



## A Sweet Vaccination – the Deadly Hershey’s Kiss

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### INTRODUCTION

In Immunology courses, concepts such as primary and secondary immune response and the topic of vaccinations can be difficult to visualize for students. Described here is a short activity where students choose and snack on candy to simulate primary and secondary immune responses in the context of a vaccination. This short interactive activity is performed in the lecture course of Immunology, an upper-division Biology course that contains mostly Biology major juniors or seniors (class of 30–40). It is performed on the first day of class, and is consistently referred to as the semester progresses and more complex and detailed topics are introduced. It is utilized to help students understand and visualize the process of primary immune response, secondary immune response, immunological memory, and vaccinations.

### PROCEDURE

A bag filled with various types of candy – Hershey’s Kisses wrapped in different colored foil, individually-wrapped hard candy, tube of M & M’s, and wrapped small chocolate balls – is brought to class on the first day. Before class begins, the students are welcomed by myself as I walk around the room and asked if they would like a piece of candy. Some students take the candy while others don’t. They are instructed to remember what they took and what the candy looked like (color of wrappers and such). During the discussion on vaccinations, all the students are instructed to stand up. The students are told that the room has been invaded by an outbreak of a deadly pathogen – the Green Hershey’s Kiss. Some students will perish but some have been protected by a vaccination with a similar sweet treat. Those students who did not accept a piece of candy are informed that they were not vaccinated at all and have been killed by the Green Hershey’s Kiss; they are asked to sit down. The students who accepted the hard candy have been vaccinated but against something that is not chocolate. Therefore, they are not protected against the

deadly Green Hershey’s Kiss and they must sit down. The students who accepted M & M’s or small chocolate balls have been vaccinated by something that is chocolate but not the same type of chocolate candy; so those students are not protected and have to also sit down. The students who chose the Hershey’s Kisses have been vaccinated against a chocolate kiss, but only the students who picked the green wrappers are fully protected – students who selected any other colored wrappers have to sit down as they are not protected. The only students fully protected are those still standing. They have been vaccinated against the Green Hershey’s Kiss and have, therefore, survived the outbreak.

This activity is then related to flu viruses found in the flu vaccine. Each year, the flu virus can differ and this is similar to the different colored Hershey’s wrappers – same basic candy (flu virus) but “different wrappers” (foil color in the candy similar to protein spikes in the flu virus). Only vaccinations with the same color wrappers (candy) or protein spikes (virus) offer protection against the Green Hershey’s Kiss.

This short activity is then related to the primary and secondary immune responses in the context of a vaccination. When the student first chose the candy and ate it, the body responded with a primary adaptive response. Remember no one was sick from the pieces of candy because the candy was essentially a decoy. It stimulated the immune system to respond to that candy but the candy did not cause disease. This stimulation induced immunological memory in the student’s system and offered the student acquired immunity against that specific candy only. Therefore, the second time this pathogen enters the student’s system (the deadly Green Hershey’s Kiss), a secondary immune response is induced which is a stronger, faster-acting response that is able to clear infection (1). This secondary immune response is only induced in students who first accepted the same type of candy (the green colored wrapped Hershey’s Kisses).

### CONCLUSION

As the semester proceeds, this activity is continually used in discussions such as primary and secondary response of the immune system to vaccines and specificity of immunological reactions. This short activity is presented as a visual representation of essentially the basis of vaccinations. The vaccination contains a “decoy,” something that elicits a

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primary immune response against a possible future invading pathogen but does not cause disease. The immune system develops a memory to that specific “decoy” in the form of acquired immunity (I). Upon exposure to the disease-causing pathogen, the immune system remembers that pathogen and mounts the secondary immune response against the pathogen which can clear the infection much faster. This brief activity is introduced on the first day of class and then continually discussed as the “candy vaccination” and deadly Green Hershey’s Kiss throughout the semester, as the students delve into more complex immunological topics surrounding immune responses and vaccinations. This

activity greatly aids in their understanding of the more difficult concepts surrounding vaccinations, immunological memory, and immune responses to pathogens.

### **ACKNOWLEDGMENTS**

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### **REFERENCES**

1. **Parham, Peter.** 2009. *The Immune System*, 3<sup>rd</sup> ed. Garland Science, Oxford, UK.