

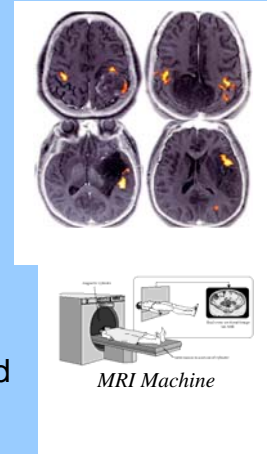
# Brain Slicing with MRIs!

## What is it?

MRI is a way of creating pictures of our body without using potentially harmful x-rays or radiation. Our body generates a naturally occurring magnetic field and an MRI scanner can take pictures of it. MRI pictures can show soft tissues of the body like the brain, muscles, and nerves. MRI is useful for detecting abnormalities of the brain, spinal cord, blood vessels, joints and organs.

The MRI scanner is a big machine with a tunnel through the middle. During an MRI scan you have to lie very still in the tunnel, usually on your back.

The magnetic field and radio waves used in an MRI scan are believed to be safe and no adverse effects have ever been reported.



## Conversation starters / Dialogue samples

- **Do you think you can figure out what object is inside a head just by looking at slices?**  
MRIs are like x-rays that show pictures of the brain from one side of your head to another. Doctors look at these photos to piece together what's inside a head, like an injury or a brain tumor.
- **How can you look inside the body without surgery?**  
X-rays, computed tomography, Computed tomography scans, and magnetic resonance imaging
- **How do MRI's work?**  
MRI uses the detection of radio frequency signals produced by displaced radio waves in a magnetic field. It provides an anatomical view of the brain.
- **What are the advantages of MRI's?**
  1. No X-rays or radioactive materials are used.
  2. Provides detailed view of the brain in different dimensions.
  3. Safe, painless, non-invasive.
  4. No special preparation (except the removal of all metal objects) is required from the patient. Patients can eat or drink anything before the procedure.
- **What are the disadvantages of MRI's?**
  1. Expensive to use and huge machinery.
  2. Cannot be used in patients with metallic devices, like pacemakers.
  3. Cannot be used with uncooperative patients because the patient must lie still for up to 3 hours!
  4. Cannot be used with patients who are claustrophobic (afraid of small places). However, new MRI systems with a more open design are now available.
- **What are the differences between sagittal, transverse, and coronal MRI's ?**  
Sagittal MRI - image slices run from your left to your right, or right to left  
Transverse/Horizontal MRI – image slices run from the top of your head to the bottom of your chin.  
Coronal MRI -image slices are from the front of your face to the back of your head.

## Deeper Content

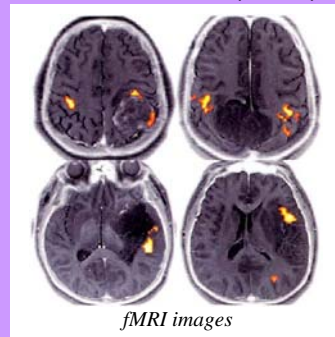
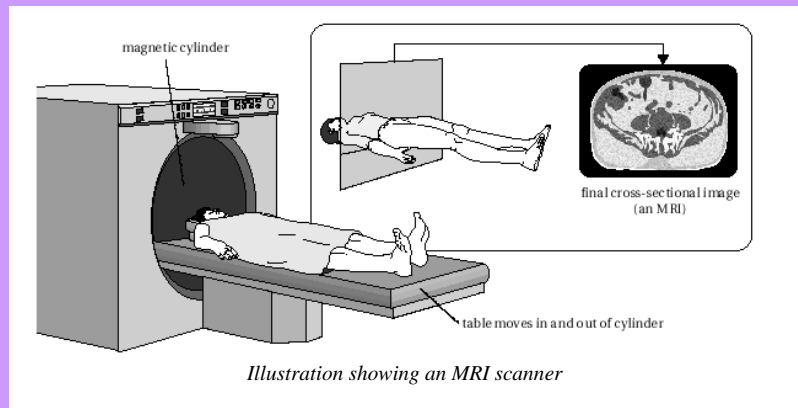
### MRI-Magnetic Resonance Imaging

MRI uses magnetic fields and radio waves to produce images of the brain structures without using radioactivity. This procedure was first done in the 70s.

