Difference Between Myofibril and Muscle Fiber

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Key Difference – Myofibril vs Muscle Fiber

There are three types of muscle tissues; cardiac muscles, skeletal muscles and smooth muscles. Each type has a specific structure and role in the muscular system. Smooth muscles make organs such as bladder, and stomach. Cardiac muscles contract and pump the blood throughout the body. Skeletal muscles help bones and other structures for their movements. These muscles are composed of long bundles of cells called muscle fibers or myocytes. Muscle fibers are composed of thousands of myofibrils. The key difference between myofibril and muscle fiber is that **myofibril is the basic rod-like unit of a muscle fiber** while **muscle fiber is the tubular cells of the muscle.**

What is Muscle Fiber?

Skeletal muscles represent a majority of the muscular system. Skeletal muscles are protected with a connective muscle tissue called epimysium. The muscle is composed of bundles of tubular muscle cells. These tubular cells are known as muscle fibers or myocytes. Bundles of muscle fibers are known as fasciculi. One bundle of muscle fibers is protected with a connective tissue known as perimysium. Inside the perimysium, there are many muscle fibers. Each fascicle may contain 10 to 100 muscle fibers. Large, strong muscles have a large number of muscle fibers inside each bundle. Smaller muscles contain fewer numbers of muscle fibers in the fascicle.

Muscle tissues and muscle fibers are formed from the mesodermal layer of the embryonic germ cells by a process called myogenesis. Each muscle fiber is covered with a fibrous connective tissue called endomysium. The diameter of muscle fibers can range from 10 to 80 micrometres and they can be extended up to 30 cm length.

Muscle fiber is composed of numerous rod-like units or cylindrical organelles called myofibrils. Each muscle fiber contains hundreds to thousands of myofibrils which are bundles of myosin and actin proteins run through the length of the muscle fiber. Myofibrils are important in muscle contraction.

