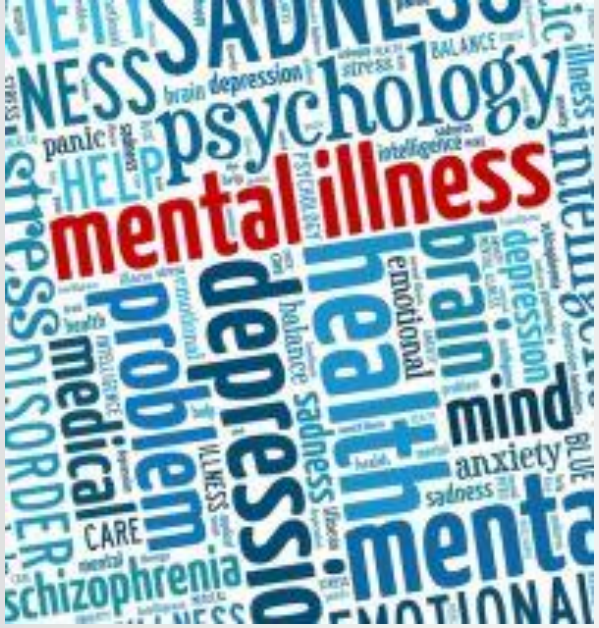

Neuroscience of Mental Health Disorders Part 2

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Autism Spectrum Disorder

What is Autism Spectrum Disorder?

- Autism spectrum disorder includes conditions previously called autism, pervasive developmental disorder, and Asperger's syndrome.
- Autism spectrum disorder is a brain disorder that often makes it hard to communicate with and relate to others.
- With autism spectrum disorder, the different areas of the brain fail to work together.
- The causes are not known.

Symptoms of Autism Spectrum Disorder

- A delay in learning to talk, or not talking at all. A child may seem to be deaf, even though hearing tests are normal.
- Repeated and overused types of behavior, interests, and play. Examples include repeated body rocking, unusual attachments to objects, and getting very upset when routines change.

Autism may also include other problems:

- Many children with autism have below-normal intelligence.
- Teenagers with autism often become depressed and have a lot of anxiety, especially if they have average or above-average intelligence.
- Some children get a seizure disorder such as epilepsy by their teen years.

Social Interactions and relationships Symptoms may include:

- Significant problems developing nonverbal communication skills, such as eye-to-eye gazing, facial expressions, and body posture.
- Failure to establish friendships with children the same age.
- Lack of interest in sharing enjoyment, interests, or achievements with other people.
- Lack of empathy. People with autism may have difficulty understanding another person's feelings, such as pain or sorrow.

Verbal and Nonverbal Communication Symptoms may include:

- Delay in, or lack of, learning to talk. As many as 40% of people with autism never speak.
- Problems taking steps to start a conversation. Also, people with autism have difficulties continuing a conversation after it has begun.
- Stereotyped and repetitive use of language. People with autism often repeat over and over a phrase they have heard previously (echolalia).
- Difficulty understanding their listener's perspective. For example, a person with autism may not understand that someone is using humor. They may interpret the communication word for word and fail to catch the implied meaning.

Limited Interests in Activities or Play
Symptoms may include:

- An unusual focus on pieces. Younger children with autism often focus on parts of toys, such as the wheels on a car, rather than playing with the entire toy.
- Preoccupation with certain topics. For example, older children and adults may be fascinated by video games, trading cards, or license plates.
- A need for sameness and routines. For example, a child with autism may always need to eat bread before salad and insist on driving the same route every day to school.
- Stereotyped behaviors. These may include body rocking and hand flapping.

Physical assessments and laboratory tests for Autism Spectrum Disorder

Tests may be used to determine whether a physical problem may be causing symptoms. These tests include:

- **Physical exam,** including head circumference, weight, and height measurements, to determine whether the child has a normal growth pattern.
- **Hearing tests,** to determine whether hearing problems may be causing developmental delays, especially those related to social skills and language use.
- **Testing for lead poisoning,** especially if a condition called pica (in which a person craves substances that are not food, such as dirt or flecks of old paint) is present. Children with developmental delays usually continue putting items in their mouth after this stage has passed in normally developing children. This practice can result in lead poisoning, which should be identified and treated as soon as possible.

