

# 國立臺北大學自然資源與環境管理研究所

## 102 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 Health Risk Assessment

**R:** Robson, M. and W. Toscano (Editors), 2007, *Risk Assessment for Environmental Health*, John Wiley, Hoboken, N.J.  
**M:** Masters, G. M. and W. P. Ela, 2008, *Introduction to Environmental Engineering and Science*, 3rd Edition, Pearson Education, Upper Saddle River, N.J.  
USEPA: Framework for Human Health Risk Assessment to Inform Decision Making  
<http://www.epa.gov/raf/files/hhra-framework-final-2014.pdf>  
<http://ivy5.epa.gov.tw/epalaw/docfile/033310.pdf> 健康風險評估技術規範

#### ● 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
- 中科三期七星農場環評爭議 => 《[健康風險評估技術規範](#)》
- Definition of Environmental Health Risk Assessment (**R**-p.11):  
“systematic scientific characterization of potential adverse health effects resulting from human exposures to hazardous agents or situations”
- Types of Risk Concerned
  - ⇒ Human Health and Safety; Ecological Systems
  - ⇒ Social Welfare and Cultural Heritage; Financial and Investment
- 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.

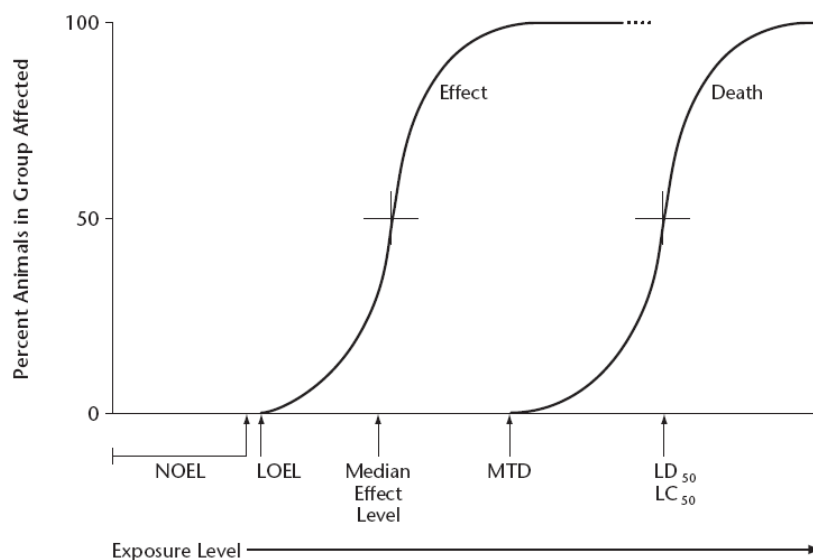
#### EXHIBIT 2.3. BIOLOGICAL END POINTS.

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

- ENVIRONMENTAL RISK ASSESSMENT OF HUMAN HEALTH (M-chp.4)
  - Hazard Identification 危害性鑑定 (危害確認)
  - Dose-Response Assessment 劑量效應評估
  - Exposure Assessment 暴露量評估
  - Risk Characterization 風險特徵評估 (風險特徵描述)

- HAZARDS TO HUMAN HEALTH

- Acute Toxicity (R-p.79)
  - ⇒ Lethal Dose (LD<sub>50</sub>) 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 (M-p.145~146)
- Sub-chronic Toxicity



- EVENTS, SITES OR SOURCES THAT CAUSE HEALTH HAZARDS
  - Work Places and Daily Living
  - Specified Sites => 'Superfund' Sites
  - Soil and Groundwater Contamination
  - Chemical Release or Spills => PRTR
  - Mobile Source of Air Pollution => MTBE
  - Hazard Waste Treatment and Disposal
  - 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 <http://eia-report.epa.gov.tw/EIAWEB/main.aspx?func=00>」, 篩選開發行為適用健康風險評估技術規範第 1 條:「進行危害性化學物質之健康風險評估作業」相關案例。