

# OCCUPATIONAL HEALTH



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- **OH definition and focus**
- **OH history and legislation**
- **OH basic principles**  
**(hazard, risk, exposure, risk assessment)**
- **Causes of occupational diseases**
- **Examples from practice**

# OH DEFINITION



As defined by WHO and ILO **occupational health (OH)** aims at:

1. **the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations;**
2. **the prevention amongst workers of departures from health caused by their working conditions;**
3. **the protection of workers in their employment from risks resulting from factors adverse to health;**
4. **the placing and maintenance of the worker in an occupational environment adapted to his or her psychological capabilities and;**
5. **to summarize: the adaptation of work to the worker and of each workers to his or her job.**

# FOCUS OF OH

The main focus of occupational health is in three different objectives:

1. the maintenance and promotion of workers' health and working capacity;
2. improvement of working environment and work to become conducive to safety and health;
3. and development of work organizations and working cultures in a direction which supports health and safety at work and in doing so also promotes a positive social climate and smooth operation and may enhance productivity in the undertakings.

# OCCUPATIONAL DISEASES

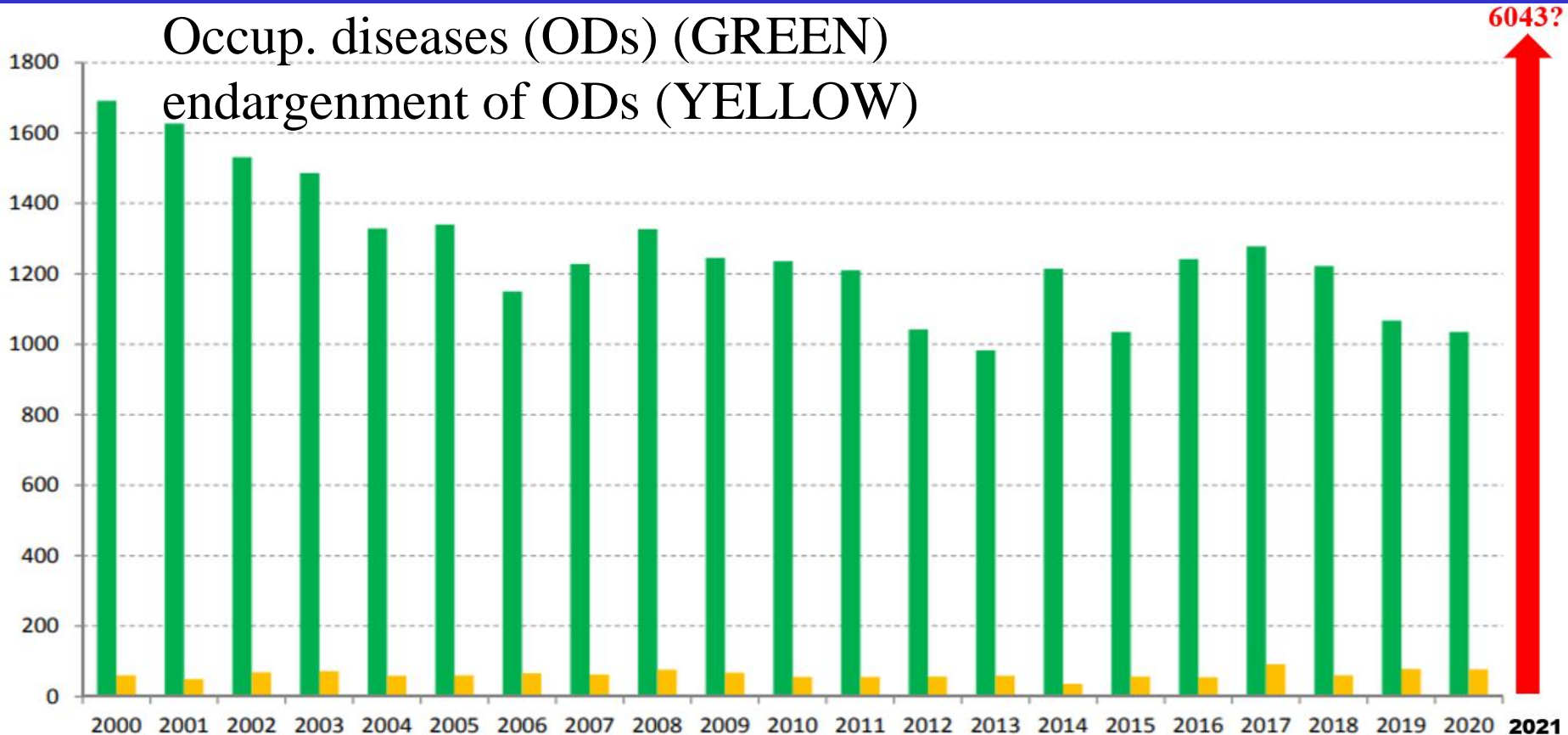
## definitions

- Czech legislation differentiates between occupational diseases and so-called “endangerments” by an occupational disease.
- An **occupational disease** is defined as a disease caused by the noxious effects of chemical, physical, biological, and other factors, provided that the disease originated under conditions **described in the List of Occupational Diseases**.
- An **endangerment by an occupational disease** is defined as a health impairment which occurs during the performance of a working activity as a result of a noxious effect of the conditions which are known to cause an occupational disease. While the health impairment does not meet the prerequisites for being recognized as an occupational disease, such a disease might ensue if the work under those conditions continues.
- “**Professional diseases**” is a general term that we use to encompass both the occupational diseases and the endangerments by an occupational disease.
- **Work related disease** is disease associated with working environment, working conditions or exposure at workplaces

# OCCUPATIONAL DISEASES (1)

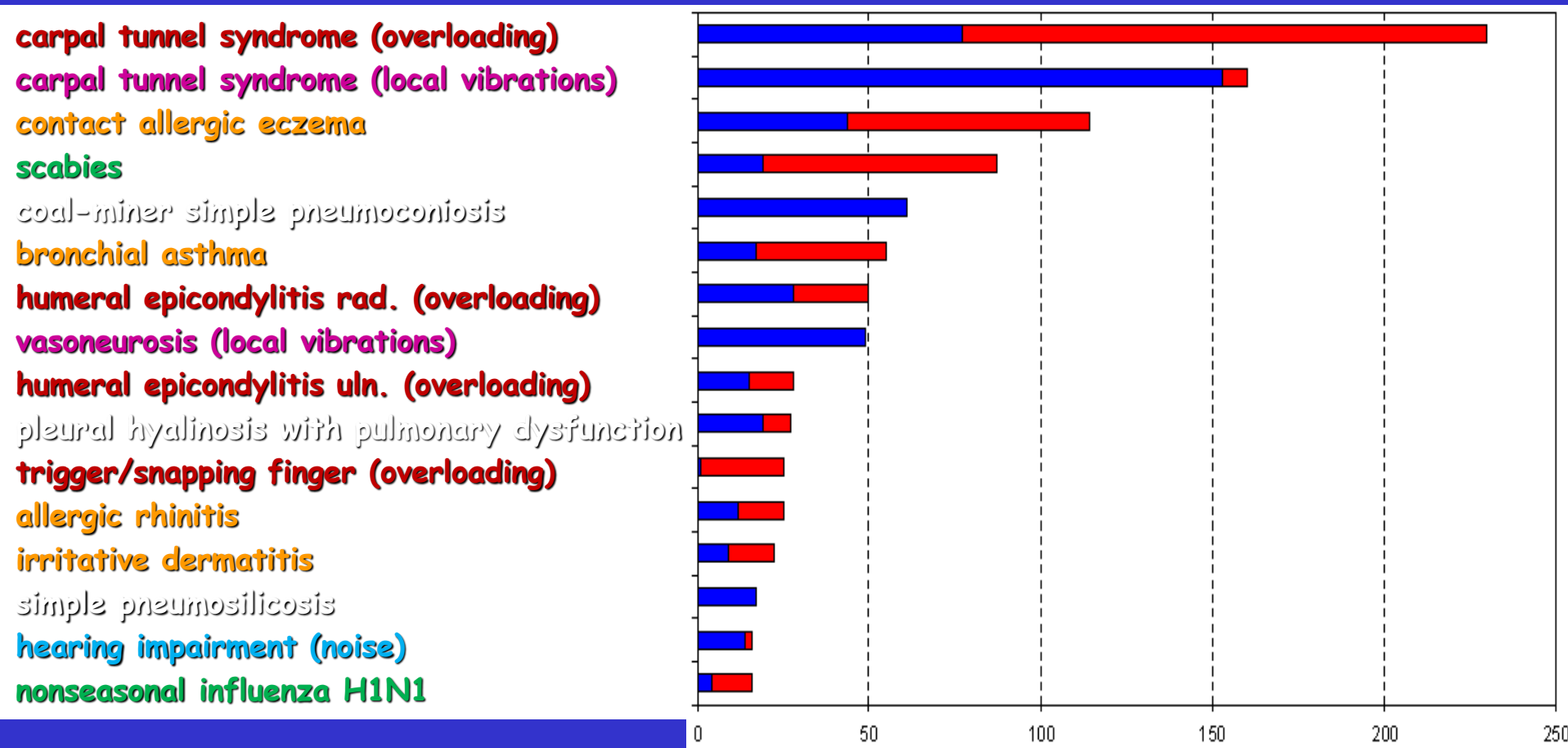
1991 National Registry of Occupational Diseases

2003 Joined EUROSTAT/EODS System



# OCCUPATIONAL DISEASES (2)

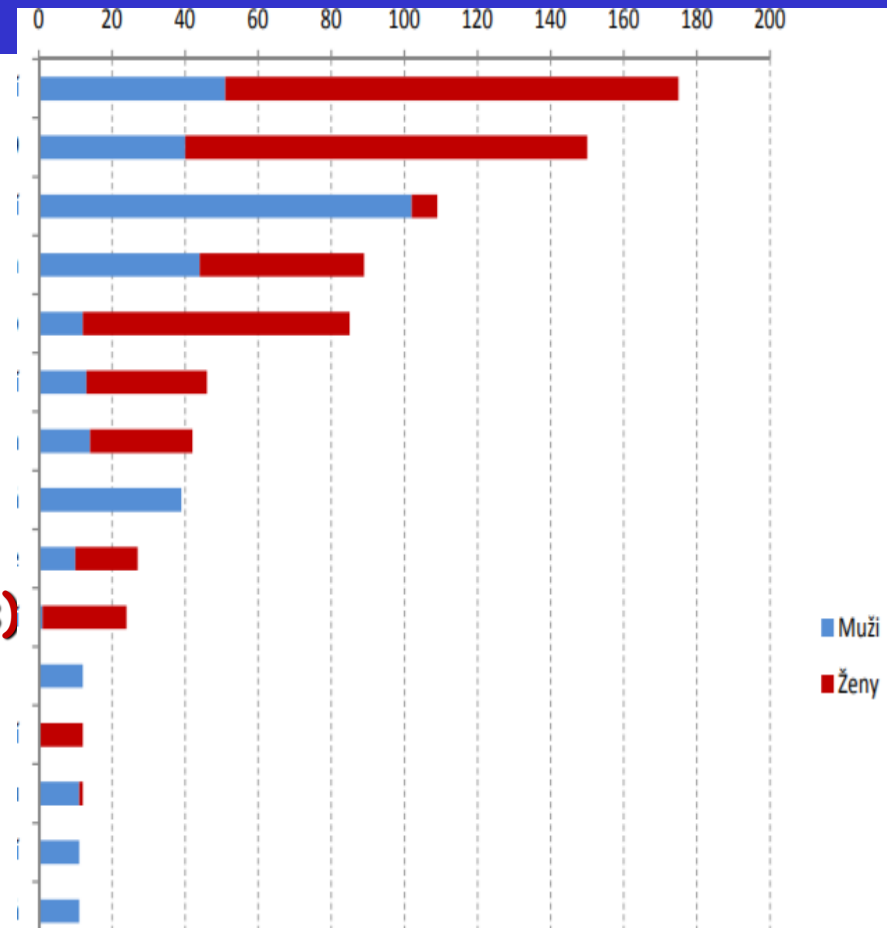
## 15 main diagnoses (2019)



