Structure and Function of Muscle and Nerves

Readiness Assessment Questions

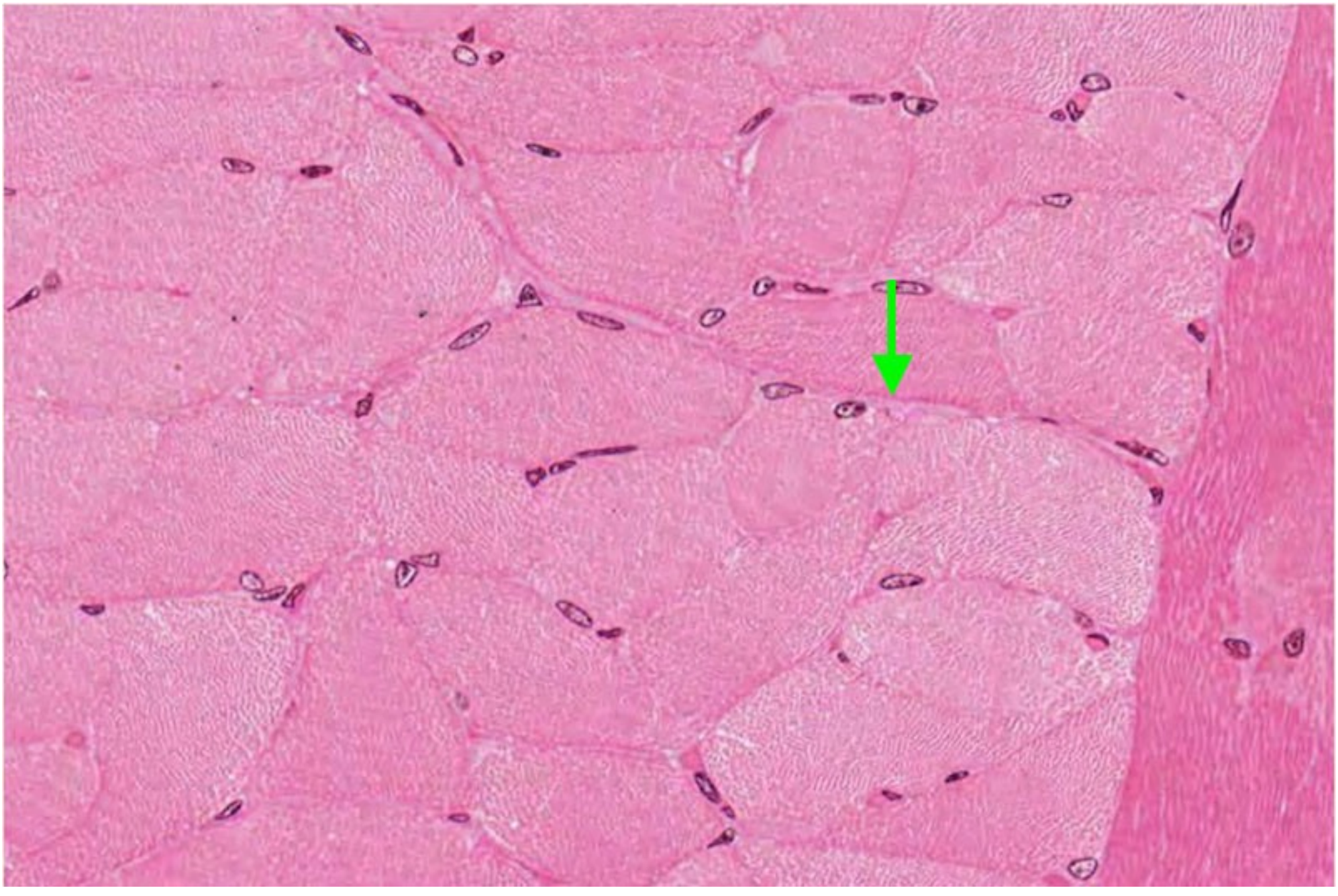
1. Identify the connective tissue layer indicated by the arrow.

