



## SCREENING METHOD OF CNS STIMULANTS

{PHARMACOLOGICAL & TOXICOLOGICAL SCREENING  
METHOD}

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# CONTENT

- ❖ Introduction
- ❖ Central Neuro - transmitters
- ❖ Causes
- ❖ Classification
- ❖ Evaluation Method

# WHAT IS CNS ?

I. CNS is made up of BRAIN and SPINAL CORD.

A. The brain is divided into three parts:

- Forebrain
- Midbrain
- Hindbrain

- ❖ Spinal cord begins from the brain stem and extends till the lowest end of the backbone.
- ❖ Both brain and spinal cord contain fluid filled spaces of cavities .
- ❖ The fluids in these spaces is called **cerebrospinal fluid (CSF)** ,and contains nutrients, hormone ,white blood cells to maintain the CNS.
- ❖ Brain and spinal cord mainly responsible for information processing ,imagination, memory and communication.

# CENTRAL NEURO-TRANSMITTERS

1. Aminoacid
  - ✓ Glutamate
  - ✓ GABA
  - ✓ Glycine
2. Acetycholine
3. Monoamines
  - ✓ Dopamines
  - ✓ Norepinephrine
  - ✓ 5-Hydroxytryptamine
4. Nitric Oxide
5. Peptide
6. Endocannabinoids

# CNS STIMULANTS

- ❖ Central Nervous system stimulants may be used to reduce tiredness and increase alertness, competitiveness and aggression.
- ❖ CNS stimulants may be defined as “ Drug substance that most specifically afford an enhancement in excitability either very much within the different portion of the spinal cord which may lead to convulsion.”

# BEHAVIORAL MANIFESTATION OF CNS

## ❖ Analeptic effects

- Increases Alertness and Attention ,and fatigue
- Increases nervous And Anxiety
- Decreases drowsiness
- Can also lead to convulsion.



# CLASSIFICATION OF CNS STIMULANTS

## 1. Analeptics (convulsion )

- ✓ Doxapram (respiratory stimulant)
- ✓ Nikethamide (respiratory stimulant)
- ✓ Strychnine
- ✓ Bicuculline

## 2. Psychomotor stimulants

- ✓ Amphetamine and Methamphetamine
- ✓ Methylphenidate
- ✓ Cocaine
- ✓ phentemine



### 3. General cellular stimulants-

- ✓ Methylxanthines derivatives
- ✓ Caffeine (coffee)
- ✓ Theophylline (tea)
- ✓ Theobromine (chocolate)

### 4. Clinical antidepressants-

- ✓ MAO inhibitors
- ✓ Catecholamine reuptake inhibitors

### 5. Psychotomimetic (Hallucinogenic)

# **SCREENING MODELS**

# EVALUATION METHODS

In-vivo methods :-

1. Screening of Analeptics By PHOTOACTOMETER
2. Sand - displacement Method
3. Runway test
4. Ptosis test
5. Jiggle cage method
6. Open field test
7. Hole board test
8. Strychnine induced convulsion
9. Combined open field test.

# 1. SCREENING BY PHOTOACTOMETER

- ❖ **PURPOSE** :- To evaluate locomotor Activity in animals.
- ❖ **PRINCIPLE** :- When the beam of light falling on the photo cell is cut off by the
- ❖ **PROCEDURE** :- Mice weighing 20-25gm are divided into 3 groups, each contains animal, a count is recorded.
- ❖ 4 animals.
  - control**:- saline
  - standard**:- Amphetamine(1mg\kg I.P)
  - Test** :- Drug to be evaluated
- ❖ Mice from each group is placed seperately in photoactometer for 10 min. after every 30 min. till max affect of drug is observed

# Photoactometer



**Evaluation:-** no. of cut-off is compared between groups.

- More cut-off CNS stimulants
- Less cut -off CNS depressant.

