

WORK AND HEALTH

LECTURE FOR MEDICAL
STUDENTS



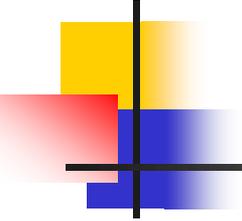
WORK ENNOBLES

- WORKING HELPS TO FIND THE CREDIT WITHIN THE SOCIETY
- UNEMPLOYMENT IS ASSOCIATED WITH:
 - POVERTY,
 - DEPRIVATION, PASSIVITY
 - BARRENNESS



SOCIAL CONSEQUENCES

- DISSATISFACTION
- PROTESTS, sometimes with VIOLENCE
- REVOLUTION
- WAR – civil, national



HEALTH CONSEQUENCES

- WORSE LIFESTYLE (MALNUTRITION, SMOKING, ALCOHOL and DRUGS ABUSE, PASIVITY, POOR HYGIENE)
- INFECTIOUS DISEASES
- PSYCHOSOMATIC DISEASES
- PSYCHIATRIC MORBIDITY (depression, suicide)



HISTORICAL CHANGES OF WORK

- EVERYBODY MADE EVERYTHING = the main contribution to human anatomy and physiology during phylogenesis
- HAND-MADE SPECIALIZATIONS
- FIRST MACHINES
- MECHANIZATION
- AUTOMATIZATION
- ROBOTIZATION



CHANGES IN WORKERS' CONDITIONS

- DYNAMIC/ENERGETIC LOAD DECREASED
- STATIC LOAD INCREASED
- SEDENTARY POSITIONS
- MONOTONY WITH NARROW MUSCULOSCELETAL PARTS OVERLOAD



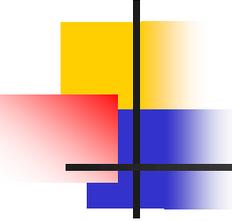
Changes - continue

- GROWING DEMAND FOR:
- SENSES ABILITIES (espec. Vision)
- MENTAL ACTIVITY (qualification, attention, responsibility)



RISK OF THE LOST OF CONTROL

- ERGONOMIC APPROACH:
- DETAIL KNOWLEDGE ABOUT HUMAN ANATOMY, PHYSIOLOGY, PSYCHOLOGY
- ADAPTATION OF WORKING ENVIRONMENT TO HUMAN CAPABILITY



EXAMPLES:

- ERGONOMIC CHAIRS
- HANDLE HAFTS
- CONTROL EQUIPMENTS
- INFORMATIVE EQUIPMENTS
- WORKING ENVIRONMENT
(microclimate, lighting)
- ARRAGEMENT OF WORKPLACE



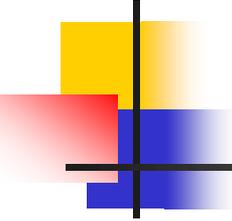
ENVIFORM

- ERGONOMIC SIMULATIONG SYSTÉM = METHOD FOR THE ASSESSMENT OF POOR ERGONOMY:
 - VIRTUAL WORKING PLACES
 - ANALYSIS OF WORK PROCESSES
 - ANALYSIS OF AVAILABILITY, VISIBILITY, BODY LOAD, ENERGY LOST



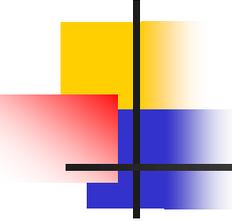
WORK AS A HEALTH RISK

- OCCUPATIONAL D.:
 - MAINLY AMONG WORKERS
 - CAUSE SPECIFIC
 - OCCUPATIONAL EXPOSURE IS ESSENTIAL
- WORK-RELATED D.:
 - LARGELY IN THE POPULATION
 - MULTIFACTORIAL
 - OCCUPATIONAL EXPOSURE MAY BE A FACTOR



THE SOCIAL APPROACH

- OCCUPATIONAL D.:
 - NOTIFABLE
 - COMPENSABLE
- WORK-RELATED D.:
 - MAY BE NOTIFABLE
 - MAY BE COMPENSABLE



OCCUPATIONAL HAZARDS

- FACTORS:

- MECHANICAL
- HEAVY PHYSICAL LOAD

- OUTCOMES:

