$
- OR = ad/bc
- Interpretation: The odds of being exposed are x times greater among the diseased compared to the non-diseased.

Odds Ratio

- OR = ad/bc

		NHL		
		Present	Absent	
TCE	Present	590	443	1033
	Absent	599	539	1138
		1189	982	2171

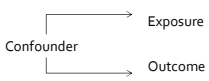
Why this, not that?

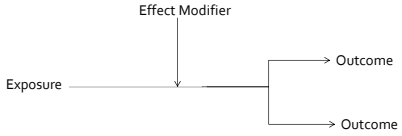
- Relative Risk
  - Temporality
    - Prospective cohort
    - Retrospective cohort
    - Experimental
- Odds Ratio
  - No temporality
    - Case-control
    - Cross-sectional

Why not everyone?

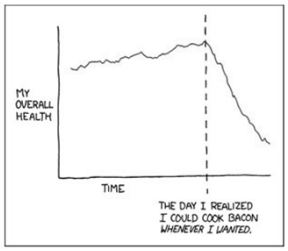
- Personal characteristics
  - Age, gender, genetics, immune response, etc.
- Habits
  - Smoking, drinking
- Dose
- Timing
- Other
  - medications

Confounding vs. Effect Modification





Questions



xkcd.com

Psychiatric Issues in the Workplace

COL Mimms J Mabee, D.O., M.P.H.

2

Objectives

- Understand the Breadth of psychiatric disease in the work place
- Discuss implications of Laws, work practices, and cultural relationships
- Examine the spectrum of occupational psychiatric disease
- Identify areas of controversy in occupational psychiatric disorders
- Offer relevant management/treatment strategies

3

ACGIH statement

- Because of wide variation in individuals, a small percentage of workers may experience discomfort from some substances at concentrations at or below the threshold limit; a smaller percentage may be affected by *aggravation* of a pre-existing condition or by development of an occupational illness.

4

Stress Definition

- Stress develops when there is a perceived imbalance between environmental demands and an individual's response capabilities, under conditions where failure to meet the demand has important adverse consequences

Data

NIOSH Report

- 40% of workers reported their job was very or extremely stressful;
- 25% view their jobs as the number one stressor in their lives;
- 75% of employees believe that workers have more on-the-job stress than a generation ago
- 26 % of workers said they were "often or very often burned out or stressed by their work"
- Job stress is more strongly associated with health complaints than financial or family problems.

- 65% of workers said that workplace stress had caused difficulties
- 10% said they work in an atmosphere where physical violence has occurred because of job stress
- 29% had yelled at co-workers because of workplace stress
- 19% or almost one in five respondents had quit a previous position because of job stress
- 62% routinely find that they end the day with work-related neck pain
- 44% reported stressed-out eyes, 38% complained of hurting hands and 34% reported difficulty in sleeping because they were too stressed-out
- 12% had called in sick because of job stress

U.S. Ranks #1

- 20 Workers are murdered each week
- 18,000 non-fatal crimes against workers weekly
- Over 1 million violent acts yearly in our companies

We Work Longer Hours

- 1 month longer than the Japanese
- 3 months longer than the Germans
- ON average we work 47 hrs/week with
- 20% work 49 hrs/week.

Stress Days off

- 1 million world-wide absent every day
- 1/5 last minute "no shows" are due to stress
- Estimated cost is $602/worker/year- this study was done in 1997
- Estimated cost to large employers: $3.5 million annually

Occupational Pressures

- 30% of workers suffering from back pain
- 28% complaining of "stress"
- 20% feeling fatigued
- 13% with headaches

$$$$ COST $$$$

- **$57 billion yearly**

3 Types of Stress Claims

- Physical-mental where a physical illness or injury leads to a mental condition or disability
- Mental-physical where mental stress leads to a physical illness or condition, such as a heart attack
- Mental-mental where mental stress results in a mental condition or disability

States who limit Claims

- Louisiana does not consider mental injury
- North Dakota - only if acute reaction to traumatic event
- Washington and Virginia specifically exclude
- Most other states pay or lack precedent to pay

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Stress Compensation by State

- Not Compensable
  - Florida
  - Georgia
  - Kansas
  - Louisiana
  - Montana
  - Nebraska
  - Ohio
  - Oklahoma
- Unusual stressors
  - Arizona
  - Arkansas
  - Maine
  - Massachusetts
  - New Mexico
  - New York
  - Pennsylvania
  - Rhode Island
  - Washington
  - Wisconsin
  - Wyoming

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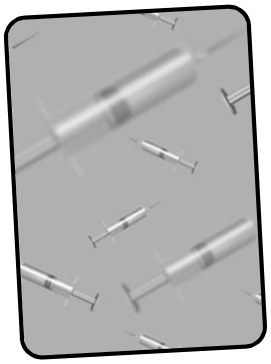
Stress Compensation by State

- Stressor must be sudden
  - Illinois
  - Maryland
  - Missouri
  - Mississippi
  - South Carolina
  - Tennessee
  - Texas
  - Virginia
- Broadly Compensable
  - California
  - Hawaii
  - Kentucky
  - Michigan
  - New Jersey
  - Oregon
  - West Virginia

Federal Laws

- Equal Pay act of 1963
- Title VII - 1964 prohibiting discrimination
- 1967 Age discrimination of those >40
- Section 501 Rehab Act 1973- Disabilities
- 1980 EEO- sex discrimination and harassment
- 1990 ADA
- 1993- FMLA giving up to 12 weeks unpaid, job guaranteed leave



Family Medical Leave Act

- Law was intended to help people recover from illness and keep jobs
- Continued Tx for mental health is easily available
- Mental Health provider is going to justify their time for payment
- Many feel this is a tool for abusing the system

Stress
Working Environments

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Cultural Relationships

- Union presence
- Benefits
- Security
- Roles, Norms, Status
- Supervision
- Promotion
- Turnover
- Accidents
- Overtime
- Training
- Standardization
- Autonomy
- Competition
- Absenteeism
- Theft
- Managerial Defenses

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Hostile Work Environments

Less Severe	Severe	Most Severe
Verbal harassment	Stalking	Terrorism
Sexual harassment	Physical abuse	Homicide
Shunning	Rape	
Bullying		
Intimidation		

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Hostile Work Environments

- Phases of traumatic stress experience
  - Impact stage: shock, fear, anger, helplessness
  - Recoil: preoccupation with looking for answers and dealing with strong emotions
  - Reorganization: coping with emotions and redirecting energy
    - May be effective
    - May be maladaptive

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Risk Factors for Perpetrators

- Male Sex
- History of violence
- History of suicidal act
- Violent fantasies
- Identified victim
- Involvement with victim
- Access to weapon
- Drug, etoh, Rx use
- Organic brain disorder
- Altered mental status
- Social isolation
- Treatment compliance
- Domestic problems
- History of loss

Spectrum of Disease

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Anxiety Disorders

- Generalized anxiety disorder
  - Somatic manifestations
    - Diarrhea, perspiration, tachycardia
- Acute anxiety disorder (panic attacks)
  - Decompensation from normalcy
    - Tachycardia, tachypnea, nervousness
- Both can lead to depression

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Depression

- Mood disturbance
  - Withdrawal, decreased motivation, fatigue, sleep and eating disturbances, difficulty concentrating, somatic complaints, suicidal tendencies
  - Tendency for recurrence
  - Mania characterized by episodes of loud speech, demanding behavior, poor judgment, expansive mood

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Post Traumatic Stress Disorder = PTSD

- Proximity to event
- Preexisting psychiatric illness
- Lack of post event social support
- Poor socioeconomic status
- Hx of child abuse
- Neural sensitization

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PTSD continued

- Symptoms
  - Fear
  - Anxiety
  - Motor tension
  - Autonomic hyperactivity

- **Disabling condition**
- **Persistent re-experiencing**
- **Persistent avoidance behavior**
- **Numbing of responsiveness**
- **Persistent psychological arousal**

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Toxic Exposure

- Inorganic mercury poisoning - erythism
- Lead exposure
- Manganese intoxication – manganese madness
- Others: inorganic tin, aluminum, gold, zinc

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Chronobiology Issues

- Body temperature
- Hormone secretion
- Sleep-wake cycle
- Responses to medication
- Mood and cognition

- Increasing age
- Female gender
- Extreme "morningness"
- Family members with a daytime routine
- History of intolerance to circadian rhythm changes

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Acute Time Shift Syndrome

- Easier to adjust to schedule delays than advances
  - Switching from day shift to night
  - Traveling from east to west
- Symptoms: GI distress, insomnia, fatigue
- Prevention:
  - Hydration
  - Avoid alcohol, tobacco, caffeine
  - Eat light while traveling

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Chronic Time Shift Syndrome

- Sleep disturbance
- Chronic fatigue
- Medical complaints
- Alcohol and drug abuse
- Accidents and near misses
- Mood disturbances
- Personality changes
- Relationship problems

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Chronic Time Shift Syndrome

- **Endocrine**
  - Melatonin, Insulin, ACTH
- **Neuropsychiatric**
  - Neurotransmitter responsiveness
  - Acute mania in susceptible individuals
  - Depression from accelerating REM sleep
- **Pulmonary**
  - Nocturnal decrease of ACTH
- **GI**
  - Altered enzyme and acid secretion
- **Neoplastic**
  - antileukemic properties of melatonin
- **Reproductive**
  - low birth weight infants
  - spontaneous abortion
- **CV**
  - HTN
  - Elevated triglycerides

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Prevention

- Rotating shifts on weekly or monthly basis
- Rotate in direction of time delay
- Educate regarding sleep discipline
- Educate regarding mealtime discipline
- Maintain light exposure during waking hours
- Avoid caffeine, alcohol, sedatives, sleep aids, NSAIDS which suppress melatonin

