REGULATORY TOXICOLOGY:

- It consists of collecting, processing and evaluating incidents, distribution, and control of diseases towards the protection of health against harmful toxicants.
- It supports the development of standard protocols and new testing methods.
- Its aim is to control production and use of dangerous materials to prevent adverse effects on human health and the environment.

NATIONAL AND INTERNATIONAL COLLABORATION IN REGULATORY TOXICOLOGY

- These standards are implemented worldwide for sustainable development with the goal of improving the quality of life for all people.
- A number of international bodies and authorities promote the sound management of chemicals at national and international level. They are:
- ICH
- WHO
- FDA
- OECD

QUALITY ASSURANCE IN REGULATORY TOXICOLOGY

- Reliable data are essential for the assessment and evaluation of the toxicological characteristics of chemical substances
- Data reliability is closely linked with the minimization of errors and mistakes in the generation of data.
- These objectives can be reached by the implementation of appropriate Quality Assurance (QA) systems.
- An important part of such systems is Quality Management (QM).

REGULATORY TOXICOLOGISTS

- Help governments to formulate regulations and put them into practice.

- They help to minimize the risk presented by chemicals which may be hazardous to human health and the environment.
- They evaluate data from all branches of toxicology
- With their help not only we understand the health hazards posed by a chemical, but also how these translate into health risks.
- They help to enhance and safeguard the health of the public.

IMPORTANCE OF GUIDELINES IN REGULATORY TOXICITY STUDIES:

- Prevent duplication of clinical trials in humans .
- Ensure SAFETY, EFFICACY and QUALITY of medicines .
- Minimize the use of animal testing.
- Provides the definite parameters of evaluation.
- Provides a roadmap to prepare a study protocol.
- Increase international harmonization of technical requirements to ensure that safe, effective, and high quality medicines are developed.
- Supports economic growth, raise living standards, maintain financial stability and contribute to growth in world trade

DESCRIPTIVE TOXICOLOGY:

- It is concerned directly with toxicity testing, which provides information for safety evaluation and regulatory requirements.
- Focuses on toxicity testing of chemicals, usually on animals and then correlated to human conditions.
- It provides dose-response information upon exposure to a harmful toxic agent.
- The results from the toxicity testing are typically applied to approval of product use and regulating allowable concentrations in the environment.

THE TOXICITY ASSESSMENT COMMONLY INVOLVES FOLLOWING STEPS

- 1. Hazard identification
- 2. Dose-response assessment
- 3. Exposure assessment
- 4. Risk characterization

1. HAZARD IDENTIFICATION

- It determines the exposure to chemical can increase the incidents of a particular adverse effect. It is done by:
- • Hazard identification Data
- • Human epidemiology data
- • Animal bioassay
- • Supporting data
- •Prediction of hazard –Structure activity relationship

2. DOSE-RESPONSE ASSESSMENT

- Relationship between the exposure, appearance and duration of adverse effect.
- **No observed adverse effect level (NOAEL)**
- It denotes the level of exposure of an organism, at which there is no biologically significant increase in the severity of any adverse effects
- **Lowest-observed-adverse-effect-level (LOAEL)**
- Lowest concentration causes an adverse alteration of morphology ,growth ,or life span of a target organism distinguishable from normal (control)
- **Acceptable Daily Intake**
- Maximum amount of an agent, expressed on a body mass basis, to which a subject may be exposed over his lifetime without appreciable health risk.

3. EXPOSURE ASSESSMENT

- • Exposed population (General public or selected groups)
- • Types of substances (pharmaceuticals, chemicals or environmental pollutants)
- • Single substance or mixture of substances
- • Duration of exposure
- • Pathways and media

4. RISK CHARACTERIZATION

- • Review toxicity and exposure assessment output
- • Quantify risks
- • Combine risks across all pathways
- • Assess and present uncertainties
- • Consider site specific human studies

TOXICITY IS REFLECTED BY BROAD SPECTRUM OF RESPONSES LIKE:

- Functional effects, such as immunological responses
- Growth inhibition
- Reproductive impairment
- Increase in cancer incidence
- Mortality

TYPES OF TOXICITY TESTING

- *In vitro* (test tube)—useful in detecting potential biochemical and genetic effects
- Uses model systems (bacteria, cultured animal cells, DNA interactions)

- *In vivo* (animal)—are essential for detecting health effects
- Experimental animals may be treated with high doses over a lifetime to evaluate potential to cause cancer.

- *In silico* (computer-based)—biological experiments conducted by computer models. These depend on data previously collected in other experiments.

IMPORTANCE OF TOXICITY TESTING

- • To have an idea of toxic doses of xenobiotic for certain organisms
- • Evolution of safe doses of those toxicants for certain organisms.
- • Recommendation of maximum permissible limits of those substances in the ambient air and drinking water
- • The data on long term toxicity tests may be reliable for the evaluation of safe level of toxicants.
- • Evolution and recommendation of maximum acceptable daily intake.
- • Developing the air water quality.

PRIVATE AND PUBLIC SECTORS INVEST IN TOXICITY TESTING THAT AIMS TO PROTECT HUMAN HEALTH

- They are:
- • Chemical Manufacturers
- • Pharmaceutical Industry
- • US Federal Agencies and Programs
- National Toxicology Program (NTP)
- Environmental Protection Agency (EPA)
- National Institute of Environmental Health Sciences (NIEHS)
- Food and Drug Administration (FDA)
- •State and Local Governmental Bodies