- ACCIDENTS, INJURIES
- MUSCULOSCELETAL DISORDERS, INJURIES, LOW BACK PAIN



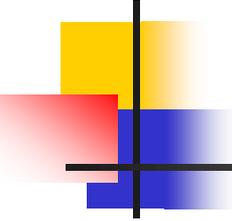
OCCUPATIONAL HAZARDS

- ERGONOMIC
- MONOTONY
- MUSCULOSCELETAL DISORDERS (D. FROM REPEATED OVERLOAD)
- MENTAL STRESS, LOWERED QUALITY AND PRODUCTIVITY
- D.FROM REPEATED OVERLOAD



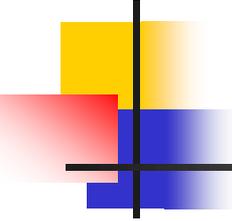
OCCUPATIONAL STRESS

- WORK INITIATES STRESSFULL RESPONSE (sympaticus, adrenalin, other hormones) =>
- ENERGY for STRIFE or RUNNING
- IN MODERN SOCIETY THE ENERGY IS CUMULATED WITH KNOWN HEALTH CONSEQUENCES



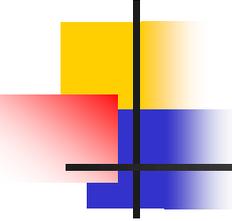
OCCUPATIONAL STRESS

- TWO-DIMENSIONAL APPROACH:
 - 1) TENSE/ LOAD
 - 2) POSSIBILITY TO COPING
- => FOUR CATEGORIES:



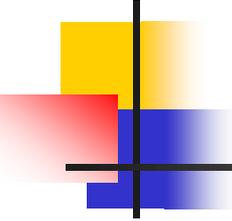
OCCUPATIONAL STRESS:

- 1) HIGH LOAD + HIGH SELF-COPING
(physicians, teachers, managers)
- 2) HIGH LOAD + LOW SELF-COPING
(monotony jobs, time stress)
- 3) LOW LOAD + HIGH SELF-COPING
(artists, scientists)
- 4) LOW LOAD + LOW SELF-COPING
(unemployed, portress)



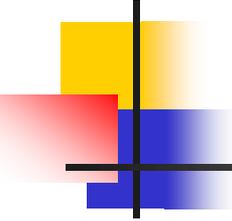
PREVALENCE OF STRESS-RELATED DISEASES

- LOWEST IN THE 3rd GROUP
- LOW IN THE 1st GROUP
- HIGH IN THE 4th GROUP
- HIGHEST IN THE 2nd GROUP



PHYSICAL HAZARDS

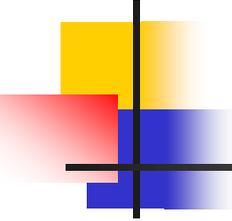
- NOISE
- VIBRATION
- RADIATION
- EXTREME MICROCLIMATE
- HEARING LOSS
- PSYCHOSOMATIC D.
- TR.VASONEUROSI
- CANCER, RADIAT.D.
- CATARACT
- CVD,HYPERTHERM.
- CHILBLAINS



CHEMICAL HAZARDS

- DUSTS

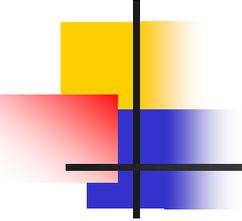
- PNEUMOCONIOSIS
- SILICOSIS
- ASBESTOSIS
- BERYLLIOSIS
- SIDEROSIS



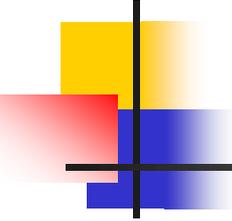
RESPIRABLE DUST

- DIAMETER 1 – 5 μm ; 2.5 μm
- DUST 10+ μm : MUCOCILLIAL
ESCALATOR
- DUST less than 1 μm – IN EXPIRATED
AIR