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Somatoform Illness

- Often and element of unconscious motivation for illness behavior – a defense mechanism
- Clinically identifying elements of voluntary control
  - Meticulous cataloging of medical history
  - Inconsistencies in describing physical symptoms
  - Legal involvement
  - Anger and defensiveness
  - Resistance toward treatments
  - Development of new problems when confronted with nonorganic nature of complaints

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Somatoform Illness

1. Psychophysiological Disorders
2. Somatoform Disorders
3. Factitious Disorders
4. Malingering

Unconscious and involuntary

Conscious and voluntary

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Somatoform Illness-Malingering

- Symptoms do not fit diagnostic category
- Symptoms and pain have no organic basis
- Claimant hostile, intimidating and confusing
- Past history of arrests, lying
- Claimants memory is "hazy"
- History of failure to comply with medical advice
- Avoidance of psychological and psychiatric evaluations
- Withholding information about prior history

Controversies

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Neuropsychiatric Disease Relate to Perception of Toxic Exposure

- Dependent upon worker's own appraisal of danger: Non-dose related ("NDR")
- May have symptoms of toxic exposure
- Other variables
  - Previous exposure experience
  - Knowledge and ***beliefs*** of consequences
  - Reliability of authority
  - Social support of the organization

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Multiple Chemical Sensitivities

Non-Dose Related: NDR

- Recurrent somatic and psychological symptoms; lack of cognitive impairment
- Severity inconsistent with toxicological properties
- Unclear whether psychiatric findings are a contributory cause or a sequelae

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Spectrum of NDR Occurrences

- True toxic exposure: DR and NDR (fear, etc.)
- Benign toxic exposure, fear: NDR
- Ambient odors and irritants: NDR
- Fear of imaginary dangerous exposures: NDR
- Retrospective attribution of chronic, vague somatic complaints: NDR

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Sick Building Syndrome

- Medical
  - Atopy
  - Seborrheic dermatitis
- Job
  - Photocopying
  - Recent renovation
  - Carbonless copy paper
  - Work stress
- Building
  - Low outdoor air delivery
  - UV lights
  - Poor/excessive housekeeping
  - Pollution sources

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Sick Building Syndrome

- 70% deficient outside air supply
- 60% inadequate air distribution
- 60% standing water and biological growth
- 40% visible contamination of insulation
- 20% malfunctioning humidifiers

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Mass Psychogenic Illness

- Convergence and Contagion variables
  - Inaccurate perceptions of triggering event
  - Index case and sympathetic physician
  - Explosive person-to-person spread of symptoms via employee networks
  - Symptoms: hyperventilation, syncope, fatigue
  - Favorable worker compensation laws and legal environment
  - Media and family reactions

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Solvent Syndrome

- Controversial Diagnosis for low level exposures
  - Chronic exposures, usually to mixtures
  - Cacosmia: previously innocuous odors causing headache and nausea
- World Health Organization summary
  - Type 1: reversible personality and mood changes
  - Type 2A: sustained personality or mood changes
  - Type 2B: symptoms accompanied by objective intellectual impairment
  - Type 3: dementia

Management and Treatment Strategies for Occupational Psychiatric Disease

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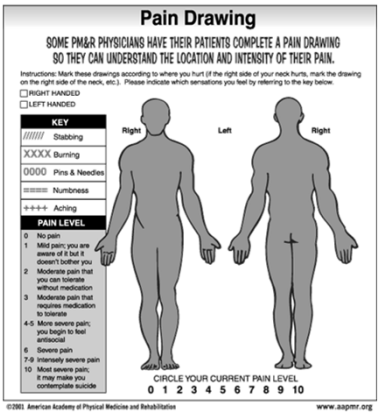

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Initial Therapeutic Response

- Evaluation of toxic exposure
- *Medical and psychological evaluations
- Counseling
- Early referral
- Education and reinforcement

  - *Informal bedside tests generally considered unreliable for diagnosis.

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Medical Therapies

- Anxiolytics and hypnotics
- Antidepressants
- Appropriate medical and physical therapies for accompanying medical disorders

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Stress Management

- Exercise
- Avocational endeavors
- Relaxation training
- Family support

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Psychotherapy

- Cognitive Restructuring: altering patterns of thinking
  - Identifying and refuting dysfunctional thought patterns
  - Developing new thought patterns
- Behavioral Therapy:
  - social skills training
  - biofeedback
  - systematic desensitization
  - relaxation techniques

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Neuropsychological Evaluation

- Through detailed Hx
  - Childhood development, family history, academic history, substance abuse, legal history, occupational and military history, recreation
- Specific testing
  - WAIS-R: Wechsler Adult Intelligence Scale-Revised
  - MMPI: Minnesota Multiphasic Personality Inventory
  - TAT: Thematic Apperception Test (variation of Rorschach)
  - NAART: North American Adult Reading Test

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Mental Status Exam

- Emotional
  - Range, quality and authenticity of affect and mood
- Behavioral
  - appearance, attitude, cooperation, credibility
- Cognitive Measurement
  - Attention and concentration
  - Intellectual function
  - Executive function (independent behavior)
  - Language
  - Visual-spatial functions
  - Memory and learning
  - Motor Speed and Dexterity
  - Malingering and Deception

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Residual Functional Capacity Testing

- Understanding and memory
- Social interaction
- Adaptation
- Sustained concentration and persistence
  - Carrying our short and simple instructions
  - Carrying out detailed instructions
  - Maintain attention and concentration
  - Conform to a schedule
  - Sustain an organized routine
  - Work with others
  - Make simple work-related decisions
  - Perform a normal workday without psychological interruptions

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EAP's: Employer Supported Employee Assistance Programs

- Detection and early intervention
  - Family, marital, social and legal problems
- Appropriate cost-effective referral
- Self-referral and Confidentiality
- Various structures
  - On-site
  - Off-site
  - Consortium
  - Joint labor/management initiative

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Health Promotions Programs

- Programs
  - May incorporate EAP
  - Health and Fitness
  - Stress Management
- Benefits
  - Reduced Absenteeism
  - Reduced health care costs
  - Reflects employer attitudes: Vision, Mission, Goals

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Job Redesign

- Shift work modifications
- Ergonomic considerations
- Engineering controls
- Administrative controls
- Personal Protective Equipment (PPE)

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Organizational Redesign

- Basic elements
  - Change agent
  - Client
  - Interventions
    - Diagnostic activities
    - Education
    - Coaching and counseling
    - Life and career planning

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Organizational Redesign

- Major Organizational Development Interventions
  - TQM: Total Quality Management
    - Sharing of information
    - Need for developing knowledge
    - Rewarding organizational performance
    - Redistributing power
  - ISO 9000: International Organization for Standards
    - Quality standards including management responsibility, product quality, record keeping, training, use of statistical methods

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Summary

- There is a wide range of psychiatric disease that is being claimed under workers compensation
- Interrelatedness exists between worker's environment and industrial organization
- Neural sensitization and cross reactivity of pharmacological, psychological and physical stressors may contribute to less well understood entities that are non-dose related
- A variety of emergent and long-term management and treatment strategies are available.

Questions?

Reproductive Issues in the Workplace

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Practice Objectives

- Be able to cite some important court decisions regarding reproductive health issues in the workplace
- Be able to describe the difference between reproductive hazards and teratogens

Practice Objectives (cont'd)

- Be able to describe background rates of infertility and sub-fertility, miscarriage and stillbirths, birth defects, low birth weight and premature birth, developmental disorders, and childhood cancers

Practice Objectives (cont'd)

- Be able to list some suspected reproductive hazards and the suspected consequences of their exposures
- Be able to describe some prevention strategies to minimize exposure to workplace reproductive hazards

Introduction

- Question: "Doctor, if I work with substance X, will it hurt my baby?"
- Physician's response must incorporate;
  - scientific literature regarding substance X
  - quantification of the work exposure
  - sensitivity to the fears and concerns of the patient.

Populations of Concern

- Three groups of employees with concerns:
  - pregnant women
  - women of childbearing age
  - men
- Determining the exact cause of the concern is important.

Legal Opinion

- Supreme Court decision (International Union vs Johnson Controls - 1991)
  - does not allow employers to keep pregnant or fertile women from working in jobs that may injure a fetus and cause an adverse reproductive outcome.

Employer Approach

- Employers should:
  - develop educational programs for at risk employees
  - develop surveillance programs for adverse reproductive outcomes in its employees
  - create a policy to link employee removal from specific work activities based on specific work performance

Reproductive Hazards

- Definition: Substances or agents that affect the reproductive health of women or men or the ability of couples to have healthy children.

Suspected Reproductive Hazards

- Spontaneous abortion
  - anesthetic gases
  - arsenic
  - carbon disulfide
  - ethylene glycol ethers
  - inorganic mercury
  - lead
  - video display terminals

Suspected Reproductive Hazards (cont'd)

- neurologic dysfunction in children
  - lead
- childhood cancer
  - ionizing radiation
- CNS defects/malformations
  - organic mercury
  - ionizing radiation
  - vinyl chloride

Suspected Reproductive Hazards (cont'd)

- Low birth weight
  - arsenic
  - carbon monoxide
  - PCB's (polychlorinated biphenyls)
- Prematurity
  - lead
  - physical stress

Teratogens

- An agent or factor that results in birth defects or malformations in the developing embryo but does not result in any toxigenic effects to the mother.
- Example; Thalidomide

Children of thalidomide (CNN/file)

Thalidomide

Teratogenic Effects

- Are dose related:
  - High dose: embryolethal
  - Moderate dose: embryological defect
  - Low dose: may produce no effect

Teratology - General Principles

- Susceptibility to teratogens depends on the genotype of the conceptus.
- Susceptibility to teratogens varies with the developing stage of the fetus at the time of exposure.
- Teratogenic agents act through specific mechanisms on the developing cells and tissues

Teratology (cont'd)

- The final manifestations of abnormal development are;
  - malformation
  - growth retardation
  - functional disorders
  - death

Teratology (cont'd)

- Manifestations of abnormal development increase from no effect to the totally lethal as the dosage increases.

