

Qianjun Wang

Professor Don Larson

BIOL F111X

31 July 2023

My steam project is going to demonstrate the structure of the knee joint and the meniscus and the role of the meniscus on the knee. The first picture introduces the different components of the front and back of the knee.

The knee joint is the largest joint in the human body and acts as an important part connecting the thigh bone, also known as the femur, and the shin bone, also known as the tibia; the kneecap, also known as the patella is the other one of the three bones in the structure of knee joint. It is an essential part of the skeletal system, containing cartilage, tendons, bursae, muscles, ligaments, nerves, and synovial membranes. The ligaments in the knee contain two kinds, which are collateral ligaments and cruciate ligaments. Each kind also can be separated into two kinds, which are the medial collateral ligament and lateral collateral ligament, and the anterior cruciate ligament and the posterior cruciate ligament. There are two types of cartilage, which are articular cartilage and menisci (CC, 2023). The function of the knees is mainly to revolve around providing support for body weight and facilitating leg movements, including flexion and various motions such as walking, running, climbing, lifting, and jumping.

The second picture shows the position of the meniscus in the knee, viewed from the front of the knee on the left side. On the right side is the position and shape of the meniscus from above. Menisci are two c-shaped pieces of rubbery cartilage that function as shock absorbers within the knee joint. However, they are highly susceptible to injury. An interesting fact about

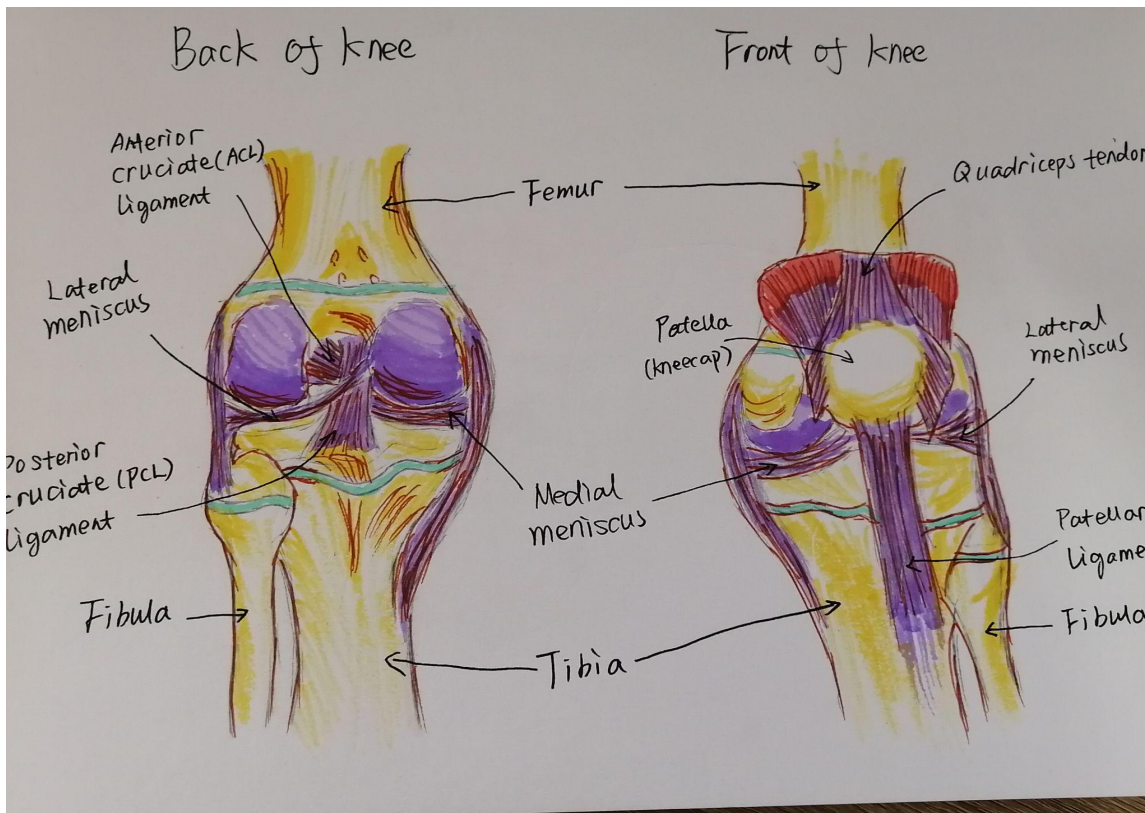
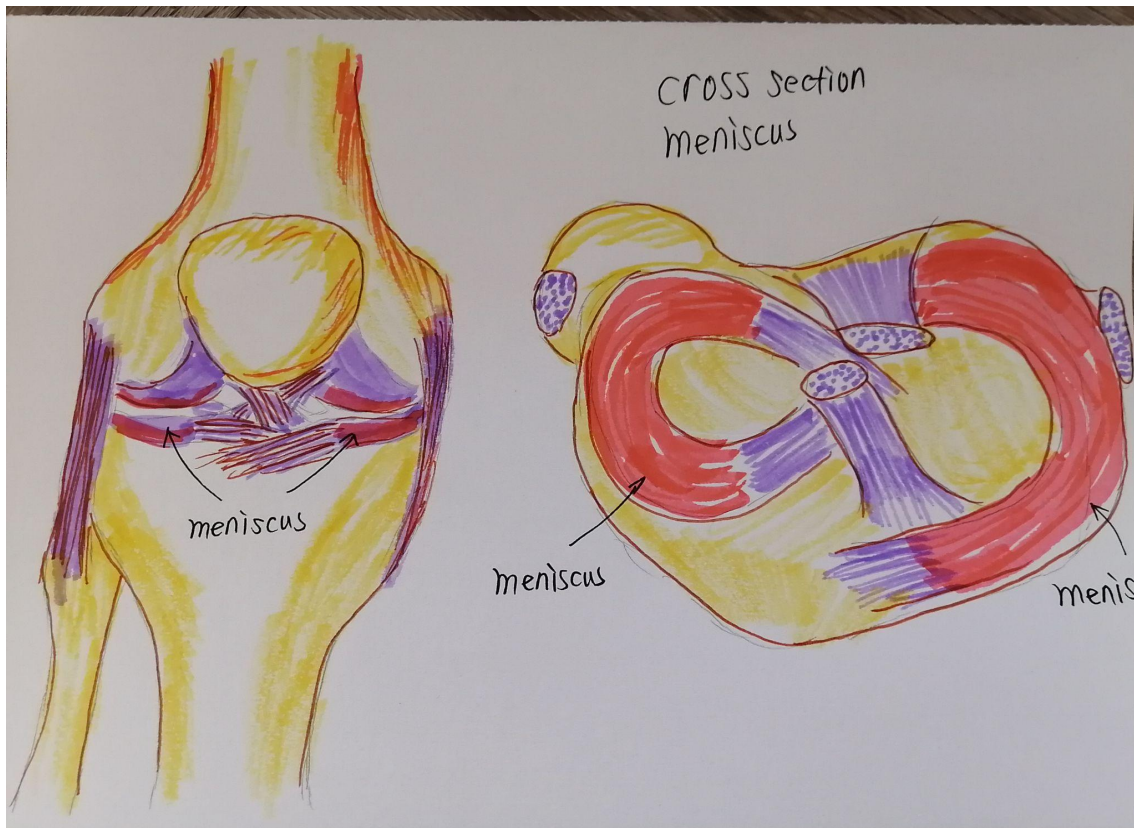
the meniscus is that it is composed of 72 percent water and 22 percent collagen, making it a non-bone structure that can easily wear or tear. Simple actions like jumping and landing on the knees or even jumping from a high object can cause a meniscal tear.

