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Diploma in Pharmacy 1st Year

Human Anatomy & Physiology

Experiment

To perform the microscopic examination of the given smooth muscle tissue slide

Aim:

To perform the microscopic examination of the given smooth muscle tissue slide

Reference :

Dr. Gupta G.D , Dr. Sharma Shailesh , Dr. Sharma Rahul Kumar ,
“Practical Manual of Human Anatomy and Physiology” Published by Nirali Prakashan , Pg.No 15- 18

Theory :

- Smooth muscle is a non-striated, involuntary muscle that lacks sarcomeres and thus no striations.
- This muscle is classified into two types, i.e., single-unit and multiunit.
- The ciliary muscle, a smooth muscle, dilates and contracts the iris and changes the shape of the lens in the eyes.

Microscopic Examination

- Myocytes or smooth muscle cells, are spindle-shaped with a wide middle area and tapering ends and can tense and relax like a striated muscle.
- Each cell is 30-200 micrometres long in its relaxed state.
- Although no myofibrils are present in these cells, the proteins myosin and actin, which together have the ability to contract, take up a large portion of the cytoplasm.
- Usually, smooth muscle myosin is class II.

1. The head and tail domains of myosin II are made up of two heavy chains (MHC). The N-terminal head domain is found in each of these heavy chains, whereas the C-terminal tails have a coiled-coil shape, which holds the two heavy chains together. Myosin II has two heads as a result. There is a single gene (MYH11) in smooth muscle that codes for the heavy chains myosin II, although there are four different isoforms due to splice variations. Smooth muscle may also contain MHC that is not involved in contraction and can be derived from multiple genes.
2. Myosin II also comprises four light chains (MLC), two of which weighting 20 (MLC20) and 17 (MLC17) kDa each. These bind the heavy chains in the "neck" region between the head and tail.
 - i) The MLC20 also known as the regulatory light chain and is a protein that helps muscles contract. Smooth muscle contains two MLC20 isoforms, each expressed by a separate gene, although only one is involved in contraction.
 - ii) The fundamental light chain is another name for the MLC17. Its exact role is unknown, although it is assumed that together with MLC, it contributes to the structural stability of the myosin head. As a result of alternative splicing at the MLC17 gene, two MLC variants (MLC176) exist.

There are hundreds of various forms of myosin structures that can be created by combining heavy and light chains, but it is unlikely that more than a few of these combinations are used or authorised within a particular smooth muscle bed. A shift in myosin expression in the uterus has been assumed to avail for changes in the directions of uterine contractions seen during the menstrual cycle.