Reproductive Toxicology

- An understanding of normal reproduction is a necessary foundation for the recognition of adverse effects to the reproductive processes of both men and women.

Baseline (Normal) Rates

- 10-20% of pregnancies - spontaneous abortion
- 30-40% of spontaneous abortions have a chromosomal anomaly
- 3% of all newborn children will present with birth defects or congenital anomalies

Baseline (Normal) Rates

- 1% of men - azoospermia
- 2-4% of fetuses - stillborn
- 7% of births - low birth weight (<2500g)
- 0.4% of births - severe mental retardation

Baseline Rates (cont'd)

- 3% of anomalies in live births will manifest themselves during the postnatal period or later on in development
- 2/3 (67%) of all congenital anomalies or malformations have no known cause

Reproductive Toxicology

- Drugs (chemicals) and environmental agents are implicated in approximately 3% of congenital anomalies or malformations
- Other causes;
  - 1-2% - maternal metabolic imbalance
  - 2-3% - infection
  - 3-5% - chromosomal aberrations
  - 20% - known genetic transmission
  - 70% - unknown factors

Male Reproductive System Development

- Sexual differentiation begins at about 7 weeks after conception and is completed by the 4th month of gestation
- FSH acts on Sertoli cells in testes to release LH.
- LH stimulates the testicular Leydig cells to produce testosterone.

Sexual Differentiation

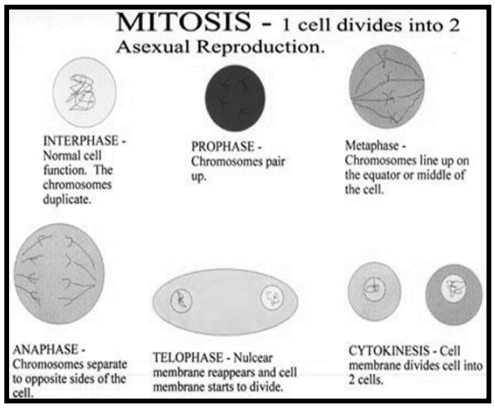
- Although males and females have identical FSH and LH, it is the hormonal effects on sex-specific target cells that produce sexual differentiation

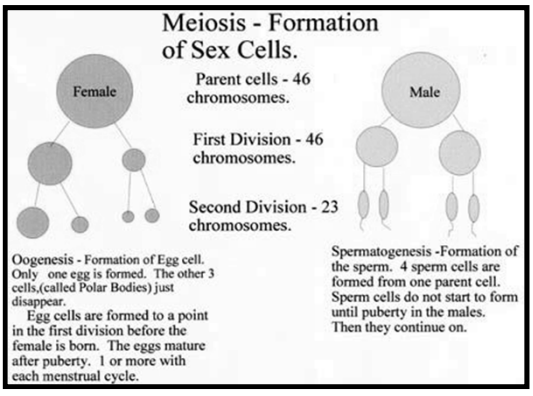
Male Reproduction

- Spermatogenesis - 70-80 day period of high rate cell division in adult men.
  - very susceptible to adverse influences

Male Reproduction (cont'd)

- spermatogonia (mitosis) -> spermatocytes
- spermatocytes (meiosis) -> spermatids
- spermatids mature into the characteristic head and tail shape of sperm





Male Reproduction (cont'd)

- Normal values:
- sperm production - 20-350 million/day
- human ejaculate - 50-150 million/ml
- Fertility criteria defined as:
  - > 40% motile sperm
  - > 20 million sperm per milliliter of semen
  - > 70% normal morphology

Affects on the Male Reproductive System

- Chromosomal or gene changes
  - can stop or slow the actual production of sperm
- Sexual performance
  - hormonal changes may affect sexual performance

Affects on the Male Reproductive System (cont'd)

- Hazardous chemicals, which may collect in the epididymis, seminal vesicles, or prostate may;
  - kill the sperm
  - affect sperm shape
  - affect sperm motility
  - be carried to the egg at the time of fertilization

Affect on Male Reproduction (cont'd)

- Pregnancy:
  - If a damaged sperm fertilizes an egg
    - miscarriage
    - fetal abnormality
    - congenital abnormality detected after delivery
  - If a reproductive hazard is carried in the semen
    - fetus may be exposed within the uterus

Female Reproduction

- Entire component of ova are present at birth, and number decreases with age.
- Approx. 400 mature ova are released during ovulation in a lifetime.
- Release of specific factors from the hypothalamus and hormones from the pituitary produce the development of the ovarian follicle.

Female Reproduction (cont'd)

- Follicle expels the mature ovum at the peak of the estrogen and luteinizing hormone levels, approx. 14 days after the beginning of menses.
- Fertilization and early development occur during the ensuing few days and are followed by implantation onto the uterine wall.

Fetal Development

- 3rd-8th wk - Embryonic stage (organogenesis)
- 9th-14th wk - Organ growth
- Adverse reproductive outcomes can occur at any of these points but organogenesis most susceptible.

Female Reproductive Problems from Workplace exposures

- Menstrual cycle effects
- Infertility and subfertility
- Miscarriage and stillbirths
- Birth defects
- Low birth weight and premature birth
- Developmental disorders
- Childhood cancer

Menstrual Cycle Effects

- Disruption of the hormonal balance between brain, pituitary, and ovaries may result in;
  - estrogen and progesterone imbalances
  - changes in menstrual cycle length
  - menstrual irregularity
  - failure to ovulate

Menstrual Cycle Effects (cont'd)

- Potential causative factors;
  - stress - e.g. physical and/or emotional
  - chemicals - e.g. carbon disulfide, xylene
  - metals - e.g. inorganic mercury
  - ionizing radiation

Infertility and subfertility

- 10%-15% of all couples are unable to conceive after 1 year of trying.
- Infertility evaluation includes assessment for;
  - Damage to the egg or sperm.
  - Hormonal abnormalities

Miscarriage and Stillbirths

- 1 in 6 pregnancies - miscarriage
- Occur for many reasons:
  - egg or sperm may be damaged so that the egg cannot be fertilized or cannot survive after fertilization.
  - Hormonal imbalance
  - Fetus may have not developed normally
  - physical problems with uterus or cervix.

Birth Defects

- 2-3% of births - major birth defect
- Most cases the cause is unknown
- First 3 months of pregnancy- most important
- Many women unaware that they are pregnant during much of this critical period.

Low Birth weight and Premature Birth

- 7% of U.S. births are born prematurely or are underweight.
- More likely to become ill and die during first year of life.
- Potential causes;
  - Poor maternal nutrition
  - smoking
  - alcohol use during pregnancy

Developmental Disorders

- Sometimes the brain of the fetus does not develop normally, which leads to developmental delays or learning disabilities later in life.
- 10% of children in the U.S. have some form of developmental disability.

Childhood Cancer

- Ionizing radiation has caused cancer in some children whose mothers were exposed during pregnancy.
- Preventive measures;
  - minimize use of X-ray on pregnant women
  - use of newer equipment that reduces the risk of exposure
  - use of protective shields

Routes of Worker Exposures

- Inhalation
- Skin absorption
- Ingestion
- Family members can be exposed by workers carrying the toxin home on skin, clothing, hair.

Exposures Prevention

- Employers are responsible for training and protecting their workers.
- Employees are responsible for learning about the hazards in their workplace, using PPE, and following proper work practices.

General Duty Clause

- Employer may be cited under section 5a(1) of the "general duty clause" of the Occupational Safety and Health Act of 1970;
  - for failing to provide working conditions free from recognized hazards likely to cause serious harm.

Exposure Prevention (cont'd)

- Store chemicals in sealed containers when not in use.
- Wash hands after contact with hazardous substances and before eating, drinking, or smoking.
- Avoid skin contact with chemicals
- Review all MSDS's to assess for workplace reproductive hazards

Prevent Home Contamination

- Leave contaminated clothing at work
- Store street clothes in separate area
- Wash work clothing separately
- Avoid bringing contaminated clothing or objects home.

Clinical Aspects

- Some physicians may respond to the women who asks, "Will compound X hurt my baby?" by writing "No chemical use allowed" on a slip.
- DO NOT DO THIS!!
- This may increase anxiety and liability

Clinical Algorithm

- Four categories:
  - woman may continue working
  - woman may continue working, job modification is desirable
  - woman may continue working only with job modification
  - woman may not work

Clinical Algorithm (cont'd)

- These categories are dependent to an extent on exposure limits.
- The published OSHA and ACGIH standard recommended thresholds can be used as starting points for exposure limit guidelines.

Clinical Resources

- NIOSH published *Guidelines on Pregnancy and Work* (publication no. 78-118) in 1978 which contained an algorithm for medical management of the pregnant worker. This can now only be ordered from the National Technical Information Service (NTIS) stock #PB83179952 @ (800)553-6847 or at www.NTIS.gov.
- NIOSH.gov

Guidelines for continuation of various jobs

- Secretarial/clerical — 40 weeks gestation
- Professional/Managm. — 40
- Sitting/light task
  - prolonged (>4 hrs) — 40
  - Intermittent — 40
- Standing
  - Prolonged (>4 hrs) — 24
  - Inter. (>30 min/hr) — 32
  - Inter. (<30 min/hr) — 40

Guidelines for continuation of work (cont'd)

- Stooping/Bending
  - repetitive(>10x/hr) — 20 weeks gestation
  - Intermittent(2-20x/hr) — 28
  - Intermittent(<2x/hr) — 40
- Climbing
  - Vertical ladders/poles
    - repetitive(>4x/8hrs) — 20
    - intermittent(<4x/8hr) — 28
  - Stairs
    - repetitive (>4x/8hr) — 28
    - intermittent(<4x/8hr) — 40

Guidelines for continuation of work (cont'd)

- Lifting
  - repetitive
    - <25lbs — 40 weeks gestation
    - 25-50lbs — 24
    - >50lbs — 20
  - Intermittent
    - <25lbs — 40
    - 25-50lbs — 40
    - >50lbs — 30

Clinical Determination

- Clinical determination of work-relatedness of adverse reproductive outcomes must be based on;
  - evaluation of the workplace
  - workplace surveillance data
  - knowledge of epidemiology (background)
  - patient's physical exam and lab findings
  - medical literature search

Questions?

