Mysteries of the Brain: Searching for Answers

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Description

Scientists have been studying the brain for decades, yet there are many mysteries that remain unsolved. New research is underway to develop and use cutting edge technologies, and scientists across many fields are working together to better understand the brain. "Mysteries of the Brain" is produced by NBC Learn in partnership with the National Science Foundation.

Keywords


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Transcript

Mysteries of the Brain - Searching for Answers

TOM COSTELLO, reporting:
Across all species of animals, the brain is the most complex and amazing organ in the body. It controls just about every conscious and unconscious aspect of an animal's life, from blinking to breathing, from enjoying a sunset to finding the next meal, to knowing what is safe or not safe. Through decades of research, scientists have learned a great deal about the brain. But because it's so complex, many questions remain unanswered. And scientists anticipate much more work ahead before they fully understand how the brain functions.

President BARACK OBAMA: There's this enormous mystery waiting to be unlocked.

COSTELLO: In April 2013, President Barack Obama unveiled the BRAIN Initiative, a 10-year, nearly one billion dollar national research effort that will bring together experts in science, technology, engineering, and mathematics to develop innovative neurotechnologies that will unlock the brain.

ORIE SHAFER (University of Michigan): One of the most exciting things about the brain initiative is that it's funding neuroscience research at many different levels. That's going to usher in a new understanding of the brain.

COSTELLO: Along with the National Institutes of Health, the Defense Advanced Research Projects Agency, and other organizations, the National Science Foundation is funding research in many fields of study to expand knowledge of the brain at its most fundamental levels.

GARY LYNCH (University of California, Irvine): You have to do the basic research. It's the research for its own sake that leads to the discoveries that transform the world.

COSTELLO: The most basic components of the brain are its cells - called neurons. They communicate with each other at lightning speed, thousands, even millions at a time, to form vast, complex circuits and networks that transform the slightest neural impulses into thought and behavior. The process is the reason we can laugh or cry, find our way home, or recognize a friend.
SHAFER: We understand how the neurons work that make up the brain, but how those cells, impossibly large number of those cells, interact to create behavior is a fundamental mystery.

COSTELLO: Humans have nearly 100 billion neurons, but other animals have far fewer, making their brains and nervous systems easier to study. That's why many neuroscientists are turning to animals with much simpler brains, like fruit flies, tadpoles, and zebra fish, to uncover clues that could help explain how the brain functions in all animals, including humans.

MELINA HALE (University of Chicago): And so using these other organisms helps us to understand general principles of how nervous systems are put together across a wide diversity of animals.

COSTELLO: Still, the task of unlocking the secrets of the brain is so enormous, it requires the collaboration of scientists from different fields, like engineering, biology, physics, mathematics, and psychology.

KEVIN LABAR (Duke University): There are lots of fields that come together in order to understand something as complex as the brain.

COSTELLO: In addition, scientists are studying the brain with greater accuracy by using cutting edge tools like stronger microscopes, faster computers, virtual reality environments, and even brain-computer interfaces - machines that allow people to control objects or artificial limbs using only their mind.

CARLOS AIZENMAN (Brown University): Every time a new technology comes along, you always create new knowledge.

COSTELLO: This knowledge not only advances neuroscience, engineering, and technology, but could also inform health and medicine, public policy, and defense - advancements that could benefit our daily lives.

SABINE KASTNER (Princeton University): The neuroscience at this moment in time, at the beginning of the twenty-first century is in its infancy as an area of science. And I think we will see tremendous, tremendous discoveries during this century.

COSTELLO: Many questions still need answers: How do neural circuits work? How do circuits drive behavior? How does the brain adapt to change? How are memories recalled? Scientists are asking the questions, and the BRAIN Initiative is a revolutionary move forward in finding answers to the mysteries of the brain.