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Occupational medicine and toxicology

Oto Osina, MD, assoc. prof., PhD.

Bernardino Ramazzini
1633 – 1714

His book on occupational diseases, *De Morbis Artificum Diatriba* (*Diseases of Workers*) outlined the health hazards of chemicals, dust, metals, repetitive or violent motions, odd postures, and other disease-causative agents encountered by workers in 52 occupations.

THE COUNCIL OF THE EUROPEAN COMMUNITIES, COUNCIL DIRECTIVE of 12 June 1989 (89/391/EEC)

on the introduction of measures to encourage improvements in the safety and health of workers at work

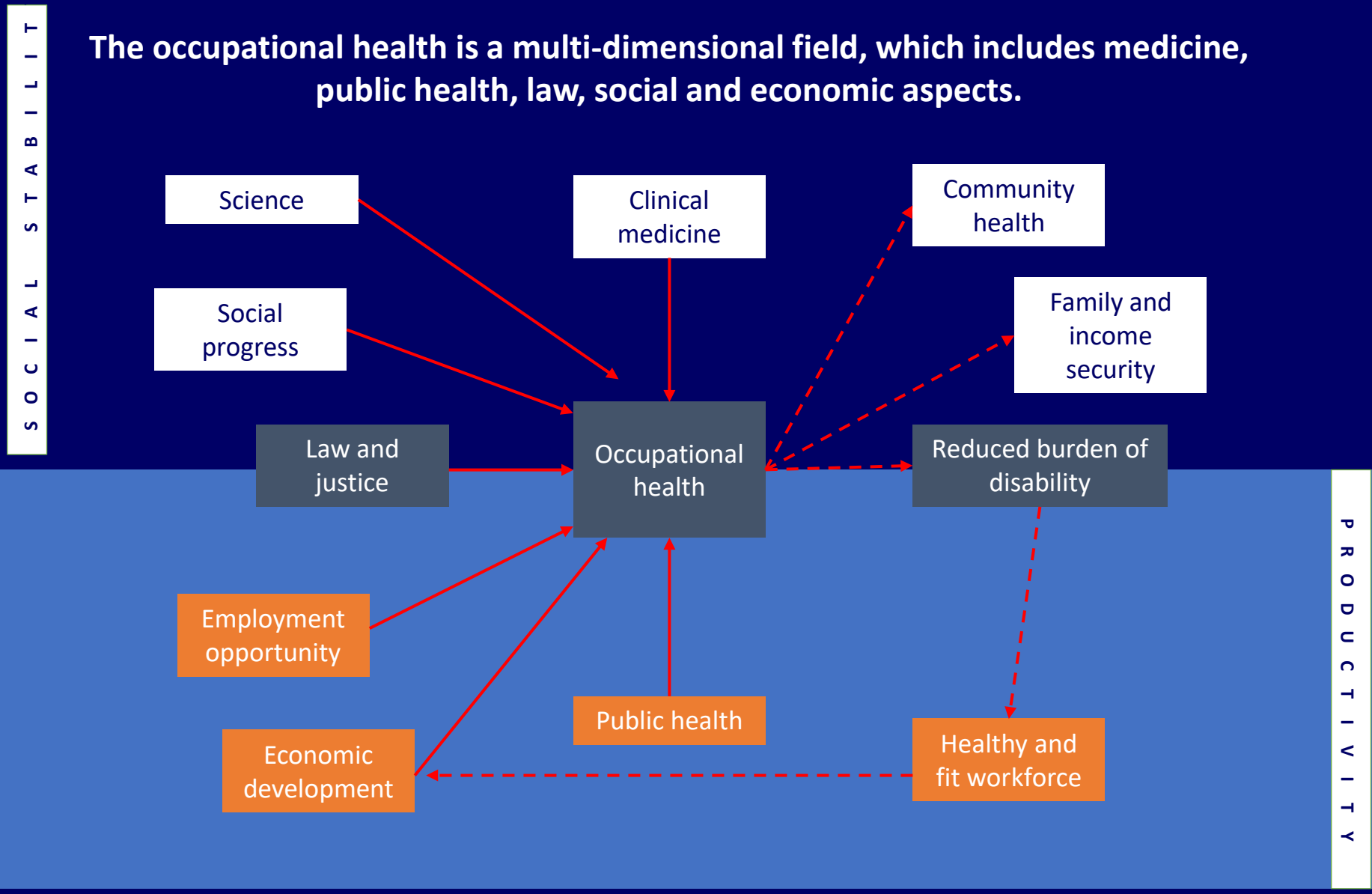
- Member States of EU have a responsibility to encourage improvements in the safety and health of workers on their territory;
- Member States' legislative systems covering safety and health at the workplace differ widely and need to be improved;
- National provisions, may result in different levels of safety and health protection and allow competition at the expense of safety and health
- The incidence of accidents at work and occupational diseases is still too high;
- Preventive measures must be introduced or improved without delay in order to safeguard the safety and health of workers and ensure a higher degree of protection