THE END

Disability / Impairment Evaluation

Richard D. Vatt, DO, MPH
Basic Course Part III
October 30, 2011

Objectives

- Compare and contrast three types of disability or income replacement programs
- Highlight the physician's participation in the three different programs
- Review the Physician's contribution to the disability process
- Understand why an IME is requested
- Review the characteristics of a good IME

Three Disability/Income Replacement Programs

- Social Security
- Workers Compensation
- Disability Insurance

Areas of Comparison/Contrast

- Authority
- Definition of disability
- Administrative process
- Conclusion/End point for benefits
- Source of funding

Social Security

- Authority
  - Federal program
  - Dept. of Health and Human Services
- Definition of disability
  - Disability per se
  - Disability in fact

Social Security (cont'd)

- Disability per se
  - Defined by Code of Federal Regulations
  - Not working
  - Age less than 65 years
  - Worked 5 years of past 10 years
  - Unable to work for 12 months
  - FICA taxes paid
  - Terminal illness

Social Security (cont'd)

- Disability in fact
  - Same criteria as disability per se except
  - Impairment fails to meet CFR listings
  - Assessment of residual functional capacity
  - GRID Factors:
    - Age
    - Education
    - Work experience
    - Transferable skills

Social Security (cont'd)

- Administrative process
  - Initiate Claim
  - Medical documentation
  - Administrative review
  - Medical evaluation
  - Medical review of documentation and data
  - Administrative Appeal

Social Security (cont'd)

- Conclusion/End point for benefits
  - Age of retirement
  - Return to work
  - Death
- Source of funding
  - Social Security taxes (employer, employee)

Workers Compensation

- Authority
  - State program
  - Legislation
- Definition of disability
  - No fault
  - Work related injury or illness
  - Income replacement
  - Medical expenses

Workers Compensation (cont'd)

- Administrative process
  - Illness or injury
  - Notify employer
  - Acceptance/Contested
  - Administrative review
  - Fitness for duty determination
  - Appeal process

Workers Compensation (cont'd)

- Conclusion/End point for benefits
  - Return to work
  - Maximum Medical Improvement
  - Impairment rating ("Disability determination")
  - Litigation
- Source of funding
  - Employer paid premiums
  - Subsequent Injury Trust Fund

Disability Insurance

- Authority
  - State charter or license
  - State Insurance Commissioner
- Definition of disability
  - Defined by the terms of the contract

Disability Insurance (cont'd)

- Administrative process
  - Notify insurer of a claim
  - Documentation (personal, medical, financial, eligibility)
  - Review process
  - Independent assessments
  - Appeals process

Disability Insurance (cont'd)

- Conclusion/End point for benefits
  - Defined by the contract
- Source of funding
  - Employer contributions
  - Individual contributions

SUMMARY

	Soc Sec	WC	Ins
Authority	Federal – DHHS Code of Fed Regs	State program Legislation	State charter or license State Ins Commissioner
Definition	No work 12 months CFR listings Grid	Work related No fault Medical tx, Lost wages Fitness for duty	Terms of contract
Process	Application Documentation Review Appeal	Notification Acceptance/Contested Administrative review	Notification Documentation Review Assessment Appeal
End point for benefits	Age/Retirement Return to Work Death	Return to work Maximum med improve Impairment rating	Terms of contract
Funding	Employer Employee	Employer Subsequent Inj Trst Fnd	Employer Employee/Individual

Physician's Contribution

- Medical evaluation and documentation
- Define functional expectations
- Define Restrictions and Limitations (R/Ls)
- Communication
- Encourage timely return to functional independence and return to work

Physician's Contribution

1. Medical evaluation and documentation
- Cost effective
- Evidence based

Physician's Contribution

2. Define functional expectations
- Make it part of the treatment plan
- Focus on restoration of overall function
-Participation and recovery is influenced by the physician

Physician's Contribution

3. Define appropriate and adequate R/Ls
- May be the result of diagnosis or treatment
- Apply to work and non-work activities

Physician's Contribution

Definitions:

RESTRICTION: Any protective measures required to prevent injury or foster recovery.

LIMITATION: Any existing constraints in the employee's physical or mental capability to perform tasks.

Physician's Contribution

Definitions continued:

APPROPRIATE: The R/L applies to the reported condition and/or treatment.

ADEQUATE: The R/Ls are sufficient to cover the reported condition and/or treatment.

Physician's Contribution

3. Define appropriate and adequate R/Ls
- Based on demonstrated impairment
  - > Patient's report
  - > Clinical experience
  - > Result of evaluation or testing

Physician's Contribution

4. Communication
- Patient
- Employer
- Third party (Insurance, Work Comp, etc.)

Physician's Contribution

4. Communication (Release of information)
- Maintain patient confidentiality
- Patient authorization to release information
- Release of appropriate information
- Patient right to examine and obtain a copy of the medical record.

Why Order An IME?

- Documentation does not support the conclusions being presented
- Conflicting information
  - Diagnosis
  - Treatment
  - Functional Ability

Characteristics Of A Quality IME

- Independent
- Medical
- Evaluation
- Things to Consider
- Reports

Characteristics Of A Quality IME : Independent

- No conflict of interest
- Understand expectations of requester

Characteristics Of A Quality IME : Medical

- Not a physician-patient relationship
- Medical records and other documentation available
- Apply scientific basis
- Appropriate specialty or training

Characteristics Of A Quality IME : Evaluation

- Apply scientific principles
- Assess available information and data
  - Thorough documentation
  - Identify and explain inconsistencies
  - Validate facts
- Demonstrate functional abilities
- Seek ecological validity

Characteristics Of A Quality IME : Things to Consider

- Missing documents or records
- Copies of imaging studies versus reports
- Ordering lab work or tests
- Scheduling the appointment
- Billing and payment

Characteristics Of A Quality IME : Reports

- Thoroughly document history and exam
- Organized
- Understandable
- Logic trail
- Distribution
- Timeliness of completion

Treatment Guidelines

- Some State Legislatures have established an authoritative treatment guideline
- Commercial product
  - AOCOPM
  - Official Disability Guidelines (ODG)
- State written guideline - CO, WA, WV

Treatment Guidelines - cont'd

- Organizational product
  - Medical specialty college
  - National Guideline Clearinghouse
    - www.guideline.gov
  - Hayes, Inc (www.hayesinc.com)
- Evidence-based medicine literature
- Peer Review

QUESTIONS?

Drug Testing For the non-MRO

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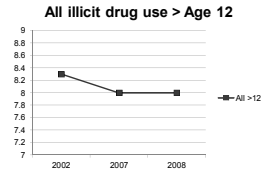
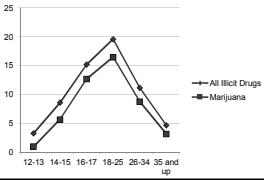
WVU Institute of Occupational and Environmental Health

Drug Abuse Basics

- Prevalence (2008)
  - Any illicit drug use past month **8.0%**
  - Marijuana use past month **6.1%**
  - Non-prescribed psychotropic **2.5%**





Employer Impact of Substance Abuse (Drugs & ETOH)

- Ten times more likely to miss work
- 3.6 times more likely to be involved in on-the-job accidents (and 5 times more likely to injure themselves or another in the process)
- Five times more likely to file a worker's compensation claim
- 33% less productive
- Responsible for health care costs that are three times as high

American Council for Drug Education, 2011

Talk Outline

- Vocabulary
- Regulated vs Non-Regulated
- Reasons for testing (Donor Selection)
- The Collection Process
- Lab Analysis
- Potential lab outcomes
- Potential MRO outcomes
- Special Topics

Vocabulary

- Donor
- Collector
- MRO – Medical Review Officer
- Regulated Test
- Unregulated Test
- Matrix

For-Cause Testing

- Supervisor Initiated
  - Apparent impairment at workplace
  - Supervisors trained to identify
  - Employer can request "Reasonable Suspicion" testing at any time while working (generally a requirement of employment)

"Post-Accident" Testing

- "Regulated" testing following crashes involving CDL drivers, drug & ETOH
- Others as determined by employer
- Special rules for public transit operators (bus, train, plane) under NTSB regulations
- Fatalities (of dead worker, OSHA Reg)
- Often broader screen, usually using blood, urine, and occasionally other fluids as the matrix (humors from eye in fatalities)

Random Testing

- Donor selection MUST be truly random
- Frequency of Selection variable:

	UDS	ETOH
– FMCSA	50%	10%
– FRA	25%	10%
– FTA	25%	10%
– FAA	25%	10%
– PHMSA	25%	N/A
– USCG	50%	N/A

Return to Work

- After Failing a Drug Test
- Completed program prescribed by SAP
- Special Collection Procedures
  - Pre-Collection "Pirouette"
  - MUST have "negative" result
- For post-failed drug test ONLY

Follow-up Testing

- After Failing a Drug Test
- Completed program prescribed by SAP
- Schedule per SAP
- Keep Schedule secret from donor
- Special Collection Procedures
  - Pre-collection "Pirouette"
- For post-failed drug test ONLY