# OCCUPATIONAL DISEASES (3)

## 15 main diagnoses (2020)

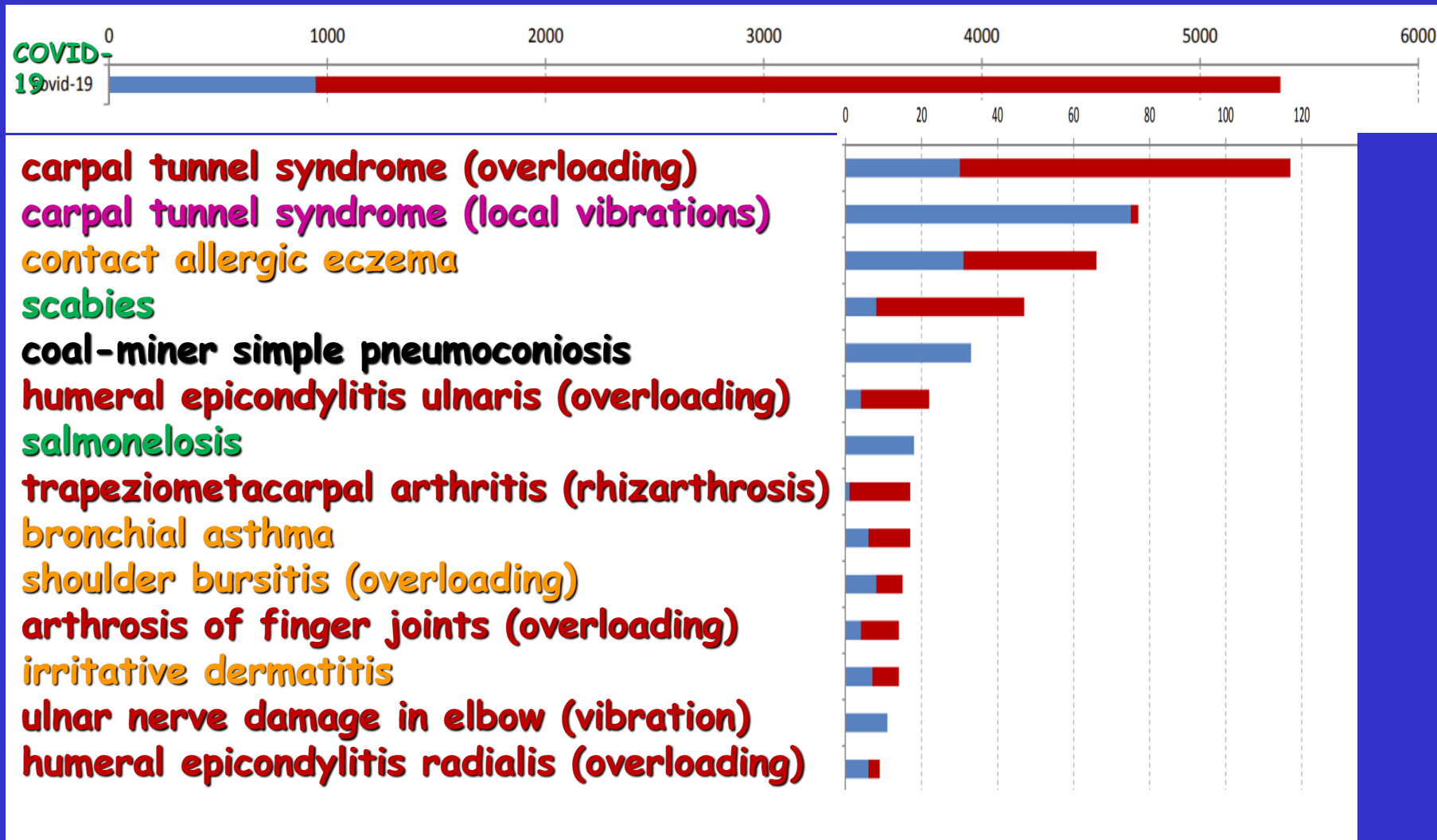
- carpal tunnel syndrome (overloading)
- COVID-19
- carpal tunnel syndrome (local vibrations)
- contact allergic eczema
- scabies
- humeral epicondylitis radialis (overloading)
- irritative dermatitis
- coal-miner simple pneumoconiosis
- bronchial asthma
- trapeziometacarpal arthritis (rhizarthrosis)
- simple pneumosilicosis
- arthrosis of finger joints (overloading)
- mesothelioma (asbestos)
- basalioma (ionizing radiation)
- coal-miner complicated pneumoconiosis





# OCCUPATIONAL DISEASES (4)

15 main diagnoses (2021)



The concept of **working culture** is intended in this context to mean a reflection of the essential value systems adopted by the undertaking concerned.

Such a culture is reflected in practice in the managerial systems, personnel policy, principles for participation, training policies and quality management of the undertaking<sup>1</sup>.

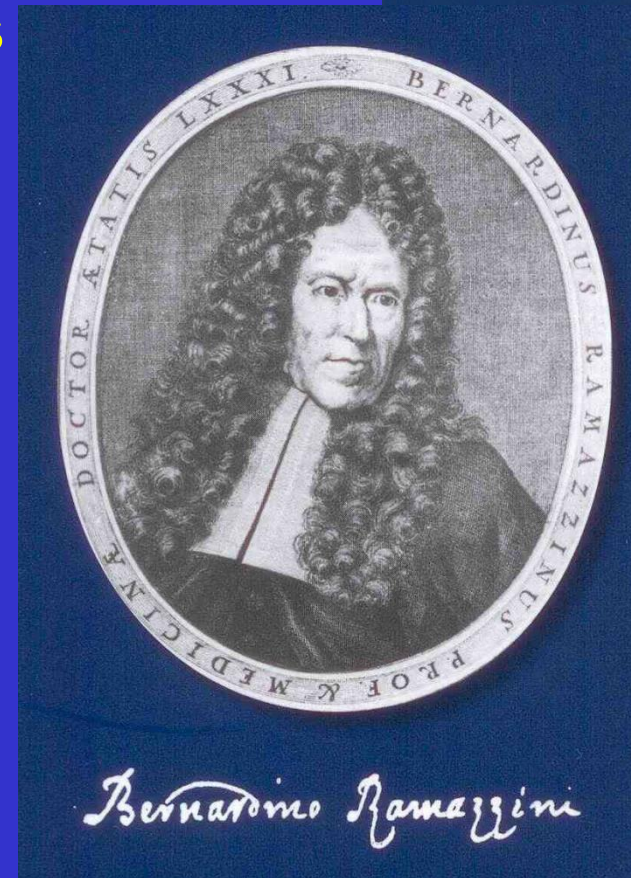
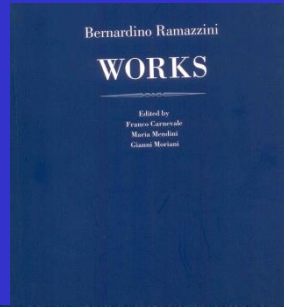
<sup>1</sup>Joint WHO/ILO Committee, 1950, revised 1995

# History of Occupational Health (1)

- The first recorded observation of an occupational disease may be a case of severe **lead colic** suffered by a worker who extracted metals described in a book attributed to **Hippocrates**, the Greek physician of the 4th century BC.
- The Roman scholar **Pliny**, in the 1st century AD., described **mercury poisoning** of slaves working in mines.
- During the Middle Ages the rise of metal mining in central Europe inspired the German mineralogist Georgius **Agricola** to describe the **primitive ventilation and personal protection** used in 16th century, common mining accidents and disasters, and such miners' occupational diseases as "**difficult breathing and destruction of the lungs**" caused by the harmful effects of dust inhalation.

# History of Occupational Health (2)

- *Dr. Ramazzini* from Italy is known as the father of occupational Health. He provided descriptions of diseases associated with 54 different occupations ( the mercury poisoning of Venetian mirror makers ).
- Ramazzini believed that a physician must determine the cause of patients' disorder.
- Way back in 1700 , he wrote the first Book on **Occupational Health**
- He started the concept of asking of a question to each and every patient  
“ *What is your occupation ?*”



# History of Occupational Health (3)

The Industrial Revolution of the **18th century** had a profound impact on occupational diseases. Rapid technological progress and industrial growth led to crowded, unsanitary working and living conditions with a corresponding rise in the number of accidents and death's ,caused by the new machinery and exposure to toxic materials.

In 1775 **Percivall Pott**, a London surgeon, linked the frequent occurrence of **scrotal cancer among chimney sweeps** to the soot ingrained into their skin by prolonged exposure to flue dusts.

In **1895**, Great Britain introduced a **statutory notification system**, requiring medical personnel to report all occurrences of certain diseases to the chief inspector of factories. *Other industrial nations followed Britain's lead, and legal provisions for the health of workers continued to be instituted throughout the 19th and 20th centuries.*

# History of Occupational Health (4)

Furthermore, new diseases keep emerging as a result of advances in technology.

**X-rays** were discovered in 1895 and 20 years later nearly 100 radiologists were estimated to have died as a result of occupational exposures.

**Asbestos-related disease** was first reported in the first half of 20th century, and in 1974 hemangiosarcoma, a rare malignant tumour of the liver, was discovered among workers involved in the polymerisation of **vinyl chloride monomer**.

# History of Occupational Health (5)

In **1950**, a joint committee of the International Labour Organization (ILO) and the World Health Organization (WHO) defined the concerns of **occupational health**.

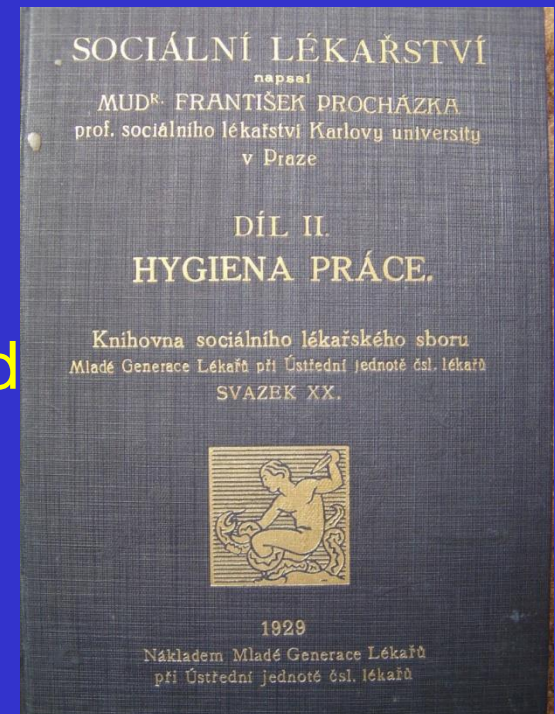
In most **countries in the West**, the responsibility for health and safety is placed on the employer, although the government may establish safety standards. Occupational health services are provided as benefits by employers and generally are separate from other community health services.

In the former Soviet Union and **Eastern European countries**, a high priority was given to occupational health and hygiene, which was generally integrated into the medical care system. Medical practitioners assigned to the factory were familiar with the local working conditions, and were qualified to recognize potential health risks in the work place.

In the **Third World countries** many of which are now undergoing rapid industrialization, the importance of occupational health is increasingly realized. The problems of exposure to nonoccupational hazards, however, are frequently compounded by pre-existing malnutrition and high incidence of infectious diseases.