   A. Epimysium

   B. Perimysium

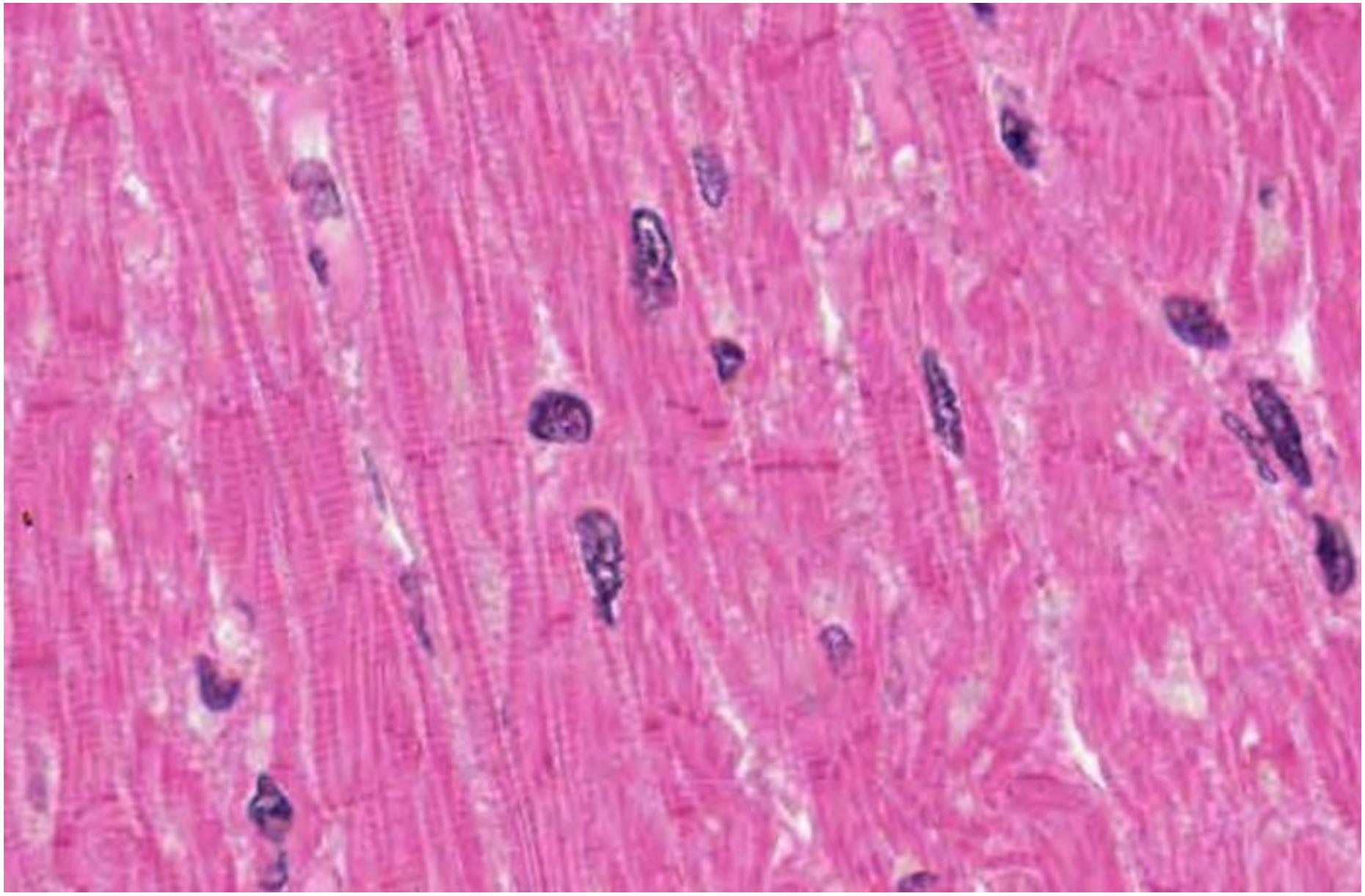
   C. Fibrocartilage

   D. Endomysium



2. Which of the following is primarily responsible for coordinating contraction of these cells?

A. Cadherins
B. Integrins
C. Gap junctions
D. Dihydropyridine channel



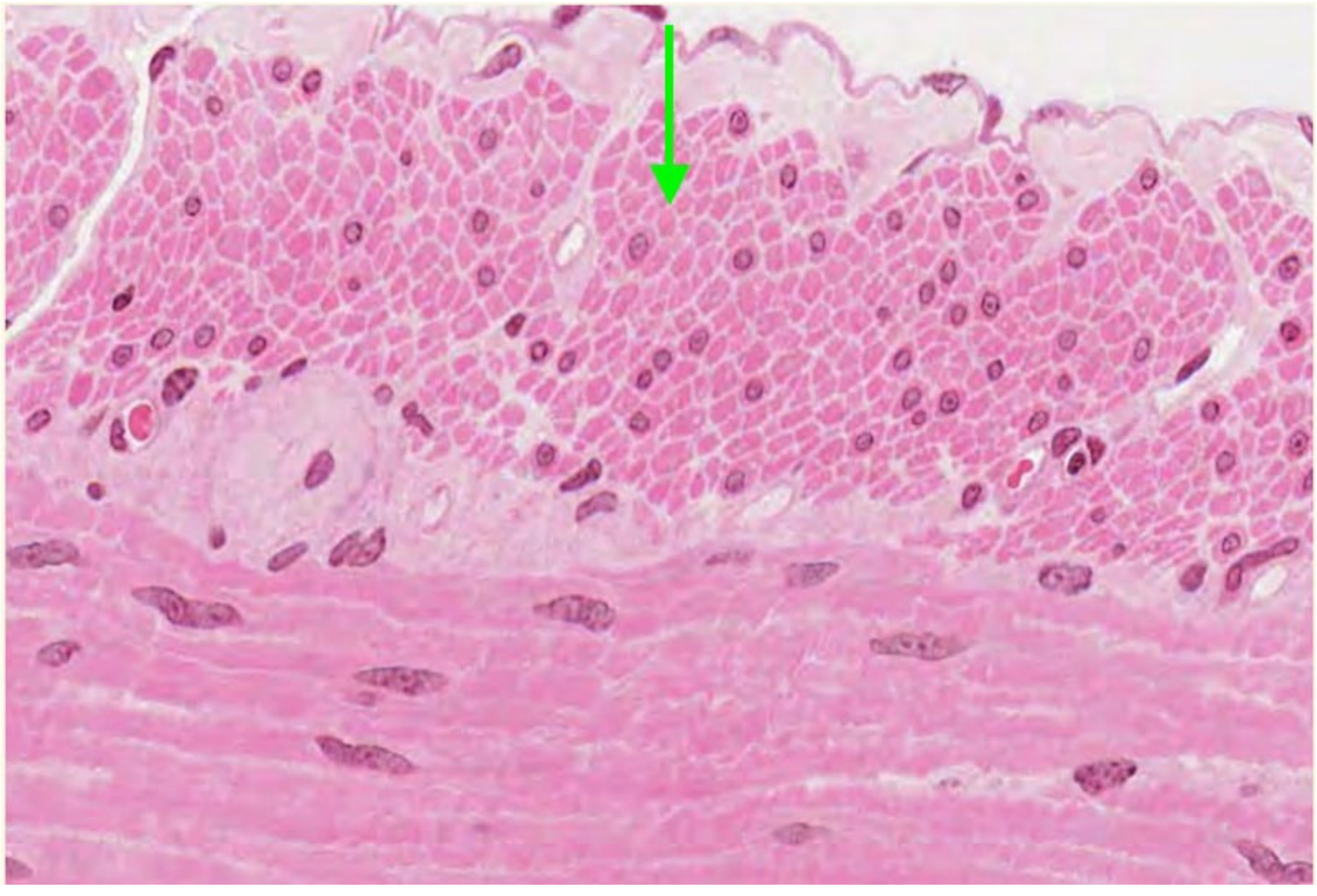
3. In which direction would the tissue indicated by the arrow contract?

