

AAI Education Committee Highlight: Teaching Tools

The Immunology Teaching Interest Group (ITIG) was created by the AAI Education Committee as an informal group comprised of past speakers and attendees of the ITIG sessions, including current immunology educators spanning a range of institutions and levels. It serves as a resource for novel teaching tools and practices that can be implemented in courses to enhance immunology education. Because of the great interest in this topic, the AAI Newsletter features “Teaching Tools” articles highlighting ITIG presentations.

The Creation and Use of Analogies as an Effective Tool for Teaching Immunology Concepts



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Learning complex immunological concepts is challenging for many students. They often are overwhelmed by jargon, complex concepts, and detail associated with each immunological process. Using existing knowledge of the familiar can help build associations toward learning content. To facilitate the first step toward grasping complex concepts, I have developed and incorporated a wide range of analogies into my teaching. The use of analogies while teaching immunology allows the unknown to become familiar and acts as an aid toward deeper understanding.

Analogies were used as a teaching tool in immunology courses offered at the University of Colorado Anschutz Medical Campus, including dental, medical, physician assistant, and graduate studies. Analogies were used during every class session to introduce, explain, and enhance the learning and retention of a wide variety of complex immunological concepts. Examples of analogies used include describing opsonins as “chocolate sprinkles” that make pathogens “tastier” to phagocytic cells, neutrophils as the “first responders” to damage and infection, and phagocytic cells as the “clean-up crew” of the immune system.

During each class session, students were encouraged to actively participate through the creation of their own analogies to enhance their learning and comprehension. To extend the use of this teaching tool beyond the classroom, students were further encouraged to develop a collection of analogies to communicate complex scientific concepts to the general public and/or medical treatments to future patients. One impressive example of a student-generated analogy is, “Adjuvants are like your morning cup of coffee—your body

could get activated on its own, but the coffee really amps you up like an adjuvant does to a vaccine.”

Results from an anonymous survey (n=155) revealed that the majority of respondents found analogies to be highly effective for a variety of purposes. While finding analogies useful for understanding and retaining information presented during classes, students also reported that analogies could be used:

- as an important tool for communicating with patients about complex medical conditions and associated treatment options
- as a tool for communicating scientific research and discoveries to nonscientists
- by immunology students to both enhance their learning of the content and provide them with a solid foundation from which to build and augment complex concepts with increased detail and added complexity.

The incorporation of analogies into the learning process can be used in any immunology classroom, from undergraduate to graduate or professional students. The use of analogies in my immunology classrooms across the medical campus enhanced the comprehension of complex concepts and served as a model for effective science communication while speaking to the general public about scientific discoveries and advancements and/or future patients about medical conditions and/or associated treatments.

Our role as immunology educators has become more challenging since the COVID-19 pandemic. Although misinformation, disinformation, and conspiracy theories are not new, the rate at which the public consumes them has increased. As immunology educators, our goal has always been to help our students understand immunology. I would like to recommend an additional goal; that we also strive to use our classrooms as a space to train the next generation of scientists and healthcare professionals to communicate immunology to the nonscientist general public in a way that is relatable and easy to understand. I have found that a well-crafted analogy is the perfect teaching and science communication tool for the mission!