

SMOOTH MUSCLE CONTRACTION

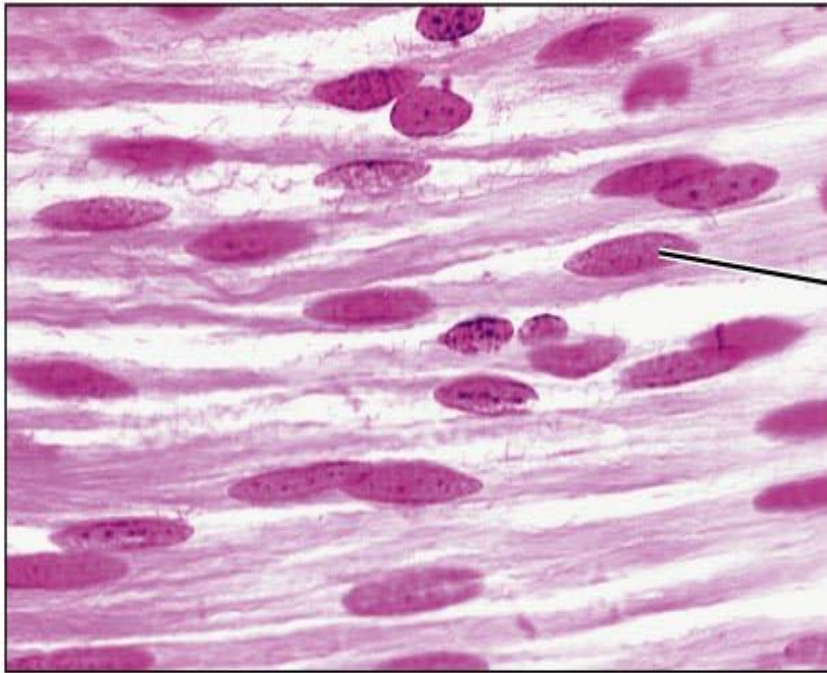
(RABBIT SMALL INTESTINE)

INTRODUCTION

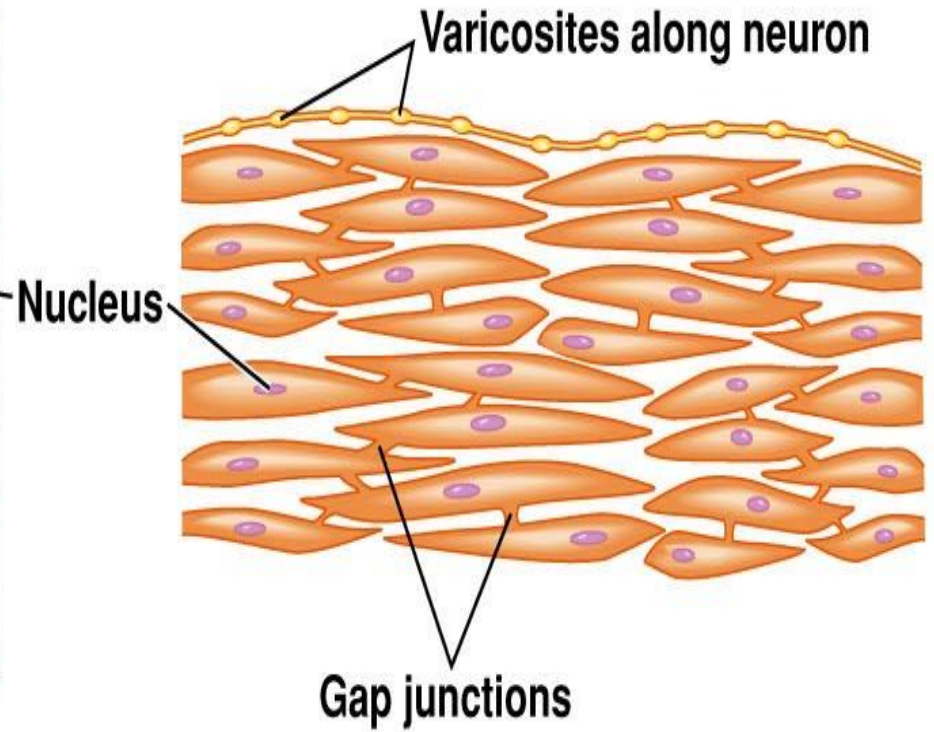
- ◀ visceral smooth muscle contraction occurs spontaneously, meaning that its action potential generated without input from either motor or autonomic nervous system.
- ◀ smooth muscles controlled involuntary by endocrine and autonomic nervous systems.

