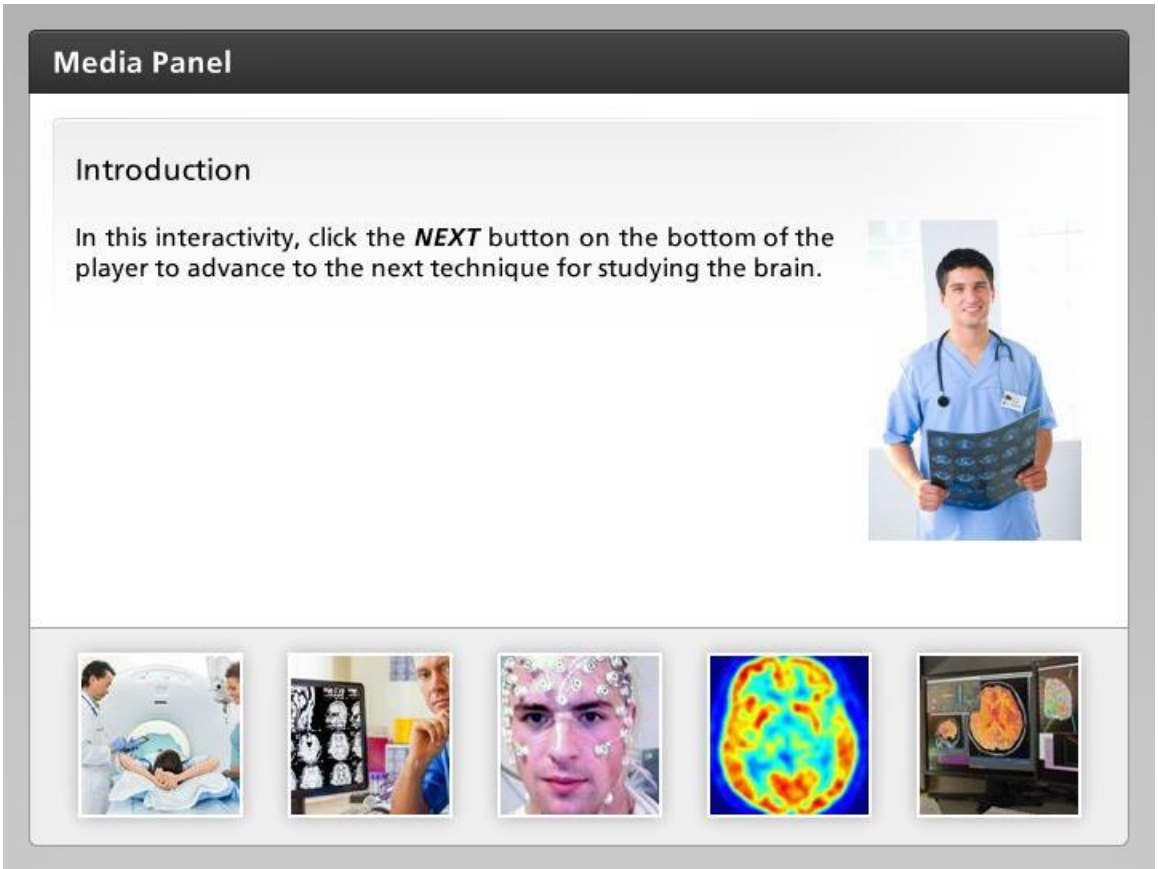
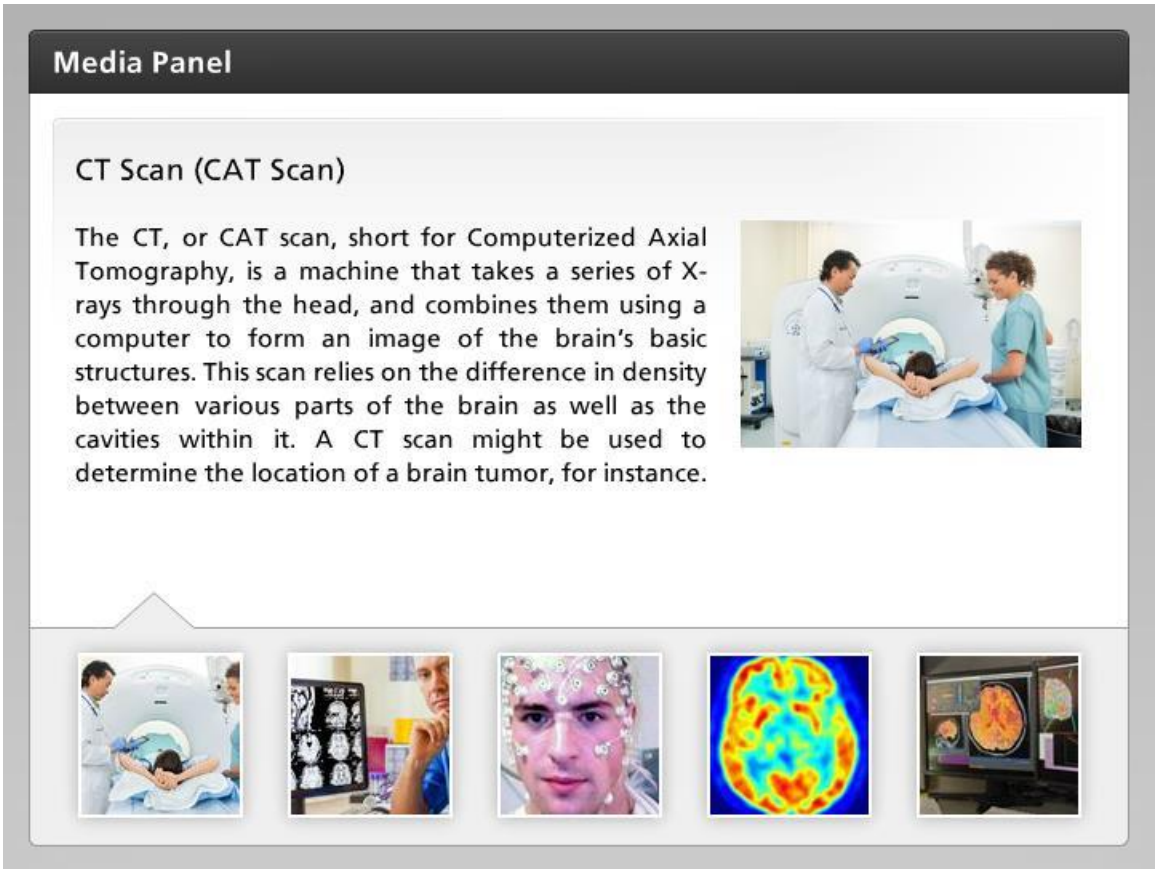
Module 2: Biological Basis of Behavior
Topic 3 Content: Modern Techniques for Studying the Brain

