

國立臺北大學自然資源與環境管理研究所

110 學年度第二學期『環境災害與風險管理』

課程講義 (09-10)：健康風險評估

Introduction to Health Risk Assessment

● INTRODUCTION

- Assessment vs. Analysis; Risk Assessment vs. Risk Management
- Environmental Impact Assessment => Human Health Impact => Risk Assessment
- ‘*A Priori*’ Health Risk vs. ‘*Posterior*’ Epidemiological Survey
- Health Risk Assessment => Environmental Issues or Public Health Concerns
- 中科三期七星農場及中油三輕更新計畫環評爭議 => 《[健康風險評估技術規範](#)》
- Definition of Environmental Health Risk Assessment (<http://www.eh.org.au/documents/item/916>):
“Risk assessment is the process of estimating the potential impact of a chemical, physical, microbiological or psychosocial hazard on a specified human population or ecological system under a specific set of conditions and for a certain time frame.”
- The scope of environmental health risk assessment can cover health impacts of
 - ⇒ Chemical pollutants and contaminants in air, water, soil and food
 - ⇒ Pathogenic microbiological contaminants in food and water
 - ⇒ Radiation sources
 - ⇒ Electromagnetic fields (EMFs)
 - ⇒ Climate and climate change
- Risk Assessment Steps
 - ⇒ Hazard Identification / Evaluation / Characterization
 - ⇒ Effects / Losses / Impacts Assessment
 - ⇒ Assessment of Occurrence Probability
 - ⇒ Characterization (NOT ‘*Quantification*’) of Risk
 - ⇒ Risk Communication and Risk Management

EXHIBIT 2.2. OBJECTIVES OF RISK ASSESSMENT.

1. Balance risks and benefits.
 - Drugs
 - Pesticides
2. Set target levels of risk.
 - Food contaminants
 - Water pollutants
3. Set priorities for program activities.
 - Regulatory agencies
 - Manufacturers
 - Environmental and consumer organizations
4. Estimate residual risks and extent of risk reduction after steps are taken to reduce risks.

EXHIBIT 2.3. BIOLOGICAL END POINTS.

- Cancers
- Mutations
- Birth defects
- Reproductive toxicity
- Immunological toxicity
- Neurobehavioral toxicity
- Organ-specific effects
- Endocrine modulation or disruption
- Ecosystem effects

● RISK ASSESSMENT RELATED TO AIR POLLUTION AND SOIL CONTAMINATION

- [固定污染源有害空氣污染物健康風險評估作業方式](#)
 - ⇒ 依據：空氣污染防制法第 20 條第 4 項
 - ⇒ [新聞發布 | 環保署公告「固定污染源有害空氣污染物健康風險評估作業方式」](#)
- [應設置空氣污染防制專責單位或專責人員及健康風險評估專責人員之公私場所](#)
 - ⇒ 依據：空氣污染防制法第 34 條第 1、2 項
 - ⇒ [新聞發布 | 環保署公告「應設置空氣污染防制...及健康風險評估專責人員...」](#)
 - ⇒ [環境保護專責及技術人員訓練管理辦法](#) => [108.07.08 修正總說明及條文對照表.pdf](#)
 - ⇒ [環境保護人員訓練所-訓練簡章](#) => 健康風險評估專責人員訓練簡章
 - ⇒ [開班資訊-中央大學永續環境科技研究中心](#) (健康風險評估專責人員訓練)
- [土壤及地下水污染整治場址環境影響與健康風險評估辦法](#)
 - ⇒ 依據：土壤及地下水污染整治法第 24 條第 8 項
 - ⇒ [參考手冊 :: 土壤及地下水污染整治網 \(epa.gov.tw\)](#)
 - 撰寫指引→[土壤及地下水污染場址健康風險評估方法](#)
 - 污染場址風險評估→[土壤及地下水污染場址健康風險評估作業手冊](#)
 - 污染場址風險評估→[土壤及地下水污染場址風險溝通作業參考手冊](#)