Definition of Occupational medicine

Country	Definition of Occupational Medicine	Main Document/Source
Slovakia	Occupational medicine focuses on the **diagnosis**, prevention, and treatment of diseases caused by working conditions. It also includes assessments of workers' fitness for specific jobs.	Act No. 355/2007 Coll. on Protection, Support, and Development of Public Health
Norway	Occupational medicine is a medical specialty focused on the **prevention** and management of work-related diseases, promoting workplace safety, and evaluating workers' health status.	Working Environment Act (Arbeidsmiljøloven)
Iceland	Occupational medicine focuses on the **prevention** and treatment of work-related illnesses, the promotion of health in the workplace, and the evaluation of occupational hazards.	Regulation No. 920/2006 on Health and Safety at Work
Germany	Occupational medicine includes the **identification**, prevention, and treatment of occupational diseases and work-related health risks, along with health promotion in the workplace.	German Occupational Safety and Health Act (Arbeitsschutzgesetz, ArbSchG)
Sweden	Occupational medicine is concerned with **preventing** and managing health risks in the workplace, improving the health of workers, and ensuring safety in work environments.	Work Environment Act (Arbetsmiljölagen)
Poland	Occupational medicine deals with the prevention, **diagnosis**, and treatment of diseases related to work, while also promoting worker health and evaluating work conditions for health risks.	Act on Occupational Medicine Services (Ustawa o służbie medycyny pracy)
Great Britain	Occupational medicine focuses on **preventing** work-related health problems, promoting workplace safety, managing occupational risks, and assessing worker fitness for employment.	Health and Safety at Work etc. Act 1974 and subsequent regulations