Types of Testing

- "Regulated"
  - DOT
    - Commercial Drivers
    - Commercial Airplane Pilots
    - Coast Guard (Dock hands, captains, etc)
- Others with Regulations about testing
  - Nuclear Industry
  - Military / DoD
  - Other agencies usually follow DOT Regs

Types of Testing

- Non-Regulated
  - Employer Directed (Drug-Free Workplace Act)
    - Whatever testing the company wants
      - In Hiring
      - For Cause
      - Almost any imaginable combination of timing, drugs screened, and matrix
  - Legally required
    - After Car Wreck (DUI testing)
    - Upon incarceration

Types of Testing

- Non-Regulated
  - Medical testing
    - Emergency Department (Especially Trauma)
    - Pain Clinic Monitoring
  - Athletes
  - Parenting Issues
  - Legal/Regulatory Requirement
    - For licensure of at-risk professionals
    - Parole requirement
    - Family Court Issues

Matrix (Substrate) Tested

- Regulated (DOT)
  - Almost exclusively Urine
  - Breath
- Non-Regulated
  - Urine in most programs
  - Hair
  - Saliva
  - Sweat
  - Breath
  - Blood

Regulated Testing process

- Selection and notification of the “donor”
- Detailed Collection Procedure
  - Photo or personal identification
  - Empty and invert pockets
  - Prepare collection room
  - All specimen handling until sealed done in donor’s presence (& initialed)
  - Specimen Temperature (90-100 °F) and color
  - Signed/initialed collection documents

Regulated Testing process

- To certified testing Lab via courier
  - Usually fed-ex, UPS, DHL, etc.
- Testing centers do a qualitative screen
  - On-site screening used in some programs (Testcup, Instatest, etc.)
- Specific Gravity
- Creatinine
- Review for suspected adulterants

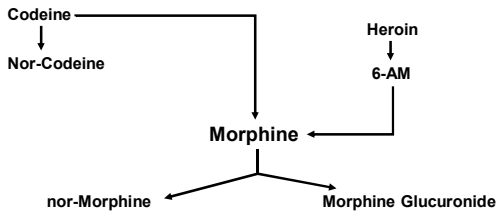
Regulated Testing process

- If:
  - Initial drug screen negative
  - adulterant screen negative
  - normal creatinine (>20)
    - If Cr < 20m then specific gravity also reported
- Reported as negative
- Urine Discarded - No further testing

Regulated Testing process

- If screen positive
  - Confirmatory GC-MS to confirm both the drug/metabolite and quantitate the level
  - Some drug positives receive further testing
    - Opiate → 6-MonoAcetyl Morphine (6-MAM) testing
      - Allows for identification of heroin
    - Methamphetamine
      - Chirallity testing (L-Legal vs D-Dirty)

Opiate Metabolism



Regulated Testing process

- If confirmatory testing positive
- Notification to MRO
  - Positive screening test(s)
  - Drugs/Metabolites Positive and levels found
  - Results of Additional Tests
  - Irregularities with paperwork or collection process

Regulated Testing process

- MRO notified of positive
- MRO contacts Donor to review medical history
  - Looking for "medical" explanation for positive
  - Looking for "medical" explanation for tests suggesting possible adulteration or substitution (renal disease)
- Must allow donor up to 3 days to offer proof of prescription or other medical condition
- Can require physical evaluation/documentation
- Must explain split specimen options and procedures

Result = Negative

- Negative Screening Test
- Confirmatory test below threshold following positive screening test
- Appropriate Creatinine and SG
- Legitimate medical explanation
  - For use of drug
    - Current (legal) Prescription
  - For Abnormal Result
    - e.g. Low Spec Gravity in Pt with Diabetes Incipitis

Result = Positive

- Positive Confirmatory Test
- Without verified medical explanation
- Failure to respond to MRO contacts
- Failure to provide requested verification of prescriptions or medical condition

No Medical Explanations (Allowed)

- + 6-MAM (even if opiate negative)
- + Phencyclidine (PCP)
- + ETOH (Above cutoffs) - (No MRO involvement)
- **Always reported as positive**, regardless of medical information offered!

Result = Test Cancelled

- Fatal flaw in collection/processing
- Invalid result
  - Medication Interference
  - Other Interference
- If collection process error, then recollect with normal procedures
- If invalid result from lab - immediate re-collection with the direct observation

Result = Refusal To Test

- No Specimen Provided
  - Failure to report for testing
  - Failure to comply with collection regulations
  - No Photo ID
  - Failure to provide urine without medical explanation
- Specimen Adulterated
- Specimen Substituted

Substitution

- Definition: Providing a specimen other than Donor's Urine
- Options Abound – Especially on the internet and at truck stops
- http://www.thewhizzinator.com
- Other less complicated options

Adulterants

- Definition: Adding substances to the specimen in an effort to mask the presence of drugs or metabolites
- Options Abound
- http://www.passthetest.com
  - Also sell a variety of body cleansing regimens
    - Urine cleansers
    - Teas and Shakes
    - Special Shampoos

Testing for Substitution and Adulterants

- Lab or on-site testing (Intect™ 7 Test Strips)
  - Creatinine
  - Nitrite
  - Gluteraldehyde
  - pH
  - PCC
  - Bleach
  - Specific Gravity

Alcohol Testing

- Regulated
  - Upon hiring
  - For Cause
  - Random for airline pilots
- Unregulated
  - Usually only for cause

Alcohol Testing

- Matrix
  - Breath
  - Saliva
    - If using saliva for screening, must have backup breath testing for positives
- Cutoffs are DOT mandated
- No MRO role, BAT certifies positive
- No medical review since no medical reason for positives while working.

What About ADA?

- Drug addiction is a medical/psychiatric condition
- **Current** drug users are specifically excluded from protection under ADA
- Prior drug users (now clean) are protected under ADA

On-site Screening

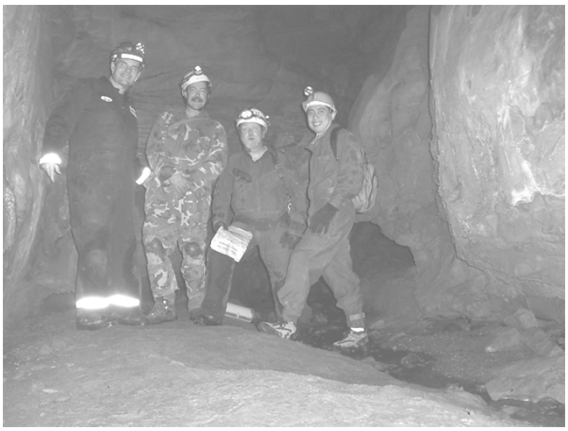
- Testcup

Options for Positive Tests

- DOT → SAP evaluation → RTW (Per SAP)
- Unless negotiated otherwise, employers have no legal responsibility to employees who fail drug testing
- Many employers offer a rehab program to current employees, however this is NOT required (some programs are Draconian)

Relations with Employers

- Unless exclusively DOT, insist on written policy
- Make sure they understand that they must follow their own policy, no matter how valuable the employee
- Offer Rehab? Who Pays?
- Follow-up testing
- For-cause testing – What triggers?



¿ Questions ?

Occupational Lung Disease

Basic Course in Occupational Medicine
Lance Walker D.O. MPH

Objectives

1. Establish basic understanding of Occupational Lung Disease
2. Learn about the OSHA Respiratory Standard
3. Learn about spirometry in the occupational setting
4. Discuss the basic categories of Occupational Lung Disease

Occupational Pulmonary Disease

- Significantly under reported
- One of top ten causes of occupational disability and death
- Importance of Recognition and Diagnosis
  - Minimizes health effects and disability
  - Enables appropriate treatment and response (including compensation)
  - Identification to prevent future exposures

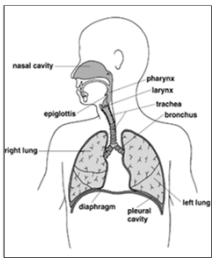
Respiratory Tract

- Frequent Site of Injury from Occupational Exposures
  - Responses of Respiratory Tract to Injury
    - Acute include; sinusitis, laryngitis, bronchitis, alveolitis, and pulmonary edema
    - Chronic include; asthma, bronchitis, bronchiolitis, parynchymal fibrosis, bronchiolitis obliterans, pleural fibrosis, and cancer

Respiratory Tract

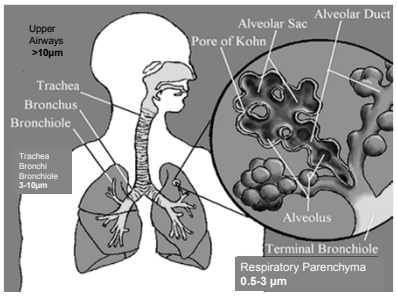
- Size Matters
  The smaller the particle the deeper it goes in the lung 5µm usually the cutoff between upper and lower airway (metal fumes and asbestos fibers)
- Solubility Matters
  The less water soluble the further down in the lungs the substance goes (phosgene and nitrogen oxides)

Respiratory Tract



Water Solubility	Level of Impact	Compounds
High	Eyes	Aldehvdes
	Nose	Ammonia
	Pharynx	Chlorine
	Larynx	Sulfur Dioxide
Medium	Trachea	Ozone
	Bronchi	
Low	Bronchioles	Nitrogen
	Alveoli	Phosgene

Particles in The Lung



Being a Good Occ Doc

- Industrial process (onsite visits)
- Job duties and tasks
- Protective equipment?
- Worksite evaluation (ventilation system, enclosed space?)
- Specific chemical exposure (MSDS)
- Physical form of exposure (dust vapor, etc)
- Understanding health effects of exposure
- History of plant compliance/ monitoring
- Employee relations and litigation

How do we measure risk?