利害關係者

指依土污法所稱之污染行為人、潛在污染責任人、污染土地關係人，及污染場址土地開發行為人、污染場址所在地居民及其他經中央主管機關認定者。



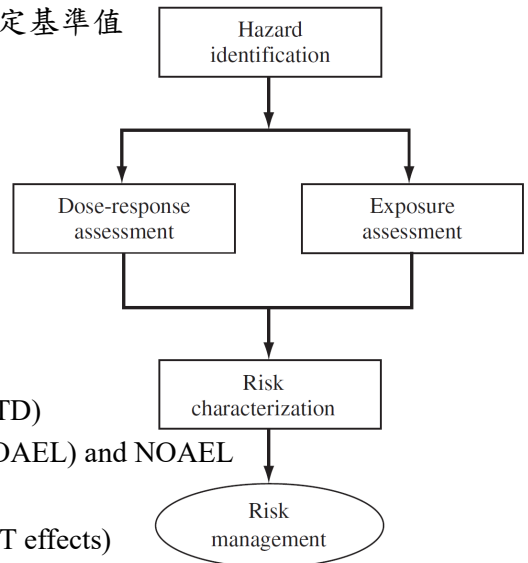
- ENVIRONMENTAL RISK ASSESSMENT OF HUMAN HEALTH

- Masters, G.M. and W.P. Ela (2008). “Chapter 4: Risk Assessment”, *Introduction to Environmental Engineering and Science*, 3rd ed., Pearson, Upper Saddle River, N.J.

- 《健康風險評估技術規範》 => 以 95% 上限值為判定基準值

- The Four Steps of Risk Assessment

- ⇒ Hazard Identification 危害確認
- ⇒ Dose-Response Assessment 劑量效應評估
- ⇒ Exposure Assessment 暴露量評估
- ⇒ Risk Characterization 風險特徵描述



- HAZARDS TO HUMAN HEALTH

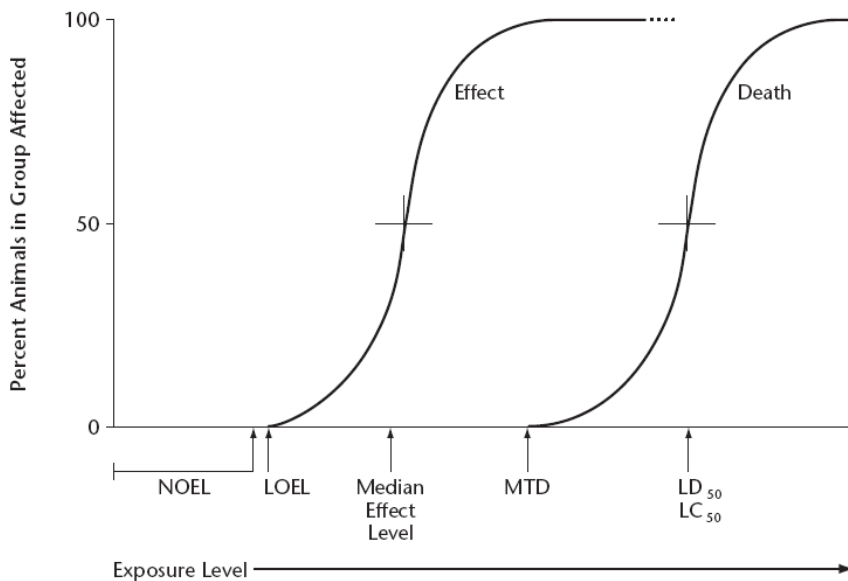
- Acute Toxicity

- ⇒ Lethal Dose (LD₅₀) and Maximum Tolerated Dose (MTD)
- ⇒ Threshold: Lowest Observed Adverse Effect Level (LOAEL) and NOAEL

- Chronic Toxicity

- ⇒ Mutagenic, Carcinogenic and Teratogenic Effects (MCT effects)
- ⇒ Threshold (?) => Cancer Potency
- ⇒ Weight-of-Evidence Categories for Human Carcinogenicity

- Sub-chronic Toxicity



Robson, M. and W. Toscano (Eds), 2007, *Risk Assessment for Environmental Health*, John Wiley, Hoboken, N.J. (p.79)

- EVENTS, SITES OR SOURCES THAT CAUSE HEALTH HAZARDS

- Work Places and Daily Living
- Chemical Release or Spills => PRTR
- Hazard Waste Treatment and Disposal
- Food Additives, Detergents => NP (Environmental Hormones or Endocrine Disruptors)
- Incinerators, Power Plants (including *Nuke*), Industrial Plants / Parks => 「開發行為」
- Events and Facilities Involved Emotion Aspects of Outrage, Suspicion, Perception, and Belief
- Specified Sites => ‘*Superfund*’ Sites
- Soil and Groundwater Contamination
- Mobile Source of Air Pollution => MTBE