# History of Occupational Health in the Czech Republic

- 1932 First Out-Patient Department of Occupational Health
- 1947 First In-Patient Department of Occupational Diseases
- 1951 Institute for Industrial Hygiene and Occupational Diseases
- 1961 Poison Information Center
- 1991 National Registry of Occupational Diseases
- 2003 Joined EUROSTAT/EODS System





**Occupational medicine**  
is one of the major disciplines  
of **occupational health**.

While **occupational medicine** is  
a **speciality of physicians**,  
**occupational health** covers a  
**broader spectrum of different**  
health protective and  
promotional **services**.

# Occupational health services definition (1)

**Occupational medicine** is a speciality of physicians.

**Occupational health** covers a broader spectrum of different health protective and promotional services.

**Modern occupational health** is a multidisciplinary expert area, which consists of several knowledge domains including

**occupational medicine** (clinical medicine focusing on occupational diseases, their diagnostics, treatment and prevention),

**occupational health services** (protection of workers against hazards at work, protection of their health and promotion of health and work ability),

**occupational psychology** (identification, assessment and prevention of psychological and psycho-social factors at work and their prevention and control),

**occupational hygiene** (measurement of physical, chemical, biological and other hazardous agents at the workplace, risk assessment and advice in preventive actions),

**ergonomics** (identification, assessment and prevention of unphysiological working conditions, such as repetitive movements, their prevention and control),

**occupational safety** including accident prevention and development of safe work environments and working practices

# Occupational health services definition (2)

Occupational medicine is one of the major disciplines of occupational health.

Complex of

- preventive medical examinations,
- workplace inspections/visits,
- consultations and recommendations

provided in the Czech Republic mainly by medical staff, i.e. by physicians and nurses.



**International Commission on Occupational Health - ICOH**  
**Commission Internationale de la Santé au Travail - CIST**

*Founded in 1906 as Permanent Commission*



Such broad knowledge of occupational health specialists is crucial for following reasons:

1. To understand the whole health and safety situation at the workplace, to be able to make identification of hazards and problems at work, health risk assessment and proposals and actions for their prevention and control
2. To assess workers' health and work ability against the demands from work and to adjust work to the health situation, capacities and abilities of the worker
3. To promote workers health and work ability in order to assure sustainable health and productivity of worker and provide effective responses to special needs of different types of workers such as ageing workers, female workers, young people and people with special needs such as migrants, handicapped workers and workers with special vulnerabilities.
4. To identify adverse health effects of work and make diagnosis and appropriate management of occupational and work-related diseases.
5. To advise employers, managers and workers representatives on health issues at the workplace and on development of safe and healthy working environments and working conditions.



Basic Occupational Health Services

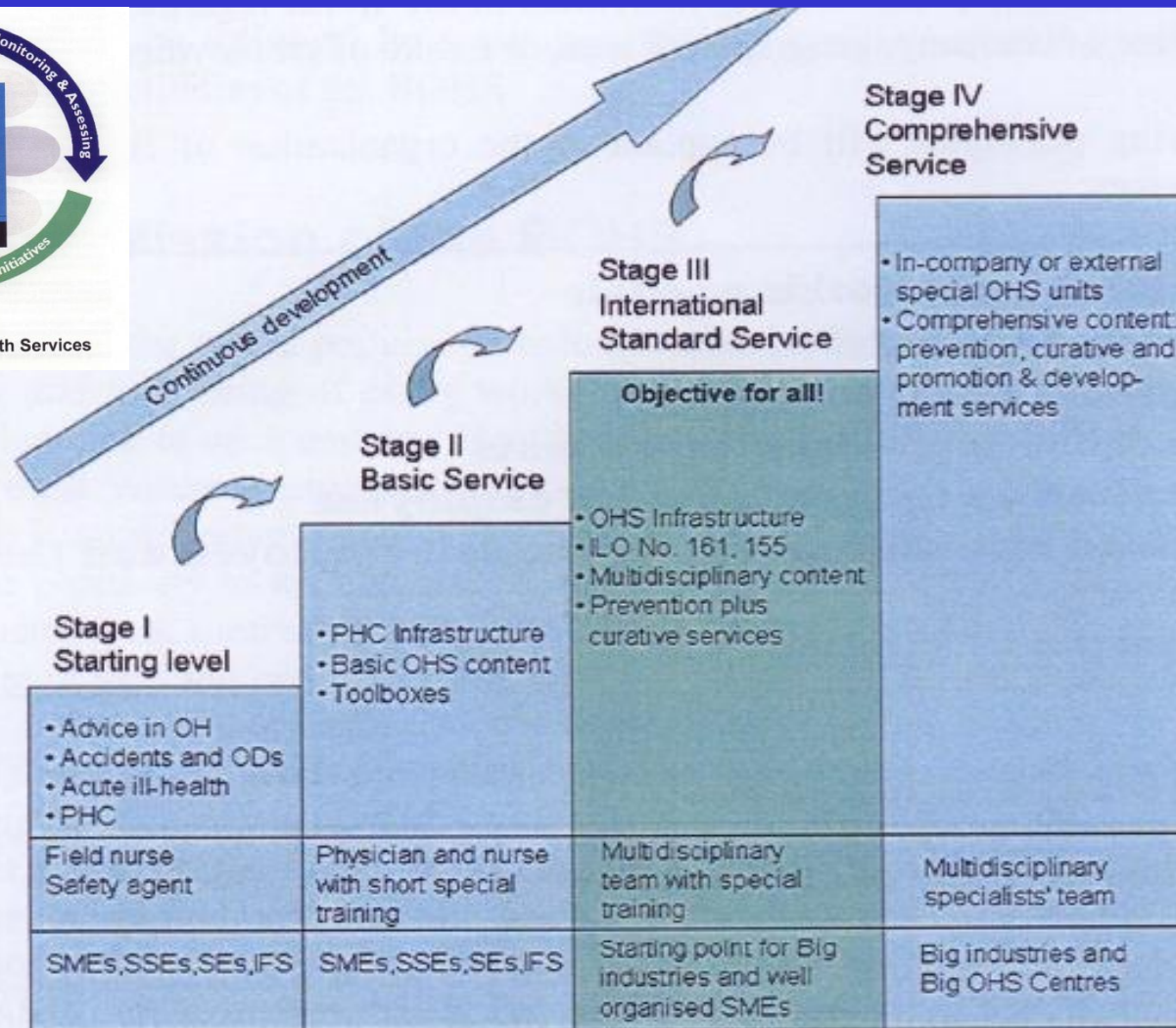
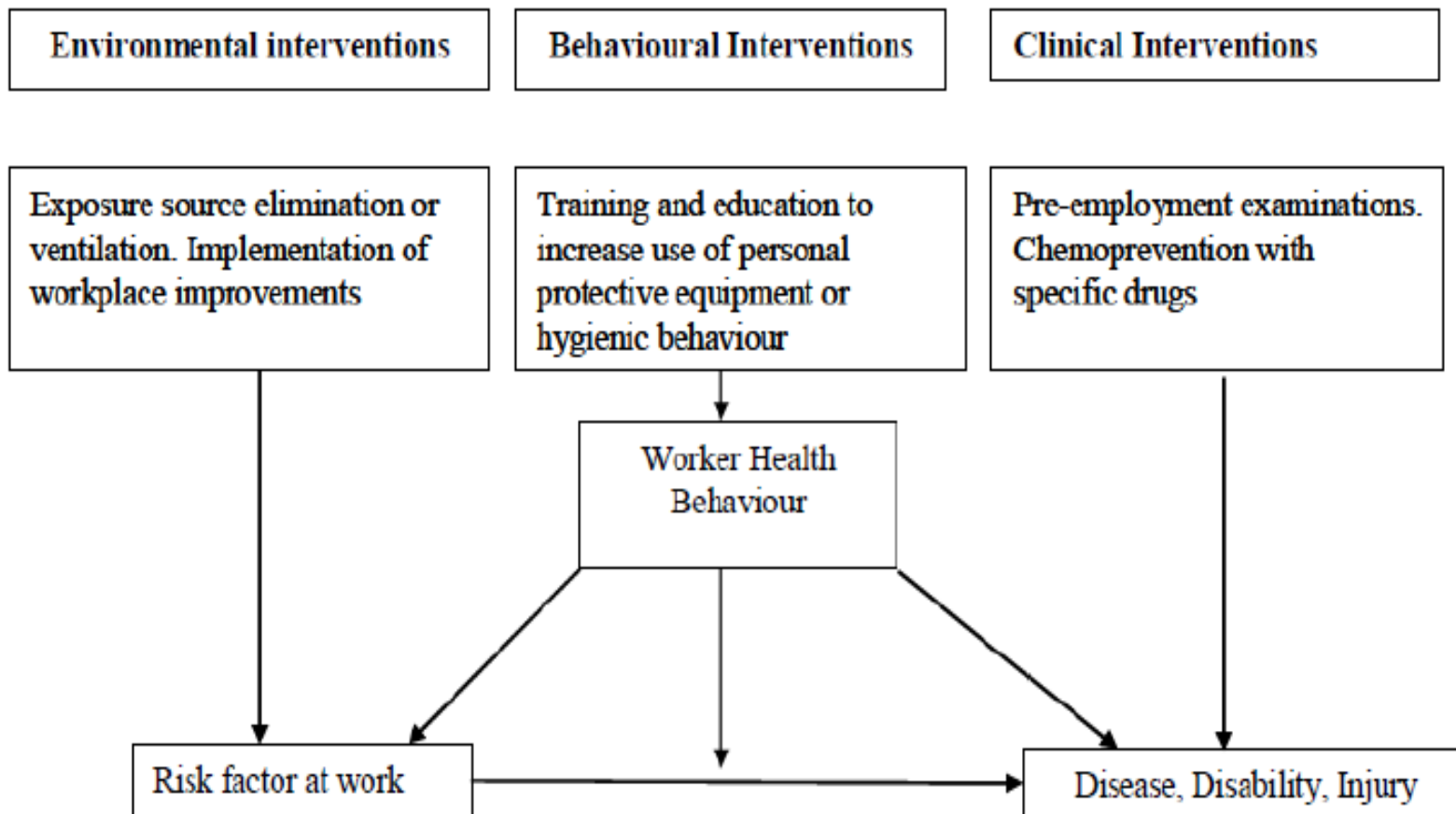


Figure 2. Stepwise development of occupational health services

ODs = occupational diseases, PHC = Primary Health Care, OHS = occupational health services, SME = small and medium sized workplace, SSE = Small enterprise, SE = Self-employed, IFS = Informal sector