- Risk is not = to Exposure alone
- Risk is not = to Toxicity alone
- Risk= Toxicity x Exposure

Exposure Dose vs. Response

- 1 Aspirin/Day → Protects CVD
- 5 Aspirin/Day → Cures Headache
- 20 Aspirins/Day → Relives Arthritis
- 90 Aspirins/Day → Lethal

Exposures

- Timing of symptoms in relation to work
  - Worse at work or better at home
  - Coincide with introduction of new exposure or change in job description
  - Re-exposure relationship
- Evaluation of non-work exposures
- Home environment
- Recreational activities

Factors for host susceptibility

- Age
- Genetic make-up
- Co-morbid disease
- Nutrition
- Exposure Data
- Atopy
- Race
- Gender
- Cigarette Smoking
- Physical capacity
- Emotional factors

Physician's Role in Diagnosis

Occupational History
- Include all work experiences
- Explore known and suspected exposures
- Hobbies
- Environmental exposures
- History of present illness (Symptoms)

Physician's Role in Diagnosis

Physical Examination
- Symptom overlap in lung disease
- Insensitive for mild respiratory disease
- Cyanosis, Clubbing
- Skin and Mucosal Irritation
- Lung examination
- Cor Pulmonale

Physician's Role in Diagnosis

Imaging Studies
- CXR routine part of workup, normal CXR does not rule out disease and findings do not necessarily correlate with degree of injury
- Insensitive for mild respiratory disease
- ILO classification for Pneumoconioses B reader
- CT more sensitive than CXR, HRCT even more sensitive

Physician's Role in Diagnosis

Pulmonary Function Testing
- Detect and quantitate abnormal lung function
- Spirometry needs to be done properly, ATS 2010 statement, NIOSH training for technicians
- Predicted values for Spirometry based on age and height with race correction
- PEFR Testing
- Inert gas dilution or body plethysmography, DLCO

Physician's Role in Diagnosis

Other Tests
- Bronchoprovocation
- Immunologic
- Bronchoscopy
- Lung Biopsy

Prevention of Occupational Lung Diseases

- OSHA 29 CFR 1910.134
- OSHA standard for workers required to wear respirators

Questionnaire: Appendix C

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9783

- Remember PPD is the final step in your hierarchy of controls

Evaluation for Respirator Use

- Must provide a medical evaluation to determine employee's ability to use a respirator
  - ***before fit testing and use***
- Must identify a **physician or other licensed health care professional (PLHCP)** to perform medical evaluations using a medical questionnaire or an initial medical examination that obtains the same information as the medical questionnaire (information required is contained in mandatory Appendix C).
- Annual review of medical status is not required unless there is a change in job status or respirator type.

The Most Important Questions

- Have you worn a respirator before?
- Have you had any problems with respirator use in the past?
- Are you able to perform the function of your job while wearing a respirator?
- What is your job and what type of respirator are you wearing? (very important)

Medical Exam

- Must obtain a **written recommendation** regarding the employee's ability to use the respirator from the PLHCP.
- Additional medical evaluations are required when:
  - employee reports medical signs or symptoms related to ability to use respirator;
  - PLHCP, program administrator, or supervisor recommends reevaluation;
  - information from the respirator program, including observations made during fit testing and program evaluation, indicates a need;
  - change occurs in workplace conditions that may substantially increase the physiological burden on an employee.

Medical Exam For Respirator Use

- May be questionnaire only
- May be hands on exam
- May be Pulmonary Function Testing
- May be imaging studies
- May be referral to a specialist
- May be all of the above!!

- You are the Occ Doc and you decide, remember this is your opportunity to detect and prevent disease, use it wisely, counsel on other health issues, hypertension, obesity, smoking, exercise, vaccinations, etc.

SPIROMETRY in the Occupational Setting

Reasons for Spirometry

- Diagnostic
- Monitoring
- Occupational Reasons

Reasons for Spirometry

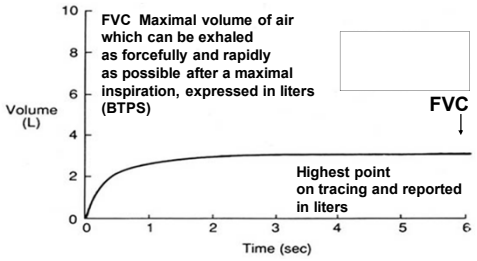
Occupational Reasons

- meet OSHA, Governmental requirements - cotton dust, asbestos
- obtain baseline
- susceptible person - high risk
- surveillance and looking for change due to exposure
- assess changes from removal from exposure
- Respirator Clearance
- Disability and Impairment

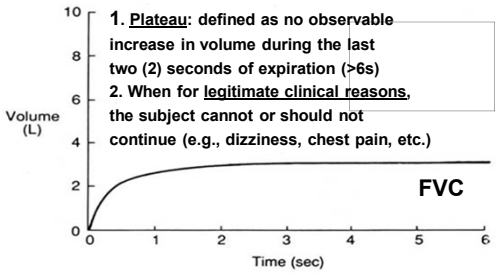
Spirometry the Basics

- Essential test for the Occ Doc
- Lots of variation in test quality
- You need to know if a test is valid in order to make medical decisions based on that test
- Efforts have been made in standardization of testing but…

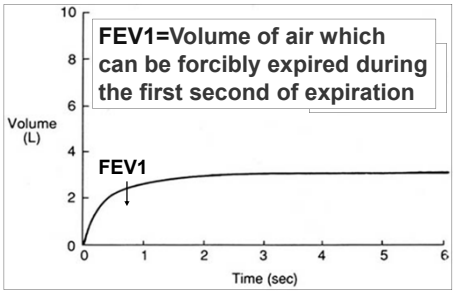
Forced Vital Capacity



End of Test Criteria (ATS-1987)



FEV1

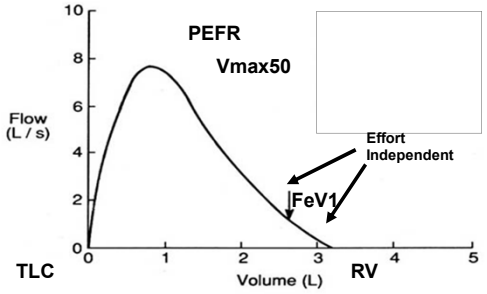


FEV1/FVC%

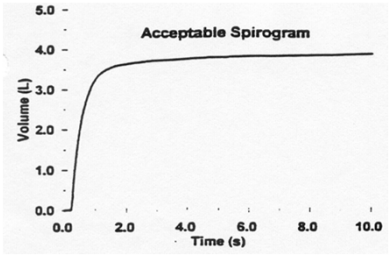
FEV1 expressed as a % of FVC

- expresses the volume of air the patient exhales in one (1) second as a % of the total volume of air that he/she exhales
- FEV1/FVC ratio is calculated by using the largest valid FEV1 and the largest valid FVC even if the FEV1 and FVC are not from the same tracing

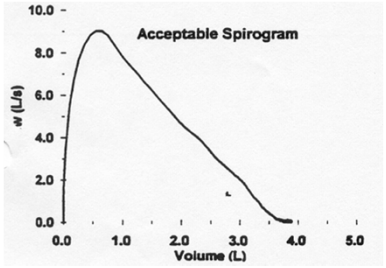
Expiratory Flow Volume



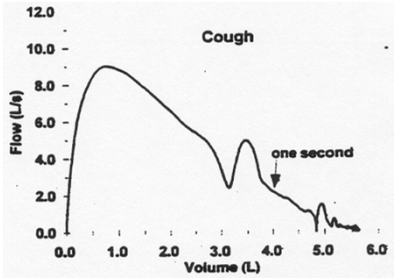
Acceptable Time Spirogram



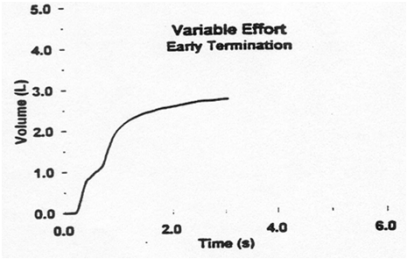
Acceptable Flow-Volume Spirogram



Cough-EFVC



Unacceptable



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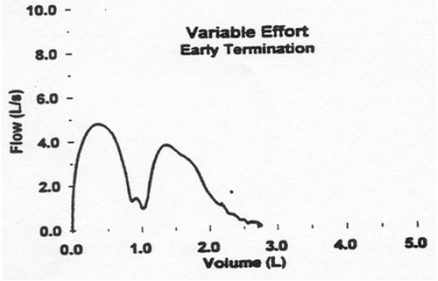
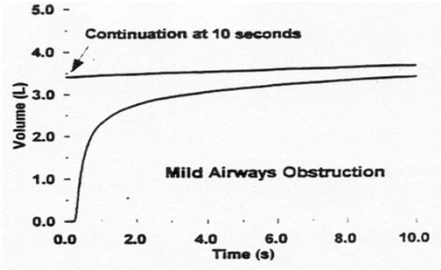


Acceptable



Criteria for a Valid Test

- Three Acceptable Tracings not just accepted
- Two matches, FEV1 and FVC within 150 ml of each other

Restrictive vs. Obstructive Lung Disease

- Restrictive Disease - Lungs stiff can't take in full deep breath. Low FVC, normal FEV1, increased or normal ratio.
- Obstructive Disease - Lungs lose natural spring back, FEV1 is decreased, FVC normal, low ratio
- Mixed, low FEV1, Low FVC
- ACOEM Position Statement, Spirometry in the Occupational Health Setting 2010 Update

Categories of Occupational Lung Disease

1. Toxic Inhalation Injury
2. Occupational Asthma
3. Hypersensitivity Pneumonitis
4. Inhalation Fevers
5. Metal Induced Lung Disease
6. Pneumoconioses