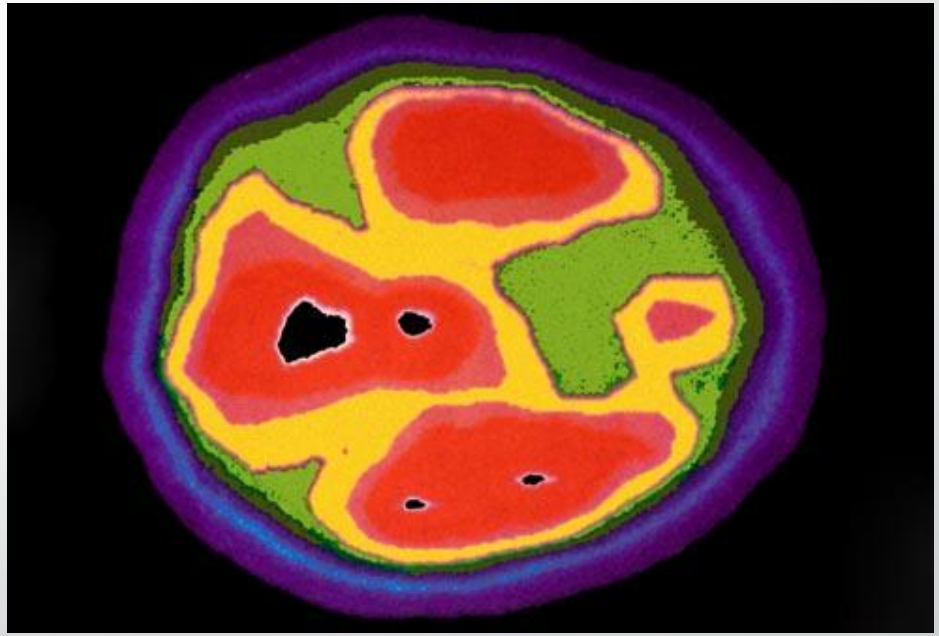
Other lab tests may be done under specific circumstances

These tests include:

- **Chromosomal analysis,** which may be done if intellectual disability is present or there is a family history of intellectual disability. For example, fragile X syndrome, which causes a range of below-normal intelligence problems as well as autistic-like behaviors, can be identified with a chromosomal analysis.
- **Electroencephalograph (EEG),** which is done if there are symptoms of seizures, such as a history of staring spells or if a person reverts to less mature behavior (developmental regression).
- **MRI,** which may be done if there are signs of differences in the structure of the brain.

How Does Autism Spectrum Affect the Brain?

- Autism Spectrum Disorder (ASD) affects parts of the brain that control emotions, communication, and body movements.
- By the toddler years, some children with ASD have unusually large heads and brains – which may be because of problems with brain growth.
- Abnormal genes, passed down through a family, have been linked to poor functions in some parts of the brain.
- Researchers hope to find a way to diagnose Autism Spectrum Disorder through brain scans.



