Connecting knee ligament functions to knee injuries

Take a look at the table you completed table of knee ligament knock-out experiments and outcomes from page 1 of the activity worksheet. You now have a fairly complete picture of how the ligaments of the knee limit particular motions, the motions that would injure them, and how those injuries would destabilize the knee. You should now be able to answer the questions below related to the likelihood of various types of knee injuries and how they can occur. For some questions, referring to your completed table will be sufficient. For others, it will be helpful to have your knee kit handy for simulations and testing out ideas.

> Answer the questions 1-8 below, writing your answers on pages 2-5 of your worksheet.

1. Are there ligaments that have the same function(s) as other ligaments? If yes, why do you think this is (from the perspective of knee evolution and/or selection for increased performance of the knee)? If no, why not?

2. Based on your answer to the previous question, would you expect most knee injuries to affect a single ligament or more than one ligament? Why or why not?

3. A common knee injury is a blow to the side of the knee (e.g., from a side tackle in sports). What ligament or ligaments would be injured by a blow to the lateral side of the knee? Why?

4. The MCL is one of the most commonly injured ligaments in the knee, if not the most commonly injured (Andrews et al. 2017). Why do you think this is?

5. When the ACL is injured, the MCL is often injured too (Willinger et al., 2021; Cristiani et al., 2024). Why do you think this is?

6. When the MCL and ACL are injured together, the medial meniscus is also often injured too. For this reason, these three structures are known as the "unhappy triad" or the "terrible triad." One reason for this is because the medial meniscus is connected to the MCL directly by a ligament (this ligament is not represented in your knee kit). Using your knee kit, can you provide an additional reason why an injury of the MCL and the ACL would often also injure the medial meniscus?

7. Another ligament commonly injured with the ACL is the IT tract (Mansour et al., 2014). Why do you think this is and what would be the nature of the injury to cause the IT tract

to be injured in addition to the ACL?

8. Two commonly cited strategies for decreasing the chances of an ACL injury are to land with your knees bent (i.e., more flexed) and with your knees aligned over your toes. Based on your simulations and what you now know about the functions of the knee ligaments, why are these effective strategies?

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