Clinical Outcomes of Occupational Lung Disease

1. Asthma
2. COPD
3. Bronchiechtisis
4. Bronchiolitis Obliterans
5. Pulmonary Fibrosis
6. Cancer
7. Pleural Disorders

Toxic Inhalation Injury

Short Term Exposures to High Concentrations of noxious gases, fumes or mists

- Think: Firefighting, Spills, Accidents
- Site of injury depends on physical and chemical properties of inhaled agent, size and solubility
- Degree of injury also depends on time of exposure and minute ventilation

Toxic Inhalation Injury

Effects

- Vary depending on agent, concentration exposure time
  - Transient mild irritation of mucous membranes to ARDS
- Long term sequelae may include bronchietasis, bronchiolitis obliterans and persistant asthma

Toxic Inhalation Injury Evaluation and Management

- What is the causative chemical?
- Physical Findings
  - Look for burning of the nose or throat Hoarseness, Stridor, Wheezing
  - CXR may be normal initially, chemical pneumonitis and ARDS findings 4-8 hour delay
  - ABGs likely to show hypoxemia prior to radiographic findings
  - Observation for at least 24 hours

Toxic Inhalation Injury Evaluation and Management

- Irrigation of exposed cutaneous and conjunctival areas with water
- Laryngoscopy, Bronchoscopy, Spirometry
- Consider intubation if laryngeal edema
- Oxygen, Bronchodilators, ABGS
- Aggressive Bronchial Hygiene
- Steroids, ABX maybe
- Essentially supportive care
- Consider long term follow up of exposed individuals

Train Derailment Kills 9 in 2005

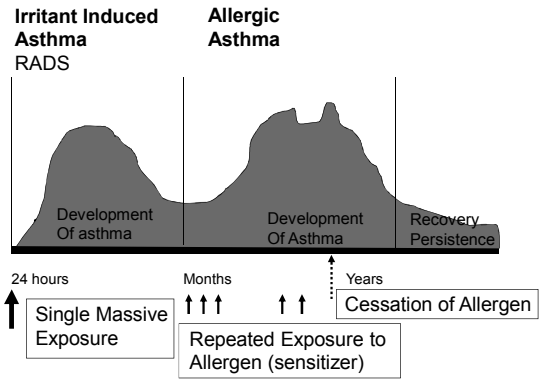
Occupational Asthma

- Is "Asthma caused by exposure to agents encountered primarily (and usually exclusively) in the working environment?"

Hendrick, D, Burge, S, Beckett, W, Churg, A. Occupational Disorders of the Lung: Recognition, Management, and Prevention. WB Saunders 2002

Types of Occupational Asthma

- Occupational Asthma with a latency period encompasses asthma of immunologic mechanism
- Occupational Asthma without a latency period Immunologic Mechanism is not operative Irritant Induced Asthma (RADS)



Cause and risky jobs for allergic asthma (IgE positive) with latency period

- Bakery workers
- Animal handling
- Metal working operations
- Dusts from flours, grains, gluten, alpha-amylase, mites, molds
- Mouse, rat, guinea pig urine and serum proteins on bedding
- Dusts form tungsten carbide containing cobalt, nickel, platinum, chromium, metal working, fluid aerosols

Cause and risky jobs for allergic asthma (IgE positive) with latency period

- Working in health care facility
- House keeping work
- Food, fish, processing
- Latex gloves, biocides
- Dust from mites, animal dander, molds
- Aerosol/dust of clam, shrimp, lobster, various fish, food additives, spices

Culprits in Occupational Asthma

Diisocyanates - polyurethane, insulation, upholstery

Vegetable dusts, Cotton, Hemp Flax and Jute
Byssinosis Specific Cotton Dust Standard

Metal Salts - platinum refining, jewelry making, fluorescent manufacture

Acid Anhydrides - epoxy resins

Wood Dusts- woodworkers,

Host Determinants

- Atopy
  Associated with sensitization to high molecular weight agents
- Histocompatibility genotype
  HLA class II antigens
  Genetic polymorphism

- Cigarette smoking
  Sensitization to high molecular weight agents that produce IgE Synergistic effect with Atopy

Diagnosis

- Suspected in new onset asthma
  - Obtain good occupational history
- Pulmonary Function Testing
  - Airway hyperreactivity
    Methacholine challenge
  - Exaggerated PEF
- Peak expiratory Flow Rate
  - May help identify agents
- Skin Testing
  - High molecular weight compounds
    Vegetables, dusts, grains, Animal proteins, Metals; Chemicals, TDI
  - Not available for low molecular weight
- Inhaled preparations
  - Suspected antigen
  - In the workplace

Management

- A favorable prognosis is dependent upon:
  - Rapid diagnosis
  - Early removal
  - Improvement plateaus two years after cessation of exposure

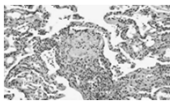
Remember Hierarchy of Controls

- Drug treatment does not differ from that for non-occupational asthma

Hypersensitivity Pneumonitis

Extrinsic Allergic Alveolitis





Hypersensitivity Pneumonitis

- Immunologically mediated inflammatory disease of the lung parenchyma
- Many antigenic culprits, basic clinical and pathologic findings are similar

Hypersensitivity Pneumonitis

- Lymphocytic alveolitis and granulomatous pneumonitis with resolution if antigen exposure is terminated early
- Continued antigenic exposure can lead to progressive interstitial fibrosis

Hypersensitivity Pneumonitis

- Relatively small number of exposed persons develop HP
- TYPE III and TYPE IV Hypersensitivity Reactions

Farming, Vegetable and Dairy Cattle Workers

- Inhaled Bacteria; Thermophilic bacteria (T. faeni, T. vulcaris)
- Inhaled Mold; Fungi Aspergillus umbrosus, A. clavatus
- Inhaled Mold Dusts (ODTS)

Occupational Cardiovascular Disorders

Elizabeth P. Clark, D.O., MPH & TM, FAOCOPM, FIAMA

American Osteopathic College of Occupational & Preventive Medicine

Occupational Medicine Basic Course Part III
OMED ORLANDO 2011

Educational Goals and Objectives

- Define key terms, phrases and exposures relevant to occupational induced Cardiovascular disorders
- Discuss the health impact and the major causes of morbidity and mortality due to Cardiovascular occupational diseases
- Describe the features of Cardiovascular diseases: burden of illness, risk factors/etiology, prevention strategies
- Discuss the key components of an occupational evaluation and demonstrate the ability to utilize screening, diagnostic and monitoring modalities

2

Cardiovascular Disease Burden of Illness

- PREVELANCE:
- Affects >81 million American adults (more than 1 in 3)
  - 74,500,000 High BP
    - 33% of U.S. adults >20 have HTN
    - >43% of African American adults (among highest HTN rates in the world)
  - CHD 17,600000
    - MI 8,500,000
    - AP 10,200,000
  - Heart Failure 5,800,00
  - Stoke 6,400,000
  - Congenital CV defects 650,000-1,300,000

Circulation JOURNAL OF THE AMERICAN HEART ASSOCIATION Heart Disease and Stroke Statistics2010 Update. 3

Cardiovascular Disease Burden of Illness

- INCIDENCE:
- Average annual rate to first CV event
  - Raise from 3/1000 in men from 35-44 y/o to 74/1000 at 85/94 y/o
- For women comparable rates occur 10 years later (gap narrows with increasing age)
- In men under age 75; most CVD events occur due to CHD

In women under age 75; most cardiovascular events are due to stroke

Circulation JOURNAL OF THE AMERICAN HEART ASSOCIATION Heart Disease and Stroke Statistics2010 Update 4

Cardiovascular Disease Burden of Illness

- MORTALITY:
- Leading cause of death, CVD in 2006 accounted for 2300 deaths per day or 1 death/38 seconds
- CHD caused 1/6 deaths in the U.S. in 2006
- Estimates for 2010
  - 785,000 Americans will have their 1st coronary attack
  - 470,000 will have a recurrent attack
  - An additional 195,000 will have their 1st silent MI

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Cardiovascular Disease Risk Factors

- **Non-modifiable factors;**

Family history (genetics and shared social/cultural environments)

Male (age adjusted risk double in men)

Age 55% of all MI's and 85% of all fatal ones occur in those 65+ years

Uncommon in premenopausal women & men <40

6

Cardiovascular Disease Risk Factors

- **Modifiable factors;**
  - ***a. Smoking:***
    - ➔ Adults who smoke die 13-14 years earlier than nonsmokers
    - ➔ 2- to 3-fold increased risk of dying of CHD
    - ➔ Mortality increases according to amount smoked
    - ➔ Risk for CHD is near normal within 2-3 years of quitting

Medical Costs $96billion Lost Productivity $97billion

Circulation Heart Disease and Stroke Statistics2010 Update

Cardiovascular Disease Risk Factors

- **Modifiable factors;**
  - ***b. Elevated cholesterol and low-density lipoprotein***

➔For every 1% decrease in LDL-C, relative risk for major CHD events decreases by 1% (*Circulation.* 2004;110:227-239.)
➔ <200 mg/dl results in low risk of middle age adults
➔ *At* ≥240 mg/dl CHD risk doubles
➔ Low risk associated with total cholesterol: HDL ratio < 3.5
➔ Estimated responsible for >40% of CHD mortality

Cardiovascular Disease Risk Factors

- **Modifiable factors;**
  - ***c. High blood pressure***

➔ Increased risk if SBP ≥140 and/or DBP ≥90
➔ 69% of people who have a 1st MI have BP >140/90
➔ Affects 33% of adult population in US
➔ Estimated to be responsible for 30% of CHD deaths
➔ Risk of ischemic heart disease reduced 2-3% for each mm hg decline in DBP

Circulation Heart Disease and Stroke Statistics2010 Update

Cardiovascular Disease Risk Factors

- **Modifiable factors;**
  - ***d. Sedentary lifestyle***
    - ➔ Physical inactivity is responsible for 12.2% of the global burden of MI after accounting for other CVD risk factors
    - ➔ Responsible for 35% of CHD deaths
  - ***e. Obesity (reported as 33% for Mississippi)***
    - ➔ Age adjusted relative risk for cardiovascular disease 20 increase if overweight increases 46% for men and 64% for obese women
    - ➔ Responsible for 13% of CVD deaths (2004)
  - ***f. Diabetes (increased risk of developing CVD 2-3 fold)***
    - ➔ CHD death rates are 2-4x higher for those with diabetes

Circulation Heart Disease and Stroke Statistics2010 Update.