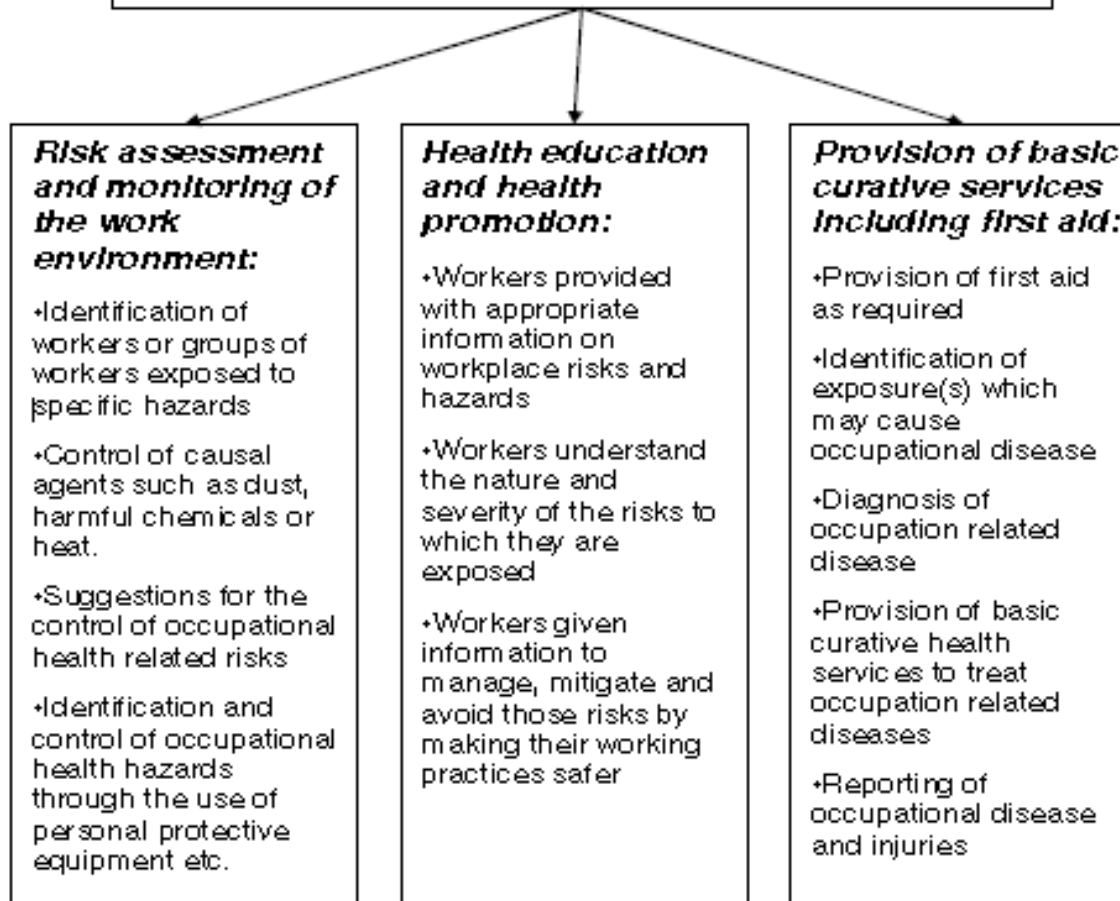
Preventive interventions can be divided into primary, secondary or tertiary prevention.

**Primary** preventive interventions aim at preventing disease or injury outcomes before the onset of the pathological process whereas other preventive interventions address later stages. In **occupational health**, primary preventive interventions **aim at eliminating and decreasing exposure known to be hazardous to health or to create a barrier to exposure.**



**Figure 1. Occupational health interventions for primary prevention (J. Verbeek, 2011)**

## Basic Occupational Health Services



# Basic terminology in occupational health

**EXPOSURE** = effects of environmental factors (such as noise, vibration, dust, radiation) or effects of the substance;  
takes into account the **objectively determined (measured) value** of load factors, work environment and the **period** during which the work load of the person exposed.

**HAZARD** = **intrinsic property or ability** of a material, devices, methods and practices with the potential **to cause harm**

**RISK** = **probability to cause harm** in terms of use or exposure, and the possible extent of damage



# Occupational (Industrial) Hygiene

is discipline recognizing, evaluating and controlling occupational health hazards and about practical risk assessment in the workplace (exposure assessment)

- T. L. V . Threshold Limit Value
  - for toxic air borne contaminants
- Bio-Chemical Monitoring
  - urine , blood level of toxic substances

**ILO's Occupational Safety and Health Convention (No.155/1981)**

**Occupational Health Services Convention (No.161/1985)**

**European Community Framework Directive 1989/391/EEC**

**have guided recent changes in legislation and occupational health practice in many European countries**

# **European Community Framework Directive 1989/391/EEC**

## **3 MAIN TOPICS**

**Risk evaluation, assessment**

**Protective and preventive services**

**Consultation and participation of workers**

**Employers**, including self-employed persons, in the Czech Republic **are required to carry out a risk assessment** .

Every employer has to make a **suitable and sufficient risk assessment** for the purpose of identifying the measures he needs to take to comply with the law.

The risk assessment **must be reviewed and revised regularly.**

The findings of the risk assessment must be **recorded in a written statement.**

There are **no specific requirements** on the substance and procedures of the risk assessment.

Risk assessment is **obligation of the employer** according to the Labour Code.

The risk assessment in principle consists essentially of an identification of the present hazards and an estimate of the extent of the risks involved taking into account whatever precautions already have been taken.

Many think of the term  
„risk assessment“ as belonging  
primarily to the environmental  
community ; however, if you are a  
practicing **industrial hygiene**  
**professional**, you are already doing  
**risk assessment.**

*(Jayjock M.A., et al.: Risk Assessment Principles for the Industrial Hygienist,  
AIHA Press, 2000)*

**Risk assessment** has been broadly defined as **the methodology that predicts the likelihood of numerous unwanted events, including**

- **industrial explosions**
- **workplace injuries**
- **natural catastrophes**



- **injury or death due to an array of voluntary activities** (e.g., skiing, sky driving)
- **diseases** (e.g., cancer, developmental toxicity caused by chemical exposure)
- **death due to natural causes** (e.g., heart attack, cancer) and **death caused by lifestyle choices** (e.g., smoking, alcoholism, diet)

This table shows the **comparison of the terminology** between the elements of classical industrial hygiene and the more recent environmental risk assessment approach. As shown , the four components of classic IH are similar to those of classic risk assessment.

INDUSTRIAL HYGIENE	ENVIRONMENTAL RISK ASSESSMENT
Anticipation/recognition	Hazard identification (Data collection/evaluation)
Evaluation	Exposure assessment Toxicity assessment Risk characterization
Control	Risk management
Hazard communication	Risk communication

# PHILOSOPHY OF SAFETY AND HEALTH AT WORK

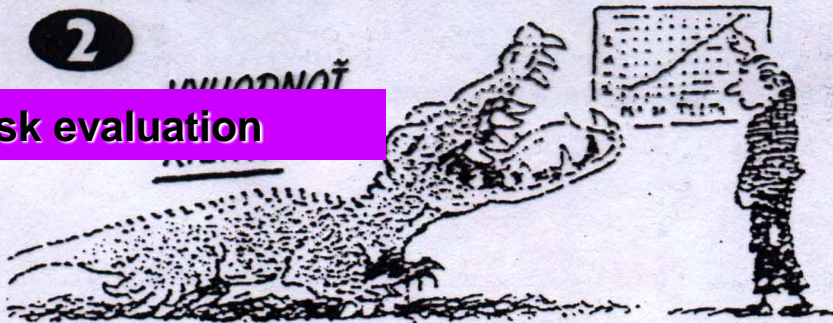
1

Hazard identification



2

Risk evaluation



3

Risk elimination



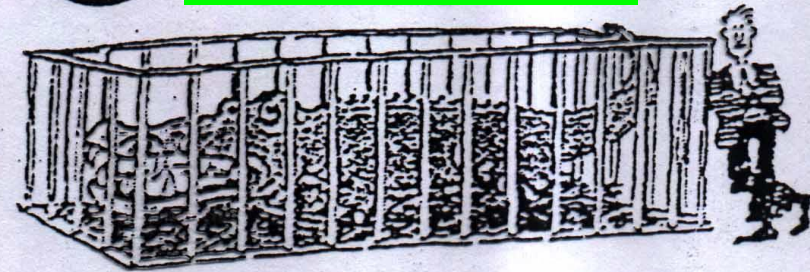
4

Risk minimization



5

Risk control



6

Personal protection



7

DISASTER



# RISK ASSESSMENT

According to Public Health Act (Act Nr.258/2000)

Employer's obligation is **to submit** to the public health inspection **a proposal for categorization of work operations**



with the results of health risk assessment including the results of measurements of concentrations and of the intensities of the working conditions factors for which they are hygienic limit given

identification of kind and type of the biological agent which is hazardous for human health

number of workers in the individual categories

the way to ensure protection of their health

Proposals expected by the public  
health inspection **should be based**  
**on exposure assessment**  
to the burden of the working  
environment factors

As a **tool for health risk assessment** a **system of categorization of work operations** has been established in the **Czech Republic**.

The system is based on **monitoring different harmful factors** in the **workplace**.

**Work operations are divided into four categories** (category 1 is the safest) according to the extent of risk.

**The category of the work operation and the most important risk factor determine the frequency and range of periodic medical examination of workers (periodicity 1-6 years).**



Categorization of work is allowing **complex evaluation of the factors load level of employees** which is decisive from the **health point of view** about the quality of working conditions which are **characteristic for the given work on the concrete workplace** and the level of health protection of employees.

**There is to classify 13 risk factors:**  
dust, chemical substances, noise ,  
vibrations, electromagnetic fields,  
atmospheric pressure, physical load,  
working position, thermal exposure,  
cold exposure , psychical burden,  
visual burden, work with biological  
agents.

# GENERAL DESCRIPTION (I) OF THE FACTORS LOAD LEVEL ( CATEGORIES 1 – 4)

1. GRADE OF LOAD – CATEGORY 1 – **minimal health risk** – factor is not existent in the work environment or the load is minimal, ***optimal working conditions*** (minimal health risk even for handicapped persons, influence of factor is irrelevant from the health point of view)
2. GRADE OF LOAD – CATEGORY 2 – **acceptable level of health risk** – from the health point of view is level of load caused by factor acceptable, ***exceeding of load limits*** as per regulations ***doesn't exist*** ( the influence of factor for healthy person is acceptable but negative effect of factor can't be excluded for sensitive individuals)

## GENERAL DESCRIPTION (II) OF THE FACTORS LOAD LEVEL ( CATEGORIES 1 – 4)

3. GRADE OF LOAD – CATEGORY 3 – **considerable level of health risk** – the level of factor load is *exceeding given exposure limits* , there are necessary realisations of technical replacements and organisational regulations at work places (negative influence on health of workers can't be excluded)
4. GRADE OF LOAD – CATEGORY 4 - **high level of health risk** – the level of factor load is *highly exceeding given exposure limits*, complex of preventive regulations must be observed (occupational diseases are more often present)

<b>FACTOR</b>	<b>MAIN PARAMETETRS</b>
<b>DUST</b>	<b>RECALCULATED CONCENTRATION OF SPECIFIC KIND OF DUST IN WORKING ATMOSPHERE PER 8 HOURS SHIFT</b>
<b>CHEMICAL SUBSTANCES , CARCINOGENS, MUTAGENS</b>	<b>RECALCULATED CONCENTRATION OF SPECIFIC CHEMICAL SUBSTANCE IN WORKING ATMOSPHERE PER 8 HOURS SHIFT EXCEEDING OF MAC FOR GIVEN CHEMICAL SUBSTANCE IN WORKING ATMOSPHERE SKIN PENETRATION POSSIBILITY DESIGNATED ALLERGENS R 42 OR R 43 VALUES OF PARAMETERS OF BIOLOGICAL EXPOSURE TESTS ( URINE, BLOOD)</b>

<b>FACTOR</b>	<b>MAIN PARAMETETRS</b>
<b>NOISE</b>	<b>EQUIVALENT NOISE OR ULTRASOUND LEVEL PER 8 HOURS SHIFT WORK AVERAGE GROUP INCREASE OF HEARING LOSS (ACCORDING TO SPECIAL LAW)</b>
<b>VIBRATIONS</b>	<b>WEIGHTED SUMMARY LEVEL OF VIBRATION ACCELERATION (ACCORDING TO SPECIAL LAW)</b>

## EXPOSURE ASSESSMENT - NOISE

Exposure 20 minutes	noise 93 dB(A)
120 minutes	80 dB(A)
30 minutes	98 dB(A)

