Safety Assessment of Cosmetic Raw Material – General and Active Ingredients
Liu Yuet Kan, Ken
Toxicologist
BSc, MSc, MRSB
Ken.liu@delphichse.com
Delphic Services

- Regulatory and Toxicology assessments
- Responsible Persons
- Consultancy and Training
- Factory auditing and GMP compliance auditing

ISO 9001:2008 Accredited
EUROTOX Registered
Toxicologist
Toxicological Risk Assessment

- Cosmetics / Personal Care Products
- CPSR (Cosmetic Product Safety Report)
- Toys, e.g. paints, inks, liquids, putty, chemistry sets
- Household Products inc, Detergents and Biocides
- LHAMA (Labelling of Hazardous Art Materials Act)
Content

1. Is Safety Assessment important?
2. How can we assess General Cosmetic Ingredients?
3. How can we assess Active Ingredients?
Is Safety Assessment important?

• Regulatory requirement
  – EU Cosmetic Regulations 1223/2009 Article 3:
    
    *A cosmetic product made available on the market shall be safe for human health when used under normal or reasonably foreseeable conditions of use*
  
  – EU Cosmetic Regulations 1223/2009 Article 10:
    
    *The responsible person shall, prior to placing a cosmetic product on the market, ensure that the cosmetic product undergone a safety assessment on the basis of the relevant information and a cosmetic product safety report is set up.*
Hazard Identification
Identifying the intrinsic toxicological properties of the substance

Dose-response assessment
Relationship between the exposure and toxic response

Exposure assessment
Human exposure data (including specific groups e.g. children; pregnant women)

Risk Characterisation
Calculation of Margin of Safety (MoS)
1. Hazard Identification
Physical and Chemical Properties

- Chemical identity
- Physical form
- Molecular weight
- Characterisation and purity of the chemical
- Impurities
- Solubility
- Volatility
- Homogeneity and stability
- Functions and uses

Skin penetration

Inhalation exposure

Chemical name
CAS number
SLS
Carbomer
Toxicological Studies

Animal testing has been banned for cosmetic safety assessment in many countries!!!
Toxicological Studies on Cosmetic Ingredients

- Reproductive Toxicity
- Carcinogenicity
- Mutagenicity / Genotoxicity
- Repeated dose Toxicity
- Acute Toxicity
- Skin Irritation
- Eye Irritation
- Sensitisation
- Dermal Absorption
- Skin Irritation
- Full Toxicological Studies
- Short Term & Local Toxicity
- Chronic Toxicity
- Acute Toxicity
- Eye Irritation
- Sensitisation
2. Dose Response Assessment

![Graph showing dose response assessment with NOAEL and safety factors]

- **NOAEL**
- **NOAEL / 10**
- **NOAEL / 100**

Safety Factor = 10
3. Exposure Assessment

Daily quantity of use

- Product type
  - e.g. lip product
  - Hair Spray
- Physical form of the product

Daily Frequency of Use

- Gender
- Age
- Pregnant women
- Place of living
4. Risk characterisation

MoS based on systemic (mg/kg) effects are calculated as:

\[
\text{Margin of Safety (MoS)} = \frac{\text{Point of Departure (PoD)}}{\text{Systemic Exposure Dose (SED)}}
\]

- PoD can be:
  - No Observed Adverse Effect Level (NOAEL)
  - Acceptable Daily Intake (ADI)
  - Derived No Effect Level (DNEL)
Safety Assessment of Active ingredients

Botanical extract and Nanomaterials
Safety Assessment of Active Ingredients

Special Features

Special Assessment Approach

Delphic HSE
Safety assessment of Ingredients of Botanical Extract

Composition Variation

Geographical Origin
- Location; Environment

Conditions of Harvest
- Season; Temperature; Time

Storage
- Growing of mold, fungi
Important Parameters

Source of Raw Material

- Botanical Name of plant source
- Part(s) of plant used
Important Parameters

Method of Preparation

- Ratio of Plant/solvent
- Processing
e.g. Extraction/
  Concentration/
  Fractionation
History of Traditional Use

- Human consumption
  - Food
  - Medicine
Important Parameters

Specification

- Physical Form
  - Powder; Liquid
- Appearance
Important Parameters

Contamination

- Microbiological
  - Fungi, Mould
- Chemical
  - Mycotoxins, pesticide
  - Heavy metal
Important Parameters

Chemical Consistency

- Batch-to-batch analysis
- Composition Testing
Risk Assessment Approaches

- History of Safe Use
- Comparative Approach
- Local Tolerance Assessment
Nano-material

• Definition:

• EU Cosmetic Regulation 1223/2009 Article 2 (1) (k)

An *insoluble or bio-persistent* and intentionally manufactured material with one or more external dimensions, or and internal structure, on the scale from *1 to 100 nm*. 
EU Regulation

• Article 16 (3):
  – Cosmetic containing nano-materials need to be notified to the Commission 6 months prior to placing on the market.
  – Exception applies for nanomaterials used as colorants, UV-filters or preservatives
EU Regulation

• Article 16 (3):
  – Identification (IUPAC name)
  – Specification (particle size; physical and chemical properties)
  – Estimated quantity contained in cosmetic product per year
  – Toxicological profile
  – Safety data
  – Reasonably foreseeable exposure conditions
Special Features Of Nano-materials

Nano-dimensions
1. Altered uptake and biokinetic profile
2. Increased biological interaction

Insoluble in water
1. Most test methods are suitable for soluble substances

High surface energy
1. Tend to stick together
2. Forming agglomerates
3. Bind other chemicals
Assessment Approach of Nano-materials

• Current Identification Schemes for conventional chemicals are broadly applicable to nano-materials. However, determining the exposure and translocation is very important.

• Toxicological tests shall be conducted on free nano-particles and agglomerated nano-particles.

• Also new methods may need to be developed when necessary.
Summary

1. Is Safety Assessment important?
2. How can we assess General Cosmetic Ingredients?
3. How can we assess Active Ingredients?
Contact of Delphic

UK Office
1 Blackdown Road,
Deepcut, Surrey.
GU16 6SH. UK
Tel: +44(0)1252 856 700
Email: Tra@delphichse.com

HK Office
Unit 205 2/F Building 12W
Hong Kong Science Park
Shatin, Hong Kong
Tel: +852 2657 8373
Email: Tra-hk@delphichse.com