

CHEMIOSMOSIS

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Chemiosmosis

Understanding the theory of chemiosmosis is central to understanding the processes of cell respiration and photosynthesis. To help students better conceptualize chemiosmosis during cell respiration, you can dramatize the event: one set of colored marbles or beads (blue) represent protons, and another colored set (red) represents the electrons. A student must pass an electron before they can receive another. Oxygen can be represented by cotton balls. Students work as the electron-transport molecules in the mitochondria inner membrane. As they pass electrons across the rows, energy from the electrons is used to pump protons up the rows to the back of the room to form a gradient. The protons flow back through a tube (which represents ATP synthase) to turn a wheel to make ATP. Electrons must combine with oxygen and protons to make water (use a pipette to squirt water). Remove the oxygen, electrons can no longer flow, protons can not be pumped, and the whole system shuts down.

Role-play

Many lessons can be dramatized by role-playing. If you teach the functions of the immune system, use an analogy from a well-known fantasy world like Lord of the Rings, Star Wars, or Harry Potter and dress up as your favorite character that has come to defeat the bad guys. Gandalf and the other good guys use their weapons and powers to defeat orks. As in the real of Middle Earth, in our realm (our bodies) there are good guys (B cells, T cells, etc.) and weapons (antibodies, interferons) to defeat the bad guys (bacteria, viruses) and their weapons (toxins). Other role-playing ideas: dress up as Charles Darwin and talk about your voyage on the HMS Beagle, or dress up as Morgan or Mendel and talk about your genetic studies. The more props you have, the better (usually!).