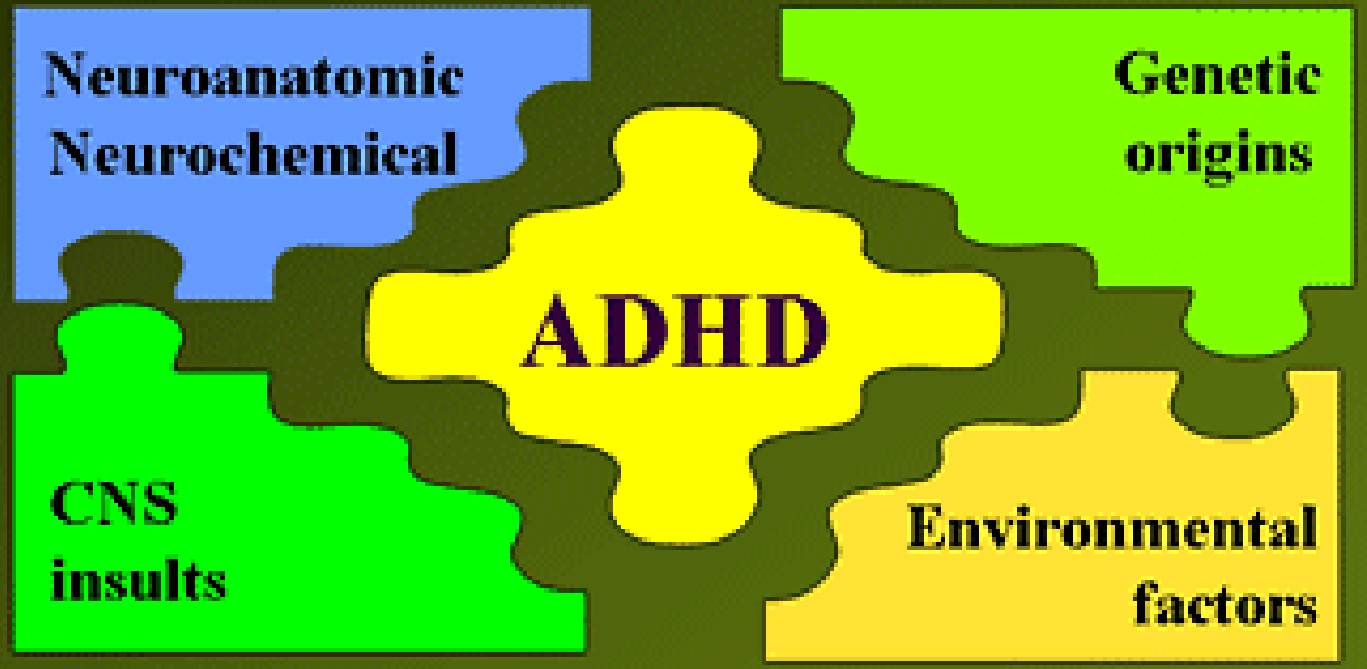
Medication for Autism Spectrum Disorder

- There's no medical treatment for autism itself, but medicine may help with some symptoms.
- Anti-psychotic medicines may be given for serious behavior problems. One drug in this category, Risperdal, has FDA approval to help with aggression, self-injury, and tantrums in autistic children.
- If seizures are an issue, an anti-convulsant drug may help.
- Drugs that treat depression are sometimes prescribed.
- A child’s response to medications should be closely monitored.

ADHD

ADHD: Etiology

ADHD is a heterogeneous behavioral disorder with multiple possible etiologies



CNS; central nervous system.

Biederman J, Faraone SV. *Lancet*. 2005;366:237-248;
Pearl PL et al. *Ann N Y Acad Sci*. 2001;931:97-112.

Neurobiological View of ADHD

Amen, a child, adolescent, and adult psychiatrist who serves as medical director of the Amen Clinics in California, Washington, and Virginia, has used a combination of symptoms and brain scans to come up with his own types of ADHD.

Amen considers these to be the hallmark symptoms of ADHD:

- Short attention span
- Distractibility
- Disorganization
- Procrastination
- Poor judgment and ability to plan ahead
- Difficulty with impulse control

Use of SPECT to diagnose ADHD

- Single photon emission computed tomography (SPECT) brain scans are used on people with psychological problems.
- SPECT uses a radioactive dye to create a three-dimensional image of the blood flow and activity in the brain.
- It is typically used to diagnose medical conditions such as Alzheimer's disease, Parkinson's disease, and head injury.
- Amen used the symptoms of ADHD he had identified and used brain scans to measure blood flow (SPECT), to highlight activity in the parts of the brain related to attention, short-term memory, and forethought, and he came up with 6 types of ADHD

Amen's Six Types of ADHD

Type 1: Classic ADHD. Symptoms of ADHD, plus hyperactivity and impulsivity; responds well to stimulant medications

