NOTA KURSUS: MEDICAL SURVEILLANCE OF CHEMICALS AFFECTING THE RESPIRATORY SYSTEM

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VIA SISCO WEBEX

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1) This webinar is focusing on the respiratory system as the target organ of chemical health effects.

The design is based on the medical surveillance objective as recommended by ILO(International Labour Organization). Where necessary, the employer, or the institution competent under national law and practice, should arrange, through a method which accords with national law and practice, medical surveillance of workers:

(a) for the assessment of the health of workers in relation to risks caused by exposure to chemicals.

(b) for the early diagnosis of work-related diseases and injuries caused by exposure to hazardous chemicals.

(c) for the assessment of the workers' ability to wear or use required respiratory or other personal protective equipment.

2) The medical surveillance program begins with the CHRA findings that indicate the requirement of a medical surveillance program.

The training aims to fill the gap in terms of knowledge in conducting medical surveillance for chemicals not listed in the medical surveillance guidelines 2001, especially chemicals targeting the respiratory system. There are many chemicals with the main entry routes into the body is the respiratory system.

3)Chemicals with Permissible exposure Limits as listed in the schedule 1, will certainly cause health effects when the exposure exceed the limits. The respiratory system may be the target organ of a chemical, or the target organ affected due to the chemical entry into the bodies.

4)Health surveillance programme is where an assessment indicates that health surveillance is necessary for the protection of the health of employees exposed or likely to be exposed to chemicals hazardous to health, the employer shall carry out a health surveillance programme.

5) The medical surveillance component of the health surveillance programme in subregulation (1) shall be carried out by an occupational health doctor.

6) If an employee is exposed or likely to be exposed to chemicals hazardous to health listed in

Schedule II, the health surveillance required under subregulation (1) shall include medical

surveillance conducted at intervals of not more than twelve months or at such shorter intervals as

determined by the occupational health doctor or an occupational safety and health officer who is

also a medical practitioner.

7) Medical surveillance is a secondary prevention program and a risk-based program where the program may be stop when the exposures are below the action level (if skin absorption risk is not a problem). Action levels are used by OSHA and NIOSH of USA to express a health or physical hazard. They indicate the level of a harmful or toxic substance/activity which requires medical surveillance, increased industrial hygiene monitoring, or biological monitoring. Action levels are generally set at one half of the permissible exposure limit (PEL), but the actual level may vary from standard to standard.

8) Identifiable diseases that can caused by chemical hazard are, acute respiratory conditions, occupational asthma, chronic restrictive disease, chronic obstructive disease, work aggravated conditions, mixed conditions and cancer.

9) Respiratory system has physical contact with air pollutant by respiration. After being exposed to air pollutant such as particulate matter(PM), inhalation toxicity to the respiratory system might be occurred.

10) Numerous research studies have suggested that PM is associated with respiratory toxicity in in vitro, in vivo, and epidemiological studies. It can induce oxidative stress and inflammation on respiratory organ tissue and triggers the development and exacerbation of diverse diseases of the respiratory system, such as asthma, chronic obstructive pulmonary disease (COPD) and so on.

11) PM can generate reactive oxygen species (ROS) and some oxidative metabolite, causing oxidative stress. It damages DNA and causes epigenetic changes. According to this reason, PM can eventually induce cancer. Once lung is damaged by chemical such as PM, regeneration of lung to normal state is almost impossible. Thus, prediction and early diagnosis of lung diseases are important and imperatively necessary. Biomarkers can be used for disease prediction.

12) Various epigenetic biomarkers of lung diseases induced by PM exposure have been discovered in recent researches. Epigenetic changes do not alter the DNA sequences. However,they can modify methylation or acetylation of DNA and histone protein, and then induces changes in DNA structure and gene expression.