There are two parts to the menisci, which are the lateral and medial meniscus. The medial meniscus has a limited range of motion, moving only between 3mm to 5 mm, whereas the lateral meniscus has a larger range of motion, between 9 mm to 11.2 mm (Allen, 1995). I believe that the meniscus' ability to move is crucial in distributing stress evenly across the knee joint, thus protecting the articular cartilage from excessive wear and tear. Without a meniscus, increased contact and friction between the bones could lead to pain and swelling in the knee (Aweid, 2019).

Menisci were previously thought to be nonfunctional but now are considered an important part of knee joint function. Injuries to the menisci are common in athletes, and modern surgical approaches aim to preserve and repair healthy meniscal tissue whenever possible. The menisci serve various important biomechanical roles, including load transfer, shock absorption, joint stability, joint conformity, lubrication, and nutrition. It protects the articular cartilage from excessive stress, enhances joint consistency, and may have a stabilizing effect on the knee joint. The menisci also help with joint lubrication and nutrition.

I personally know a friend who injured her meniscus when she slid down a snow hill and landed on her foot. She had her meniscus removed a few years ago, and since then, she has experienced pain in her knee joint every time she jumps from a truck or bus. Additionally, her knee easily swells after such activities. This demonstrates the importance of the meniscus in maintaining proper knee function and preventing discomfort and complications in the joint.

The third picture is a comparison of a normal meniscus and five types of meniscus tears. The incidence of meniscus repair has indeed increased in recent years due to concerns that removal of the meniscus may lead to osteoarthritis or other damage to the knees. As a result, indications for meniscus repair have expanded, and it is now performed on active elderly patients as well. The importance of identifying the tear characteristics and types when making a treatment plan for meniscal tears. This approach allows doctors to assess the condition thoroughly and determine whether meniscus repair is the most appropriate treatment option for patients. In some cases, complete removal of the meniscus might be considered unnecessary and might result in pain and limitations in exercise and daily activities (Karia, 2023).



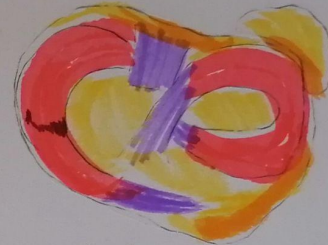
Normal meniscus VS 5 Types of meniscal tears



Normal



Vertical longitudinal



Vertical radial



Horizontal



Oblique



Complex/degenerative

Works Cited

Allen, Answorth, et al. "Anatomy and Biomechanics of the Meniscus." *Operative Techniques in Orthopaedics*, 1995.

Aweid, Osama, et al. "Biomechanics of the Knee." *Principles of Orthopaedics*, 2019.

Karia, Monil. *Current Concepts in the Techniques, Indications and Outcomes of Meniscal Repairs*,

www.researchgate.net/publication/328595047_Current_concepts_in_the_techniques_indications_and_outcomes_of_meniscal_repairs. Accessed 1 Aug. 2023.

"Knee Joint: Function & Anatomy." *Cleveland Clinic*,

my.clevelandclinic.org/health/body/24777-knee-joint. Accessed 1 Aug. 2023.