Introduction



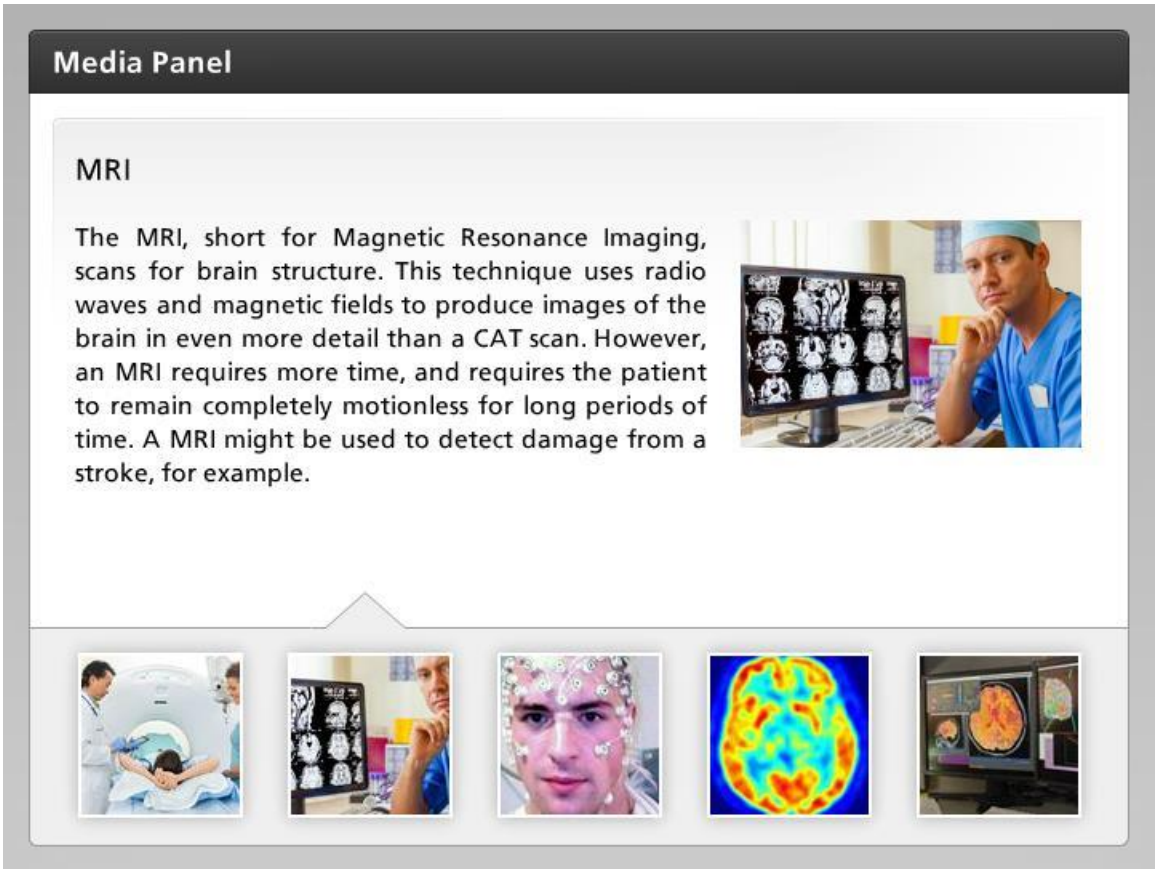
Modern technology has revolutionized the way scientists are able to study the brain. As technology continually expands, so does our ability to study and understand the functions of the human brain. Click on the images below to view some of the modern techniques used for studying the brain.