Cardiovascular Disease Primary Prevention Strategies

- ***a. Smoking***
  - ➔ Tobacco use prevention
  - ➔ Smoking cessation
- ***b. Physical Activity***
- ***c. Consumption of a healthy diet (low in fat and cholesterol)***
- ***d. Alcohol consumption***
  - ➔ Light consumption (< 2 drinks/day) reduced MI risk 25-45%
  - ➔ Must balance "other risks" associated with alcohol use

Cardiovascular Disease Primary Prevention Strategies (Insufficient evidence)

- ***Aspirin prophylaxis:***
  - ➔ May prevent CHD in persons at increased risk (must weigh risks)
  - ➔ Slight increase in hemorrhagic CVA
- ***Estrogen-replacement therapy:***
  - ➔ Risk of CHD reduced 45% in postmenopausal women
  - ➔ Risks of endometrial and breast cancer must be weighed

Return to Work Evaluations

- ***Most Common evaluations;*** post MI, CABG and angioplasty
  - Rehabilitation includes Education, exercise and encouragement to RTW
- ***Work disability after MI:*** related to several personal variables
  - Age, socioeconomic status, education, culture
- ***Psychological factors:*** stress, self-assessed health, depression, perception of work demands
- ***Cardiac indicators;*** angina, past MI, severity of AMI, LV function, exercise tolerance
- ***Job related factors;*** physical workload, financial incentives

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Return to Work Evaluations Clinical Assessment

Main goal is to ***SAFELY*** increase RTW rates

- Dependant on extent of MI
  - Uncomplicated sedentary work; RTW 2-4 weeks
  - Uncomplicated strenuous work: RTW 4 weeks after symptom limited stress test
- All others RTW will be based on: physical exam, physical capabilities, exercise stress test, LV dysfunction on echocardiogram

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Work and Demand

- U.S. Department of Labor
  - Classifies jobs from sedentary to very heavy depending on the energy expenditure required

PDL	HR	ENERGY
Sedentary	70-80	1.5-2.1 METS
Light	81-90	2.2-3.5 METS
Medium	91-110	3.6-5.5 METS
Heavy	111-130	5.6-7.5 METS
Very Heavy	130+	7.5+ METS

	METS
Sitting	1
Sweeping	1.5
Driving a car	2
Ironing	3.5
Showering	3.5
Bowling	3.5
Sex	3.7-5
Golfing	4
Gardening	4.5
Tennis	6
Lawn Mowing	6.5
Shoveling	7
Skiing	8

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DOT Recommendations for RTW

- 1 week after elective PCI for stable angina
- 2 months after MI & no recurrent angina
  - ETT 4-6 weeks after MI pt should be able to
    1. achieve 6 METs (standard Bruce protocol)
    2. 85% of maximal HR
    3. LVEF >40% on echo
- 3 month waiting period after CABG

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Occupational Cardiovascular Disease
Complicating Factors

- Common in absence of occupational exposure
- Nonspecific
- Difficult to document toxic levels
- May be prolonged latency period
- Interaction among other risk factors

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Evaluation of Patients

- Detailed occupational History
- Examine industrial hygiene data
- Evaluate other risk factors
- Perform complete Physical exam
- Diagnostic studies

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Occupational Exposure
Cardiotoxins

- Carbon Monoxide
- Carbon Disulfide
- Organic nitrates
- Solvents
- Miscellaneous

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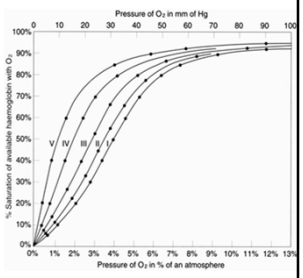
Carbon monoxide

High risk occupations:

Fork lift operator, foundry worker, miners, mechanics, garage attendants, firefighters

- Decrease delivery of oxygen
- Headache at levels <10%- may have nausea, fatigue, dizziness, dimmed vision at higher levels
- 20% Dizziness, nausea, and syncope, arrhythmias 25%
- 30% Visual disturbances
- 40% Confusion and syncope
- 50% Seizures and coma
- 60% Cardiopulmonary dysfunction and death



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Carbon monoxide

- ***Laboratory findings,*** elevated carboxyhemoglobin
- ***T1/2:*** room air 4-6 hours,
  60-90 minutes at 100% oxygen,
  < 25 minutes in hyperbaric chamber at 2atmos
- ***ABG:*** Likely to have normal PaO2, respiratory alkalosis, lactic acidosis
- ***EKG changes:*** associated with angina, delayed av conduction and ventricular repolarization
- ***TLV:*** 25ppm which is 2-3% concentration
- ***Treatment:*** removal, oxygen

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Cardiovascular Abnormalities
Carbon Disulfide

- ***Used as solvent;*** rubber and viscose rayon industries, pesticide mixed with carbon tetrachloride, ammonium salts, degreaser
- ***Pathogenesis:*** complexes with trace metals in the body and inhibits enzyme systems
  - Inhibits lipid metabolism leading to increased LDL
  - Disturbs thyroid function leading to hypothyroidism
- ***CAD – seen after 5-10 years of exposure***
- ***Reports of renovascular hypertension***

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Clinical Findings

- ***Acute intoxication:*** encephalopathy, polyneuropathy, fatigue headaches, dizziness disorientation delirium
- ***Disulfiram-like reaction:*** inhibition of alcohol dehydrogenase
- ***Skin contact:*** erythema, pain, burns
- ***Cardiovascular:*** atherosclerotic disease, angina, MI, EKG-ischemia, delayed conduction
- ***Diagnostic labs:*** , serum thyroxine, LDL
- ***Treatment:*** removal from exposure may have improvement in retinal circulation, symptomatic treatment

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Organic Nitrates

Ammonium, Sodium Nitrate, Ethylene Glycol Dinitrate, Nitroglycerin (Glyceryl Trinitrate), and TNT

- ***Munitions workers:*** explosive manufacturing, weapons handling
- 1950's epidemic of sudden death in young munitions workers after abrupt withdrawal from organic nitrate exposure who hand packed cartridges

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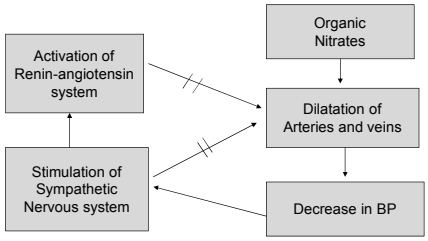
"Monday Morning Angina"

- ***Pathogenesis:*** Vasospasm typically occurs 2-3 days after last nitrate exposure



Adapted from Current Occupational & Environmental Medicine Fourth edition

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Organic nitrates

- ***Symptoms:*** typical for Ischemic CAD
- ***Labs:*** EKG, CPK, Troponin I
- ***Treatment:*** Cardiac nitrates, Ca blockers
- ***Other exposures:*** "trinitrophenylmethylnitramine"

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Case Presentation

- 14 y/o male is brought to the emergency room unresponsive by paramedics. He has paint around his mouth. Police state that they found some kids in a parking lot behind a building involved in suspicious activity. The boys started to flee when the police approached, all got away but this one who suddenly collapsed in the middle of an on foot pursuit. What happened?
  - Pneumothorax
  - Aspiration
  - Dilated cardiomyopathy
  - Boy was scared to death

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Hydrocarbon Solvents Chlorofluorocarbons

- ***Chlorohydrocarbon solvents:*** Trichloroethane, trichloroethylene, methylene chloride
  Dry cleaning, degreasing, painting, chemical manufacturing, refrigerants
- Heart is sensitized to catecholamine response and it lowers the threshold to arrhythmia's
- Induce bradycardia by affecting SA node
- Depress AV nodal conduction causing AV block
- Prevention: engineering controls, restricting a worker with pre-existing heart arrhythmias from working with hydrocarbons
- ***Treatment:*** expect resolution when removed from exposure, monitor pulse ox for 6 hours, CXR, avoid use of epinephrine if arrhythmias present

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Insecticides

Organophosphate & Carbamate toxicity

Inhibits acetylcholinesterase: Causes accumulation of acetylcholine and myoneural junctions

- ***Nicotinic effects (acute poisoning)*** Muscular fasciculation's, cramping, weakness, diaphragmatic failure, HTN, tachycardia, mydriasis and pallor, anxiety, confusion, tremors, ataxia, seizures coma

- ***Muscarinic effects (later)*** bradycardia, hypotension, bronchospasm, rhinorrhea, cough, hypersalivation, N/V/D, incontinence, myosis, blurred vision, lacrimation, diaphoresis
  - Asynchronous repolarization of different parts of the heart may lead to QT-interval prolongation and torsades de pointes.
- ***Treatment:*** decontamination, pralidoxime and atropine, avoid antiarrythmics (slows conduction)

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Heavy Metals and "Others"

- ***Arsenic:*** acutely can cause torsades de pointes, chronic exposure can cause "blackfoot diseae" with claudication and gangrene
- ***Arsine:*** hemolysis→hyperkalemia→ cardiac arrest
- ***Cadmium:*** peripheral arterial disease
- ***Cobalt:*** diastolic dysfunction on echo
  - Used to stabilize beer foam and caused 22% mortality rate in affected heavy drinkers secondary to myocardial necrosis
- ***Lead:*** HTN, fatal myocarditis

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Thank you!

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