



Status of Clinical Toxicology in Iran and in the World and Need of Modern Laboratory Methods in Diagnosis and Management of Poisonings

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What *is* clinical toxicology?

- the discipline within toxicology concerned with the **toxic effect of agents** whose intent is to treat, ameliorate, modify, or prevent disease states.
- Similar broader terms are **Human Toxicology** and **Medical Toxicology**
- **clinical toxicologist** is a medically qualified graduate who has specialist knowledge of the adverse effects of drugs and other chemicals in humans – and especially how to treat patients who have been exposed to a toxic substance.

Brief History of Clinical Toxicology in Iran

- **Poisoning ward of Major Tehran University Hospital 1950s.**
- Loghmanoddodolah clinic 1960s.
- **Loghmanoddolah hospital 1970s.**
- Loghman hakim hospital 1980 to date.
- **Mashhad Clinical Toxicology 1973 to date.**
- Esfahan Poisoning Ward 1985 to date.
- Recent Establishment of Poisoning Wards in TUMS and other Medical Centers.

Recognition of Clinical Toxicology in Iran

- Clinical toxicology had not been recognized as a clinical specialty in Iran.
- **After the chemical war gas attack** by the Iraqi army against the Iranian troops in 1980s, **health professionals and Iranian authorities noticed** the importance of this field in clinical medicine.
- Collaboration between the **clinical toxicologists and toxicologists of pharmacy schools** resulted in establishment of **Iranian Society of Toxicology** and **Poisonings** in 1991 and **National Board of Toxicology** in 1993.

Clinical toxicology fellowship in Iran

- Clinical toxicology fellowship was also formed as a joint collaboration between the **toxicology and internal medicine boards** in 2010.
- Medical doctors **specialized in clinical medicine** are eligible to take the entrance examination of the fellowship.
- **undergraduate teaching** in this field is **still lacking** and being taught as part of forensic medicine curriculum since 1952.

Clinical toxicology fellowship in USA

- **Emerged from pediatric:** Barry Rumack
- American Academy of Clinical Toxicology
- American College of Medical Toxicology
- American Board of Medical Toxicology
- **Clinical Toxicology Fellowship** for:
 - Emergency Medicine
 - Pediatrics
 - Preventive Medicine

No specialized ward for poisoned patients

Clinical toxicology in Canada

- **Less advanced in Canada**
- Joined venture with USA
(North America congress)
- **Clinical Toxicology Center in Quebec**
- Sick children hospital in Toronto
- **Part of Emergency** Department in most cities of Canada

Clinical toxicology in The UK

- **Emerged from Internal Medicine: H Matthew**
- **Advance by Clinical Pharmacologist: L.F. Prescott**
- Regional Poisoning Treatment Center
- **Scottish Poisons Information Bureau**
- National Poisons Information Services- London
- Birmingham and Cardiff Poisoning Wards
- **Clinical Toxicology Diploma: Medics and Non-Medics**
- **No Clinical Toxicology Fellowship Program**

Clinical toxicology fellowship in France

- Fermand Widdal hospital in Paris: S Bismouth
- **National Poisons Information Centers**
- Strasburg General hospital: A Yeager
- **Clinical Toxicology Fellowship program**
- **Reference Toxicology laboratory** in Paris

Clinical toxicology in Germany

- **Toxicologic Ward and ICU in Munich: T Zilker**
- **Reference Toxicology laboratory in Munich**
- **National poisons Information center in Berlin**
- **Treatment of poisoned patients in ED (A and E)**

Clinical toxicology in Australia and Asian Counties

- More advanced in Australia
- WHO/IPCS supports
- **Asia Pacific Association of Medical Toxicology** 1989 in Kuala Lumpur
- **National Poisons Information and control centers are lacking** in some Asian countries including **Iran**
- Toxicovigilance

Laboratory investigations in Poisonings

- Due to lack of effective poisons control, acute poisonings are common in some developing countries including Iran.
- Laboratory tests, particularly **toxicological investigations** are important in **prevention, diagnosis and management** of poisoned patients.

Severity and Duration of Poisonings

- Supra Acute
- **Acute**
- Subacute
- **Chronic**
- Subchronic

Required Laboratory Tests in poisonings

➤ **Toxicological tests**

➤ **Non-Toxicologic:**

Biochemistry

Hematology

Immunology

Bacteriology

Pathology...

Toxicological Tests

- **Qualitative** - Screening urine tests
 - False positive/negative
- **Quantitative** – whole blood: Pb, AChE
 - plasma, serum, urine
 - biological fluids
 - saliva, hair, tooth...

Modern Toxicological Methods

- Combination of immunoassays and chromatography lead to **immune chromatography** that has recently been used for both **qualitative and quantitative tests** – Drug Abuse tests.
- Combination of liquid chromatography and mass spectrometry leading to **LC-MS and LC-MS-MS**
- Combination of gas chromatography and mass spectrometry leading to **GC-MS and GC-MS-MS**
- These sophisticated techniques are only available in reference laboratories and be use as **confirmatory tests**.

Clinical applications of Laboratory Tests

- Request for toxicological tests should be **based on clinical indication** for a poisoned patient.
- Screening tests may be used for initial evaluation of a patient.
- **Quantitative toxicological test** may be used for **prevention, diagnosis, evaluation of toxicity severity, requirement of antidote therapy and prognosis** of poisoned patients.

Vital Need of Toxicological Tests in some Acute Poisonings (1)

- **In acetaminophen overdose, determination of its serum concentration at and after 4 hours of ingestion is vital, as no specific clinical manifestation can be detected during the early stage of this poisoning.**
- **Serum acetaminophen concentration is for diagnosis, severity of intoxication, indication for antidote therapy and prognosis.**

Vital Need of Toxicological Tests in some Acute Poisonings (2)

- **Phenobarbital overdose and Methanol poisoning:**
serum concentrations are needed for **diagnosis, severity of intoxication, Indication for hemodialysis.**
- Plasma and RBC Cholinesterases are essential in organophosphorus pesticides and nerve agents.
- **Therapeutic drug monitoring** for chronic use of many medications are required to **prevent intoxication and to achieve effective treatment.**

Conclusion

- Status of clinical toxicology in Iran for **postgraduate education is more advanced** than in most countries, but **poisons information and control services, antidote availability and support are lacking.**
- **Rational use** of toxicological and the other required **laboratory tests** are very important in clinical management of poisoned patients.