CHEMICAL HAZARDS

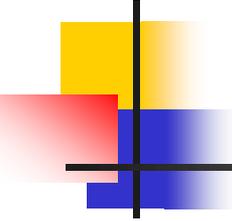


- WIDE SPECTRUM OF HUNDREDS COMPOUNDS
- INJURIES, IRRITATION
- TOXICANTS
- CARCINOGENS
- ALERGENS
- TERRATOGENS



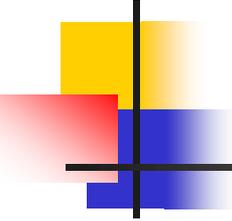
BIOLOGIC HAZARDS

- ANIMALS
- MICROBIAL AND VIRAL FACTORS
- PLANT ALLERGENS
- INJURIES,
- ANTROPOZOONOS.
- INFECTIONS
- ALLERGIES
- ALLERGIES



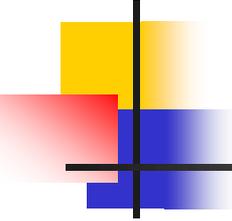
PSYCHOLOGICAL STRAIN

- DIFFERENT STRESS FACTORS
- NEUROSIS
- DEPRESSION
- DISSATISFACTION
- CONFLICTS
- PSYCHOSOMATIC D.



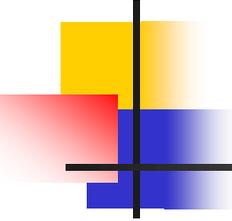
CATEGORIES OF WORK

- 1) WITHOUT THE RISK
- 2) WITH ACCEPTABLE RISK(s)
- 3) HIGH RISK(s)
- 4) VERY HIGH RISK(s)



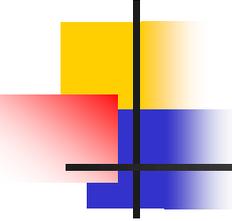
WORK FACTORS AND WORK-RELATED D.

- BEHAVIORAL AND PSYCHOSOMATIC D.
- HYPERTENSION
- WORK OVERLOAD
- WORK UNDERLOAD
- SHIFT WORK
- CAREER DEVELOP.
- MIGRATION
- INTERPERSONAL CONFLICTS
- RESPONSIBILITY



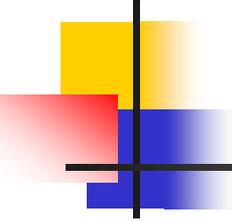
OCCUPATIONAL HAZARDS FOR HEALTH PROFESSIONALS

- INFECTIOUS AGENTS
- X-RAY
- INJURY
- POSTURAL STRESS
- NOISE, VIBRATION



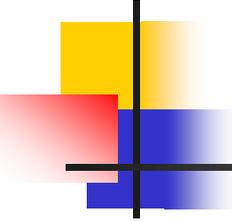
OCCUPATIONAL HAZARDS

- CHEMICALS:
- ORGANIC SOLVENTS
- CHEMICAL CARCINOGENS AND
TERRATOGENS (CHEMOTHERAPY,
ANESTESIOLOGY)
- ANORGANIC MERCURY



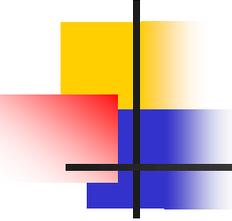
OCCUPATIONAL HAZARDS

- ALLERGENS:
- PROCAIN, MESOCAIN
- IODINE, FAMOSEPT, FORMALDEHYDE
- SULFONAMIDES
- ANTIBIOTICS
- ACRYLATES, LATEX/RUBBER



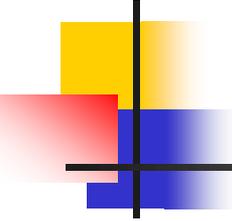
OCCUPATIONAL STRESS

- sy. WAITING-ROOM'S OVERFILL
- LACK OF DRUGS, DIAGNOSTIC METHODS
- ECONOMY
- ADMINISTRATIVE OVERLOAD
- PATIENT'S MOOD
- PATIENT'S RELATIVES
- INTERPERSONAL RELATIONSHIPS
- SHIFT-WORK



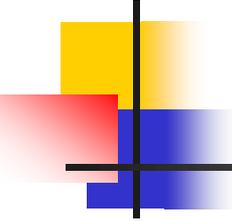
OUTCOMES OF STRESS

- „BURN OUT“ sy.
- PSYCHOSOMATIC DISEASES
- ALCOHOLISM, SMOKING, DRUGS
- PSYCHIATRIC DISORDERS – SUICIDES
RR 2,0 (Finland, UK) – 4,0 (USA)



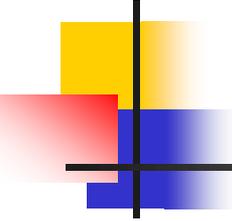
NANO-PARTICLES – NEW HAZARDS?

