**Caffeine and Neural Fatigue Answer Sheet**

1.1) When you are suffering from muscle fatigue, which of the following parts isn’t working? The brain, the upper motor neuron, the lower motor neuron or the muscle?

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1.2) When you are suffering from neural fatigue, which of the following parts isn’t working? The brain, the upper motor neuron, the lower motor neuron or the muscle?

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1.3) Define the term, “neuromodulator”

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1.4) When the ion receptor is activated, does it result in more or less neurotransmitters being released?

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1.5) When the adenosine receptor is activated, does it result in more or less neurotransmitters being released?

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2.1) What are the coaches concerned about?

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2.2) What does Marion want to know?

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2.3) What do you need to know to answer Marion’s question?

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2.4) Based on your personal experience, do you think caffeine can improve athletic performance? Why or why not?

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2.5) Do you think caffeine acts as an inhibitor or activator of the adenosine receptor? Why or why not?

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2.6) Do you think caffeine acts as an inhibitor or activator of the ion receptor? Why or why not?

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3.1) If you add adenosine to the AR cell culture, would you see a flash of light? Explain.

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3.2) If caffeine were an inhibitor of the adenosine receptor, would you see a flash of light if you added caffeine to the AR cell culture? Explain.

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3.3) If caffeine were an activator of the adenosine receptor, would you see a flash of light if you added caffeine to the AR cell culture? Explain.

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3.4) What happened with you dropped adenosine onto the square of AR cells?

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3.5) What happened when you dropped caffeine onto the square of AR cells?

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3.6) *(Only answer this if you are completing step 4, if you are not completing step 4, write in your lab notebook, “Not doing this step”)* What happened when you added a drop of adenosine to the AR cells that have caffeine on them?

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3.7) Is caffeine an activator or inhibitor of the adenosine receptor? Why do you conclude this?

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3.8) Could caffeine be acting as a performance enhancing drug through its effect on the adenosine receptor? Why do you think so?

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4.1) If you add ryanodine to the IR cell culture, would you see a color change? Explain.

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4.2) If caffeine were an activator of the ion receptor, would you see a color change if you added caffeine to the IR cell culture? Explain.

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4.3) If caffeine were an inhibitor of the ion receptor, would you see a color change if you added caffeine to the IR cell culture? Explain.

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4.4) What happened with you dropped ryanodine onto the square of IR cells?

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4.5) What happened when you dropped caffeine onto the square of IR cells?

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4.6) *(Only answer this if you are completing step 4, if you are not completing step 4, write in your lab notebook, “Not doing this step”)* What happened when you added a drop of ryanodine to the IR cells that have caffeine on them?

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4.7) Is caffeine an activator or inhibitor of the ion receptor? Why do you conclude this?

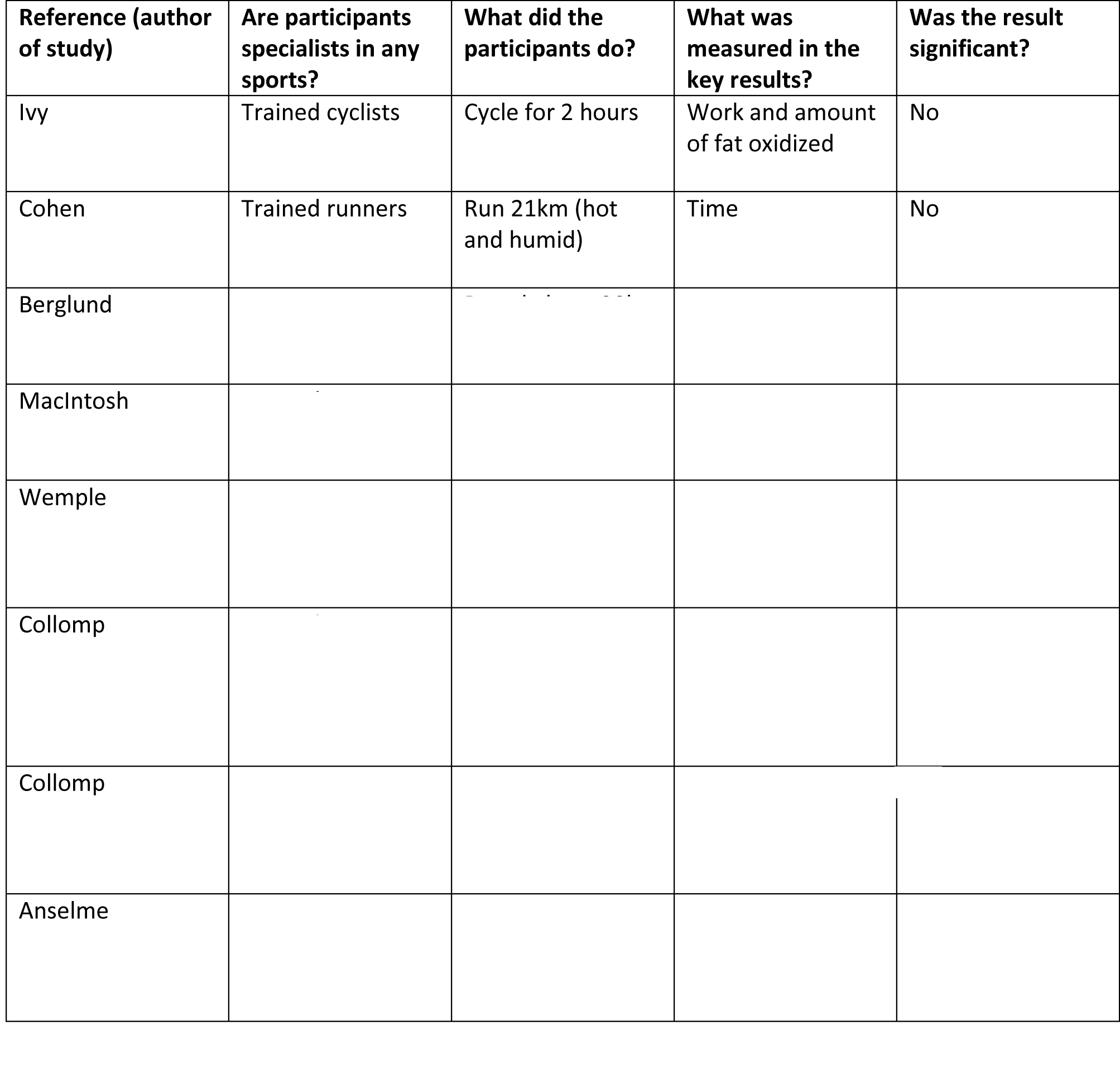
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4.8) Could caffeine be acting as a performance enhancing drug through its effect on the ion receptor? Why do you think so?

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5.1) What is the main purpose of the table?

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5.2) How many studies looked at both male and female athletes?

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5.3) Based on the information in the table, what conclusions can be drawn about how caffeine affects the performance of trained athletes?

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5.4) Based on the information in the table, what conclusions can be drawn about how caffeine affects the performance of untrained, but active individuals?

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5.5) Caffeine is no longer banned by the world anti doping agency. Do you think it should be banned? Why or why not? Write a one paragraph explanation.

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5.6) What do you think about this statement from Terry Graham (shown below)? Write a one paragraph response.

“Athletes who ingest caffeine are using a drug for the express purpose of gaining an advantage. As such, the author considers it to be doping and unethical. If an athlete has made a conscious decision to take caffeine for the purpose of gaining an advantage and enhancing performance, this could be the first of a series of similar decisions for other drugs.”

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