# ROTA -ROD TEST

- **PURPOSE:-** To evaluate the effect of drug on motor coordination
- **Principle:-** The length of time that a given animal stays on the rotating rod is a measure of their balance ,co-ordination and physical condition
- **Procedure:-** Mice weighing 18-24 gm are grouped

**control:-** Saline

**Standard:-** Amphetamine (4mg/kg I.P)

**TEST:-** Drug to be evaluated

After 30 min. animal is placed on rotarod



## ROTA-ROD APPARATUS



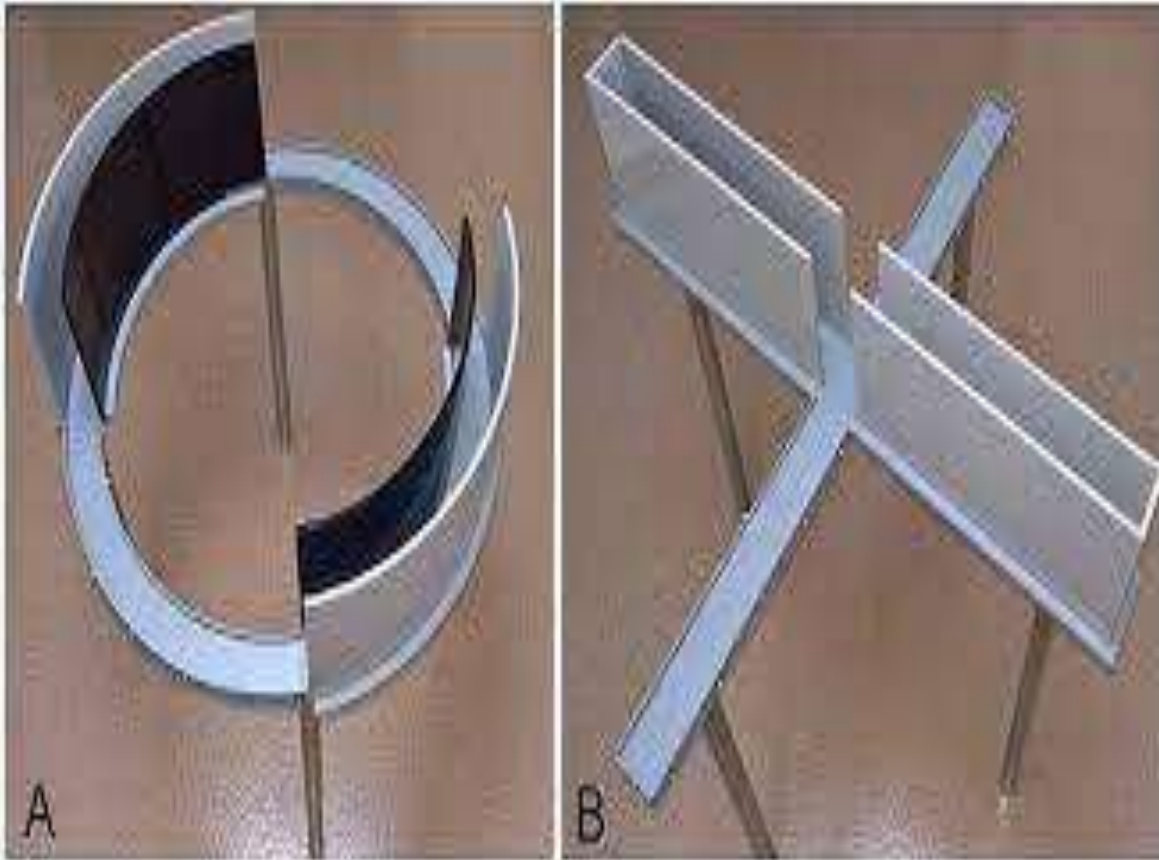
- **Evaluation:-** The time for falling of animal is recorded
- **More time:-** CNS Stimulant
- **Less time :-** CNS Depressant



# ELEVATED PLUS MAZE APPARATUS

- ❑ The elevated maze task is a simple method to assess anxiety-like behaviors in rodents.
- ❑ The test is performed on a plus-shaped apparatus with two open and two closed arms is recorded.
- ❑ The task is based on an approach-avoidance conflict, meaning that the animal is faced with a struggle between a propensity to explore a novel environment and unconditioned fear of high and open spaces.

# ELEVATED PLUS MAZE APPARATUS



# RUNWAY TEST

- ❖ **Purpose:-** To study the spontaneous activity of CNS stimulants.
- ❖ **Principle:-** The Y- shaped runway is covered with paper that can indicate the foot prints of mice which is counted afterwards for evaluation.
- ❖ **Process:-** Wistar rats of either sex weighing 250-300 gm are grouped



- ❖ Trained to run in a RUNWAY apparatus for 3 days to achieve constant time and speed to pass runway .