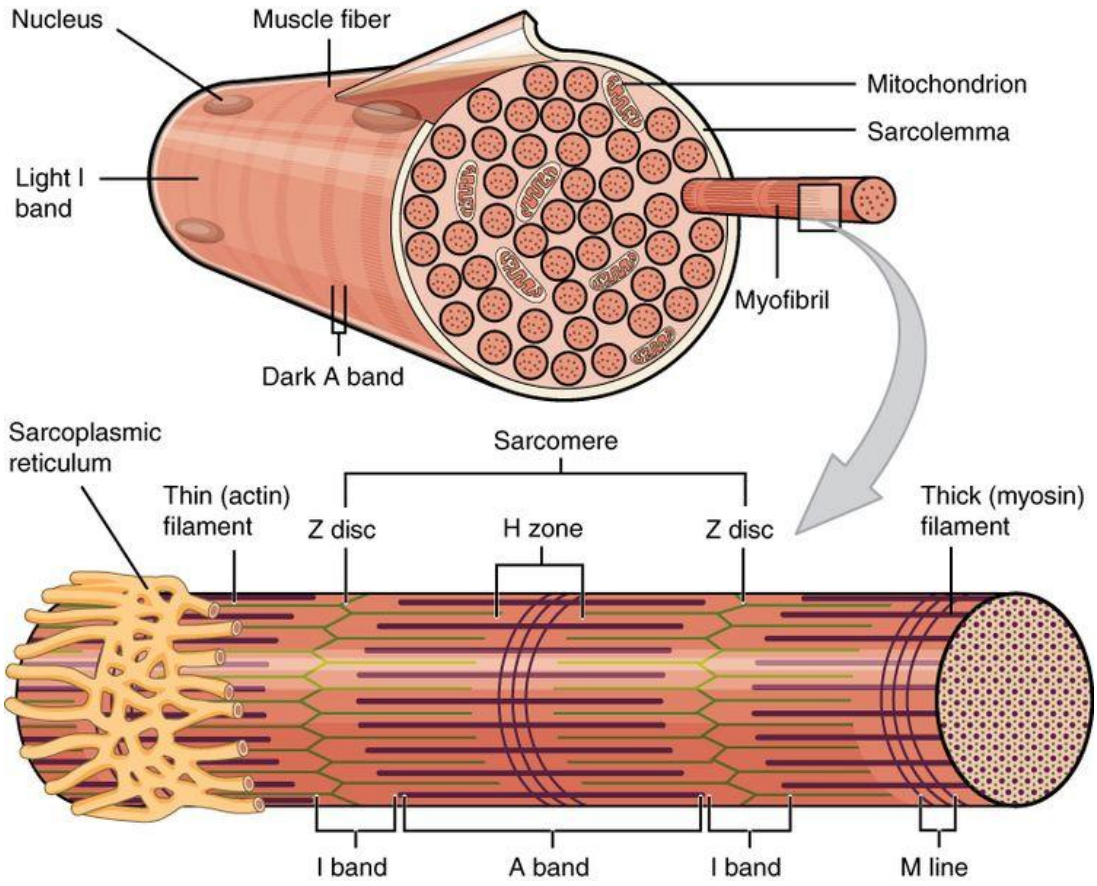

Figure 01: Structure of Muscle Fibers

There are three main types of skeletal muscle cells or muscle fibers. They are type I fibers, type IIa fibers and type IIb fibers. Type I fibers are also known as slow twitch fibers or red fast fibers. Type IIa fibers are known as fast oxidative fibers or red fast fibers. Type IIb fibers are known as fast glycolytic fibers or white fast fibers. Each type has different characteristics in function.

What is Myofibril?

A myofibril or a muscle fibril is a basic rod-like unit of a muscle cell. There are hundreds of myofibrils running parallel to each other in a muscle cell. Myofibrils are composed mainly of actin and myosin proteins. Some other types of proteins are also present in myofibrils. These proteins are organized into thick and thin long filaments called myofilaments. Thin myofilaments consist primarily of actin protein while thick filaments consist of myosin protein. These two types of myofilaments run through the length of the myofibril in sections called sarcomeres. Myofibrils comprise of repeating sections of sarcomeres. These sarcomeres appear

as alternating dark and light bands under the microscope and are responsible for muscle contractions.

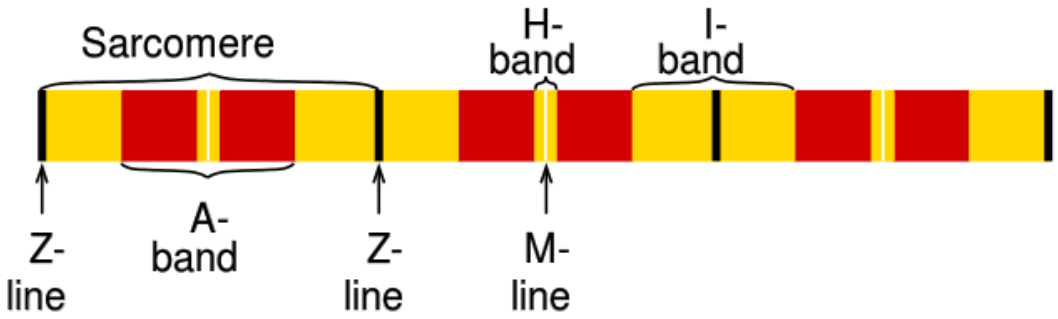

Figure 02: Structure of Myofibril

What are the similarities between Myofibril and Muscle Fiber?

- Muscle fibers and myofibrils are responsible for muscle contractions.
- Both types are tubular in shape.
- Both types are arranged in parallel inside the muscle.

What is the relationship between Myofibril and Muscle Fiber?

- Myofibrils are the basic units of muscle fibers. One muscle fiber contains hundreds of myofibrils.

What is the difference between Myofibril and Muscle Fiber?

Myofibril vs Muscle Fiber	
Myofibril is a basic rod-like unit of a muscle fiber.	Muscle Fiber is a tubular shaped cell of the muscle.
Composition	
Myofibril is composed of two types of myofilaments called thin and thick filaments.	Muscle Fiber is composed of numerous myofibrils.

Nature	
Myofibril is a cylindrical organelle.	Muscle Fiber is a cell with a nucleus and other organelles including mitochondria.

Summary – Myofibril vs Muscle Fiber

Muscle fiber is the basic unit of the muscle. They are arranged in bundles inside the muscle. Muscle fiber is composed of numerous myofibrils. Myofibrils are the basic units of muscle fibers. They are composed of thin and thick protein filaments called myofilaments. The primary proteins in myofilaments are actin and myosin. Myofilaments are composed of repeated sections called sarcomeres. Their sarcomeres are responsible for muscle contraction. Muscle fiber and myofibrils collectively help the muscle contraction.

References:

"Myofibril." Wikipedia. Wikimedia Foundation, 07 July 2017. Web. Available here. 08 July 2017.
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