When a patient has an MRI done, a large cylindrical magnet creates a magnetic field around the person's head, and radio waves are sent through the magnetic field. Sensors read the signals and a computer uses the information to construct an image.

Using MRI, doctors can SEE images of the brain's surface and structures deep inside the brain. Over time, minute changes in the structures can be detected OR SEE TUMORS.

Within the last few years, scientists have developed techniques that enable them to use MRI to image the brain as it functions. These are called functional MRIs (fMRI). fMRI relies on the magnetic properties of blood to help doctors see images of blood flow in the brain as it is occurring. Doctors can then make "movies" of changes in brain activities as the patients perform various tasks or are exposed to stimuli. For example when you see something, the area in your brain responsible for vision light up.



## Resources

- Nobelprize.org (MRI) [http://nobelprize.org/educational\\_games/medicine/mri/index.html](http://nobelprize.org/educational_games/medicine/mri/index.html)
- Movies of Visible Human Images: <http://www.dhpc.adelaide.edu.au/projects/vishuman/mpegs.html>

## Nuts and Bolts: Set-Up

### Materials:

Clay (different colors)  
MRI Slices "Worksheet"

Egg Slicer  
Plastic Knife

Computer/ Plasma with 3d Brain  
MRI image and Light Box

- Set up the lightbox and MRI x-ray to attract visitors
- Run 3d brain model on windows computer connected to plasma screen (if available). Hit "M" to show the MRI image behind the brain. Visitors click and hold the mouse button to rotate the brain.
- Make an egg-sized ball of clay to function as the head/brain mold.
- Ask one visitor to be the doctor and the other to be the patient (younger visitor as patient works best).
- Doctor stands away from the table until asked to come identify what's inside the brain
- Patient slices the clay head in half with the plastic knife. One half will be the face half - pinch a small nose on the rounded side of the face half. This will help with orientation in the egg slicer.
- Roll out a different color of clay (red) into a long thread. Patient will choose an easy capital letter to make and create it with the thread of clay. (O, T, J worked well)
- Patient should lay the capital letter on top of one half of the clay brain.
- Place the face half of the head back on top of the back half and seal the letter inside the head.
- Place the head nose-up inside the "MRI" egg slicer. The slices should go from ear-to-ear, NOT top-to-bottom
- Call the Doctor back to the group and ask the doctor or patient to perform the MRI by slowly squishing the brain inside the slicer.
- After the slicer is completely pushed down, pick the entire head out of the slicer and lay out each slice from top to bottom on a sheet, with the nose oriented up.
- Tell the Doctor to work from top to bottom, visualizing the letter inside the Patient's head. Some Doctors may wish to use the graph paper grid provided to draw the letter segment visible in each slice in order to help piece together what the letter looks like.
- After interpreting the results, remove as much of the colored clay from the egghead as possible and put it back. Mash up the head-colored clay to keep it a consistent color.

### **Nuts and Bolts: Clean Up**

- Clean clay from the egg slicer
- Collect all clay scraps
- Put all reusable MRI Slices worksheets in a common stack

### **Nuts and Bolts: How It Works**

The egg slicer acts like an MRI machine and slices the clay head into pieces that are interpreted much like actual MRI images. The letter inside the brain acts like a cancerous growth, and doctors need to find out where it is to take it out.

### **Safety**

- When using the egg slicer, slice slowly to prevent the wires from snapping
- Do not slice any fingers in the egg slicer
- Do not eat the clay
- Do not throw the clay

### **Sources**

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# Reading Your MRI

Lay the slices of your MRI in the column to the left, lining up the center of the head with the center line. Make sure all slices are oriented correctly.

To interpret the results of your MRI, record the marks in each slice as accurately as possible on the chart below. Note how long the marks are and where they show up on the slice!

Top of head

Slice 1

Slice 2

Slice 3

Slice 4

Slice 5

Slice 6

Slice 7

Slice 8

Slice 9

Bottom of head