Calculation of „average“ noise level for 170 minutes  $L_{Aeq,Te}$  (equivalent noise level A)

$$10 \log \frac{1}{20 + 120 + 30} \cdot \Sigma 20 \cdot 10^{0,1,93} + 120 \cdot 10^{0,1,80} + 30 \cdot 10^{0,1,98} =$$

$$10 \log \frac{1}{170} \cdot 2,41 \cdot 10^{11} = 91,5 \text{ dB(A)}$$

Calculation of „average“ noise level for 8 hours shift

$$L_{EX,8h} = L_{Aeq,Te} + 10 \log \frac{170}{480} = 91,5 + (- 4,5) = 87,0 \text{ dB(A)}$$

### Calculation of noise level for 12 hours shift

$$L_{Aeq,12h} = 10 \log \frac{12}{8} \cdot 10^{0,1,87,0} = 88,8 \text{ dB(A)}$$

Exposure 20 minutes noise 93 dB(A)

120 minutes 80 dB(A)

30 minutes 98 dB(A)

310 minutes 50 dB(A)

Calculation of „average“ noise level for 8 hours shift (480 minutes)  $L_{Aeq,Te}$  (equivalent noise level A):

$$10 \log \frac{1}{20 + 120 + 30 + 310} \cdot \Sigma 10 \cdot 10^{0,1,93} + 120 \cdot 10^{0,1,80} + 30 \cdot 10^{0,1,98} + 310 \cdot 10^{0,1,50} = 87,0 \text{ dB(A)}$$

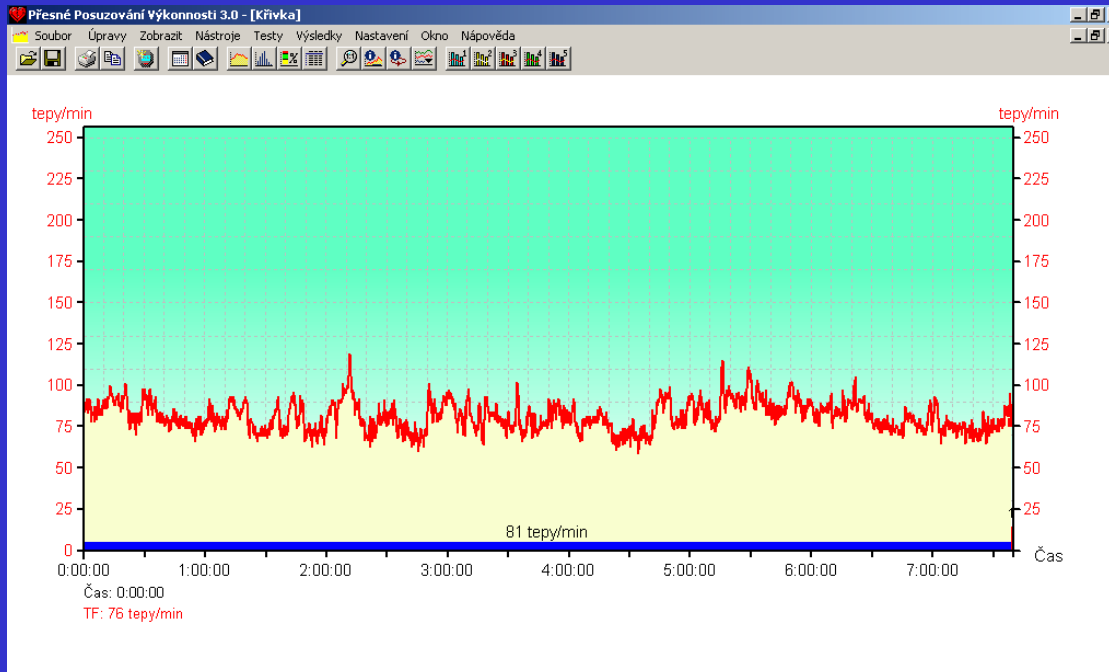


<b>FACTOR</b>	<b>MAIN PARAMETETRS</b>
<b>NONIONIZING RADIATION AND ELECTROMAGNETIC FIELDS</b>	<b>CLASS OF LASER VALUES OF PARAMETERS ACCORDING TO SPECIAL LAW</b>
<b>ATMOSPHERIC PRESSURE</b>	<b>WORK IN INCREASING ATMOSPHERIC PRESSURE</b>
<b>BIOLOGICAL AGENTS</b>	<b>WORK WITH CERTAIN BIOLOGICAL AGENTS ( BACTERIA, VIRUSES, PARASITES, MOULDS AND OTHER PATHOGENS ) ACCORDING TO SPECIAL LAW</b>

<b>FACTOR</b>	<b>MAIN PARAMETETRS</b>
<b>PHYSICAL LOAD</b>	<b>FULL SHIFT ENERGY OUTPUT (NETTO)</b> <b>MINUTE ENERGY OUTPUT (NETTO)</b> <b>AVERAGE HEART FREQUENCE PER SHIFT</b> <b>AVERAGE EXERTED MUSCULAR STRENGTH</b> <b>AND NUMBER OF MOVEMENTS PER SHIFT</b> <b>WEIGHTED MASS HAND TRANSFERRED</b> <b>ACCORDING TO SEX</b>
<b>WORKING POSITION</b>	<b>WORKING ACTIVITY IN UNACCEPTABLE</b> <b>WORKING POSITIONS ( DUATION)</b> <b>ARRANGEMENT OF WORKPLACES</b>

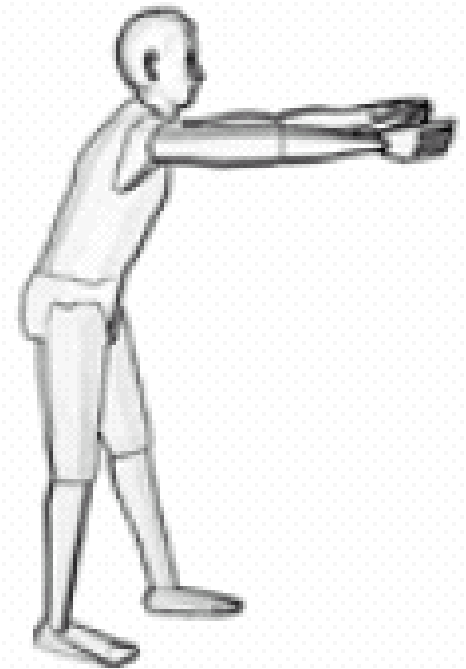
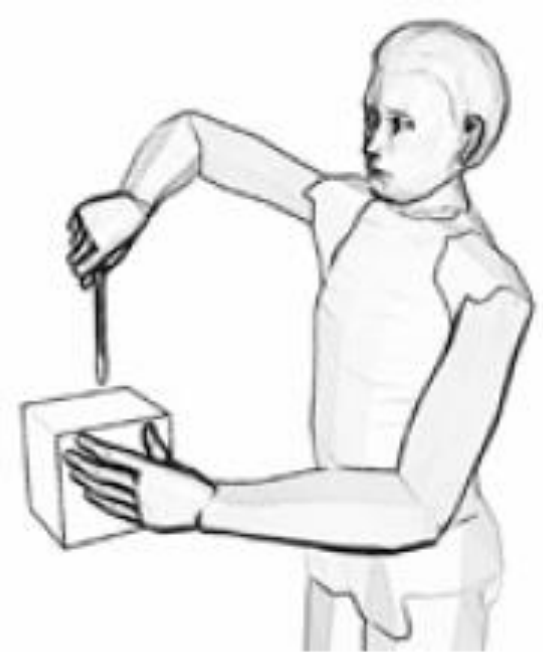
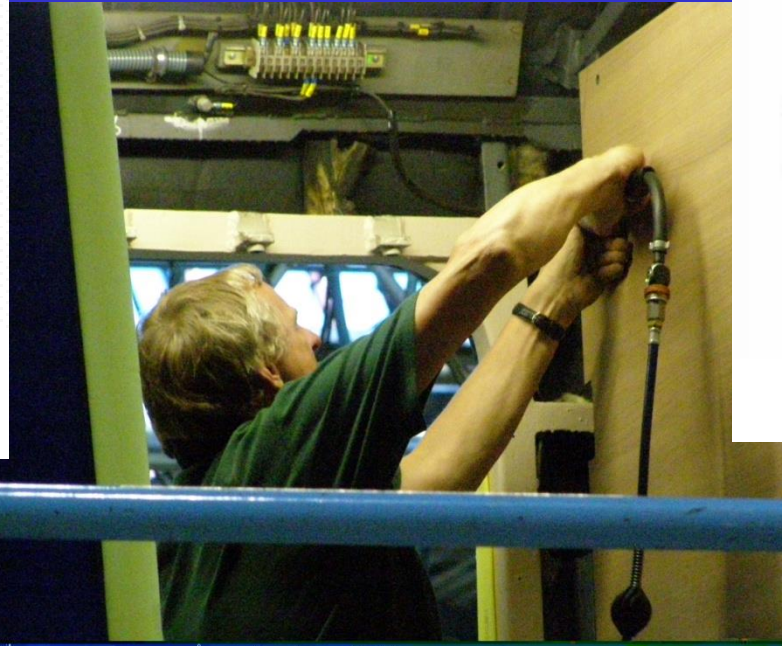
# Total physical load

## Measurement of heart frequency in railway workers



Osoba	Test	Datum	13.9.2005	TF průměr	81 tepy/min		
Záznam	13.9.2005 7:05	Čas	7:05:22	TF max	119 tepy/min		
Druh aktivity	Běh	Trvání	7:39:11.2				
Průměr					81 tepy/min	7:05:22 - 7:39:11.2 (7:33:49.0)	

# Working posture

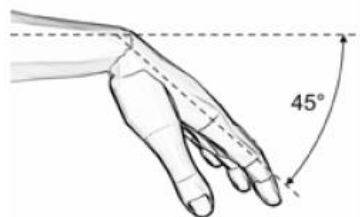


### 3.3.1. Rizikové faktory pro ruce a zápěstí

#### Poloha

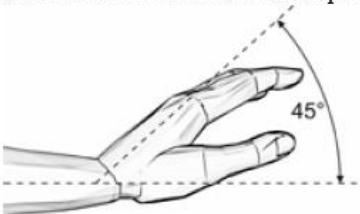
Flexe  $\geq 45^\circ$

Měření úhlu ohnutí k rovině středu zápěstí.



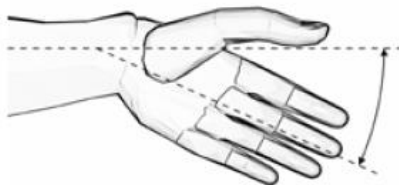
Extenze  $\geq 45^\circ$

Měření úhlu ohnutí k rovině středu zápěstí.



Ulnární deviace

Jakýkoliv znatelný odklon od palce.



Radiální deviace

Jakýkoliv znatelný odklon směrem k palci.



#### Síla

Klíčový úchop  
( $\geq 0,9$  kg)

Aplikace síly prsty okolo objektu.

Pokud jsou užití síly větší nebo rovny 0,9 kg. Není-li zde měření, požaduje se síla pro psaní tužkou.



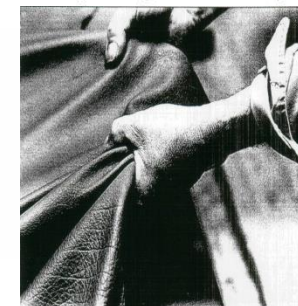
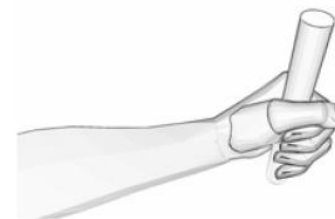
Tlak na prsty  
( $\geq 0,9$  kg)

Tlak jednoho nebo více prstů na jeden povrch nebo objekt.  
Pokud jsou užití síly větší nebo rovny 0,9 kg.



Silný stisk  
( $\geq 4,5$  kg)

Palec přesahuje nebo se dotýká ukazováku pokud je užito 4,5 kg nebo více.



Doba trvání  
 $\geq 10$  sec.