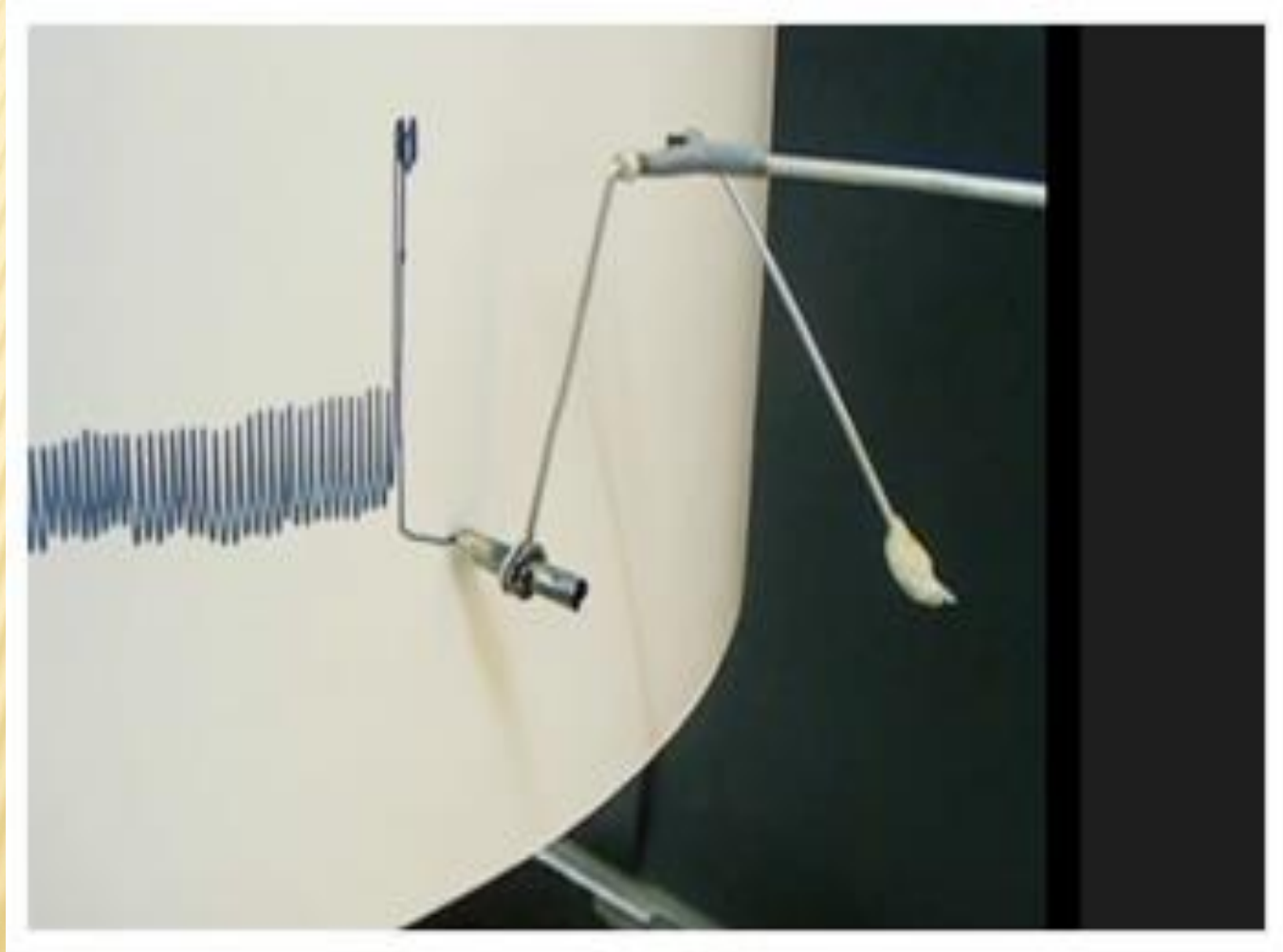
Visceral smooth muscle is characterized by the instability of its membrane potential (membrane potential shows rhythmic oscillations) which reach threshold and generate spike and shows continuous, irregular contractions independent of nerve supply this state called **tonus or tone**

the action potential spreads via **gap junctions** from muscle cell to another initiating a wave of muscle contraction in its wake.