A. Left to right

B. Top to bottom

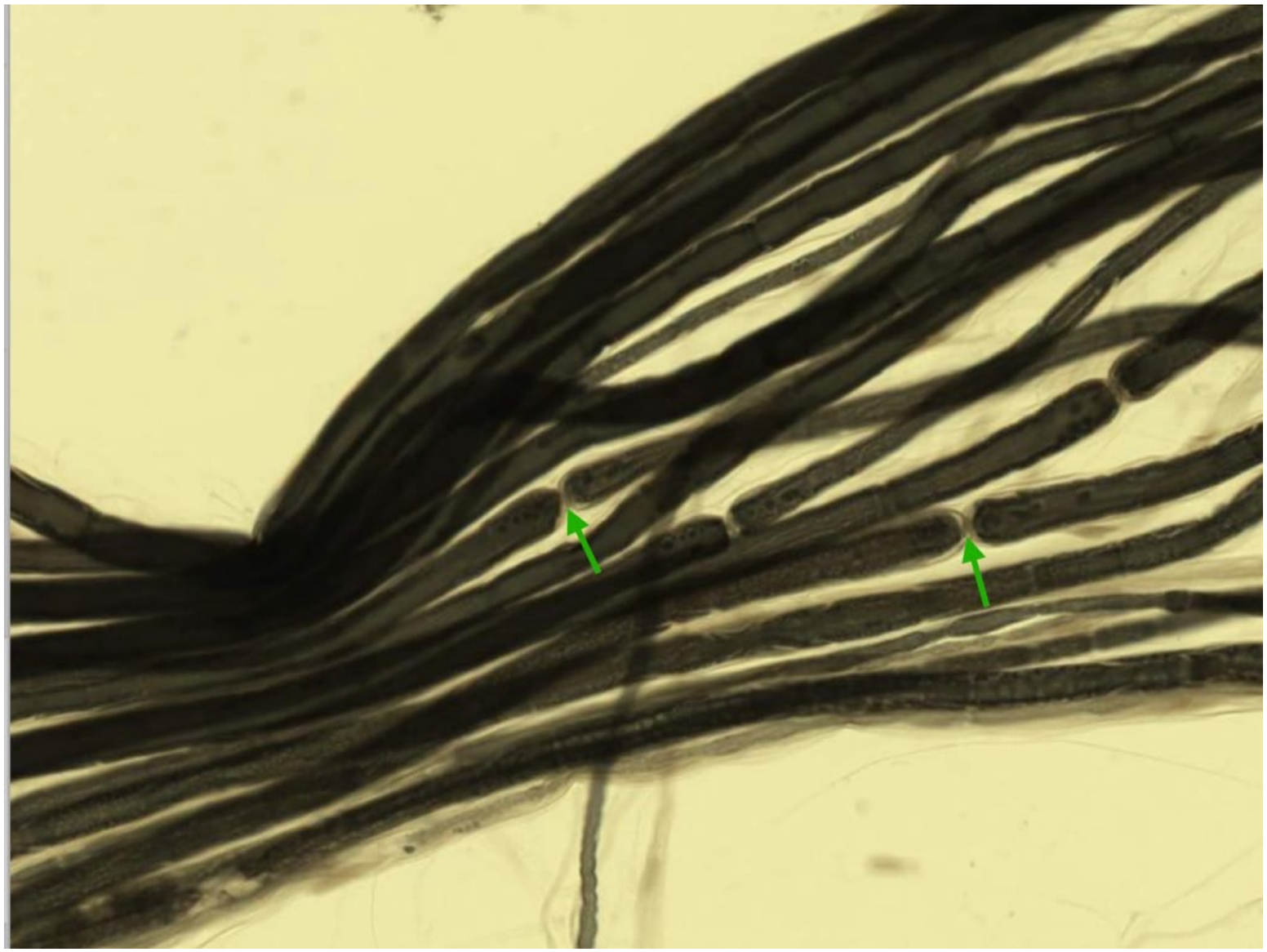
C. Into and out of the screen

D. Does not contract



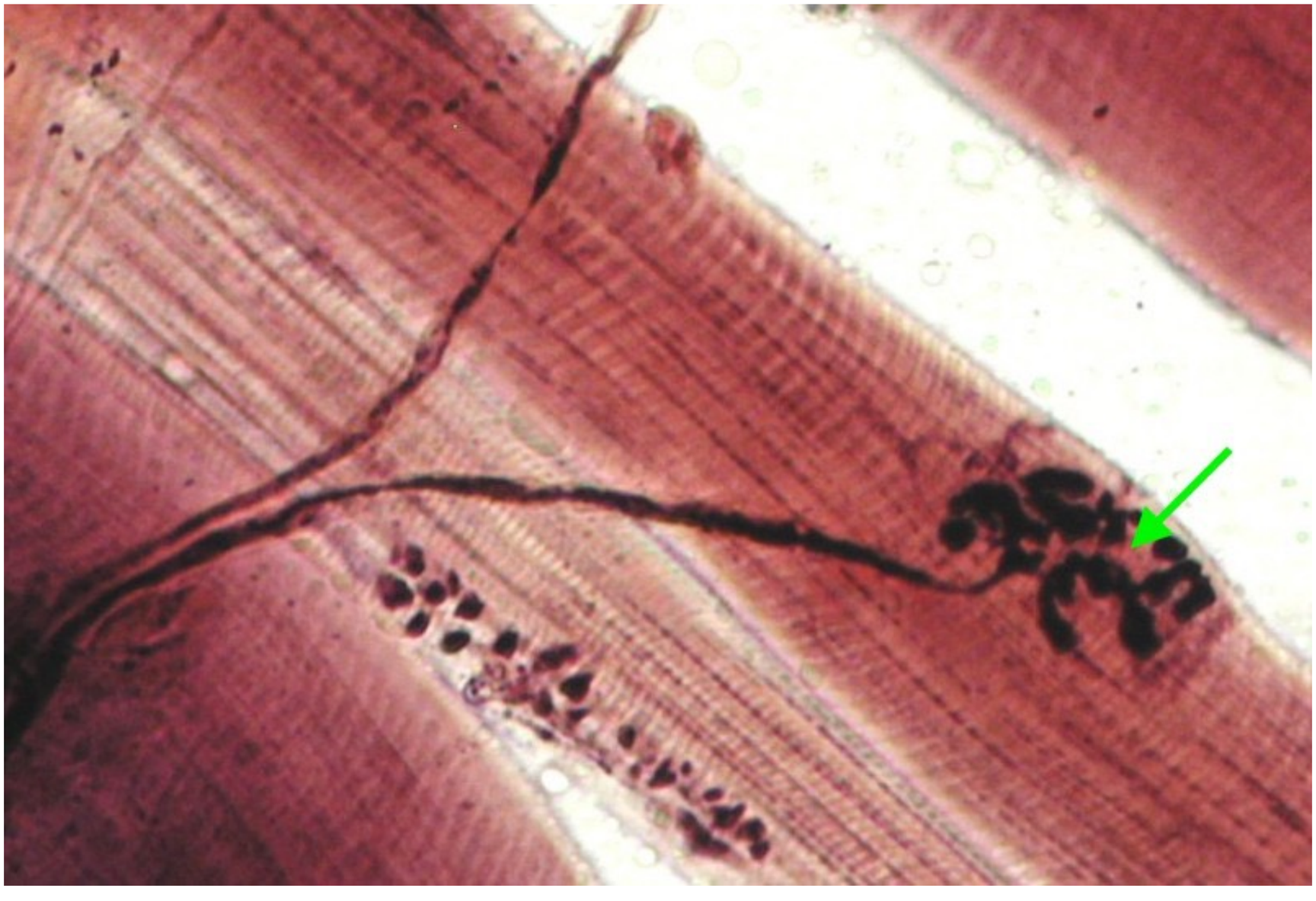
4. This image shows a collection of axons teased from a peripheral nerve. The region indicated by the arrows would contain a lot of which type of channel?