- COMPOUNDS OF DIFFERENT CHEMICALS
- AT LEAST ONE DIAMETER IS UP TO 100 nm
- DIFFERENT PHYSICAL and CHEMICAL PROPERTIES



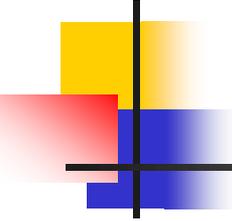
WHAT WE KNOW?

- HIGH ABILITY TO MAKE CLUSTERS WITH DIAMETERS OF RESPIRABLE DUST (1 – 5 μm)
- INCREASED TRENDS TO WIDE USING, INCLUDING MEDICINE



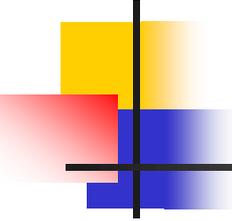
NANOMEDICINE

- OPTIC NANO-SENSORIC SYSTEMS (intracellular observation – apoptosis)
- NANOHEMOSTATIC APPROACH – hemostatis within 15 sec.)
- NANOROBOTS: target transport of drugs, angioplastic, immunology, surgery, monitoring of diabetic patients)



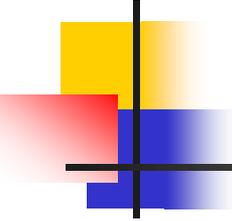
IN DENTIST PRACTICE

- **NANO-CLEARING** of **TEETH**: dentifrice, oral water => growth of hydroxyapatite in tooth enamel lesions, metabolisms of organic chemicals, destroy of plaques and dental calculus



WHAT WE DO NOT KNOW?

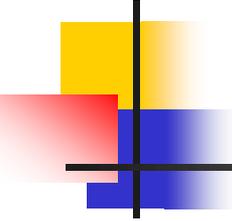
- TO MEASURE THE LEVEL OF EXPOSURE
- THE INFLUENCE OF NANOPARTICLES ON HUMAN HEALTH
- EVEN THE EXPERIMENTAL STUDIES GIVE INADEQUATE INFORMATIONS:
mesothelioma, pneumonitis, oxidative stress, cross the hematoencephalic and placental barriers



WORLD CENTERS OF RESEARCH

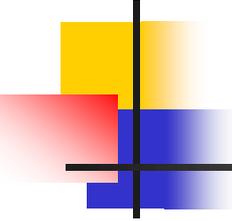
- USA
- South Korea
- EU

- SYSTEM OF PRELIMINARY CAUTION



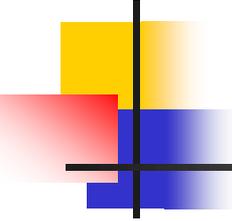
PROFESSIOGRAM 1

- TRY TO DEVELOPE THE WORKPLACE CHECKLIST FOR THE PATIENT WITH Isch.Heart Dis – MAN, 50 YEARS OLD
- WHICH RISK FACTORS WILL BE IMPORTANT FOR HIM?



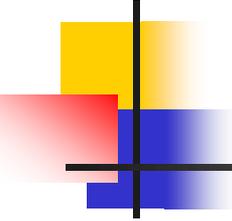
PROFESSIOGRAM 1

- INCREASED HEART RATE, BLOOD PRESSURE, NEEDS OF OXYGEN:
 - STRESS (working time/shift, timing monotony work, noise, mental stress – responsibility)
 - ERGONOMY (outdoor/indoor workplace microclima, postural stress, physical overload)



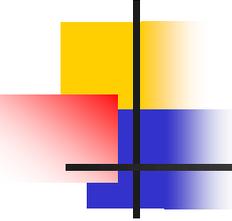
PROFESSIOGRAM 1

- DECREASED SOURCE OF OXYGEN:
 - ENVIRONMENTAL TOBACCO SMOKE (nicotine, carbon monoxide, hydrocyanide)
 - CARBON MONOXIDE
 - CARBON DISULPHIDE
 - NITRATES (Monday morning death)