(b) Smooth muscle





AIM OF EXP

To study some of autonomic properties of smooth muscle that occurs in the rabbit's small intestine in response to different agents



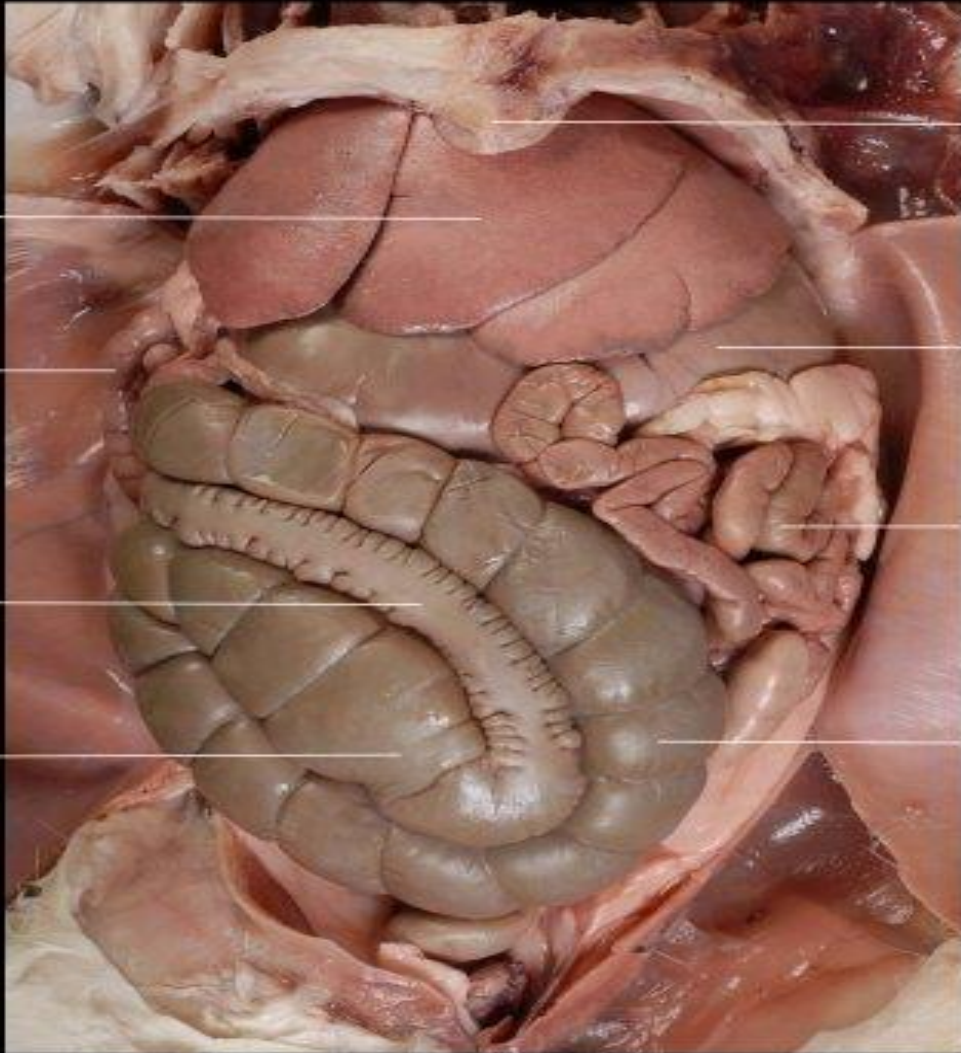
SACRIFICING THE RABBIT & REMOVING THE INTESTINAL

SEGMENTS:

- 1-the animal should be sacrificed by head trauma(cervical dislocation),without use of anesthetic?
- 2-cut the abdomen then locate the ileum cut into pieces of 1inch length.
- 3-keep the pieces in a Petri plate containing Tyrode's solution, why?
- 4-Attach one hook to the anchor pin in the muscle chamber.
- 5-Fill the chamber with 100 ml warm Tyrode's solution and air bubble into the chamber (95% oxygen + 5 % carbon dioxide) ?