CT Scan (CAT Scan)



The CT, or CAT scan, is short for Computerized Axial Tomography. This scan uses a machine that takes a series of x-rays through the head, and using a computer, combines them to form an image of the brain's basic structures. The CT scan relies on the differences in density between various parts of the brain, as well as the cavities within it. A CT scan might be used to determine the location of a brain tumor.

MRI



The MRI, which is short for Magnetic Resonance Imaging, scans for brain structure. This technique uses radio waves and magnetic fields to produce images of the brain in even more detail than a CAT scan. However, an MRI requires more time, during which the patient must remain completely motionless. A MRI might be used to detect damage from a stroke.

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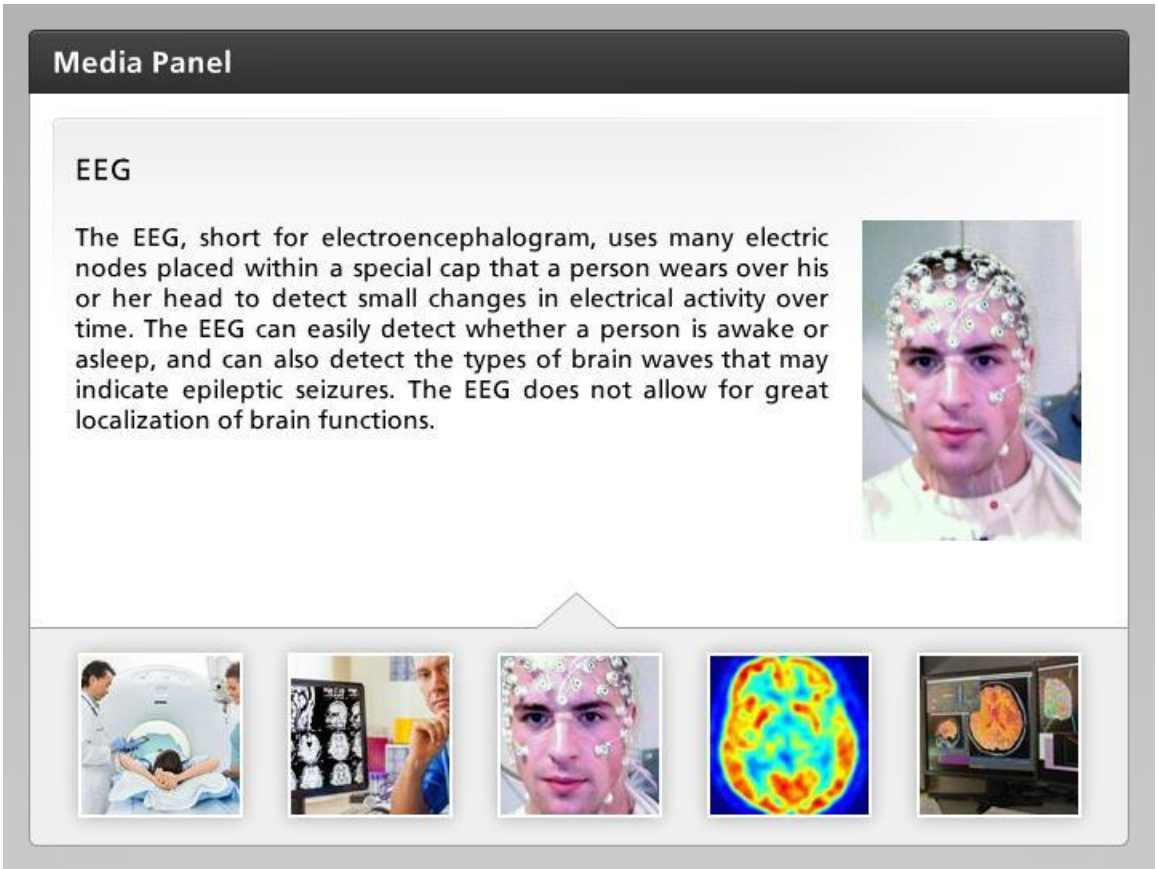
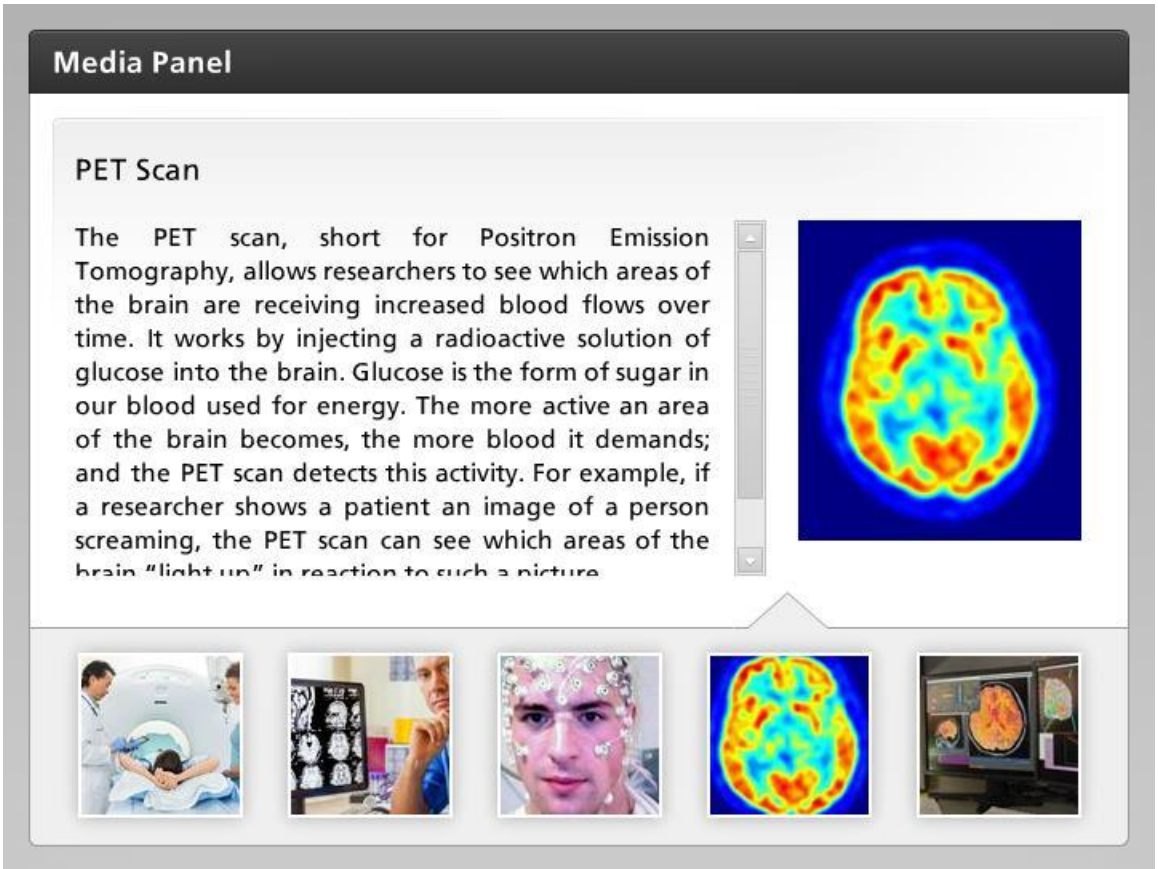
EEG