PROFESSIOGRAM 1

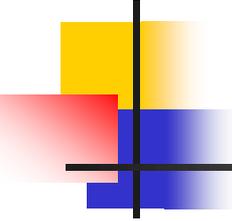
- COBALT (Quebec Beer-drinker's Cardiomyopathy)- Co + alcohol (?)
- HALOGENATED HYDROCARBONS (trichlorethylene, fluorocarbons) – ventricular fibrillation
- SILICOSIS, INFECTIONS, INJURY - pericarditis



PROFESSIOGRAM 1

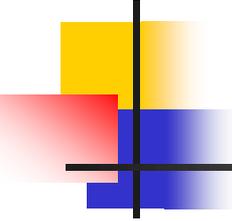
- LEAD
- CADMIUM
- NOISE

=> HYPERTENSION



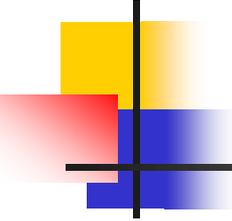
PROFESIOGRAM 2

- TRY TO DEVELOPE THE WORKPLACE CHECKLIST FOR PREGNANT WOMAN
- WHICH RISK FACTORS WILL BE IMPORTANT FOR HER AND FOR FETUS?



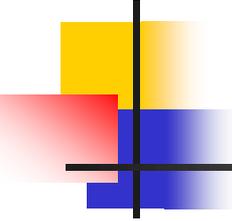
PROFESSIOGRAM 2

- INCREASED NEEDS FOR OXYGEN FROM THE 2nd TRIMESTER
 - STRESS
 - ERGONOMY



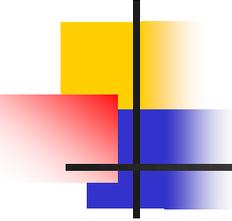
PROFESSIOGRAM 2

- DECREASED SOURCE OF OXYGEN:
 - POSTURAL STRESS
 - ENVIRONMENTAL TOBACCO SMOKE
 - CARBON MONOXIDE
 - CARBON DISULPHIDE



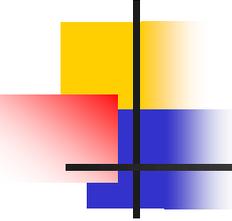
PROFESSIONGRAM 2

- EXPOSURE TO TERRATOGENS:
 - SMOKING + ENVIRONMENTAL TOBACCO SMOKE
 - NICOTINE
 - ALCOHOL
 - THALIDOMID
 - ORGANIC MERCURY



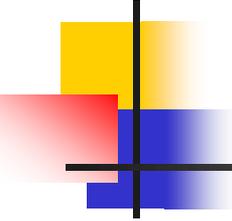
PROFESSIONGRAM 2

- TERRATOGENS:
 - VIRAL/MICROBIAL INFECTIONS
 - X-RAYS
 - CADMIUM, LEAD
 - ORGANIC SOLVENTS
 - COCAINE, HEROIN, MARIJUANA



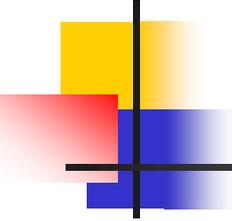
PROFESSIONGRAM 2

- NOISE, VIBRATION
- LIPOSOLUBLE VITAMINES
- SOME DRUGS
- EL.MAG. WAVES
- POLYCYCLIC CHLORINATED HYDROCARBONS (PCBs, PCDDs, PCDFs)



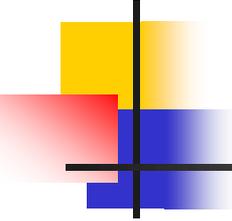
PRIMARY PREVENTION

- CONTROL OF NEW HAZARDS
- CONTROL OF KNOWN HAZARDS
- SUBSTITUTION OF RISK FACTORS
- TECHNICAL CONTROLS TO MINIMASE EXPOSURE
- ADMINISTRATIVE CONTROLS



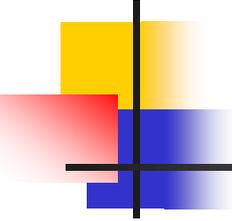
PRIMARY PREVENTION

- ENVIRONMENTAL MONITORING
- BIOLOGICAL MONITORING OF EXPOSURE
- IDENTIFICATION OF VULNERABLE PERSONS (pre-employed examination)
- PERSONAL PROTECTIVE DEVICES