A. Voltage-gated sodium channels
B. Ligand-gated sodium channels
C. CFTR channels
D. Ryanodine receptors



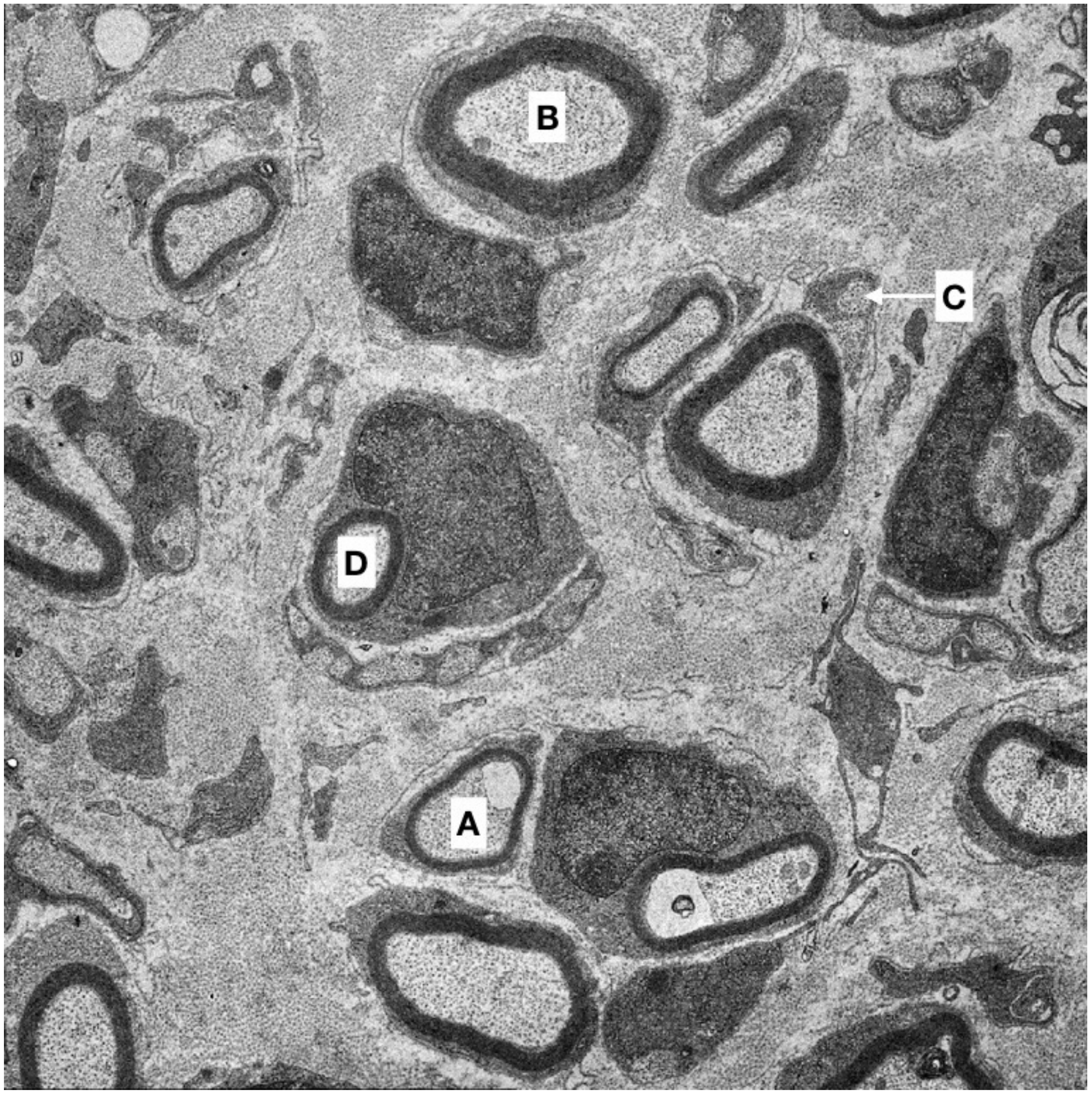
5. An antibody to which protein will label the muscle cell at the location indicated by the marker?

