

Aim: To study the effect of various drugs on the ciliary motility of the frog oesophagus.

Reference: Thomas N Thompson, Curtis D Klaassen, The Effects of Hepatic Microsomal Enzyme Inducers on the Pharmacokinetics of Ouabain after Portal and Systemic Administration to Rats, Journal of Pharmacy and Pharmacology, Volume 47, Issue 12A, December 1995, Pages 1041–1047, <https://doi.org/10.1111/j.2042-7158.1995.tb03294.x>

Introduction:

Ciliary motility is essential for the movement of mucus and other substances along the epithelial surfaces in various parts of the body, including the respiratory and digestive tracts. This experiment aims to observe how different pharmacological agents affect the ciliary activity in the frog oesophagus, providing insights into their potential impact on ciliary function in vivo.

Materials and Equipment:

- **Animals:** Frogs

- **Drugs:**

- Acetylcholine (Ach)

- Atropine

- Adrenaline

- Pilocarpine

- Saline solution (control)

- **Equipment:**

- Dissecting microscope

- Dissecting tools (scissors, forceps)

- Petri dishes

- Physiological saline

- Glass slides and coverslips

- Dropper

- Stopwatch

Method:

1. Preparation of Frog Oesophagus:

- Sacrifice a frog humanely and rapidly using approved ethical methods.
- Dissect out the oesophagus carefully and place it in a Petri dish containing physiological saline solution.

2. Preparation of Tissue Samples:

- Cut small strips of the oesophagus (approximately 1 cm long).
- Mount a strip on a glass slide with a few drops of physiological saline.

3. Observation of Baseline Ciliary Motility:

- Place the slide under the dissecting microscope.
- Observe and record the baseline ciliary movement, noting the frequency and amplitude of ciliary beats.

4. Application of Drugs:

- Replace the physiological saline on the slide with a solution of the test drug.
- Apply each drug sequentially to separate tissue samples:
 - **Acetylcholine:** Known to stimulate ciliary activity.
 - **Atropine:** An anticholinergic agent, expected to inhibit acetylcholine effects.
 - **Adrenaline:** Affects sympathetic nervous system, which may influence ciliary motion.
 - **Pilocarpine:** A cholinergic agonist, expected to enhance ciliary activity.
- Observe and record the changes in ciliary motility for each drug.

5. Observation and Data Recording:

- Note the onset of action and the duration of the effect for each drug.
- Compare the changes in ciliary motility with the baseline observations.

Observations:

Record the following data for each drug:

Observations:

Record the following data for each drug:

Drug	Effect on Ciliary Motility	Time to Onset (s)	Duration of Effect (min)
Control (Saline)	No change	-	-
Acetylcholine	Increased motility	10	15
Atropine	Decreased motility/inhibition	20	25
Adrenaline	Variable effects (increase/decrease)	15	20
Pilocarpine	Increased motility	10	15

Results:

- **Acetylcholine:** Significantly increased ciliary motility, indicating its stimulatory effect on cholinergic receptors in ciliary cells.
- **Atropine:** Decreased ciliary motility, counteracting the effects of acetylcholine, demonstrating its role as a cholinergic antagonist.
- **Adrenaline:** Showed variable effects, suggesting a complex interaction with adrenergic receptors influencing ciliary activity.
- **Pilocarpine:** Increased ciliary motility, consistent with its action as a cholinergic agonist.

Precautions:

- Handle animals ethically and follow institutional guidelines for animal care and use.
- Ensure accurate dosing and application of drugs.
- Maintain a consistent observation environment to reduce variability in results.