

Provision of Analytical Toxicology Services

*Unit IV- Analytical Toxicology
Cutm1648- Concepts of Toxicology*

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Analytical Toxicology

- *Analytical toxicology is the detection, identification and often also the measurement of drugs and other compounds in biological and related specimens to help in the diagnosis, treatment, prognosis and prevention of poisoning.*
- *Analytical toxicology is important since it is the only means by which objective evidence of the nature and magnitude of exposure to a particular compound or group of compounds can be obtained.*

- *The availability of reliable analytical facilities can also assist in assessing illicit drug use and the diagnosis and treatment of poisoning with environmental toxins such as lead, as well as in the management of incidents related to the accidental or deliberate release of chemicals into the environment and other aspects of chemical safety*

Important criteria

- *An essential preliminary to the task of establishing an analytical toxicology service is to undertake a detailed survey of the perceived toxicological problems encountered in the region or country*
- *Infrastructure to support*
 - *Instrumentation, maintenance, spare parts and day to day consumables*
 - *Provision of pure reagents and reference materials*
 - *Staff education, training and development*
 - *Laboratory certification/accreditation is required to ensure the proper establishment and viability of the analytical toxicology service*

Operation of an Analytical Toxicology Laboratory

- *Standard Operating Procedures (SOPs) or Laboratory procedures should describe all aspects of the laboratory operation including laboratory management.*
- *SOFIT and AAFS have published detailed guidelines on the operation of forensic toxicology laboratories.*

Laboratory Operations

- *Laboratory operation can be divided into three phases*
 - *Pre-analytical*
 - *Procedures for sample collection (including sample tubes), safe transport, storage and priority for the analysis.*
 - *Analytical*
 - *Validated procedures (i.e., tried and tested) must be used*
 - *USFDA-CDER provides guidance for bioanalytical method validation (FDA/CDER, 2001)*
 - *Post-analytical*
 - *Reporting results by telephone, fax or other electronic means and in writing must be in place*
 - *Proper interpretation of results*
 - *The results should be kept for a minimum of 5 years*
 - *Disposal of samples done safely in an agreed time-frame*

Analytical Methods

- *The method used for analysis should give accurate, reliable, reproducible results when used for its designated purpose.*
- *Detailed advice to select appropriate method, training on the method used as per the regulatory body guidelines are essential in testing*
- *Ideally facilities like UV-Vis, TLC, HPLC, GC or GC/MS, LC-MS/MS will be needed for analytical toxicology services*
- *In addition, AAS, ICP-MS will be required for metal analysis.*

Analysis of Pharmaceutical Dosage Forms

- *Sometimes analytical toxicology laboratory will be asked to identify pharmaceutical dosage forms or plant material either in tact or in stomach contents*
- *The tests are aimed at confirming the identity of formulations, many of which have low intrinsic toxicity, prior to clinical use and a range of reagents are needed in order to perform the tests*

Training in Analytical Toxicology

- *Training to clinicians especially on what toxicological assays are clinically useful in a given set of circumstances.*
- *Laboratory staff in hospitals providing emergency toxicology services*
 - *Requests for tests*
 - *Collection and Handling of samples*
 - *Interpretation of results*
- *Staff in the regional analytical centers will need extensive training*
- *Non-graduate scientific staff are normally trained in-house in specific aspects of laboratory especially on training in the operation of newer specialized instruments*
- *Proper recording of training is important in all cases*

Analytical Toxicology and Poisons Centre

- *The poisons centre can play an important part in developing analytical toxicology services by*
 - *Providing information about the epidemiology of poisoning in a country*
 - *Reviewing and informing relevant authorities and professionals as to the appropriate use of existing laboratory services for the diagnosis and management of poisoning*
 - *Poisons centre staff should involve in training for continuing their professional development*

Reporting Analytical Toxicology Results

- *Important to maintain consistency as to the units used by the laboratory to report analytical results*
- *System Internationale (SI) unites are most preferred for e.g., mg/L, g/L etc*

Research & Development

- *It is vital adequate provision is made for research and development, not only to ensure proper compliance with training requirements.*
- *This is also very important as new drugs and poisons as well as new analytical methods are continually becoming available*
- *Research training is invaluable in helping understand research papers*

THANK YOU

