OCCUPATIONAL CARDIOVASCULAR DISEASE
Leading causes of death in Iran

- Cardiovascular diseases % 45
- Accidents % 17.5
- Cancers % 14
- Neonatal disease % 6
- Respiratory disease % 6
Problems in identification of occupational etiologies of CVD

- Common in society
- Multifactorial etiology
- Long latency
- No accurate noninvasive tests for early disease
- Clinical expressions are similar whether the disease has an occupational or non-occupational cause
Cardiovascular risk factors

Modifiable risk factors

- Hypertension
- Smoking
- Hypercholesterolemia
- Diabetes Mellitus
- Overweight & Obesity
- Physical Inactivity
- Nutritional habits

Non-Modifiable risk factors

- Family history
- Increasing age
- Male sex
OCCUPATIONAL TOXICOLOGY

- Cardiac arrhythmia
- Coronary artery disease
- Hypertension
- Non atheromatous ischemic heart disease
- Myocardial injury
- Peripheral arterial occlusive disease

- Arsenic, CFC, Solvents
- CS2, CO, Lead
- Cadmium, CS2, Lead
- Organic nitrate, ethylene glycol dinitrate
- Antimony, Arsine, Cobalt, Arsenic, Lead
- Arsenic, Lead
OCCUPATIONAL HEART DISEASE

- CARBON MONOXIDE (CO)
- CARBON DISULFIDE (CS₂)
- NITRATES
- SOLVANTS
- HEAVY METALS
Carbon monoxide (CO)

Sources of incomplete combustion:
  Furnaces, boilers
  Internal combustion engine
    (warehouses, auto plants)
Hazards increased in cold weather
  with closed doors and windows
Carbon monoxide
Acute Poisoning

- Binds to hemoglobin more avidly than O2 (CO has 200x oxygen’s affinity)
- Shifts oxygen dissociation curve to “left”: Tissue anoxia
  the result
Chronic exposure to CO associated with cardiovascular mortality
CARBON MONOXIDE (CO)

- Binds mitochondrial enzymes and myoglobin
- Increases platelet stickiness
- Decreases arrhythmia threshold
Carbon disulfide (CS2)

- Cellulose-derived materials
  - Rayon
  - Cellophane
- Solvent for rubber, oils
- Pesticides
- Fumigant for grain, books
- Microelectronics industry
Carbon Disulfide and Atherogenesis

RR of 2 to 5x for death from CAD

Epidemiologic evidence suggests a direct role in atherogenesis in blood vessels
Retinal microaneurysms
CS₂

Retinal hemorrhages
Angina: Nitrates

- Noted to have vasodilatory effects in explosives workers
- Tolerance to absorbed nitrate symptoms (headaches, tachycardia, diastolic HTN) develops quickly
Sudden death:
24-96 hours after exposure ceased
(weekends/holidays)

“Monday Morning Angina”:
Relieved by RTW, nitrate meds: coronary spasm in absence of CAD

Three-fold increase in acute deaths in younger men from ischemic CHD
Dysrhythmias

- **Chlorofluorocarbons** (Freon® etc)
  - Refrigeration, air conditioning, propellants
  - May sensitize myocardium to catechol effects

- Other **solvents** implicated in sudden death:
  - Trichloroethylene, toluene, benzene
Cardiomyopathy

- Cobalt: used to stabilize beer foam (1960’s: Canada, Belgium)
- Cardiomyopathy reported in beer drinkers several months afterward
OCCUPATIONAL HEART DISEASE

- NOISE
- HOT & COLD
- VIBRATION
- PSYCHOSOCIAL FACTORS
- PHYSICAL INACTIVITY
Hypertension

Associations with several occupational exposures and agents

Mechanisms are varied and depend on action of agent
Hypertension

Lead

• Probable mechanism is via renal injury
• May also increase vascular tone and resistance
• Chelation may improve HTN in acute Pb intoxication, but will not reverse if longstanding renal damage is present

Cadmium

possibly associated with HTN; noted to occur at levels below nephrotoxic dose
Hypertension

Carbon disulfide

- Vascular nephropathy and accelerated atherogenesis appear to be mechanisms

Noise, Shift work

- Postulated effects mediated by stress response (increase sympathetic and hormonal mediator release)
Job Strain and Cardiovascular Disease

Body of evidence suggests relationship between job strain and cardiovascular mortality
Return-to-Work
After MI, CABG, PTCA
Patients impact of being out of work

- Have reduced confidence and self esteem
- Have increased morbidity and mortality - particularly mental health
- Have disability greater than underlying impairment
Return-to-Work after MI

- Over 80% of workers are generally able to return to work after initial MI or CABG
- Reinfarction and death NOT more frequent at work
Cardiovascular effects: Return-to-Work after MI

Medical Factors

Major predictors of RTW:
- LV dysfunction
- persistent ischemia / angina after treatment

Non-Medical Factors

- Coping styles
- Perception of work (demands, satisfaction)
- Age, gender, education
- Benefits/incentives