A. Acetylcholine receptor
B. Myosin
C. Actin
D. Tropomyosin



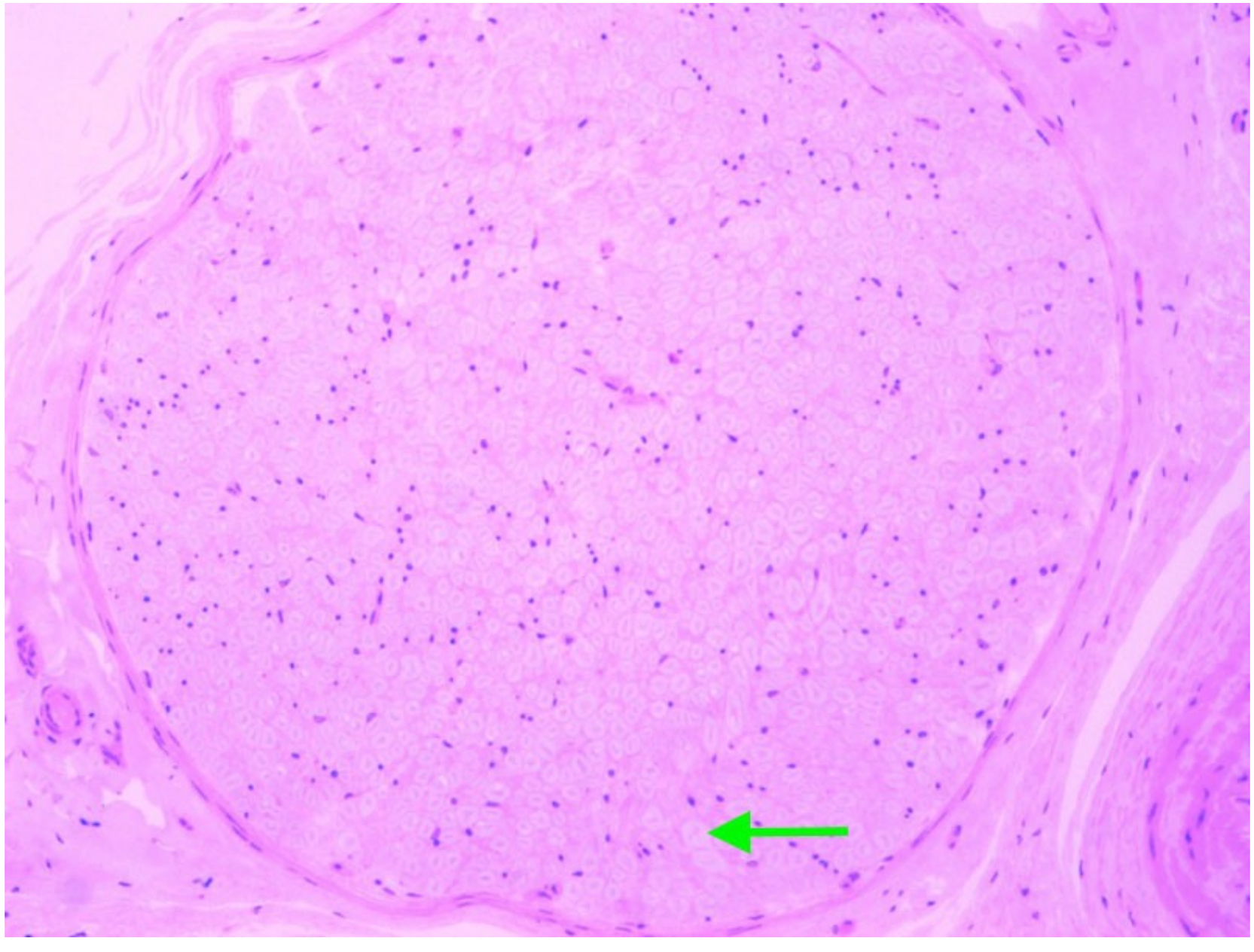
6. Which of the labeled axons below would generate the fastest conductance rate?