Jakákoliv síla nebo rizikový faktor polohy udržovaný po dobu 10 sec. nebo více.

Frekvence  
 $\geq 30$ /min

Kumulativní měření jakékoliv kombinace síly nebo rizikových faktorů vyskytující se 30krát za minutu nebo více.  
Např. vyžaduje-li operace 5 klíčových stisků, 3 ulnární deviace, 20 flexí a 2 extenze, všechno během minuty, tak je frekvence rizikovým faktorem pro tuto operaci.

### 3.3.2. Rizikové faktory pro loket

#### Poloha

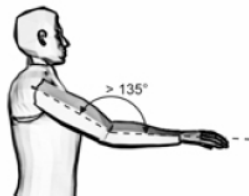
##### Rotace předloktí

Neutrální poloha předloktí je 15° od pronace (dlaň dolů). Rotace předloktí je definována jako rotace  $\pm 45^\circ$  od neutrální polohy.



##### Plná extenze

Úhel loketní kloubu mezi předloktím a paží. Pokud úhel dosahuje nebo převyšuje  $135^\circ$ , pak je tato operace rizikovým faktorem.



#### Síla

$\geq 4,5$  kg

Síla vynakládaná na paži nebo přímo paží. Může se vyskytnout při zvedání objektů vážících 4,5 kg nebo více nebo při použití síly 4,5 kg či více.

Např. zvedání 5,4 kg kufříku ze země, používání kladiva na zatlukání hřebíků nebo používání šroubováku pokud síly rotace převyšují 4,5 kg.

Pozn. Pokud síly vynakládají obě paže, tak je limit  $\geq 6,8$  kg.

#### Trvání

$\geq 10$  sec.

Jakákoliv síla nebo rizikový faktor polohy vyskytující se 10 sec. nebo více.

#### Frekvence

$\geq 2$ /min

Kumulativní měření jakékoliv kombinace síly nebo rizikových faktorů vyskytující se 2krát za minutu nebo více.

### 3.3.3. Rizikové faktory pro ramena

#### Poloha

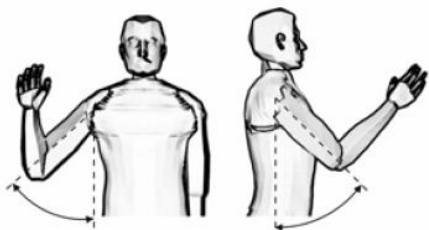
Paže za tělem

Loket je patrný za zády.



Zvednutá paže

Úhel paže 45° nebo více bez ohledu na trup.



Pokrčená ramena

Znatelné zvednutí ramenního kloubu do úrovně uší.



#### Síla

≥ 4,5 kg)

Síla vynakládaná na nebo přímo ramenem. Může se vyskytnout při zvedání objektů vážících 4,5 kg nebo více nebo při použití síly 4,5 kg a více.

Např. při sezení na židli paže odpočívají v poloze příliš vysoko. Paže dosahující přes hlavu, s plnou extenzí, pro dosažení materiálu na horním regálu. Zvedání těžké krabice (> 22,5 kg) na pás, který je příliš vysoko. Zvedání těžkého kufru do auta.

Pozn. pokud síly vynakládají obě paže, tak je limit ≥ 6,8 kg.

#### Trvání

≥ 10 sec.

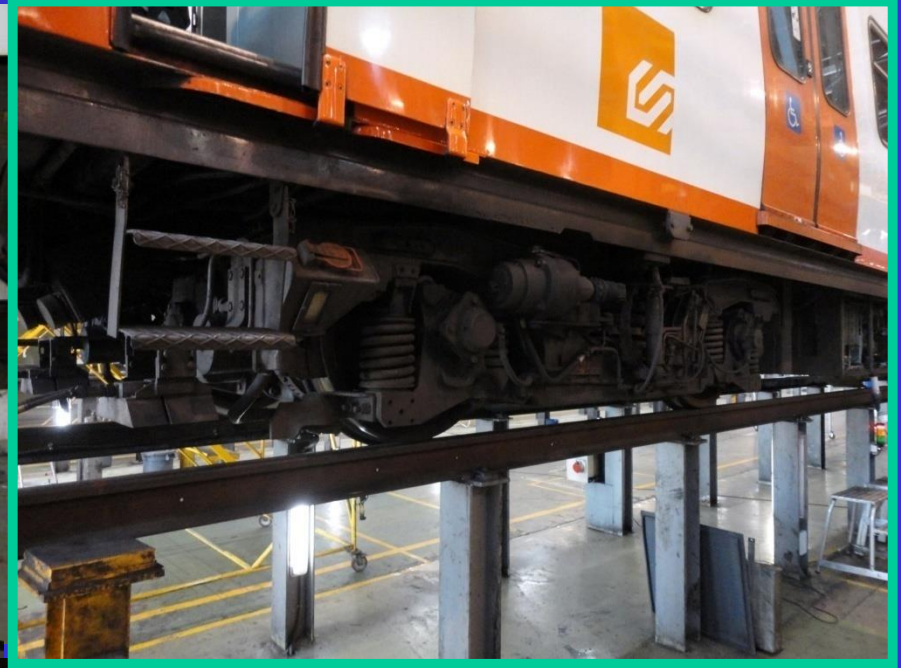
Jakákoliv síla nebo rizikový faktor polohy vyskytující se 10 sec. nebo více.

#### Frekvence

≥ 2/min

Kumulativní měření jakékoliv kombinace síly nebo rizikových faktorů vyskytující se 2krát za minutu nebo více.

# LOCKSMITH







<b>FACTOR</b>	<b>MAIN PARAMETETRS</b>
<b>THERMAL EXPOSURE</b>	<b>OBSERVATION OF MICROCLIMATIC CONDITIONS ACCEPTABLE PER FULL SHIFT OR SHORT PERIOD THE NECESSITY OF REGIME MEASURES</b>
<b>COLD EXPOSURE</b>	<b>WORK WITH PERMANENT STAY OUTSIDE IN WINTER PERIOD WORK IN AIR CONDITIONED AREAS IN CONNECTION TO ENERGETIC OUTPUT EXPOSURE TO CHANGES TO EXTREME TEMPERATURES</b>

<b>FACTOR</b>	<b>MAIN PARAMETETRS</b>
<b>PSYCHICAL BURDEN</b>	<p>MONOTONY  FORCED WORKING PACE  PERMANENT COMPUTER WORK (MINIMUM 4 HOURS NET TIME)  THREE SHIFTS WORKING REGIME  SHIFT ROTATION  WORK WITH REPEATED PSYCHICALLY BURDENING FACTORS IN CONNECTION WITH THE TIME DURATION</p>
<b>VISUAL BURDEN</b>	<p>THE NEED OF RECOGNITION OF CRITICAL DETAILS  THE USE OF ENLARGERS OR SCREENS IN CONNECTION WITH THE TIME DURATION  TECHNICALLY IRREMOVABLE BLINDING GLARE</p>

# Shift work as a possible carcinogen

An overview of the underlying biology  
and  
epidemiologic studies  
of **shift work and cancer risk**,  
with additional emphasis on the role of  
**sleep**,  
**chronotype**,  
**metabolism**  
and  
**obesity**  
in this association.

# Melatonin (5-methoxytryptamine)

is an indoleamine produced primarily by the **pineal gland**, which is **secreted** exclusively **during the dark** phase of the light-dark cycle in humans.

Several decades ago, reports indicated that melatonin possesses **oncostatic properties**, leading to novel **hypotheses** that **diminished secretion of melatonin might promote the development of cancer**.

Growing evidence also demonstrates that **visible light**, including electric light, **can acutely suppress melatonin production** – a phenomenon often referred to as **“circadian disruption”** particularly if it occurs at night, as commonly observed in **shift workers**.

# Shift work as a possible carcinogen

In **2007**, the International Agency for Research on Cancer classified shift work as a possible carcinogen, based on convincing **experimental evidence** and supportive, but still **limited, epidemiologic data**.

Indeed, experimental data has consistently demonstrated that **circadian disruption can promote carcinogenesis in animals**; specifically, exposure to light at night and phase shifts in the light-dark cycle have accelerated tumor development in rodents (reviewed in).

# Shift work as a possible carcinogen

In humans, epidemiologic data continues to accumulate, with the majority of existing studies indicating that shift work is related to a modest increase in the risk of breast cancer.

A recent systematic review and meta-analysis, published in 2013, found that women with a history of night shift work had a 21% higher risk of breast cancer compared to women without night work experience (RR=1.21, 95% CI=1.00-1.47).

Initial studies have identified links between shift work and other cancers as well, although this evidence is very limited.

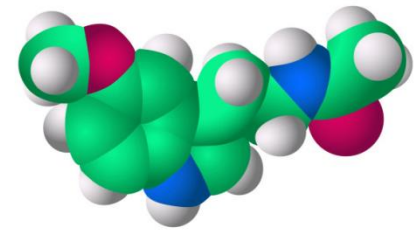
# Shift work as a possible carcinogen

Increasing evidence also suggests that **shift workers** are more often **obese** than non-shift workers, which has been attributed, in part, to the negative effects of circadian disruption on glucose and lipid metabolism and reduced thermogenesis related to eating food at night. The direct effects of circadian clock genes have been implicated in metabolism and therefore may contribute to these mechanisms as well. In addition, **obesity is an important risk factor for many cancers**, including breast cancer, endometrial cancer, colorectal cancer, among others. As a result, **obesity is a potential mediator of the observed association between shift work and cancer risk**, and it is important to appraise whether previous analyses have evaluated this hypothesis.



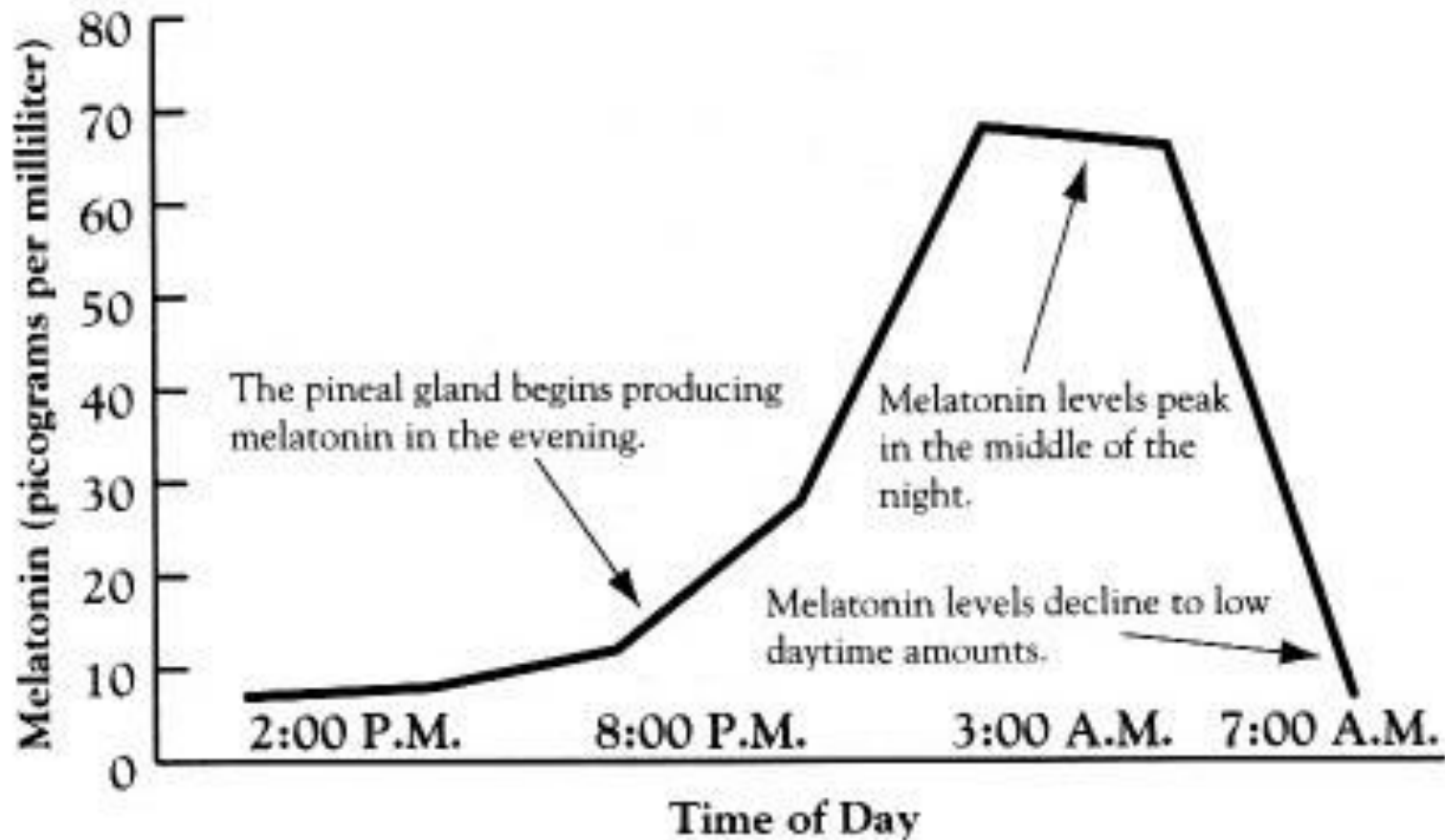
# Marker of the circadian system: Melatonin