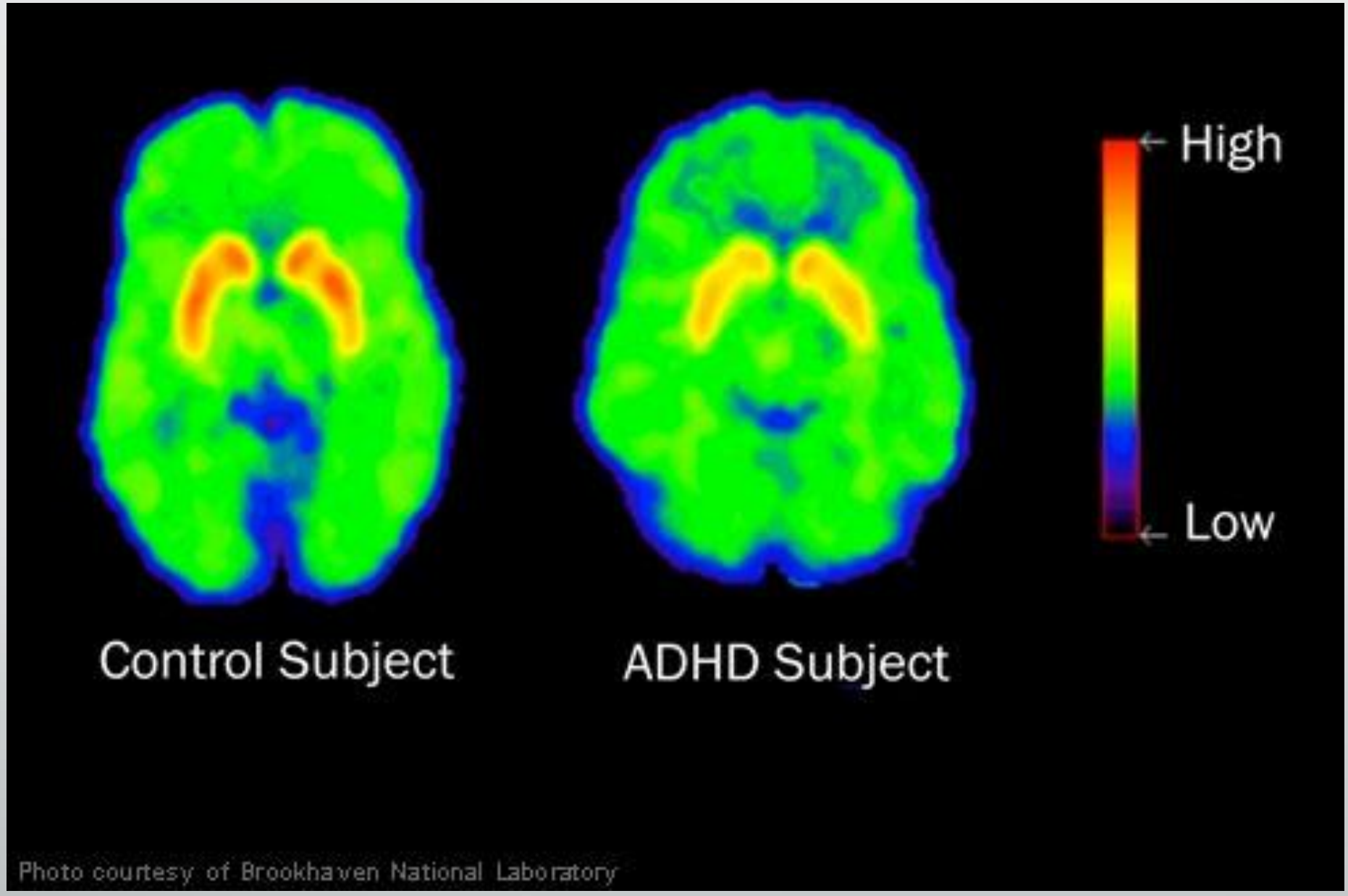
Type 2: Inattentive ADHD. Features of ADHD, but instead of hyperactivity, there is low energy; responds well to stimulant medications