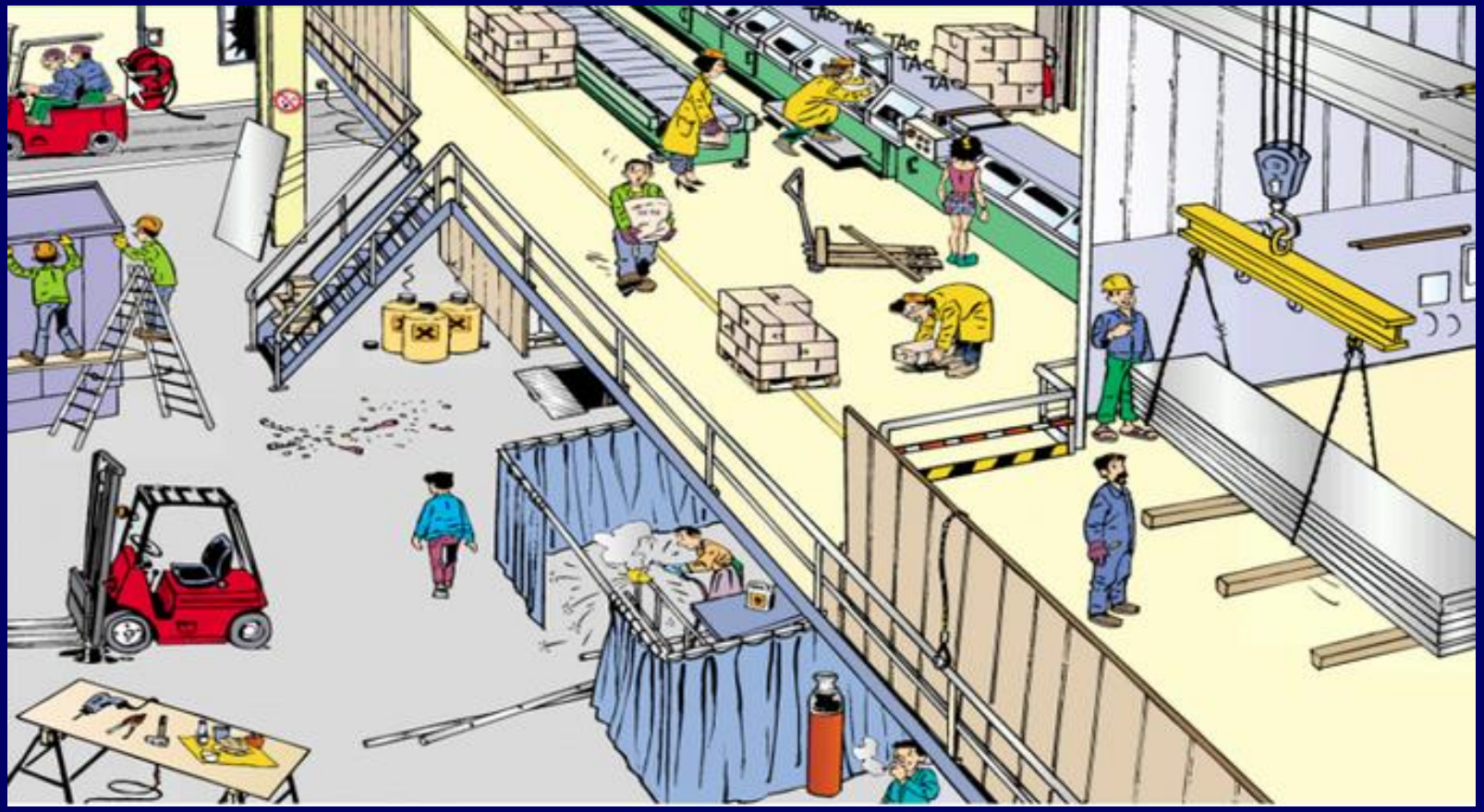
Factors influencing of occupational health

The occupational health is a multi-dimensional field, which includes medicine, public health, law, social and economic aspects.



Harmful factors of working environment

- Physical factors
- Negative ergonomic conditions – forced position (long time elevated hands, bending forward ...)



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Harmful factors of working environment