- A
- B
- C
- D



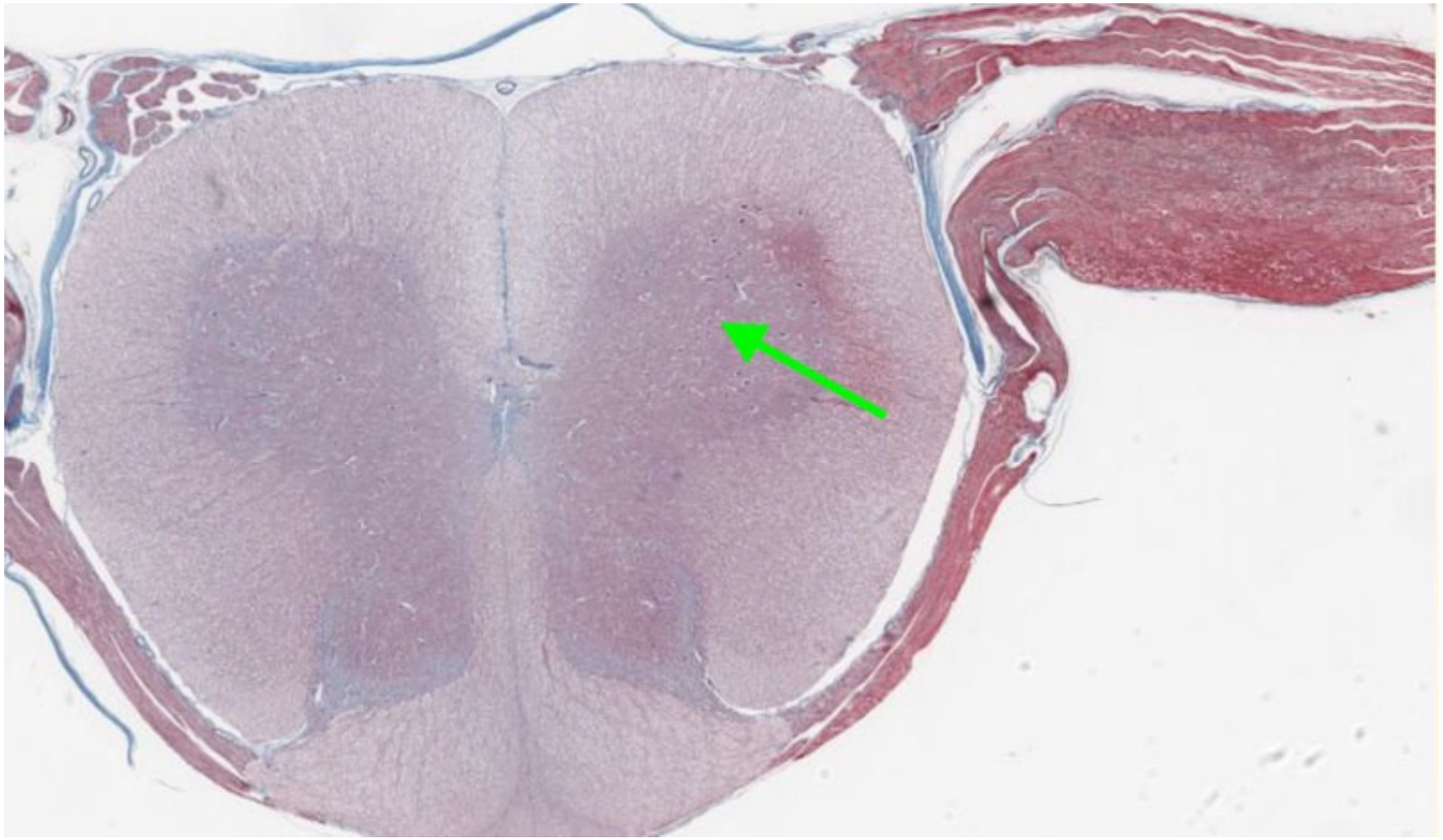
7. The structure indicated by the arrow is most directly involved with which of the following activities?