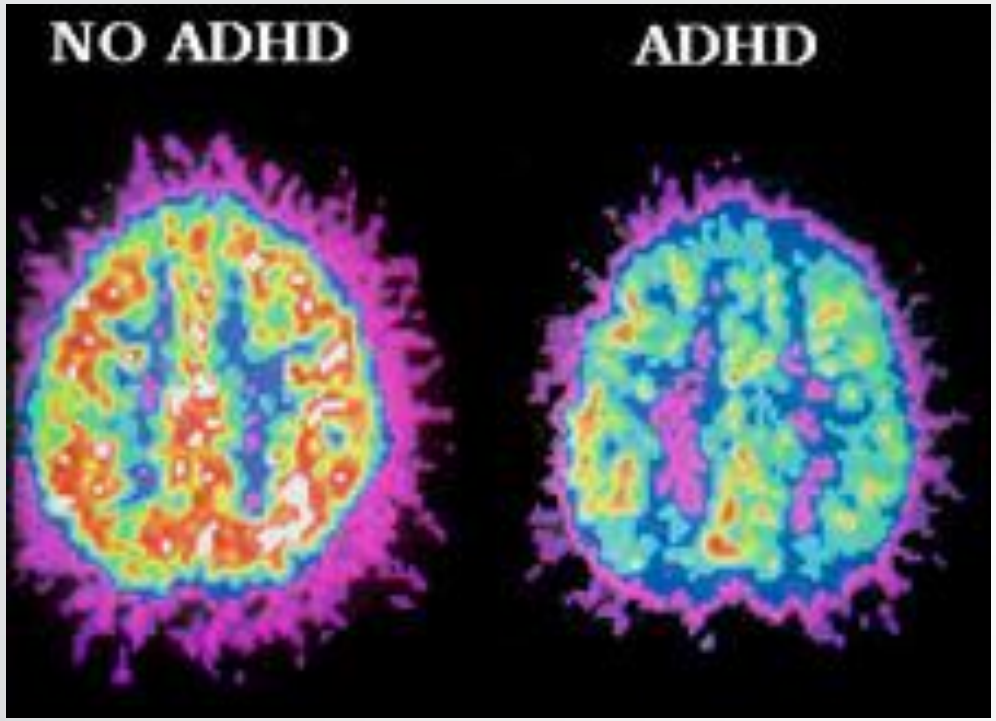
Type 3: Overfocused ADHD. Symptoms of ADHD and negative thoughts and behaviors, such as opposition and arguing; tends to respond better to an antidepressant (such as Prozac) combined with a stimulant

Type 4: Temporal Lobe ADHD. The hallmark features of ADHD, plus irritability, aggressiveness, and memory and learning problems; responds better to antiseizure medications (like Neurontin) than to stimulants

Type 5: Limbic ADHD. Combines ADHD with depression and low energy and decreased motivation; responds better to stimulating antidepressants than to stimulants

Type 6: The Ring of Fire. Cross between ADHD and bipolar disorder; characterized by moodiness, aggressiveness, and anger. Anticonvulsants or newer antipsychotic medications tend to work better than stimulants.


High
Low
Control Subject
ADHD Subject
Photo courtesy of Brookhaven National Laboratory



