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| **Procedure** | **Method** |
| Computed Tomography Scan (CT Scan)  https://faculty.washington.edu/chudler/gif/ctym.jpg Image courtesy of the Yousef Mohammad, M.D., MSc; Assistant Professor of Neurology Division of Cerebrovascular Diseases, The Ohio State University Medical Center | CT scans use a series of X-ray beams passed through the head. The images are then developed on sensitive film. This method creates cross-sectional images of the brain and shows the structure of the brain, but not its function. |
| Positron Emission Tomography (PET)  https://faculty.washington.edu/chudler/gif/copet.gif Image courtesy of the National Institute on Drug Abuse | A scanner detects radioactive material that is injected or inhaled to create an image. Commonly used radioactively-labeled material includes oxygen, fluorine, carbon and nitrogen. When this material gets into the bloodstream, it goes to areas of the brain that use it. So, oxygen and glucose accumulate in brain areas that are metabolically active. When the radioactive material breaks down, it gives off a neutron and a positron. When a positron hits an electron, both are destroyed and two gamma rays are released. Gamma ray detectors record the brain area where the gamma rays are emitted. This method provides scientists with an idea of the function of the brain.  **Advantages:**   1. Provides an image of brain activity.   **Disadvantages:**   1. Expensive to use. 2. Radioactive material used. |
| [Magnetic Resonance Imaging](http://www.rch.org.au/cep/tests/?doc_id=3178) (MRI)  https://faculty.washington.edu/chudler/gif/kp1c.gif | 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.  **Advantages:**   1. No X-rays or radioactive material is 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.   **Disadvantages:**   1. Expensive to use. 2. Cannot be used in patients with metallic devices, like pacemakers. 3. Cannot be used with uncooperative patients because the patient must lie still. 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. |
| Functional Magnetic Resonance Imaging (fMRI) | [Functional MRI](http://exploratorium.edu/exploring/bodies_mag/fmri_1.html) detects changes in blood flow to particular areas of the brain. It provides both an anatomical and a functional view of the brain. |