Chemical factors

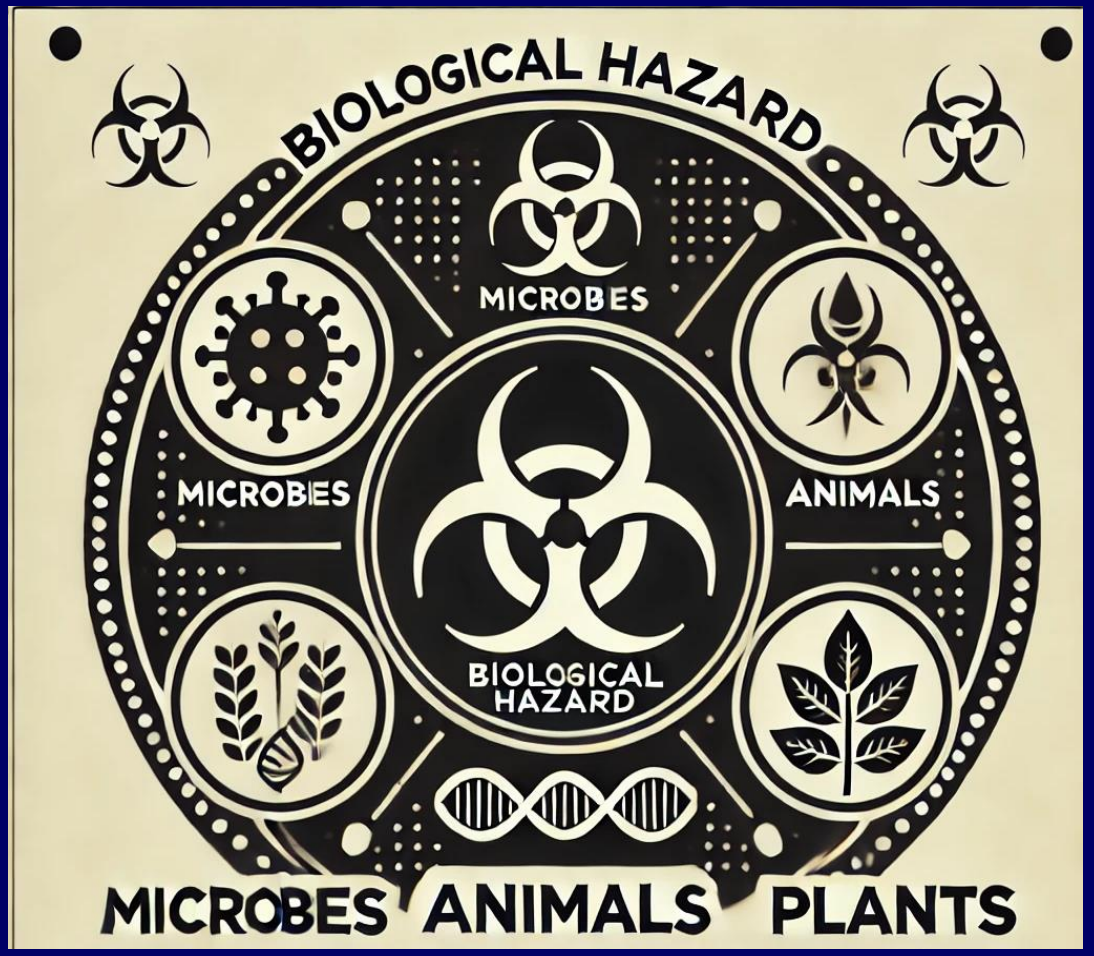
Health effects of chemical substances:

- Irritative
- Allergic
- Mutagenic
- Carcinogenic
- Teratogenic
- Hematotoxic
- Neurotoxic
- Hepatotoxic
- Toxic for cardiovascular system
- Nephrotoxic

- One substance can have several effects

Harmful factors of working environment

- Biological factors



- Psychological and psycho – social factors

Occupational diseases (ODs)

- Specific acute or chronic disease that occurs as a result of work or occupational activity
- Connected with any specific physical, chemical or biological factor of work environment
- More frequent in any profession than in the general population, or in other worker populations
- List of occupational diseases, or other legal rules
- ODs have medical – social – political content – list of ODs is usually approved by parliament of country
- Employees, which have had confirmed OD, have a claim for compensation for damage of health from work (depend on country)

Occupational disease (OD)

Country	Definition of Occupational Disease
Slovakia	An occupational disease is defined as a disease caused directly by working conditions, and it must be recognized by a physician and included in the official list of occupational diseases.
Norway	An occupational diseases are defined as conditions directly caused by exposure to harmful factors in the workplace. The Labor Code recognizes only certain diseases specified in regulations.
Iceland	An occupational disease arises as a result of exposure to risk factors at work and includes musculoskeletal disorders, respiratory problems, and skin conditions.
Germany	An occupational diseases are officially recognized conditions caused by workplace conditions, listed in legal regulations and on the official list.
Sweden	An occupational diseases are defined as diseases caused by exposure to hazardous workplace conditions and must be confirmed by a specialist. Health authorities maintain a list of recognized occupational diseases.
Poland	An occupational diseases include conditions directly caused by contact with working conditions and must be recognized by a specialist and listed in the legal register of occupational diseases.
Great Britain	An occupational diseases are defined as conditions caused by workplace factors and recognized by government institutions. Recognized diseases are included in the Industrial Injuries Disablement Benefit (IIDB) system.