COMPOSITION OF TYRODE'S SOLUTION

Nacl	8.0 gm
Kcl	0.2 gm
NaHCO ₃	1.0 gm
MgC.6H ₂ o	0.1 gm
CaCl ₂ 2H ₂ o	0.1 gm
NaH ₂ PO ₄ .2H ₂ o	0.05 gm
Dextrose	1.0 gm



LIVER

DUODENUM

PROXIMAL COLON

AMPULLA COLI

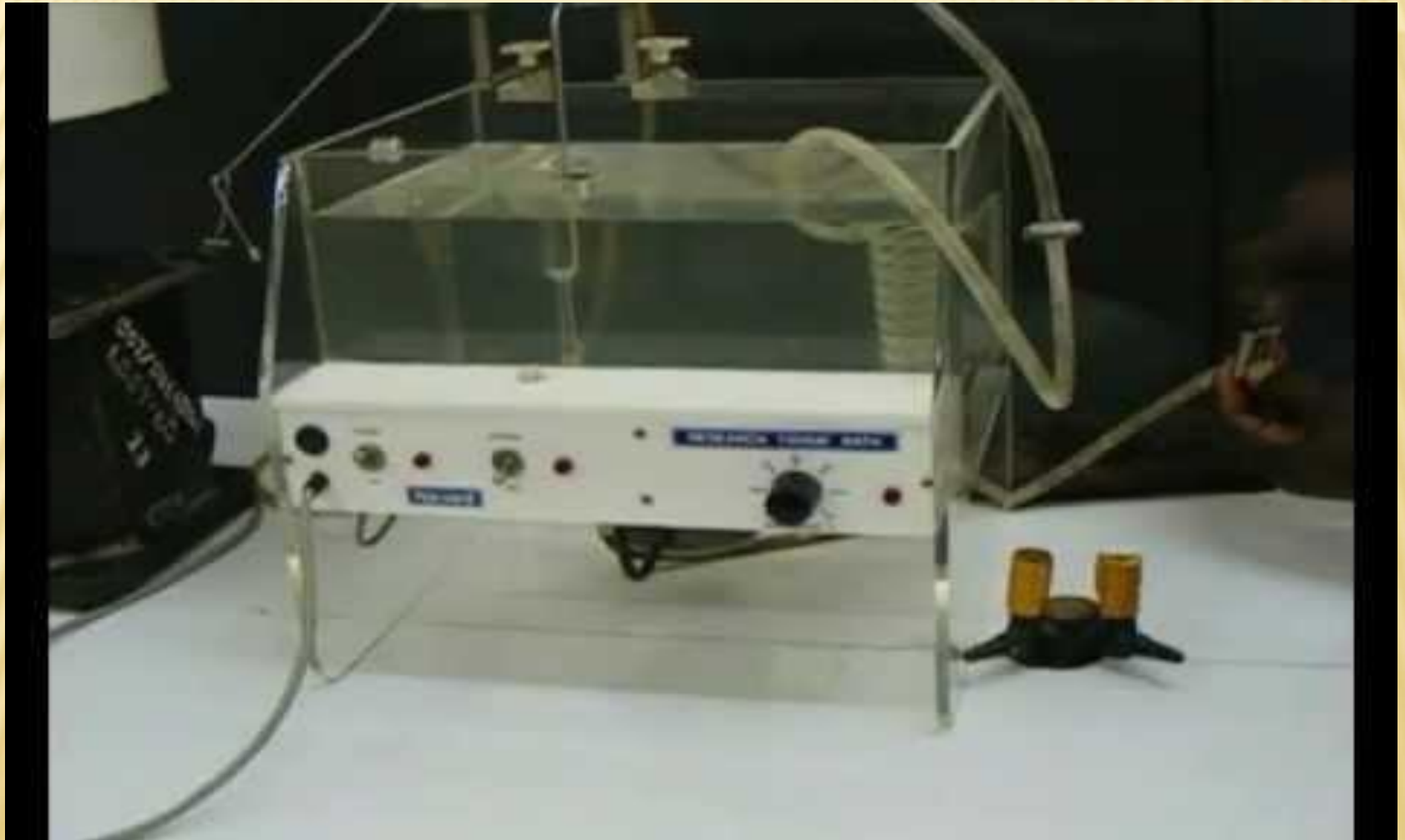
XIPHOID CARTILAGE

STOMACH

ILEUM

CAECUM

RESEARCH TISSUE BATH



1-the ilea segments will shorten when placed into the cold solution and motility will cease ,but when put into warm (37°c)solution inside the muscle bath motility will return within 5-10 min.

2- one of the advantages in adding drug directly to bath that rapid changes in muscle tonus can be clearly record. we recommend that solution be replaced between drug additions, it may take 1-2 min of the rhythm to stabilize after replacing the solution in the muscle bath.

EFFECT OF PARASYMPATHETIC NEUROTRANSMITTER

Acetylcholine, causes reduction in membrane potential and the spikes become more frequent and increase number of rhythmic contractions(increase tone) because it increases intracellular calcium ion concentration.

