國立臺北大學自然資源與環境管理研究所
106 學年度第二學期『環境災害與風險管理』

課程講義（10-11）：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.

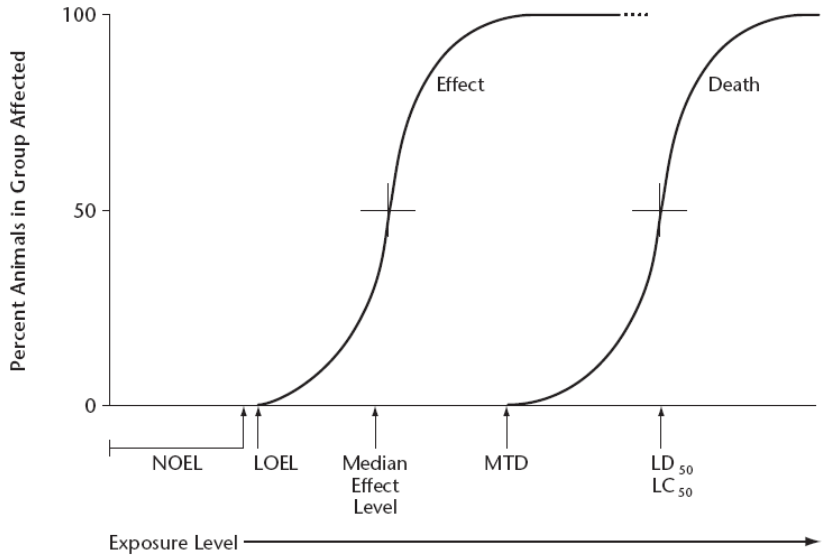
EXHIBIT 2.3. BIOLOGICAL END POINTS.

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

Robson, M. and W. Toscano (Eds), 2007, *Risk Assessment for Environmental Health*, John Wiley, Hoboken, N.J. (pp.16-17)

- ENVIRONMENTAL RISK ASSESSMENT OF HUMAN HEALTH
  - 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 (LD_{50}) 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
  - Specified Sites => '*Superfund*' Sites
  - Soil and Groundwater Contamination
  - Mobile Source of Air Pollution => MTBE
  - Food Additives, Detergents => NP (Environmental Hormones or Endocrine Disruptors)
  - Incinerators, Power Plants (including *Nuke*), Industrial Production Plants =>「開發行為」
  - Events and Facilities Involved Emotion Aspects of Outrage, Suspicion, Perception, and Belief

- HOMEWORK ASSIGNMENT #5 (To be included in the Final Report): 請利用「環評書件查詢系統 https://eiadoc.epa.gov.tw/eiaweb/」與環保署網頁之檢索系統，搜尋環境影響評估有關「健康風險評估」之案例，以利於期末報告進行個案分析與探討。