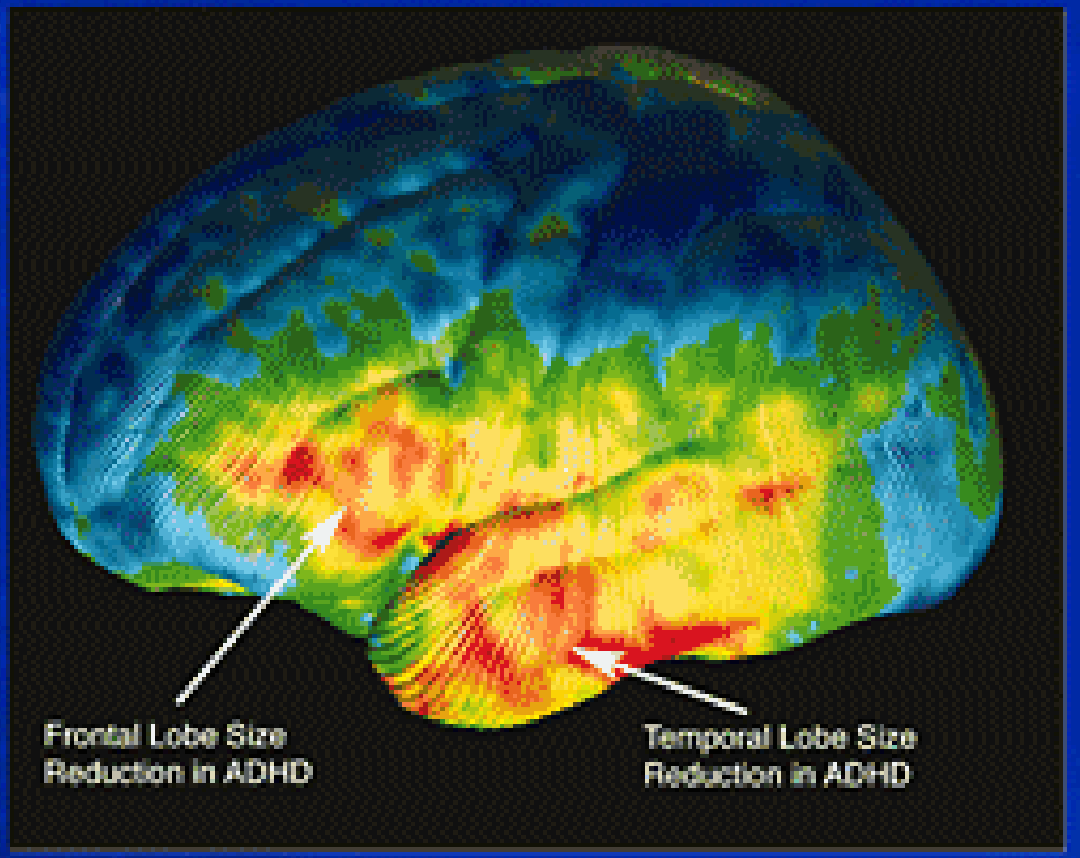
Causes of ADHD

Children with ADHD have less activity in areas of the brain that control attention. They may also have imbalances in brain chemicals called neurotransmitters which are less active in areas of the brain that control attention. It's unclear what causes these irregularities, but ADHD runs in families, so many experts believe genetics play a role.

ADHD, An Evolutionary Advantage?

One genetic variation that causes ADHD-like traits is more common in the world's nomadic peoples. Researchers think that traits such as impulsive behavior, novelty-seeking, and unpredictability might help nomads track down food and other resources. So the same qualities that make it challenging to excel at a desk job may have been an advantage to nomadic ancestors.

A 3-D High-Resolution MRI Image of the Brain of a Patient With ADHD



A three-dimensional, high-resolution MRI image of the brain of a patient with ADHD shows reductions in the size of specific areas within the frontal and temporal lobes.

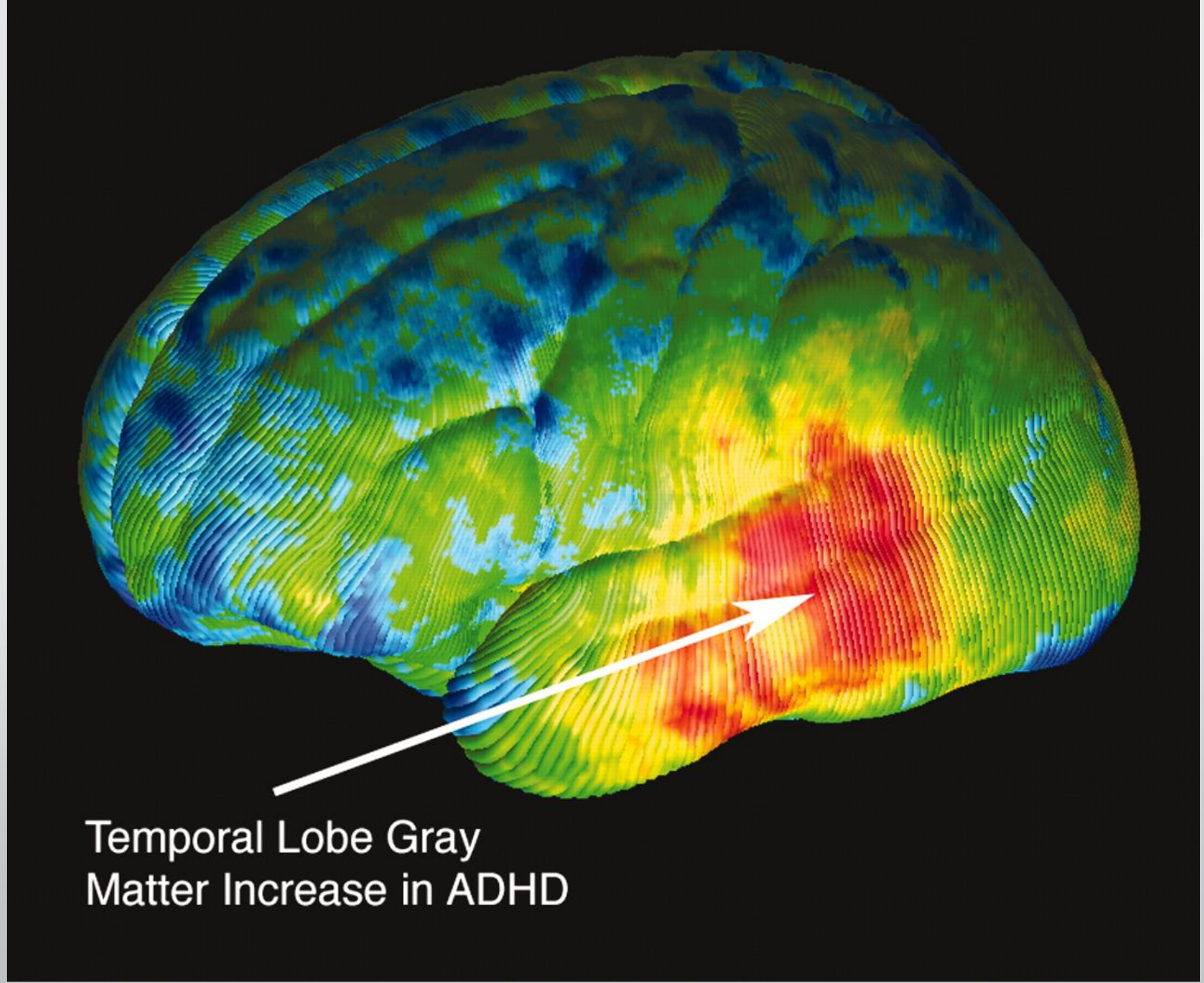
Sowell ER, et al. *Lancet* 2003;362:1699-1707.

