Effect Of Atropine On The Drc Of Acetylcholine On Rat Ileum

The effect of atropine on the dose-response curve (DRC) of acetylcholine in rat ileum provides valuable insight into muscarinic receptor interactions. Acetylcholine, a potent agonist, induces contraction of the smooth muscle in the ileum by activating muscarinic receptors. Atropine, a competitive muscarinic antagonist, inhibits this response by blocking acetylcholine binding. This study demonstrates how atropine shifts the acetylcholine DRC to the right in a concentration-dependent manner, reflecting competitive antagonism and receptor-ligand dynamics.

The experiment determines:

- To record the dose response curve for acetylcholine on isolated piece of rat ileum
- To plot the log-molar concentration vs. percent response curves for acetylcholine
- To determine how the presence of atropine (a competitive antagonist) in physiological solution affects the DRC of acetylcholine on rat ileum

EQUIPMENT REQUIRED

Animal:-	Frog
Drugs:-	Acetylcholine stock solution (10µg/ml)
	Atropine solution (1µg/ml)
Instrument:-	Student Organ Bath, kymograph.
Physiological salt solution:-	Frog Ringer's

PRINCIPLE

Dose Response Curve determine responses in graded levels in increasing order is recorded. Acetylcholine is neurotransmitter which causes depolarization of muscle fibre resulting into muscle contraction. The muscle fibre of frog leads to continuous depolarization and prolong slow contraction of muscle. Experiment involves competitive antagonism between acetylcholine and atropine on muscarinic receptors in rat ileum. Acetylcholine induces smooth muscle contractions, while atropine, a muscarinic antagonist, inhibits this effect by blocking receptor binding. The interaction is observed as a rightward shift in the dose-response curve (DRC) of acetylcholine in the presence of atropine, demonstrating the principles of receptor occupancy and antagonism.

PROCEDURE:

1) Sacrifice rat and isolate rat ileum and placed in physiological salt solution.
2) Set up Organ bath and tie end of ileum muscle to aeration tube and isotonic lever.
3) Stabilize the tissue and allow it for 30minutes in physiological salt solution and change the solution at interval of 10minutes.

4) Introduce acetylcholine and take baseline at 30sec, record concentration using frontal writing lever.
5) The contact time of tissue maintained should be of 60seconds.
6) Wash the tissue 3times after administering dose in graded response with washing time of 60sec.
7) Total time cycle should be maintained for 270sec.
8) Then take atropine and introduce in tissue containing physiological salt solution and wait for 90sec.
9) Take baseline at 30sec and maintain contact time for 60sec.
10) Wash the tissue 3times after administering dose in graded response with washing time of 60sec for atropine.
11) Total time cycle for atropine should be 360sec.

CONCLUSION

Atropine exhibits competitive antagonism against acetylcholine on the rat ileum by blocking muscarinic receptors. This is evidenced by a rightward shift in the dose-response curve without a change in the maximal response, confirming its role as a reversible antagonist and highlighting the specificity of receptor-ligand interactions.

IDEAL OBSERVATION

Sr. No.	Conc. Of Ach (µg/ml)	Amount Added in Organ Bath		Conc. In Organ Bath		In Absence of Atropine		In Presence of Atropine (0.2mL)	
		In mL	In µg	µg/ ml	Log Conc.	Respon se (mm)	% Response	Response (mm)	% Response
1	10 µg/ml	0.1	10	0.5	-0.301	11		7	
2	10 µg/ml	0.1	10	0.5	-0.301	11		8	
3	10 µg/ml	0.2	20	1	0	16		15	
4	10 µg/ml	0.4	40	2	0.301	27		22	
5	10 µg/ml	0.8	80	4	0.602	38		31	
6	10 µg/ml	1.6	160	8	0.903	51		44	
7	10 µg/ml	3.2	320	16	1.204	51		46	

RESULT: The dose-response curve of acetylcholine on rat ileum showed a concentration-dependent contraction. In the presence of atropine, the curve shifted to the right in a dose-dependent manner without reducing

DISCUSSION: The rightward shift in the dose-response curve of acetylcholine in the presence of atropine confirms its role as a competitive antagonist. Atropine binds reversibly to muscarinic receptors, preventing acetylcholine from eliciting its effect without affecting the maximal response, as sufficient acetylcholine concentrations can overcome the blockade. This demonstrates the principles of receptor competition and highlights atropine's specificity for muscarinic receptors in smooth muscle. These findings align with the expected pharmacodynamic behaviour of competitive antagonists.