A. Increasing conduction rate in axons
B. Providing mechanical support
C. Delivering oxygen
D. Storing energy



8. Which cell would you expect to find in the region indicated by the arrow?

A. Smooth muscle
B. Sensory neuron
C. Motor neuron
D. Schwann cells



9. An increase in the amount of smooth muscle around the bronchioles in the lung may be a sign of which condition?

   A. Hypertension

   B. Tumorigenesis

   C. Asthma

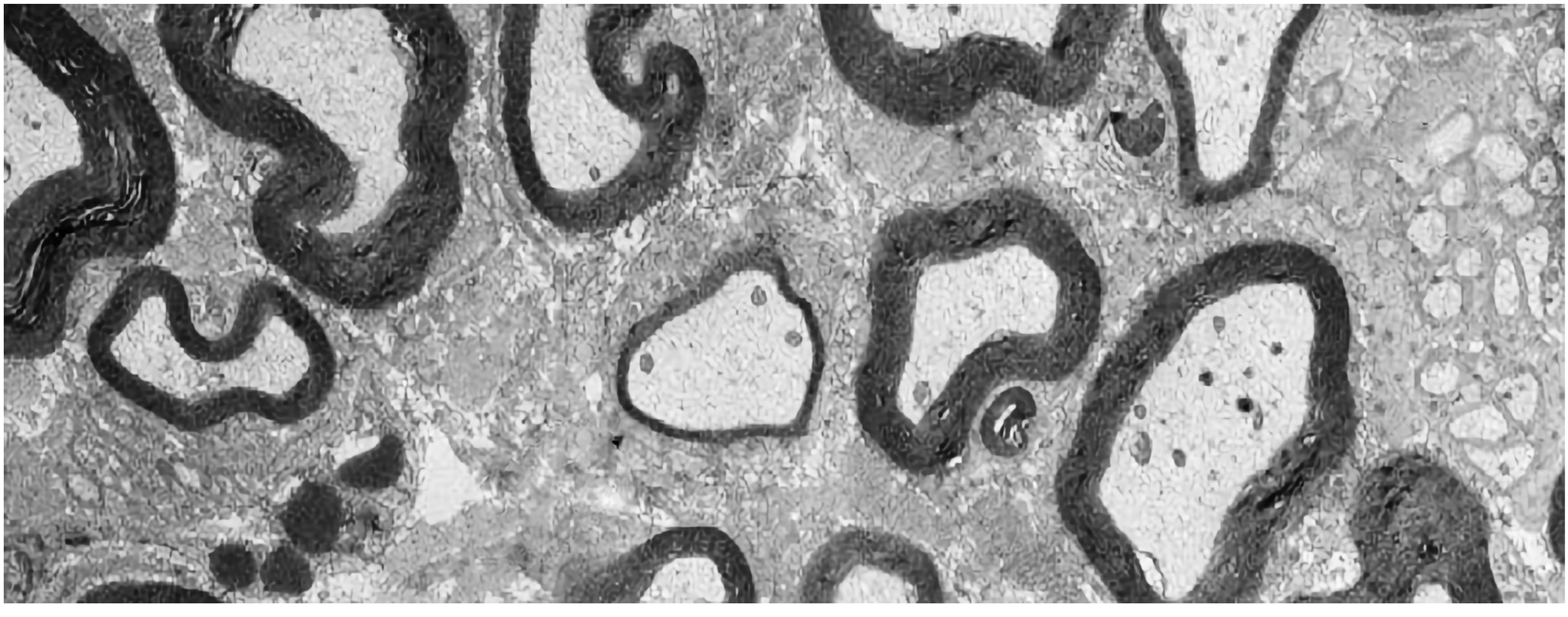
   D. Metastasis

10. Dantrolene is an inhibitor of the ryanodine receptor. What would be the effect of dantrolene on skeletal muscle cells?
    A. Increase in contraction rate
    B. Prolonged contration
    C. Decrease in muscle tension
    D. Decrease in muscle relaxation after stimulation

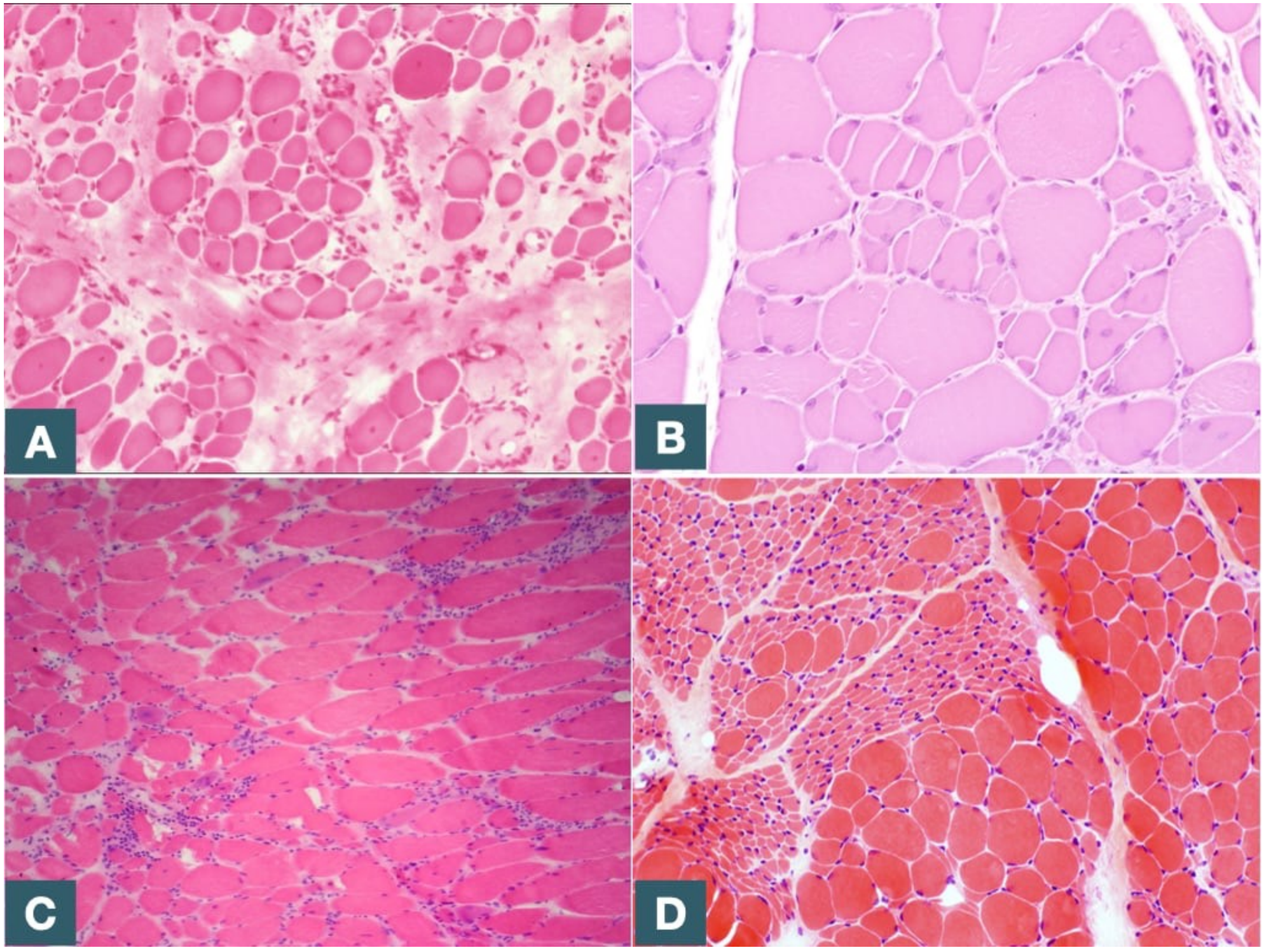
Application Questions

1. A patient visits your clinic complaining of recent muscle weakness in his arm. A physical exam reveals reduced muscle tone and strength. A blood test reveals the following results:
    - Sodium 141 meq/L
    - Chloride 102 meq/L
    - Potassium 4.0 meq/L
    - HCO_3^- 25 meq/L
    - Glucose 96 mg/dl