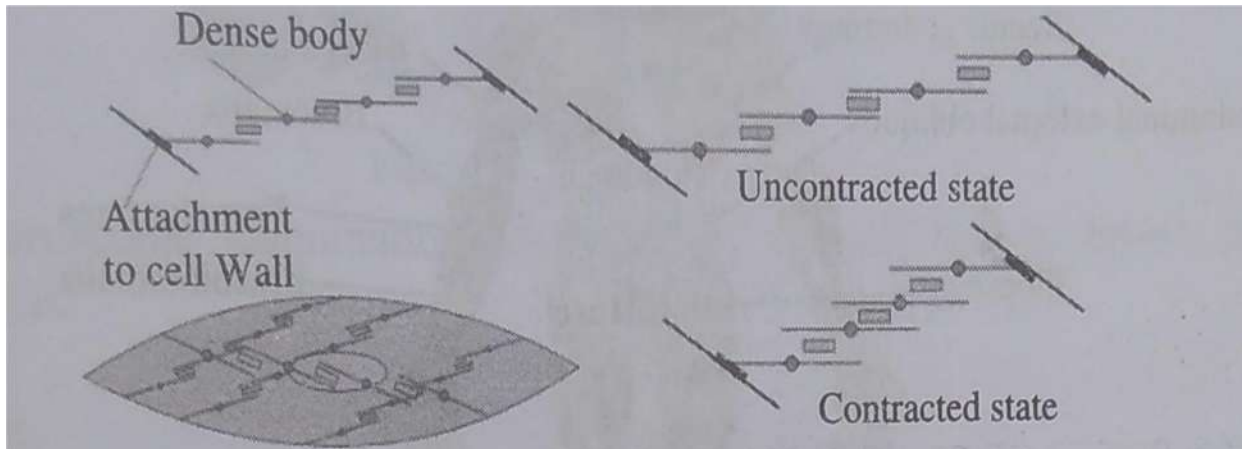


Figure 8: Actin-Myosin Filaments

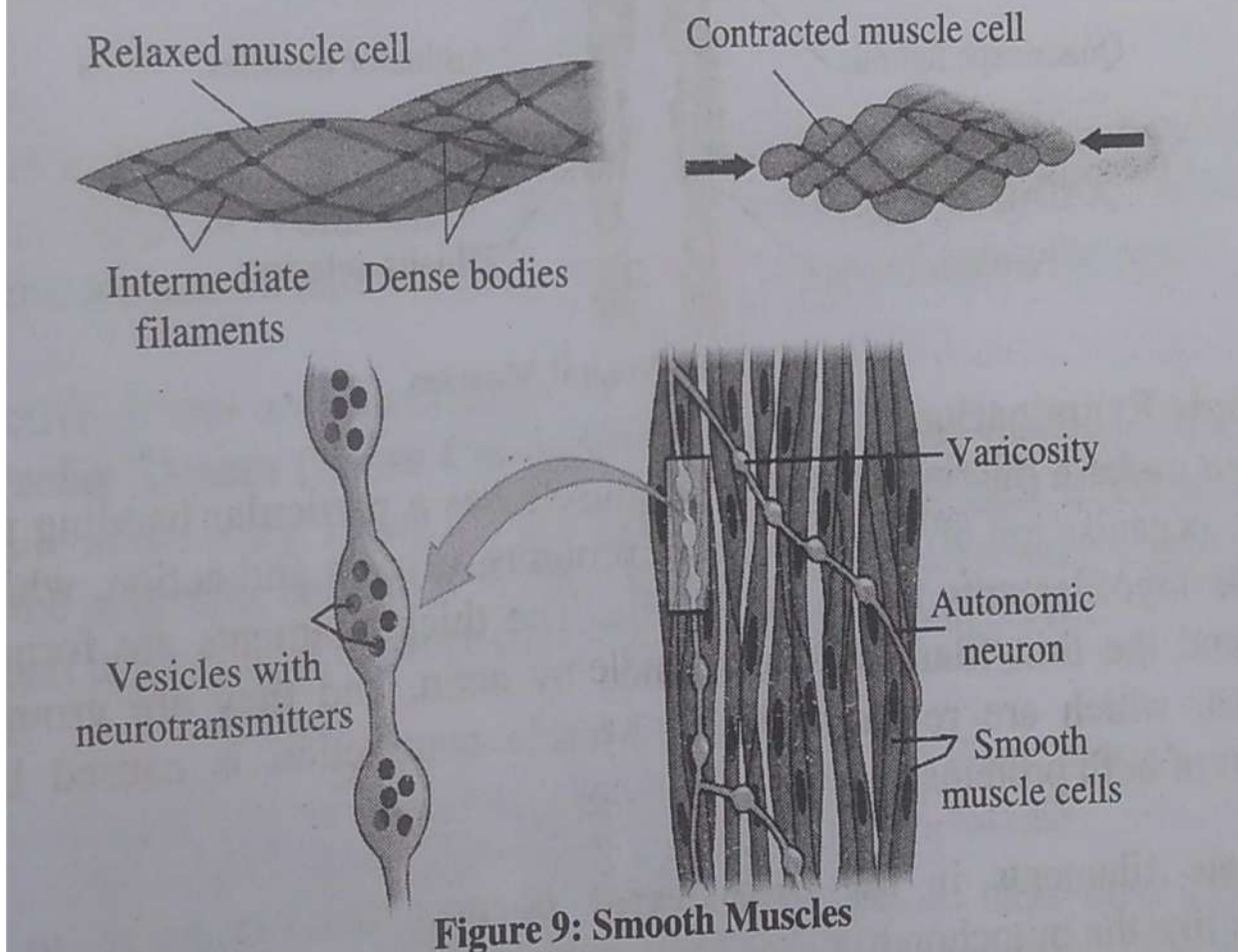


Figure 9: Smooth Muscles

Result:

The microscopic examination of the given smooth muscle tissue slide was performed.

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