Occupational diseases (ODs)

- List of occupational diseases, or other legal rules
  - International list of Ods – prepared by ILO - the ILO international list may countries use as a reference or guideline for developing or updating their national policies and lists.

Country	Number of Occupational Diseases Listed	System Type
Slovakia	47	One open point on the list
Norway	No Fixed Number	Open System
Iceland	No Fixed Number	Open System
Germany	80	Closed List with Periodic Updates
Sweden	No Fixed Number	Open System
Poland	Approximately 75	Closed List
Great Britain	70 Prescribed Diseases	Mixed System (Closed List with Open Elements)

ILO – List of occupational diseases 2010

1. Occupational diseases caused by exposure to agents arising from work activities
    - 1.1. Diseases caused by chemical agents
    - 1.2. Diseases caused by physical agents
    - 1.3. Biological agents and infectious or parasitic diseases ...
2. Occupational diseases by target organ systems
    - 2.1. Respiratory diseases
    - 2.2. Skin diseases
    - 2.3. Musculoskeletal disorders
    - 2.4. Mental and behavioural disorders...
3. Occupational cancer
    - 3.1. Cancer caused by the following agents ...
4. Other diseases
    - 4.1. Miners' nystagmus
    - 4.2. Other specific diseases caused by occupations or processes not mentioned in this list where a direct link is established scientifically, or determined by methods appropriate to national conditions and practice, between the exposure arising from work activities and the disease(s) contracted by the worker

1.1. Diseases caused by chemical agents

- 1.1.1. Diseases caused by beryllium or its compounds
- 1.1.2. Diseases caused by cadmium or its compounds
- 1.1.3. Diseases caused by phosphorus or its compounds
- 1.1.4. Diseases caused by chromium or its compounds
- 1.1.5. Diseases caused by manganese or its compounds
- 1.1.6. Diseases caused by arsenic or its compounds
- 1.1.7. Diseases caused by mercury or its compounds
- 1.1.8. Diseases caused by lead or its compounds
- 1.1.9. Diseases caused by fluorine or its compounds
- 1.1.10. Diseases caused by carbon disulfide
- 1.1.11. Diseases caused by halogen derivatives of aliphatic or aromatic hydrocarbons
- 1.1.12. Diseases caused by benzene or its homologues
- 1.1.13. Diseases caused by nitro- and amino-derivatives of benzene or its homologues
- 1.1.14. Diseases caused by nitroglycerine or other nitric acid esters
- 1.1.15. Diseases caused by alcohols, glycols or ketones
- 1.1.16. Diseases caused by asphyxiants like carbon monoxide, hydrogen sulfide, hydrogen cyanide or its derivatives
- 1.1.17. Diseases caused by acrylonitrile
- 1.1.18. Diseases caused by oxides of nitrogen
- 1.1.19. Diseases caused by vanadium or its compounds
- 1.1.20. Diseases caused by antimony or its compounds
- 1.1.21. Diseases caused by hexane
- 1.1.22. Diseases caused by mineral acids

1.1.23. Diseases caused by pharmaceutical agents
1.1.24. Diseases caused by nickel or its compounds
1.1.25. Diseases caused by thallium or its compounds
1.1.26. Diseases caused by osmium or its compounds
1.1.27. Diseases caused by selenium or its compounds
1.1.28. Diseases caused by copper or its compounds
1.1.29. Diseases caused by platinum or its compounds
1.1.30. Diseases caused by tin or its compounds
1.1.31. Diseases caused by zinc or its compounds
1.1.32. Diseases caused by phosgene
1.1.33. Diseases caused by corneal irritants like benzoquinone
1.1.34. Diseases caused by ammonia
1.1.35. Diseases caused by isocyanates
1.1.36. Diseases caused by pesticide
1.1.37. Diseases caused by sulphur oxides
1.1.38. Diseases caused by organic solvents
1.1.39. Diseases caused by latex or latex-containing products
1.1.40. Diseases caused by chlorine
1.1.41. Diseases caused by other chemical agents at work not mentioned in the preceding items where a direct link is established scientifically, or determined by methods appropriate to national conditions and practice, between the exposure to these chemical agents arising from work activities and the disease(s) contracted by the workers