EFFECT OF SYMPATHETIC NEUROTRANSMITTER

Norepinephrine, its effect opposite to acetylcholine in which membrane potential becomes larger, the spikes decrease in frequency and muscle relax(decrease tone) because it decreases intracellular calcium ion concentration

Intestinal Smooth Muscle Potentials & Contractions

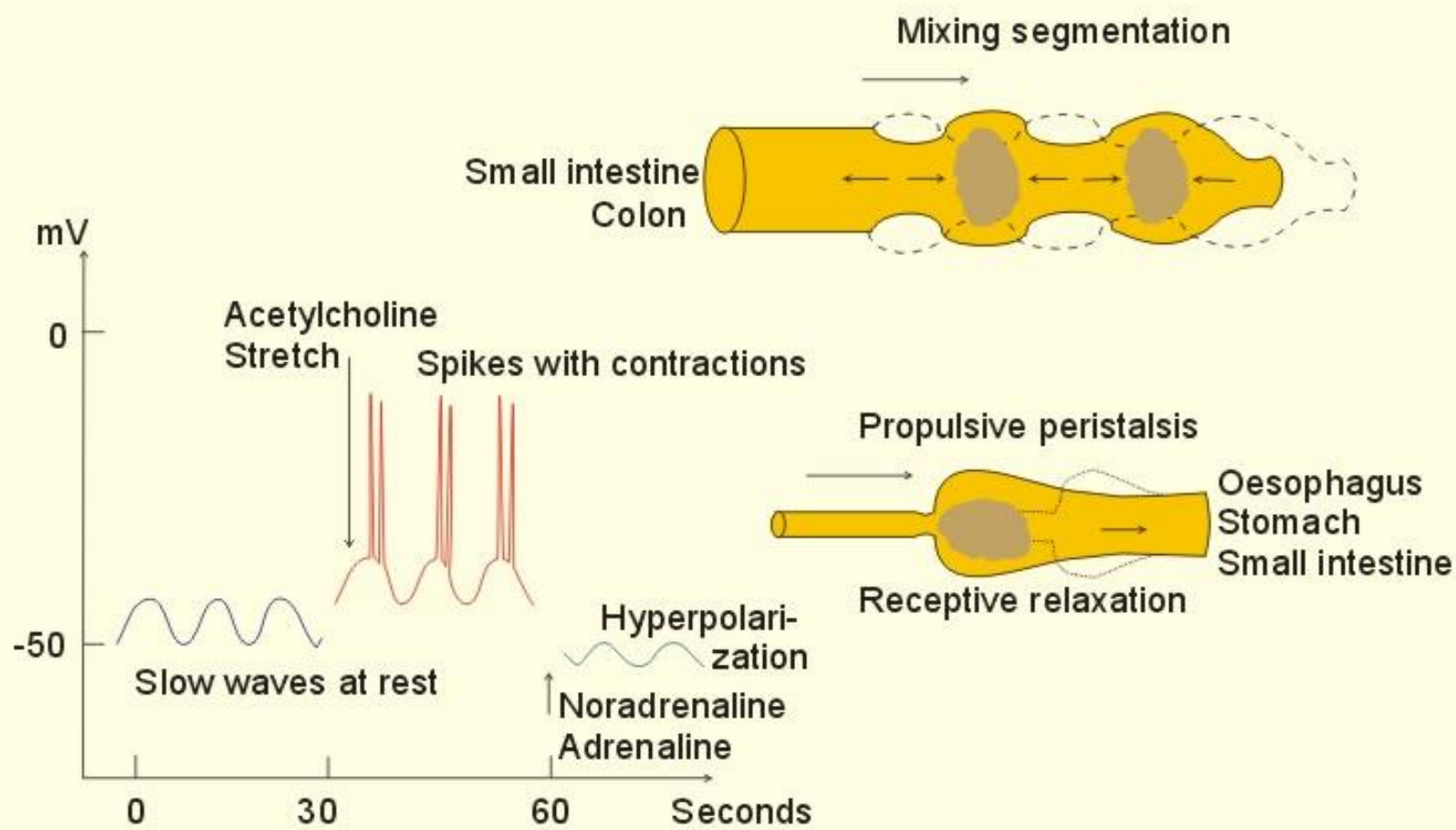


Fig. 22-3

H.W.

1- if we add atropine to Tyrode's solution what happen?

If we add atropine to tyrode 's solution primarily containing acetylcholine, what is happened?

What are the differences between skeletal and smooth muscles regarding

1-mean for spreading of action potential

2-name of solution and apparatus to study their activity invitro

3-type of neurons innervate them

4-source of calcium ions which are important for their contraction