



Animal Experiments
in
Teaching & Skill Development

Prof. Y K Gupta

74 biology students,
same teacher provided instructions,
2 Years

“Biolab Frog
Dissection”
software

Vs.

Preserved frog
specimen



Students who worked with frog specimens performed
“**significantly better**” on a laboratory practical examination

Cross TR and Cross VE. Scalpel or Mouse? A Statistical Comparison of Real and Virtual Frog Dissections. Am Biol Teacher 66: 408–411, 2004.

What computer technology cannot do?



Multi-organ response

Reveal biological variations

Determine the therapeutic index

Assess importance of multiple processes and mediators

Determine pharmacokinetics

Assess safety & toxicology

Determine clinical dose range



Virtual before Real ??



**GTC
seizures**



**MES
model**



**Phenytoin,
carbamazepine**



**Absence
seizures**



**PTZ
model**



Ethosuximide

ANIMAL for Model Establishment



Software for Teaching

Confusion & agitation

Copious secretions

Breathing difficulty

Abnormal heart rhythm



Muscle twitching & tremors

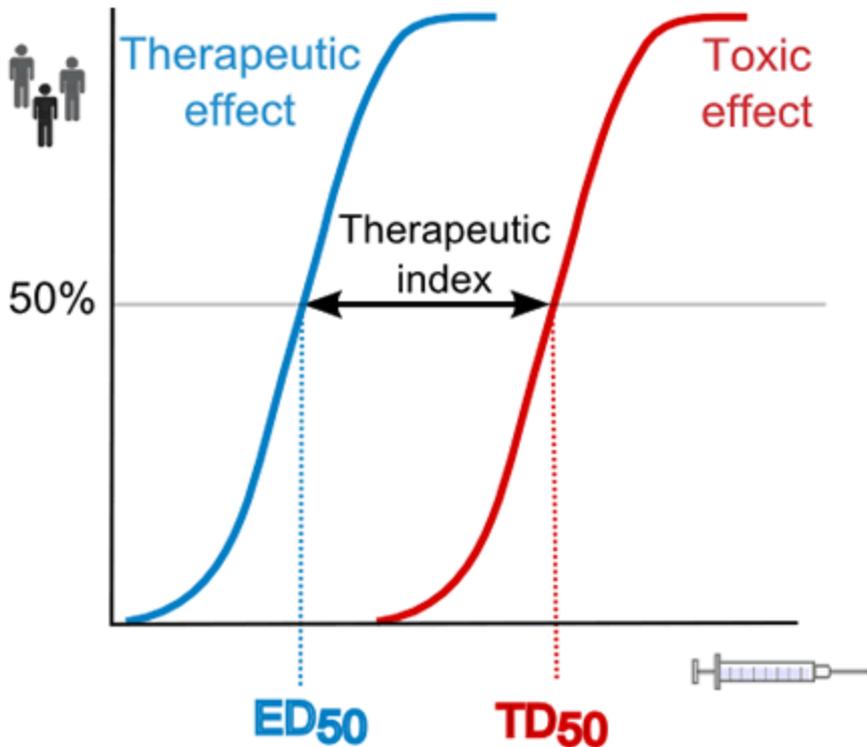
**Pesticides poisoning-
Body as a WHOLE**