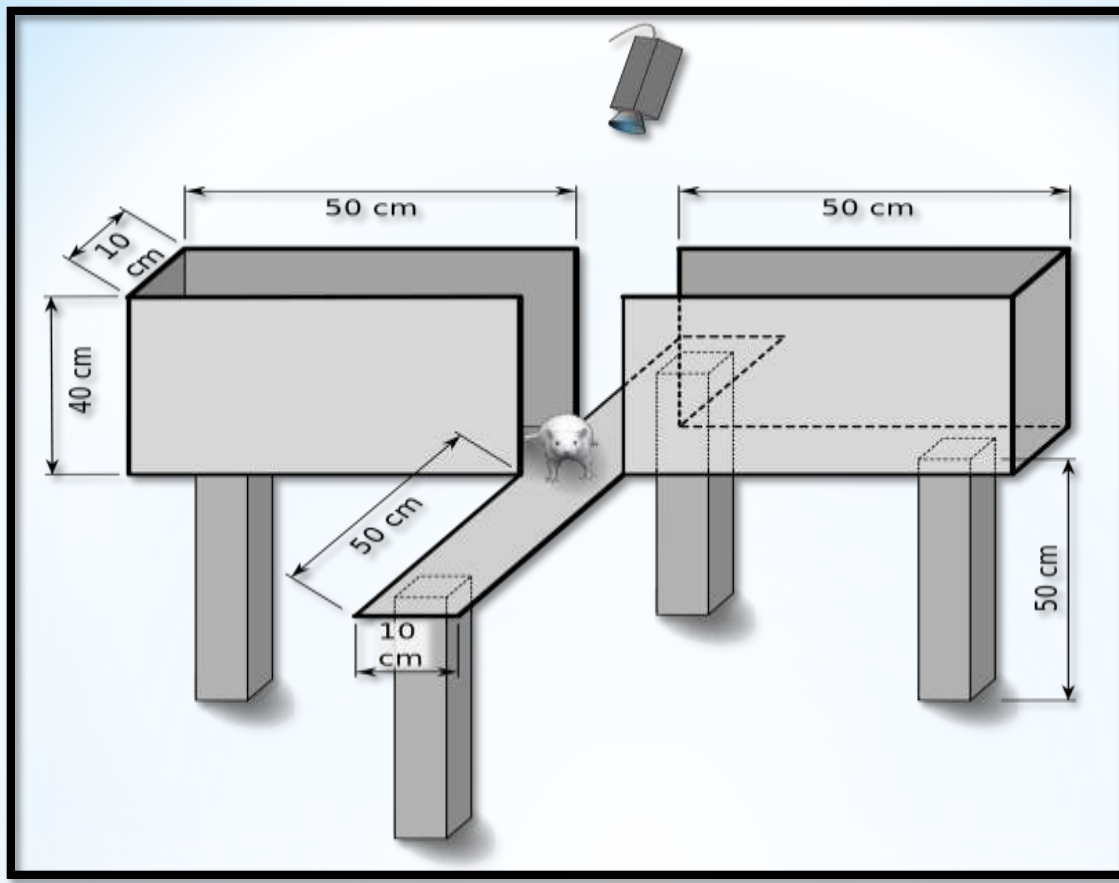
**Control:-** Saline

**Standard:-** Methamphetamine (2mg/kg I.P.)

**TEST:-** Drug to be evaluated



- ❖ After 30 min. of administration of drug test is performed.



❖ **Evaluation :-** The no. of foot prints on the maze path is measured.

- ❖ **Higher no:-** CNS stimulants
- ❖ **Lower no:-** CNS Depressant.

# STRYCHINE INDUCE CONVULSION

- ❖ **Purpose** :- To evaluate the convulsive effect.
- ❖ **Principle** :- The convulsing action of strychnine is due to interference with postsynaptic inhibition mediated by glycine.
- ❖ **Procedure** :- Group of 10 mice of either sex with height, weight between 18 to 22 g are used.





Control:-saline

Standard:-Strychine nitrate (2mg\kg)

Test:- Drug to be Evaluated



ED50- values are calculated using various doses taking the percentage of the control 100 percent



Thank You