



# 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 ??



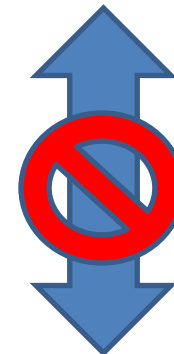
**GTC  
seizures**



**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**



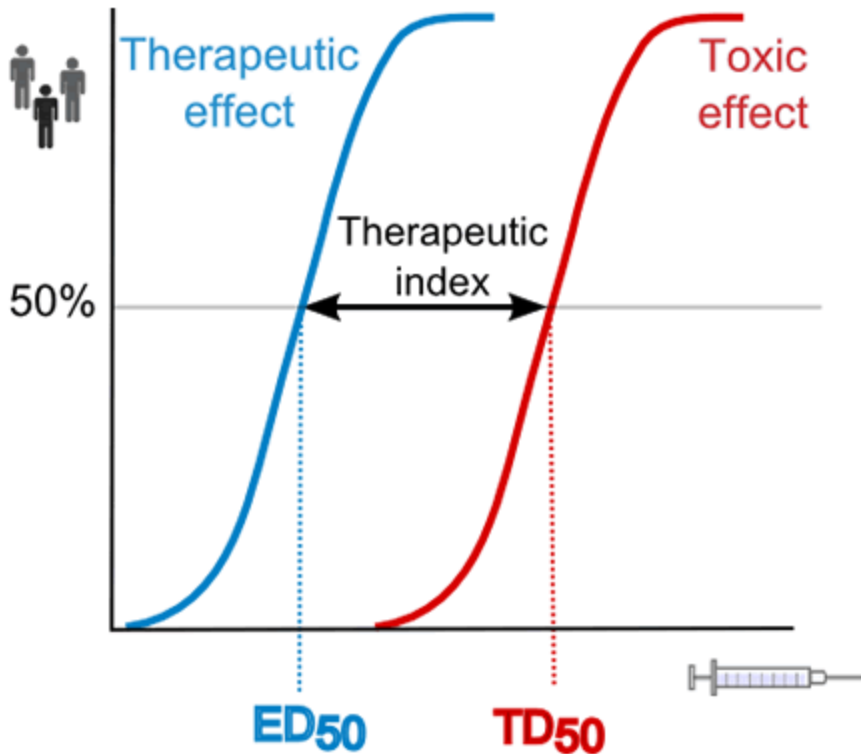
**Pesticides poisoning-  
Body as a WHOLE**