Convulsions

Pinpoint pupil

Coma & death

Understanding dose–effect relationship



Drugs with narrow therapeutic index

- 5-fluorouracil
- Phenytoin
- Gentamycin
- Digoxin

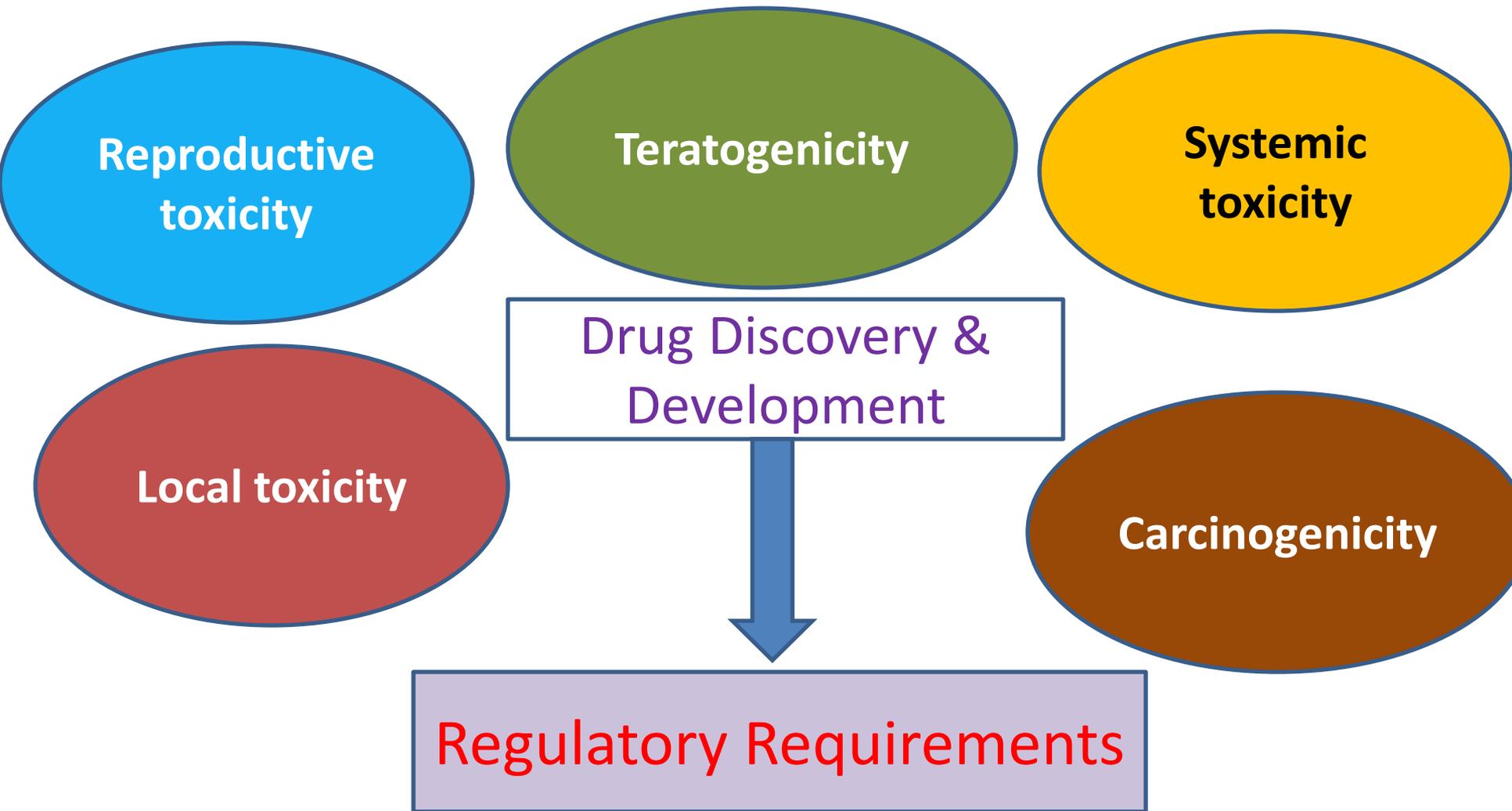
Future Responsibilities...



- Clinicians & Veterinary doctors
- Drug development

- Environmental research
- Toxicology research
- Transgenic research
- Tissue engineering

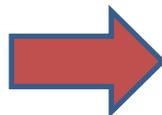
Researchers & Faculty
positions-
Basic & Clinical sciences



Who is a Pharmacologist

Knowledge:

- Principles of drug action
- Integrated response
- Specialized knowledge
- Skills

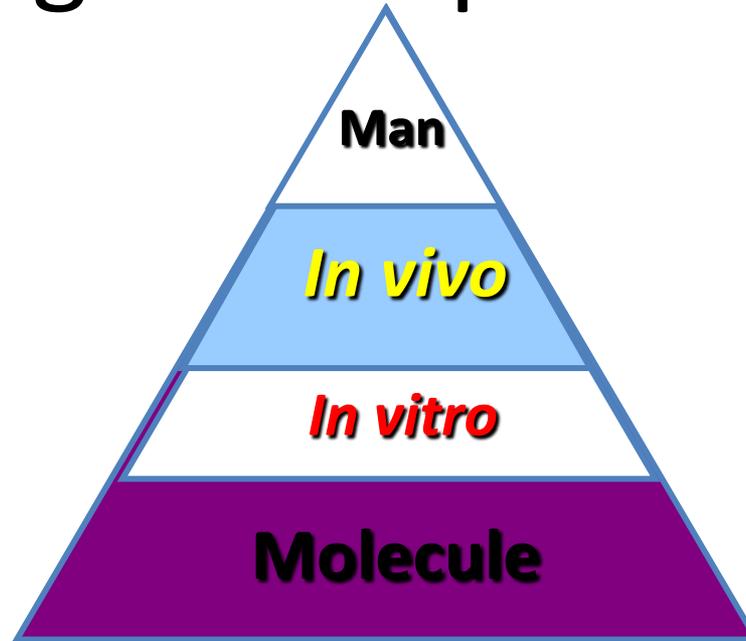


Application:

- Preclinical studies
- Proof of concept
- Safety & toxicology
- “Best guess” for clinical trial

*“Molecular revolution has led to re-emphasis of the central role of **in vivo pharmacology** in drug discovery”*

Teaching *in vivo* pharmacology



- Integrated system pharmacology
 - Autonomic reflexes, neurohumoral influences
 - Positive/ Negative feedback, cardiovascular control
 - Inflammation, analgesia, neurodegeneration, epilepsy

CORE PHILOSOPHY

**NO animal experiments
UNLESS**

Absolutely MUST

**HUMANE &
ETHICAL**

Thank You