- Synthesized by the pineal gland
- Derived from tryptophan – serotonin
- Empirical formula:  $C_{13}H_{16}N_2O_2$
- Chemical messenger which allows seasonal animals including man to perceive day length changes

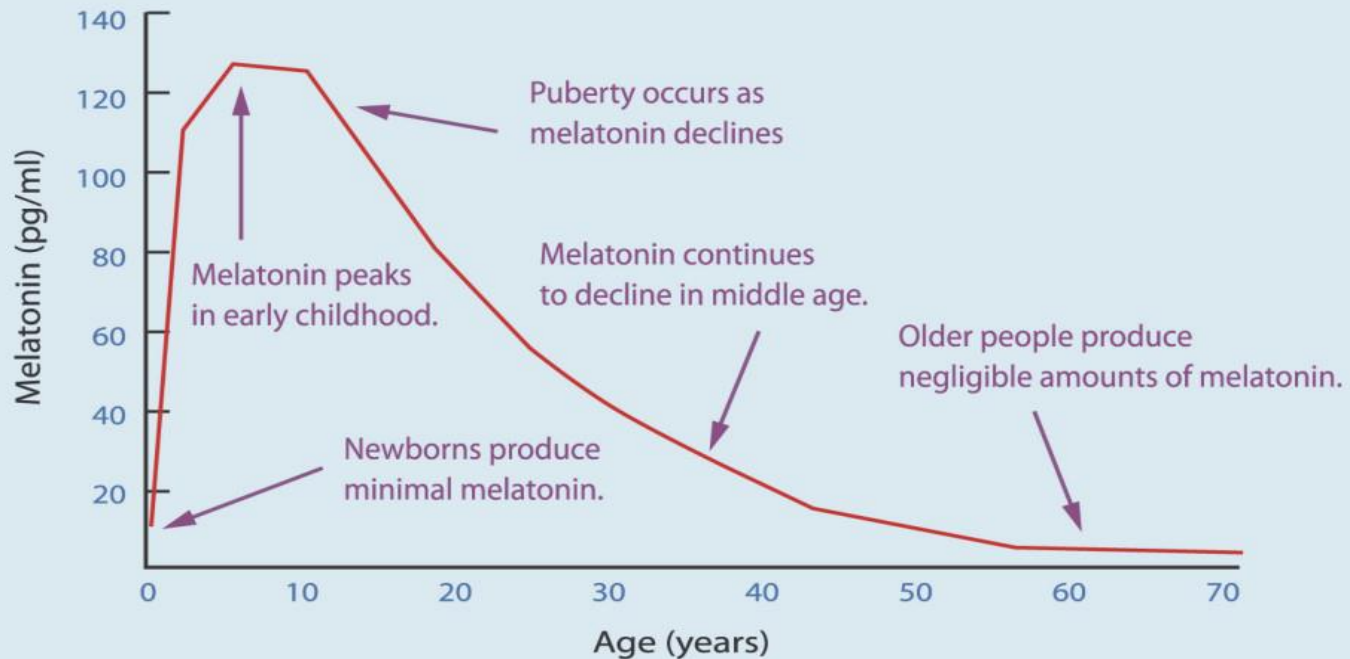


Melatonin molecule

# Melatonin peaks at night



# Melatonin production declines with age

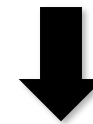
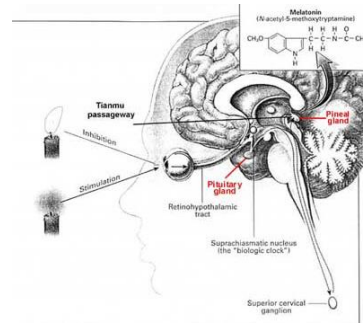


Source: Grivas et al. 2007

# How can light alter cancer risk?



Light at ~2am – e.g., during night work



Suppression of nightly melatonin peak

COMPENSATORY INCREASE IN ESTROGEN LEVELS

LACK OF CANCER PROTECTION THROUGH MELATONIN



HIGHER BREAST CANCER RISK?  
"Melatonin Hypothesis"



RISK OF ALL CANCERS HIGHER



*IARC Monographs on the Evaluation of*

**BMJ**

NEWS

## Danish night shift workers with breast cancer awarded compensation

BMJ 2009; 338 doi: <http://dx.doi.org/10.1136/bmj.b1152> (Published 18 March 2009)

Cite this as: *BMJ* 2009;338:b1152

- Shiftwork that involves circadian disruption is

*carcinogenic, in humans and sufficient evidence of carcinogenicity in experimental animals*



# Conclusion

- More refined exposure assessments that take into account external as well as internal clock will likely enable us to more finely delineate chronic disease risk and mortality in shift workers
- Future prevention strategies and work schedules likely ought to target a reduction in mismatch between biological (internal) and social (external) time

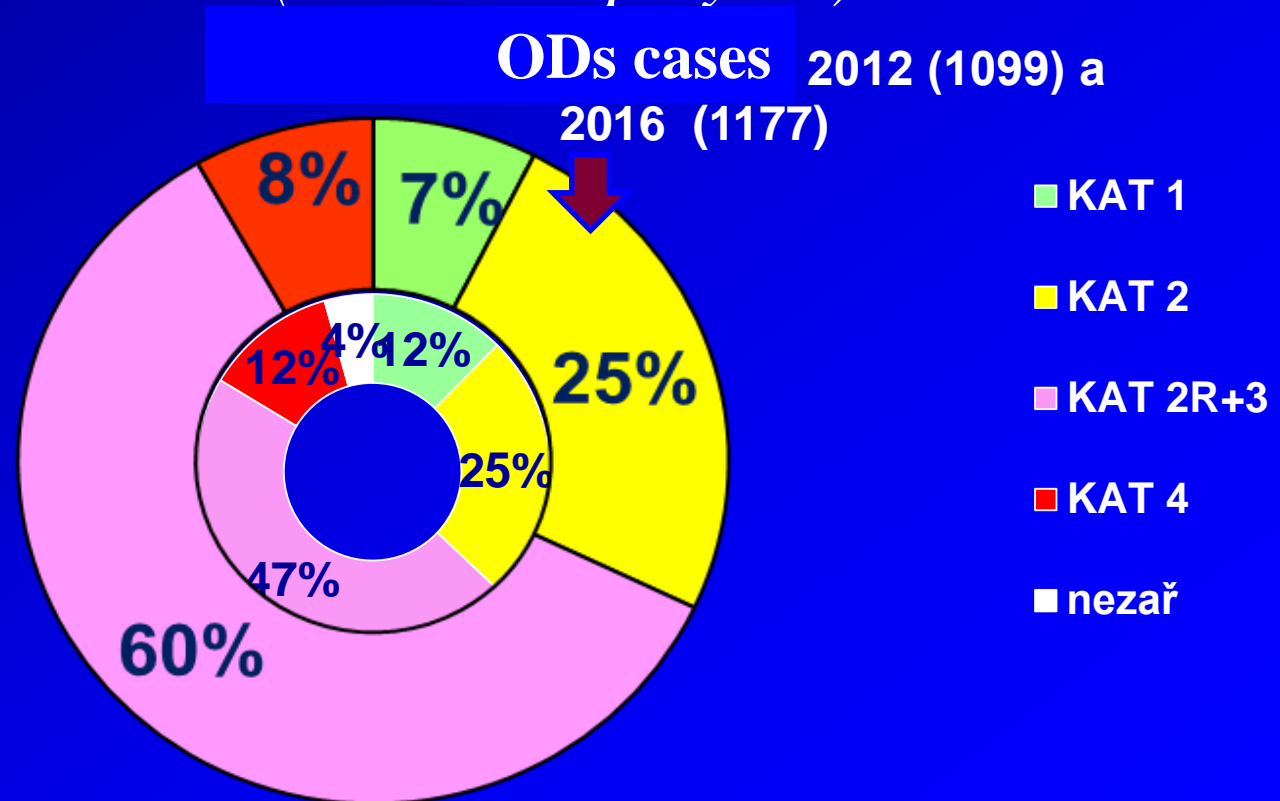
# RISK PERCEPTION

**Table 5-2: Ordering of Perceived Risk for 30 Activities and Technologies\*<sup>30</sup>**

<i>Activity/ Technology</i>	<i>Group 1: LOWV<sup>†</sup></i>	<i>Group 2: College Students</i>	<i>Group 3: Active Club Members</i>	<i>Group 4: Experts</i>
Nuclear power	1	1	8	20
Motor vehicles	2	5	3	1
Handguns	3	2	1	4
Smoking	4	3	4	2
Motorcycles	5	6	2	6
Alcoholic beverages	6	7	5	3
General (private) aviation	7	15	11	12
Police work	8	8	7	17
Pesticides	9	4	15	8
Surgery	10	11	9	5
Fire fighting	11	10	6	18
Large construction	12	14	13	13
Hunting	13	18	10	23
Spray cans	14	13	23	26
Mountain climbing	15	22	12	29
Bicycles	16	24	14	15
Commercial aviation	17	16	18	16
Electric power	18	19	19	9
Swimming	19	30	17	10
Contraceptives	20	9	22	11
Skiing	21	25	16	30
X-rays	22	17	24	7
High school & college football	23	26	21	27
Railroads	24	23	20	19
Food preservatives	25	12	28	14
Food coloring	26	20	30	21
Power mowers	27	28	25	28
Prescription antibiotics	28	21	26	24
Home appliances	29	27	27	22
Vaccinations	30	29	29	25

