Introduction to Occupational Health and Hygiene

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About Michael Riediker

Director of Operations SAFENANO, IOM Singapore
And also:

• Privat Docent (Lecturer) and head of a research group (3 PhD-students, 2 post-docs) at University of Lausanne
• Expert to several European nanosafety and health initiatives (Austrian NanoTrust, Danish NanoCenter, French NanoTeam, EU NanoSafety Cluster, European Academy of Sciences Expert Committee on Nanotechnology)

• Studies of Environmental Hygiene at ETH Zurich (MSc and PhD)
• Studies of Occupational Hygiene at ETH Zurich and Uni Lausanne (MAS)
• Certified Hygienist SGAH - IOHA
• Recognized specialist on Particles and Health
Course content

1. What is occupational hygiene
2. Understanding occupational toxicology
3. Chemical hazards in the workplace
4. Physical hazards in the workplace
What is Occupational Hygiene?
What is Occupational Hygiene?

The International Occupational Hygiene Association (IOHA) defines Occupational Hygiene as:

'The discipline of **anticipating**, **recognizing**, **evaluating** and **controlling** health hazards in the working environment with the objective of protecting worker health and well-being and safeguarding the community at large.'
# Health Hazards

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<tbody>
<tr>
<td><strong>Chemical agents</strong></td>
<td>Gases, vapours, solids, fibres, liquids, dusts, mists, fumes, etc.</td>
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<td><strong>Physical agents</strong></td>
<td>Noise and vibration</td>
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<td>Heat and cold</td>
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<td>Electromagnetic fields, lighting etc.</td>
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<tr>
<td><strong>Biological agents</strong></td>
<td>Bacteria, fungi, etc.</td>
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<td><strong>Ergonomic factors</strong></td>
<td>Lifting, stretching, and repetitive motion</td>
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<td><strong>Psychosocial factors</strong></td>
<td>Stress, workload and work organisation</td>
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Anticipation and Recognition

**ANTICIPATION** – this involves identifying potential hazards in the workplace before they are introduced.

**RECOGNITION** - this involves identifying the potential hazard that a chemical, physical or biological agent - or an adverse ergonomic situation - poses to health.
Evaluation

EVALUATION of the extent of exposure to the chemical hazards, physical or biological agents (or adverse ergonomic situation) in the workplace.

- Measurement of personal exposure (or model, estimate)
- Assess data, compare to OEL, NOEL (if existing)

OEL: Occupational Exposure Limit
NOEL: No-Observable Effect Level
CONTROL of the chemical, physical or biological agent - or adverse ergonomic situation, by procedural, engineering or other means where the evaluation indicates that this is necessary.
Occupational Hygiene - Occupational Medicine

- Work Activity
- Exposure
- Disease
- Occupational Hygiene
- Occupational Medicine
- Occupational Health
History: Ancient Greek

• Ca 400 BC Hippocrates in ancient Greece first noted illness in mercury sulphide workers.
History: Mining disease

- Ca 1540 Paracelsus described lung diseases in mineworkers
History: Mining control

Agricola (ca 1556)
The Industrial revolution from the late 1700s through to the late 1800s led to increased urbanisation and industrialisation. Picture of Manchester UK.
History: Personal Protective Equipment

• 1858 John Stenhouse introduces a charcoal impregnated mask to control exposure to gases and vapours.
1889 - Exposure limits are set for humidity and carbon dioxide in cotton mills in the UK.
History: Canaries

- 1890s - Haldane undertakes work on the toxicity of Carbon Monoxide by exposing rats, mice, and even himself to varying concentrations within an “exposure chamber”.

- He used these results to develop “dose v time” plots for severity and discomfort of health effects.

- He introduces the use of small animals and in particular Canaries as the first way of monitoring to give an indication of the levels of toxic gas.
History: Toxicology

1910 Alice Hamilton works in the US as the first Industrial toxicologist pioneering the field of toxicology and occupational hygiene.
1917 - During the first world war, the urgency of the work in munitions factories led to poor working conditions.

The work of the “Health of Munitions Workers Committee” laid the ground for many subsequent practices in ergonomics, psychology, welfare and shift-work regimes.
History: Get organized

- 1920s-30s: Industrial hygiene forms in USA
- 1938/9: Foundation of the American Conference of Governmental Industrial Hygiene (ACGIH) and the American Industrial Hygiene Association (AIHA)
- 1953 – Foundation of the British Occupational Hygiene Society (BOHS)
- BOHS starts publishing Annals of Occupational Hygiene in 1958
History - today

- 1980/90s - Occupational hygiene grows widely in North America, Europe and Australia with legislation specifically to focus on chemical and physical hazards.

- 2000s - The societies of 25 different countries are members of the International Occupational Hygiene Association (IOHA).

- Industrialisation in countries such as China and India increase the need for Occupational hygiene.
The Importance of Occupational Hygiene

The World Health Organisation estimates that globally there are:

- 2,000,000 work-related deaths per year.
- 386,000 deaths each year from exposure to airborne particulates.
- 152,000 deaths per year from carcinogens in the workplace.
- 37% of Lower Back Pain is attributed to occupation.
The Importance of Occupational Hygiene

That means approximately 228 people have died from work related injury or ill health since we started an hour ago.
Occupational Hygiene – a key discipline for managing risks at workplaces

- Define System Gap-Analysis
- Assessment
- Develop Recommendations
- Implementation
- Evaluating
- Controlling
- Recognizing
- Anticipating