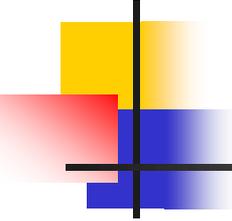
PRIMARY PREVENTION

- SMOKING REDUCTION/CESSATION
- ALCOHOL – APPROPRIATE AMOUNT,
ONLY IN THE PRIVACY
- EXERCISE AND FITNESS
- NUTRITION IN WORKPLACE
CANTEENS, IN VENDING MACHINES



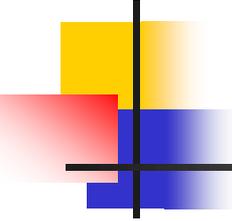
SECONDARY PREVENTION

- SCREENING = EARLY DETECTION OF DELETERIOUS EFFECTS
- PERIODIC MEDICAL EXAMINATIONS
- TESTs OF CHEMICAL EXPOSURE:
 - measurement of chemical/metabolite
 - measurement of conjugates
 - measurement of body reactions



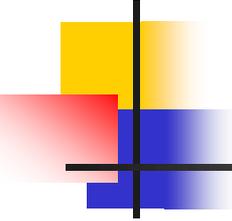
RESPONSIBILITY IN PREVENTION

- EMPLOYERS:
 - INFORMATION ABOUT RISKS
 - CONTROL FOR REDUCTION OF EXPOSURE
 - CONTRACT WITH PHYSICIANS
 - PROTECTIVE DEVICES



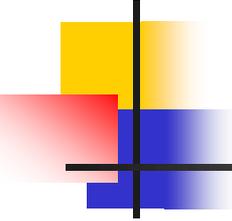
RESPONSIBILITY IN PREVENTION

- PHYSICIANS:
 - INFORMATION ABOUT HEALTH RISKS OF OCCUPATIONAL HAZARDS
 - EXCLUDING THE VULNERABLE PERSONS
 - PERIODIC MEDICAL EXAMINATIONS + COLLABORATION WITH SPECIALISTS
 - PROPOSALS FOR WORKERS PROTECTION



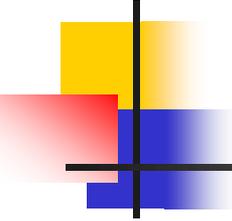
RESPONSIBILITY IN PREVENTION

- WORKERS:
 - ACCEPT THE INFORMATION AND ADVICES FOR SAFETY WORK
 - USE THE PROTECTIVE DEVICES
 - ABSOLVE PREVENTIVE MEDICAL EXAMINATIONS



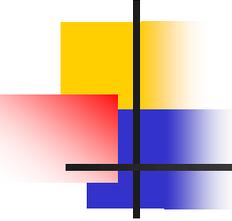
RULES IN CZECH REPUBLIC

- HAZARDOUS WORKPLACES ARE STATUTED BY REGIONAL HYGIENIST
- LIMITS/NORMS ARE STATUTED BY GENERAL HYGIENIST
- OCCUPATIONAL DISEASES ARE DIAGNOSED BY SPECIALISTS IN REGIONAL OFFICES



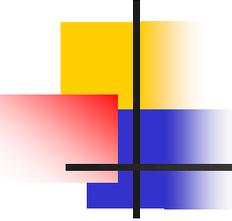
HEALTHY WORKPLACE

- SUPPORT of FRIENDLY ENVIRONMENT
- SUPPORT of HEALTHY LIFE-STYLE
(nutrition, smoking cessation, activity during breaks)
- SUPPORT of WORKING MOTHERS WITH SMALL CHILDREN
- „FLIGHT“ WORKING TIME



HEALTHY WORKPLACE

- SUPPORT of INDIVIDUAL WORKERS' INITIATIVE and PARTICIPATION on PRODUCTION, MANAGEMENT
- ACTIVITIES FOR LEISURE TIME



WORKING

- IS THE ESSENTIAL PART OF HUMAN LIFE
- IT CAN BE THE SOURCE OF SELF-SATISFACTION
- But ALSO OF HEALTH DAMAGES