A biopsy of a nerve from the patient reveals this image:



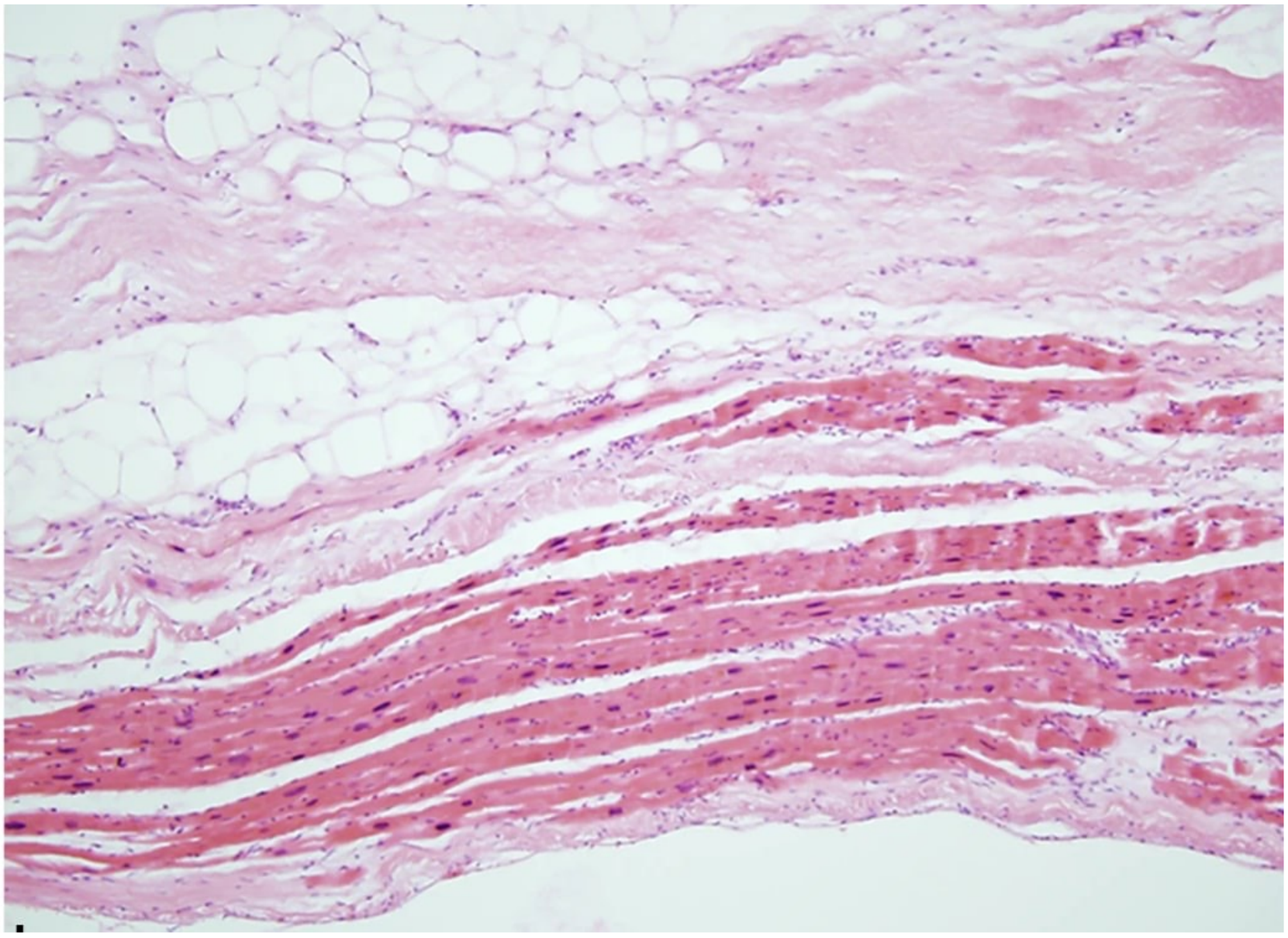
Which of the muscle biopsies shown below best matches the patient's symptoms and nerve biopsy?



2. You see a patient in their 20s who experienced an episode of syncope while exercising. An electrocardiogram reveals a right ventricular arrhythmia and defective conduction in the right ventricular muscle tissue.

   Histological analysis of the right ventricle from a family member who died suddenly from cardiac arrest reveals the image below.

   Sequencing the genomes of the patient reveals a mutation in desmoglein. How does the mutation explain the patients' symptoms and the structural changes in the ventricular tissue? Could a non-genetic cause produce a similar outcome?



3. A patient comes to you saying that she has been experiencing weakness in her legs. The symptoms usually start in afternoon. A biopsy of her skeletal muscle reveals the images below. On the left is a standard H&E stain and on the right is stain against human IgG antibody. A drug with which effect might best reduce the patient's symptoms?
   A. Increase rate of axon conductance
   B. Increase amplitude of action potential
   C. Increase size of skeletal muscle cells
   D. Inhibit acetylcholinesterase