Teaching Notes

Assignment 1 of this activity is an introductory level activity and is open-ended. The exercise focuses on public health response measures, but with an emphasis on the ethical considerations from an individual point of view. Assignment 1 is particularly well suited for general education courses and can serve to segue to lectures on the immune system or regulations of bioweapons research. Assignment 2 is more involved, focusing in greater detail on considerations of policy procedures from public funding to procedures for vaccine trials.

Since the focus here is largely on an ethical dilemma, having students complete the relevant textbooks readings either before or during this activity will support a more focused discussion based on the relevant scientific reasoning.

Activity 5 at a Glance

Class	Any size class (20-300) Non-majors to advanced level biology majors
Instructor Preparation	One to four hours (excluding grading) Review the Assignments and break class into small groups. Also read **BoNT as a Bioweapon** section in the **Botulinum Toxin Background.**
Useful Media	PBS. (2001) "Nova: Bioterror Companion Website." The website also has short video clips and tutorials for vaccine development and interviews with journalists and scientists. http://www.pbs.org/wgbh/nova/bioterror/. http://www.pbs.org/wgbh/nova/bioterror/vaccines.html# http://www.pbs.org/wgbh/nova/bioterror/biowarriors.html. DiscoverySchool.com. (1997) "Botulinum Toxin" from the Understanding Bacteria video. [VHS] 51 min. A two-minute clip reviews the trajectory of toxin use, from bioweapon to medicinal miracle. http://teacherstore.discovery.com. Schindler L, Kerrigan D, Kelly J. Science Behind the News: Understanding the Immune System. This site has a graphics slide show of immune response and vaccine development. http://newscenter.cancer.gov/sciencebehind/immune/immune01.htm Pearson, G.S., Dando, et al. (2001). Review Conference Paper No. 4: 'The US Statement at the Fifth Review Conference: Compounding the Error in Rejecting the Composite Protocol'. Fifth Review Conference of the Biological Weapons Convention, Palais des Nations, Geneva, Switzerland. This wesite has a number of papers and audio clips that

	deconstruct the U.S. position on Biological Weapons and Chemical Weapons Treaty Convention. This 15 minute video clip is of an interview with a policy analyst, Jenni Rissanen. http://www.brad.ac.uk/acad/sbtwc/other/video/jenni56k.ram
Student time	Outside of Class: None required In Class: One class session

Background Reading

The following textbook selections are interchangeable:

Molecular Biology of the Cell
Fourth Edition

Alberts, et al. (2002). Garland Science. New York.

- "Manipulating proteins, RNA, and DNA." p. 478-494 and p. 508-524.
- "Intracellular vesicular traffic." p. 711-766.
- "The Adaptive Immune System." p. 1363-1384.

Essential Cell Biology
Second Edition

Alberts, et al. (2004). Garland Science. New York.

- "Intracellular compartments and transport." p. 497-531. (Interactive 15.8)
  The most relevant sections are the sections on clathrin mediated endocytosis (p. 512-516) and receptor mediated endocytosis (p. 525-526). Note that the text does not clearly define SNAREs. V-SNAREs include VAMP/synaptobrevin and syntaxin, while T-SNAREs include SNAP-25 and its homologues. For more detailed reading see MBOC.
- Protein structure and function. p. 117-167 (Interactive 4.1, 4.2, 4.11)
  The most relevant sections include the sections on antibody production and function. (p. 144-146)
- "Membrane structure." p. 365-388 (Interactive 11.2).
- "Membrane transport: Ion channels and signaling in nerve cells." p. 411-425. (Interactive 12.8)
- Cell Communications: General Principles: p. 533-543.
- Manipulating genes and cells: DNA cloning and DNA engineering: p. 341-364 (Interactive 10.1)

Activity 5: Responding to A Bioterrorist Attack

Recommended

- Rensberger B. (1996) "In Self-Defense" in *Life Itself* by Boyce Rensberger. New York: Oxford University Press, (p. 213-246).

Implementation

For the most basic variation on these themes, follow these steps.

1. Direct students to **Assignment 1** and allow them 10 minutes to review and respond to the questions posed.
2. Break the students into small groups and give them 20 minutes to discuss their answers and arrive at consensus answers for the group. Instructors may wish to distribute **Resource One: Group Roles, Resource Three: Group Work Peer Assessment,** and **Resource Four: Group Work Self Assessment** to facilitate group work.
3. The instructor can ask some groups to share their answers with the class for 15 minutes.
4. Spend the last 5 minutes of class, reviewing key points of dispute and refer to areas for further exploration.

Alternative

If a more scientific and policy-oriented focus is desired, **Assignment 2** may be administered. This assignment extends **Assignment 1** by asking students to conduct literature research and either participate in a debate/symposium or write a response proposal that will be peer-reviewed.

1. Direct students to **Assignment 2, Resource Seven: Worksheet for Reading Primary Literature,** and **Resource Six: Self Assessment of Writing.**
2. Outside of class, students read the assigned articles, websites, and text sections to answer the questions posed in **Assignment 2.** They use their answers to synthesize a short term and long-term response proposal in the event of a botulinum toxin attack.

Assessment

There is no formal instructor assessment of student learning for **Assignment 1,** but options include:

- Student discussions online via the Classwire site can be reviewed by the instructor.
- Students can assess their success of working in groups by using **Resource Three: Group Work Peer Assessment** and **Resource Four: Group Work Self Assessment.**

If using **Assignment 2,** options include:

- Grading student answers to the questions posed in **Assignment 2.**
- Assessing student learning by reviewing answers to the questions on **Resource Six: Self Assessment of Writing** and **Resource Five: Peer Assessment of Writing**
- Grading student response proposals. Attention should be given to language, clarity, style, organization, originality, feasibility, and creativity.
- Grading student proposals, peer critiques, and revised reports.

Activity 5: Responding to A Bioterrorist Attack

- Conduct a debate in class. In this case, students would be writing the response proposal with either a pro or con focus on a particular strategy posed by the instructor.
- Conduct a symposium, students role play members of the community and present the issues and solutions most appropriate for their particular role.