Aim: Effect of agonists and antagonists on guinea pig ileum

References

1. Paton, W. D. M., & Rang, H. P. (1965). "Effects of Drugs on Isolated Smooth Muscle Preparations." *British Journal of Pharmacology*.
2. West, G. B., & Williams, K. I. (1971). "Histamine and the Guinea Pig Ileum." *European Journal of Pharmacology*.
3. Bowman, W. C., & Rand, M. J. (1980). *Textbook of Pharmacology*, 2nd Ed., Blackwell Scientific.

1. Objective

To study the effects of agonists and antagonists on guinea pig ileum and analyze their pharmacological responses using an isolated tissue bath setup.

2. Principle

The guinea pig ileum is a smooth muscle preparation that contracts in response to cholinergic and histaminergic stimulation. This experiment helps in understanding the pharmacological actions of agonists (e.g., acetylcholine, histamine) and antagonists (e.g., atropine, mepyramine) on smooth muscle contractions.

3. Materials Required

- **Animals**: Guinea pigs (350-500 g)
- **Reagents and Chemicals**:
  - Acetylcholine (ACh)
  - Atropine (muscarinic antagonist)
  - Histamine
  - Mepyramine (H1 receptor antagonist)
  - Physiological salt solution (Tyrode's solution)
  - Oxygen gas (95% O_2, 5% CO_2)
- **Equipment**:

Pharmaacademias.com

- Organ bath (10-30 mL)
- Isometric transducer
- Data acquisition system (PowerLab or similar)
- Aerator
- Syringes and pipettes
- Dissection tools
- Thermostatic water bath (37°C)

4. Experimental Procedure

4.1. Preparation of Guinea Pig Ileum

1. Sacrifice the guinea pig following ethical guidelines.
2. Dissect the abdomen and isolate a segment (2-3 cm) of the ileum.
3. Transfer the ileum to Tyrode's solution aerated with 95% O_2 and 5% CO_2.
4. Mount the tissue in an organ bath filled with Tyrode's solution at 37°C.
5. Attach one end of the ileum to the transducer and the other to a fixed hook.
6. Allow the tissue to equilibrate for 30 minutes, maintaining a preload tension of 1g.

4.2. Drug Testing

1. **Effect of Acetylcholine (ACh):**
   - Add increasing concentrations of ACh (0.1-10 µg/mL).
   - Record the contractile response.
2. **Effect of Atropine on ACh Response:**
   - Pre-treat the tissue with **atropine (1 µg/mL)** for 5 minutes.
   - Repeat ACh administration and observe any changes in contraction.
3. **Effect of Histamine:**
   - Add histamine (0.1-10 µg/mL) and observe contraction.

Pharmaacademias.com

4. **Effect of Mepyramine on Histamine Response:**
   - Pre-treat the tissue with **mepyramine (1 µg/mL)**.
   - Repeat histamine administration and record response.

5. Observations & Data Analysis

Drug	**Concentration (µg/mL)**	**Response (Contraction in mm)**	**Effect with Antagonist**
Acetylcholine	0.1	5	-
Acetylcholine	1.0	15	-
Acetylcholine + Atropine	1.0	No Response	Blocked
Histamine	0.1	7	-
Histamine	1.0	20	-
Histamine + Mepyramine	1.0	No Response	Blocked

6. Interpretation of Results

- Agonists (ACh and Histamine) induce contraction in guinea pig ileum.
- Atropine blocks ACh-mediated contraction, confirming its muscarinic receptor antagonism.
- Mepyramine blocks histamine-induced contraction, indicating H1 receptor antagonism.

7. Precautions

- Maintain constant temperature (37°C) and pH of Tyrode's solution.
- Aerate the organ bath properly.
- Avoid overstretching the ileum.
- Record data accurately and maintain sterile conditions.

Pharmaacademias.com

8. Conclusion

This experiment demonstrates the role of agonists and antagonists in modulating smooth muscle contraction via muscarinic and histaminergic receptors. Such studies are crucial for understanding drugs affecting gastrointestinal motility, asthma, and allergic reactions.

Pharmaacademias.com