# Association between risk category and occup.diseases (ODs)

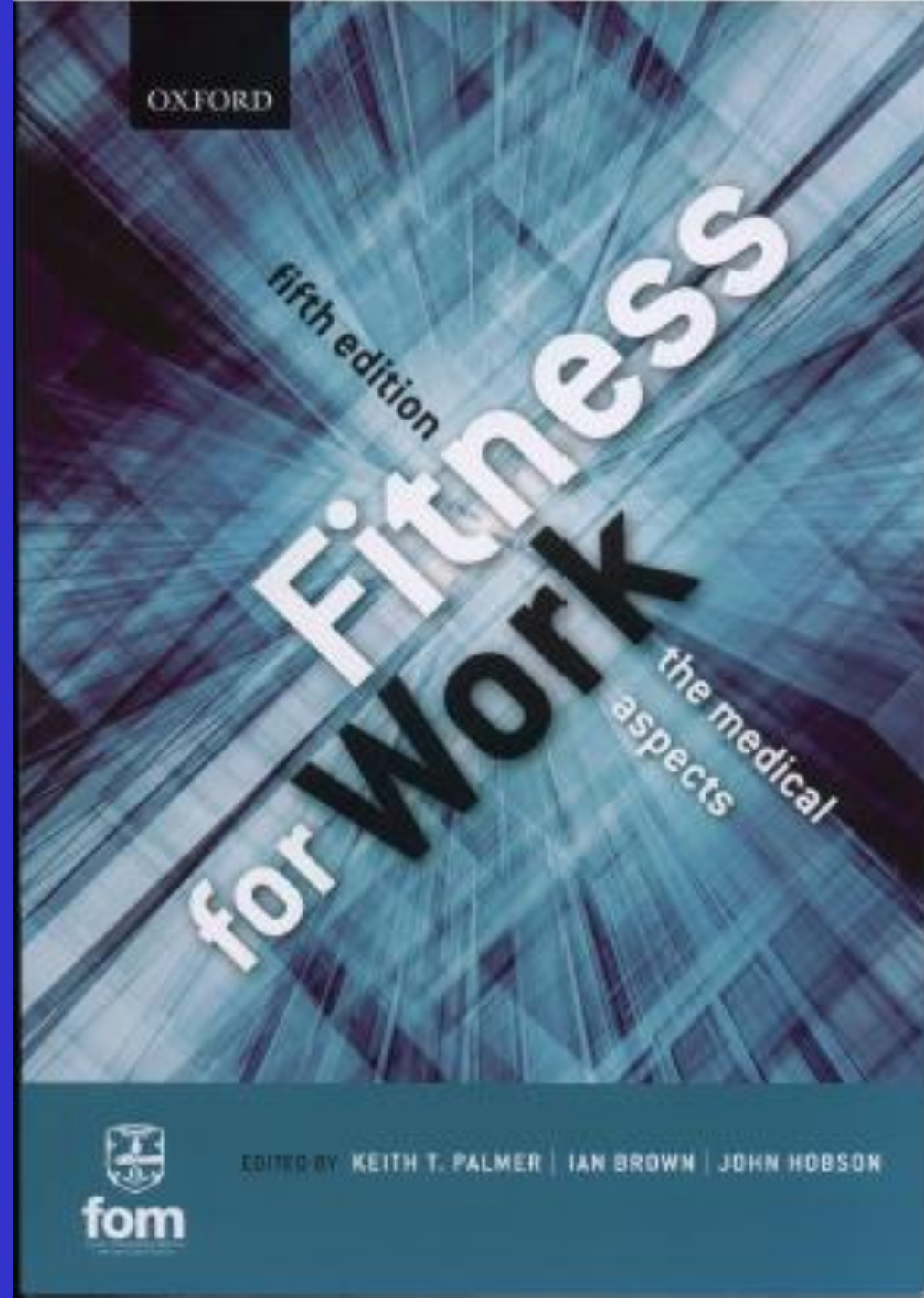
Category 1	5/100 000 (cat.1+2 4.5 mil. employees)
Category 2	2/10 000
Category 2R+3	2/1000 (500.000 employes)
Category 4	7/1000 (15.000 employees)





# The assessment of fitness for work:

the determination of whether  
an individual is fit  
to perform  
his or her tasks  
without  
risk to  
self or others



## Introduction 1

Detailed knowledge of both working and health conditions is required.

Because of the changing nature of these two variables, fitness for work is a dynamic concept.

Its assessment may be required

- at the beginning of the work relationship,
  - after transfer of positions within employment,
  - after the emergence of a health problem
- or
- periodically, especially for hazardous, physically demanding or safety sensitive jobs.

*The assessment of fitness for work is regulated by specific and general legislation in many countries .*

## Introduction 2

Czech Republic Act No 373/2011 Dig., on **specific health services** (valid since April 1,2012) defines in paragraphs 53 - 60

**Occupational Medical Services (OMSs)** as preventive services, which include

- **the impact assessment of work, working environment and working conditions on health,**
  - **workplace visits/inspections**
- and
- **preventive medical fitness assessment for work aimed at protecting the health and protection against occupational accidents, occupational diseases and work-related diseases,**
  - **training in first aid and regular surveillance in the workplace.**

## Introduction 3

**Providers of occupational medical services are**

- **general practitioners (GP's)**
- or
- **occupational health specialists :  
certified/recognized occupational physicians).**

**The employee** is obliged to undergo all preventive medical occupational examinations indicated by OMS provider for the evaluation of health status.

**The employer** is obliged to assign of employees to work in compliance with the conclusions of the medical report/certificate about their medical fitness.

# Competence of OMS providers

The **provider of occupational medical services** is required

- **to inform employee** about the possible influence of factors of working conditions on his/her health, and with knowledge of the development of his/her state of health,
- **to inform employers** about the possible influence of factors of working conditions on the health of employees,
- **to perform periodic monitoring of the workplace conditions,**
- **to cooperate with the employer, employee, safety and health at work specialist, governmental inspection authorities and trade unions,**
- **to notify promptly the employer** of serious or repeated facts adversely affecting health and safety at work
- **through employer to ensure the measurement/expertise and analysis of the working conditions, working environment including the results of categorization of health risks**

# Principles of medical fitness assessment for work 1

One of the crucial medicolegal activity of OMS providers is the **certification of medical fitness for work**

issued by examining physician

and based on **knowledge of working conditions, knowledge of health risks of work and on results of occupational medical examinations.**

A keystone of quality performance by an occupational physician is the familiarity with specific working conditions and demands of the respective job and the knowledge of the state of health of individual workers.

**Occupational medical examinations** of individuals (workers and employees) are **initial/entry, periodic, extraordinary, output and consequential.**

# Principles of medical fitness assessment for work 2

Working population in the Czech Republic currently totals about 5 million people working in 75 000 subjects/enterprises .

*There are not centralized data available about the number of certificates of medical fitness for work.*

- System of **categorization of work operations** established in the Czech Republic is based on monitoring of 13 harmful factors in the workplace  
(dust, chemical substances, noise, vibrations, electromagnetic fields, physical load, working position, thermal exposure, cold exposure, psychological burden, visual burden, biological agents, high air pressure).
- **Special guidelines** for assessment of various types of risks are available.
- The category of the work operation and the most important risk factor determine **the frequency and range of periodic medical examination of workers and frequency of periodic measurements of different harmful factors at workplaces** (*details in Decree No. 79/2013 Dig.*).

# Principles of medical fitness assessment for work 3

## Standardized **certificate of medical fitness assessment for work** must include

- identification of the employer's,
- identification of medical provider and physician/signature, Nr. of certificate
- identification of the persons employed or seeking employment: the name or names and surname, date of birth, address of permanent residence in the Czech Republic or the address of the registered place of temporary residence,
- **details of the job position** or employee data of the expected job title of person applying for employment, further information on the nature of work,
- **mode of operation, the risk factors in relation to specific work, the degree of working risk factors, job categories expressed by the key risk factors of working conditions,**
- (period of validity of certificate),
- the term an extraordinary examination, if such a procedure is justified,



## LÉKAŘSKÝ POSUDEK O ZDRAVOTNÍ ZPŮSOBILOSTI K PRÁCI č.....

vydaný ve smyslu ustanovení § 42 zákona č.373/2011 Sb., o specifických zdravotních službách, v platném znění, vyhl. č. 79/2013 Sb., v platném znění, vyhl. č. 101/1995 Sb., v platném znění

## Principles of medical fitness assessment for work 4

### Standardized certificate of medical fitness assessment for work must include

- date of issue of certificate,
- information about the possibility of appeal procedure,
- final assessment (4 possibilities):

1. is medically fit
2. is medically fit with the certain condition/medical restriction
3. is medically unfit
4. lost permanently medical fitness

Zaměstnavatel: XXXXXX, Praha 4, Na Svahu 5, PSČ 140 06, IČO 1111111

Na základě žádosti zaměstnavatele a

lékařského vyšetření dle § 94 zákonníku práce

lékařského vyšetření mladistvých dle § 247 zákonníku práce

lékařské preventivní prohlídky dle § 84 odst. 1) písm. v), w) zákona č. 258/2000 Sb.

vstupní  pravidelné  mimořádné  výstupní preventivní lékařské prohlídky

rodič(a) MUDr. .... v souladu s platnými předpisy,

že posuzovaný(á) ..... datem narození .....

adresa trvalého/ přechodného pobytu .....

drůž práce a činností/činností z toho vyplývajících: .....

mezi práci:

zahazeno/zahazeno dle

§ 1 odst. 1 písm a) nebo b) vyhl. č. 101/1995 Sb.  - práce v organech ochrany veřejného zdraví vyhlášeném riziku

§ 2 písm. a) vyhl. č. 101/1995 Sb. výsledek kategorie: 2H  3  4

§ 2 písm. b) bod 1 vyhl. č. 101/1995 Sb. rizikové faktory: .....

§ 2 písm. b) bod 2 vyhl. č. 101/1995 Sb.  - obsluha a řízení vozidel (příloha 2 část II. bod 4 vyhl. 79/2013 Sb.)

§ 87 zákona č. 361/2000 Sb.  - práce ve výškách (příloha 2 část II. bod 9 vyhl. 79/2013 Sb.)

§ 87a zákona č. 361/2000 Sb.  - noční práce (příloha 2 část II. bod 13 vyhl. 79/2013 Sb.)

§ 19 zákona č. 258/2000 Sb.  - ostatní dle přílohy 2 část II. vyhl. 79/2013 Sb. ....

.....

a) zdravotně způsobilý(á)\* b) zdravotně nezpůsobilý(á)\*

c) zdravotně způsobilý(á)\* jen za podmínek\*\*:

d) pozbyl(a) dlouhodobě zdravotní způsobilost

Doba platnosti posudku: ..... rok(y) ode dne vystavení.

.....

Poučení:

Podle ustanovení § 46 odst. 1 zák. 373/2011 Sb. v platném znění má-li posuzovaná osoba nebo osoba, které uplatněním lékařského posudku vznikají práva nebo povinnosti, za to, že lékařský posudek je nesprávný, může do 10 pracovních dnů ode dne jeho prokazatelného předání podat návrh na jeho přezkoumání poskytovateli, který posudek vydal. Osoba, které uplatněním posudku vznikají práva nebo povinnosti a které byl posudek předán posuzovanou osobou, může návrh na přezkoumání lékařského posudku podat do 10 pracovních dnů ode dne jeho předání, a to poskytovateli uvedenému ve větě první. Pokud poskytovatel návrhu na přezkoumání lékařského posudku nevyhoví v přiměřeném rozsahu, postupuje do 10 pracovních dnů ode dne jeho doručení, pokud se jedná o lékařský posudek o zdravotní způsobilosti, apod. a návrhem na přezkoumání, včetně podkladů potřebných pro přezkoumání lékařského posudku a svého stanoviska, příslušnému správnímu orgánu. Odvolání nemá / má \* odkladný účinek.

V ..... dne

Razítko a podpis lékaře:

Dne ..... Podpis posuzované osoby: .....

\* Nebodici se řetěze \*\* Konkretizují se požadované podmínky, např. způsob úpravy pracovní doby, mizeh směn, omezení některých úkolů a činností

Zaklepnutím křížkem  označte zařízení uváděné pracovní činností do příslušné skupiny

# **AIMS OF OCCUPATIONAL HEALTH**

- 1. Provide safe occupational environment**
- 2. Increase and improve health, safety and welfare of the workers**
- 3. Increase productivity and thereby production.**