What is neuroimaging?

Neuroimaging is a set of tools that produce pictures, of the brain, sometimes called brain scans. There are two kinds of neuroimaging: **structural** and **functional**. Structural imaging creates a picture of the inside of the head, which can include bone, brain tissue, blood vessels, and fluid of the brain and spine (cerebrospinal fluid). Functional imaging looks at the brain’s activity by measuring blood flow, electrical impulses, or chemical activity.

### Structural
- Magnetic resonance imaging (MRI) uses magnetic fields to show the types of tissue in the brain.
- Diffusion tensor imaging is a type of MRI that looks at water diffusion to create pictures of the white matter in the brain.
- Computerized tomography (CT) uses x-rays to create pictures of structures inside the brain.

### Functional
- Functional magnetic resonance imaging (fMRI) looks at brain activity by measuring oxygen changes in the blood.
- Positron emission tomography (PET) uses radioactive tracers to show where blood is flowing and how it is being used.
- Magnetoencephalography imaging (MEG) measures the magnetic fields produced by electrical activity in the brain.

When should neuroimaging be used?

Like any tools, neuroimaging is most helpful in the hands of a specialist, so talk to your child’s doctor. In conjunction with other tests, neuroimaging may be useful if a child
- had a serious head injury (e.g. major traumatic brain injury, skull fracture),
- shows signs of a stroke or epilepsy,
- has a brain tumor or lesion, infection, or other brain disease, or
- has a disease that affects the skull or blood vessels in the brain.

Neuroimaging can be expensive. Doctors take extra safety precautions but, depending on the kind of imaging, health risks may include
- exposure to radiation (CT scans, PET) or magnetic fields (if your child has metal on or in her body during an MRI),
- kidney problems resulting from contrast agents (sometimes used to improve MRI or CT images), or
- anxiety/fear when inside the scanner or sensitivity to noises produced by the machine.

Talk to your doctor about your child’s medical history, fears you or your child may have, and the possible risks and benefits.

What information does neuroimaging provide?

- Structural imaging can show the development of or damage to the skull, brain tissue, and blood vessels in the brain.
- Functional imaging can clarify the kind of abnormality that is present. It can also show the parts of the brain that are involved in seizures or in certain thinking skills (such as where speech is processed). This can guide treatment.
- Used in research to learn about normal brain development, and effects of disease, illness, injury, toxic substances, or treatment on the brain. Research involving neuroimaging help pinpoint parts of the brain that involved in specific medical or mental conditions.
- Neuroimaging can be part of a comprehensive assessment including other medical and psychological tests to help diagnose medical or mental health problems. Brain scans may be useful to rule out specific conditions, such as a tumor, when symptoms are not enough to know what is wrong.
What information does neuroimaging NOT provide?

- Neuroimaging alone cannot diagnose mental disorders like autism, anxiety, depression, bipolar disorder, schizophrenia, learning disorders or attention disorders. Be cautious of anyone who makes diagnoses based on scans alone. Beware of shady “experts” who say that they can diagnose types of learning disorders or attention problems using scans.
- While sometimes scans may suggest that a person is at risk for a disorder, scans are not very accurate in predicting mental illness, personality characteristics, or intelligence.
- Also be cautious if a specialist says that a scan will be able to determine which treatment is best for a developmental condition like autism, ADHD, or learning disorder. Research does not support those claims.
- All brain scans should be interpreted by qualified team of specialists. This team may include radiologists, neuropsychologists, and other medical professionals who specialize in neurology. Brain scans have several limitations depending of the type of scan conducted, movement while scanning, complexity of disorder or symptoms, and other factors.

How can a neuropsychologist help my child?

Pediatric neuropsychologists specialize in the link between a child’s brain and behavior. They work in a team of medical and mental health professionals to inform decision-making about diagnosis and interventions. They work to understand how problems with the brain may relate to problems at school, home, or with peers. They then coordinate the best treatment and school plan.

Where can I find online resources?

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<thead>
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<tr>
<td>The American Society of Neuroimaging</td>
<td><a href="http://www.asnweb.org">http://www.asnweb.org</a></td>
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<tr>
<td>The Secret Life of the Brain</td>
<td><a href="http://www.pbs.org/wnet/brain/scanning/">http://www.pbs.org/wnet/brain/scanning/</a></td>
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Additional Information:

What is board certification in clinical neuropsychology?

Believe it or not, most states allow licensed psychologists to call themselves neuropsychologists without showing they have any special training on how to care for people who have neurological or neurodevelopmental disorders. Clinicians who are board-certified in clinical neuropsychology have proven, through a rigorous evaluation, that they are fully competent. That evaluation is conducted by the largest certification group in psychology, the American Board of Professional Psychology (ABPP: http://www.abpp.org), and its subspecialty board, The American Board of Clinical Neuropsychology. The goal of ABPP is to protect the public by examining and certifying psychologists who demonstrate competence in approved specialty areas.

How do I find a board-certified clinical neuropsychologist?

These are listed by name and by location on the web site of the American Academy of Clinical Neuropsychology (AACC: http://theaacn.org). Once you find a neuropsychologist near you, click on their name for more information, including the kinds of people they work with and how to contact them.

What is pediatric neuropsychology?

Click here (http://www.div40.org/resources.htm) to download a pamphlet that explains what makes pediatric neuropsychology unique, and what to expect from an evaluation by a pediatric neuropsychologist.

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