1.2. Diseases caused by physical agents

1.2.1. Hearing impairment caused by noise

1.2.2. Diseases caused by vibration (disorders of muscles, tendons, bones, joints, peripheral blood vessels or peripheral nerves)

1.2.3. Diseases caused by compressed or decompressed air

1.2.4. Diseases caused by ionizing radiations

1.2.5. Diseases caused by optical (ultraviolet, visible light, infrared) radiations including laser

1.2.6. Diseases caused by exposure to extreme temperatures

1.2.7. Diseases caused by other physical agents at work not mentioned in the preceding items where a direct link is established scientifically, or determined by methods appropriate to national conditions and practice, between the exposure to these physical agents arising from work activities and the disease(s) contracted by the worker

1.3. Biological agents and infectious or parasitic diseases

- 1.3.1. Brucellosis
- 1.3.2. Hepatitis viruses
- 1.3.3. Human immunodeficiency virus (HIV)
- 1.3.4. Tetanus
- 1.3.5. Tuberculosis
- 1.3.6. Toxic or inflammatory syndromes associated with bacterial or fungal contaminants
- 1.3.7. Anthrax
- 1.3.8. Leptospirosis
- 1.3.9. Diseases caused by other biological agents at work not mentioned in the preceding items where a direct link is established scientifically, or determined by methods appropriate to national conditions and practice, between the exposure to these biological agents arising from work activities and the disease(s) contracted by the worker

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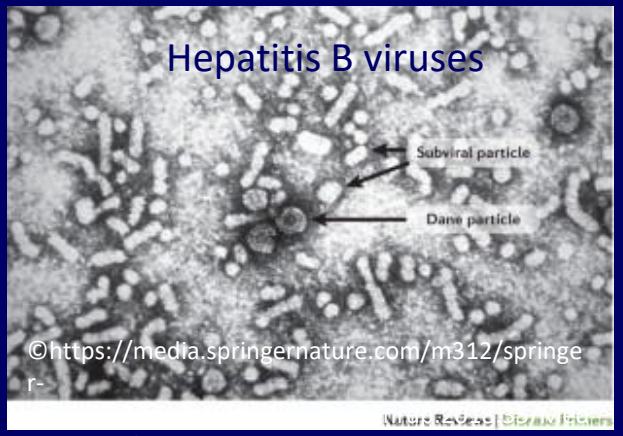

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2. Occupational diseases by target organ systems

2.1. Respiratory diseases

2.1.1. Pneumoconioses caused by fibrogenic mineral dust (silicosis, anthraco-silicosis, asbestosis)

2.1.2. Silicotuberculosis

2.1.3. Pneumoconioses caused by non-fibrogenic mineral dust

2.1.4. Siderosis

2.1.5. Bronchopulmonary diseases caused by hard-metal dust

2.1.6. Bronchopulmonary diseases caused by dust of cotton (byssinosis), flax, hemp, sisal or sugar cane (bagassosis)

2.1.7. Asthma caused by recognized sensitizing agents or irritants inherent to the work process

2.1.8. Extrinsic allergic alveolitis caused by the inhalation of organic dusts or microbially contaminated aerosols, arising from work activities

2.1.9. Chronic obstructive pulmonary diseases caused by inhalation of coal dust, dust from stone quarries, wood dust, dust from cereals and agricultural work, dust in animal stables, dust from textiles, and paper dust, arising from work activities

2.1.10. Diseases of the lung caused by aluminium

2.1.11. Upper airways disorders caused by recognized sensitizing agents or irritants inherent to the work process

2.1.12. Other respiratory diseases not mentioned in the preceding items where a direct link is established scientifically, or determined by methods appropriate to national conditions and practice, between the exposure to risk factors arising from work activities and the disease(s) contracted by the worker