**Convulsions**

**Pinpoint pupil**

**Coma & death**

# Understanding dose–effect relationship



PharmacologyCorner.com

Drugs with narrow therapeutic index

- 5-fluorouracil
- Phenytoin
- Gentamycin
- Digoxin

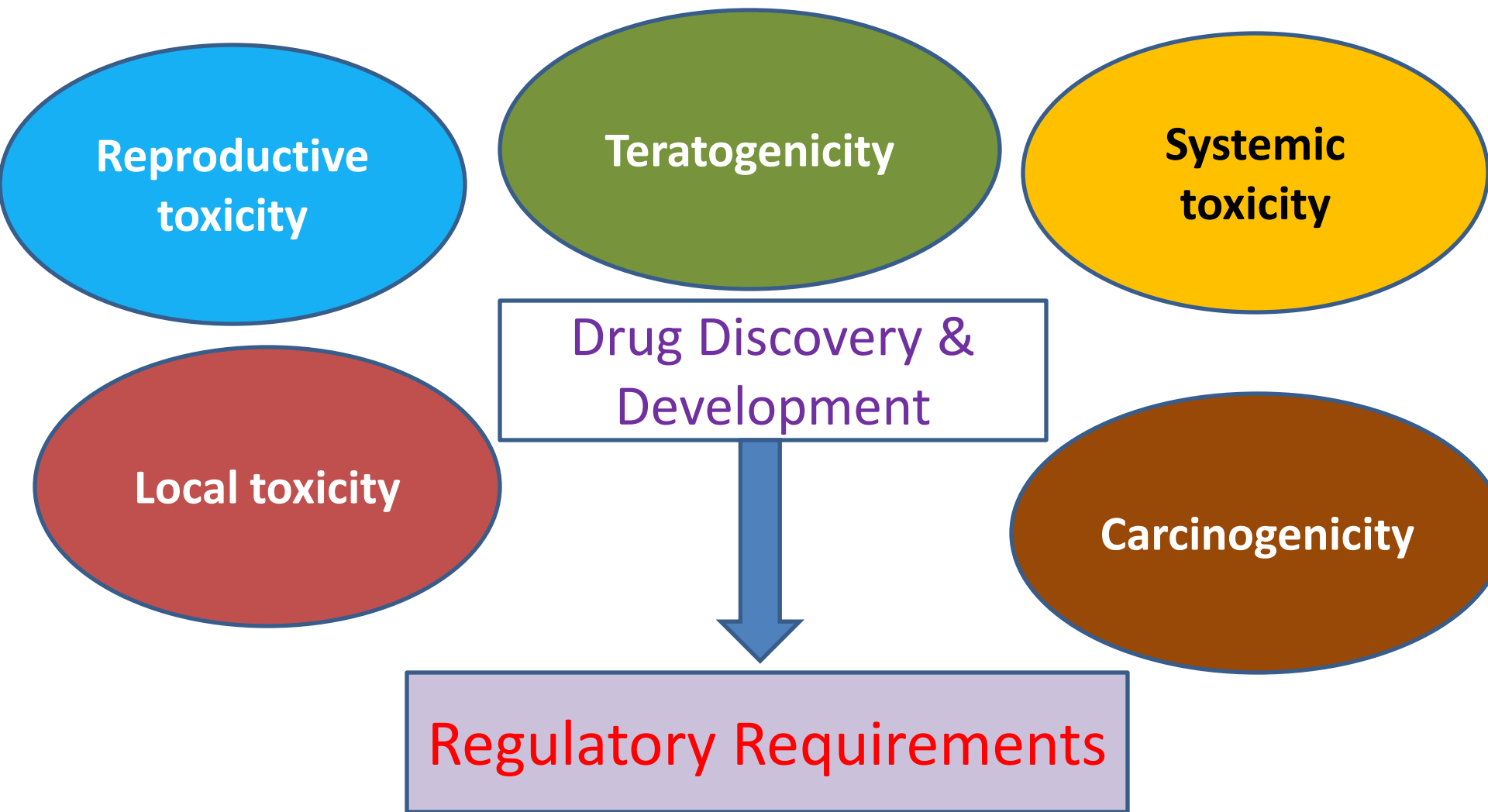
# Future Responsibilities...



- Clinicians & Veterinary doctors
- Drug development

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

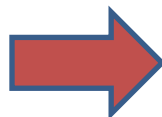
Researchers & Faculty  
positions-  
Basic & Clinical sciences



# Who is a Pharmacologist

## Knowledge:

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

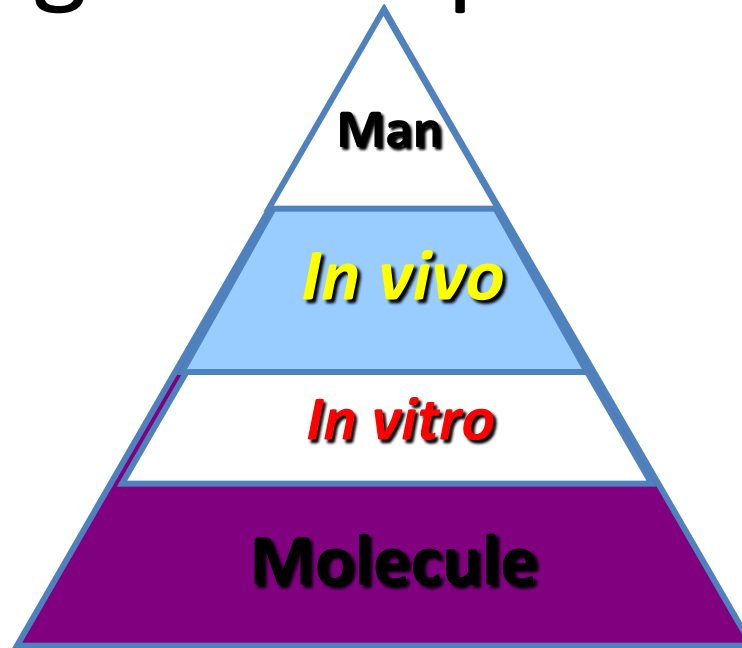


## Application:

- 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