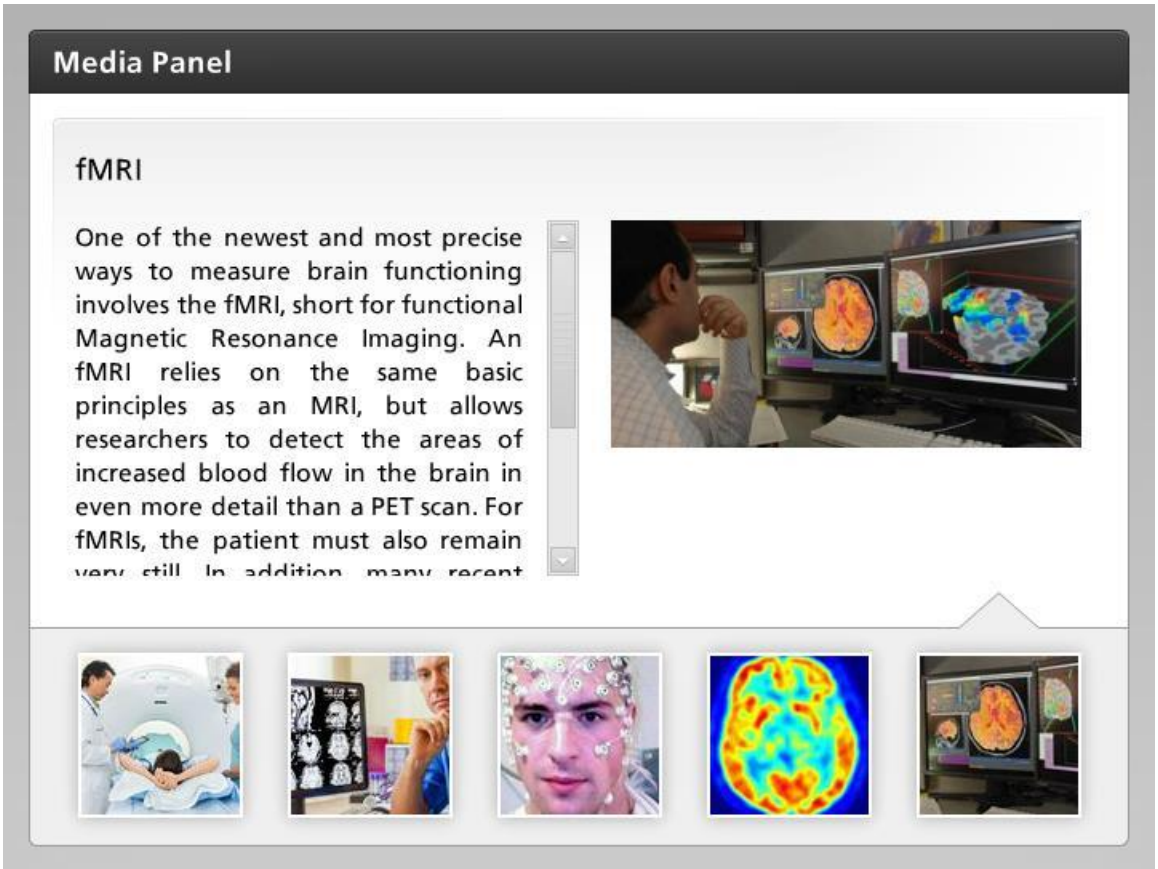
EEG, is short for electroencephalogram. This procedure uses many electric nodes placed within a special cap. A person wears this special cap over his or her head to detect small changes in electrical activity over time. The EEG can easily detect whether a person is awake or asleep, and can also be used to detect the types of brain waves that may indicate epileptic seizures. The EEG does not allow for great localization of brain functions.

PET Scan



The PET scan, which is short for Positron Emission Tomography, allows researchers to see which areas of the brain are receiving increased blood flows over time. It works by injecting a radioactive solution of glucose into the brain. Glucose is the form of sugar in our blood used for energy. The more active an area of the brain becomes, the more blood it demands. The PET scan is able to detect this activity. For example, if a researcher shows a patient an image of a person screaming, the PET scan can see which areas of the brain “light up” in reaction to such a picture.

fMRI



One of the newest and most precise ways to measure brain functions is the fMRI, which is short for functional Magnetic Resonance Imaging. An fMRI relies on the same basic principles as an MRI, but it also allows researchers to detect the areas of increased blood flow in the brain in more detail than a PET scan. For fMRIs, the patient must also remain very still. Many recent neuroscience studies have used the fMRI to determine which areas of the brain become most active during certain tasks, such as identifying objects or sounds.