2.2. Skin diseases

2.2.1. Allergic contact dermatoses and contact urticaria caused by other recognized allergy-provoking agents arising from work activities not included in other items

2.2.2. Irritant contact dermatoses caused by other recognized irritant agents arising from work activities not included in other items

2.2.3. Vitiligo caused by other recognized agents arising from work activities not included in other items

2.2.4. Other skin diseases caused by physical, chemical or biological agents at work not included under other items where a direct link is established scientifi cally, or determined by methods appropriate to national conditions and practice, between the exposure to risk factors arising from work activities and the skin disease(s) contracted by the worker

2.3. Musculoskeletal disorders

2.3.1. Radial styloid tenosynovitis due to repetitive movements, forceful exertions and extreme postures of the wrist

2.3.2. Chronic tenosynovitis of hand and wrist due to repetitive movements, forceful exertions and extreme postures of the wrist

2.3.3. Olecranon bursitis due to prolonged pressure of the elbow region

2.3.4. Prepatellar bursitis due to prolonged stay in kneeling position

2.3.5. Epicondylitis due to repetitive forceful work

2.3.6. Meniscus lesions following extended periods of work in a kneeling or squatting position

2.3.7. Carpal tunnel syndrome due to extended periods of repetitive forceful work, work involving vibration, extreme postures of the wrist, or a combination of the three

2.3.8. Other musculoskeletal disorders not mentioned in the preceding items where a direct link is established scientifically, or determined by methods appropriate to national conditions and practice, between the exposure to risk factors arising from work activities and the musculoskeletal disorder(s) contracted by the worker

2.4. Mental and behavioural disorders

2.4.1. Post-traumatic stress disorder

2.4.2. Other mental or behavioural disorders not mentioned in the preceding item where a direct link is established scientifically, or determined by methods appropriate to national conditions and practice, between the exposure to risk factors arising from work activities and the mental and behavioural disorder(s) contracted by the workers

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Slovakia, 10.8.2009
Mine Handlová

20 miners died

Several rescuers had post-traumatic stress disorder

3. Occupational cancer

3.1. Cancer caused by the following agents

3.1.1. Asbestos
3.1.2. Benzidine and its salts
3.1.3. Bis-chloromethyl ether (BCME)
3.1.4. Chromium VI compounds
3.1.5. Coal tars, coal tar pitches or soots
3.1.6. Beta-naphthylamine
3.1.7. Vinylchloride
3.1.8. Benzene
3.1.9. Toxic nitro- and amino-derivatives of benzene or its homologues
3.1.10. Ionizing radiations
3.1.11. Tar, pitch, bitumen, mineral oil, anthracene, or the compounds, products or residues of these substances
3.1.12. Coke oven emissions
3.1.13. Nickel compounds
3.1.14. Wood dust
3.1.15. Arsenic and its compounds
3.1.16. Beryllium and its compounds
3.1.17. Cadmium and its compounds
3.1.18. Erionite
3.1.19. Ethylene oxide
3.1.20. Hepatitis B virus (HBV) and hepatitis C virus (HCV)
3.1.21. Cancers caused by other agents at work not mentioned in the preceding items where a direct link is established scientifically, or determined by methods appropriate to national conditions and practice, between the exposure to these agents arising from work activities and the cancer(s) contracted by the worker

Reported occupational diseases in Norway for 2022

Musculoskeletal disorders

Approximately **600 cases** were reported, making it the most common category.

Respiratory diseases

There were around **250 cases** reported, often linked to exposure to hazardous substances.

Skin diseases

About **200 cases** were reported, typically due to contact with irritants or allergens.

Hearing loss

There were approximately **150 cases** reported, primarily from industries with high noise levels.

Criteria for diagnosing ODs

The Key criteria

- The clinical features must align with what is known about the health effects following exposure to the specified agent.
- Symptoms and signs should meet specified criteria and be supported by appropriate diagnostic tests.
- There must be evidence of sufficient work exposure confirmed by a public health institution.
- The time interval between exposure and effect must be consistent with our konwledge of the disease.
- The differential diagnosis must be considered - there are non-occupational diseases that have similar clinical features