Medication Treatment for ADHD

The most common medicines for ADHD are stimulants. It may seem ironic that people who are restless or hyperactive get help from stimulants. These drugs may sharpen concentration and curb distractibility by fine-tuning brain circuits that affect attention.

Stimulant medications can help increase a child's attention span while controlling hyperactivity and impulsive behavior. Studies suggest these drugs work in 70% to 80% of patients, although they may have some troubling side effects. Non-stimulant medications are also options for some children.

If stimulants don't help enough, a doctor may prescribe an antidepressant to stabilize mood or a selective norepinephrine reuptake inhibitor, such as atomoxetine, which can help control impulsive behaviors.


Temporal Lobe Gray
Matter Increase in ADHD

ADHD Diets

The jury is still out on whether diet may improve ADHD symptoms. While studies on ADHD diets have produced mixed results, some health experts believe foods that are good for the brain could reduce symptoms of ADHD.

High-protein foods, including eggs, meat, beans, and nuts, may improve concentration. It might also be helpful to replace simple carbs, like candy and white bread, with complex carbs, like pears and whole-grain bread. Parents need to talk to their pediatrician before making any dramatic changes to their child's diet.

While many kids bounce off the walls after eating junk food, there is no evidence that sugar is a cause of ADHD. The role of food additives is less certain. Some parents believe preservatives and food colorings worsen the symptoms of ADHD, and the American Academy of Pediatrics says it's reasonable to avoid these substances.

Preventing ADHD

There is no surefire way to prevent ADHD in children, but there are steps one can take to reduce the risk.

One can increase one's chance of one's child not having ADHD by staying healthy during pregnancy. Start by avoiding alcohol, drugs, and tobacco during pregnancy. Children whose mothers smoked during pregnancy are twice as likely to develop ADHD.

Schizophrenia

Brain Chemistry of Schizophrenia

- Scientists think that an imbalance in the complex, interrelated chemical reactions of the brain involving the neurotransmitters dopamine and glutamate, and possibly others, plays a role in schizophrenia.
- Neurotransmitters are substances that allow brain cells to communicate with each other.
- Scientists are learning more about brain chemistry and its link to schizophrenia.

Myth

Schizophrenia is a degenerative brain disease from which full recovery is not possible.

Myth

For the sake of compassion and safety, we have little choice but to resort to the use of a lifelong regimen of debilitating drugs and other harmful medical model "treatment," using coercion when necessary for those who "lack insight" into their "illness."

Fact

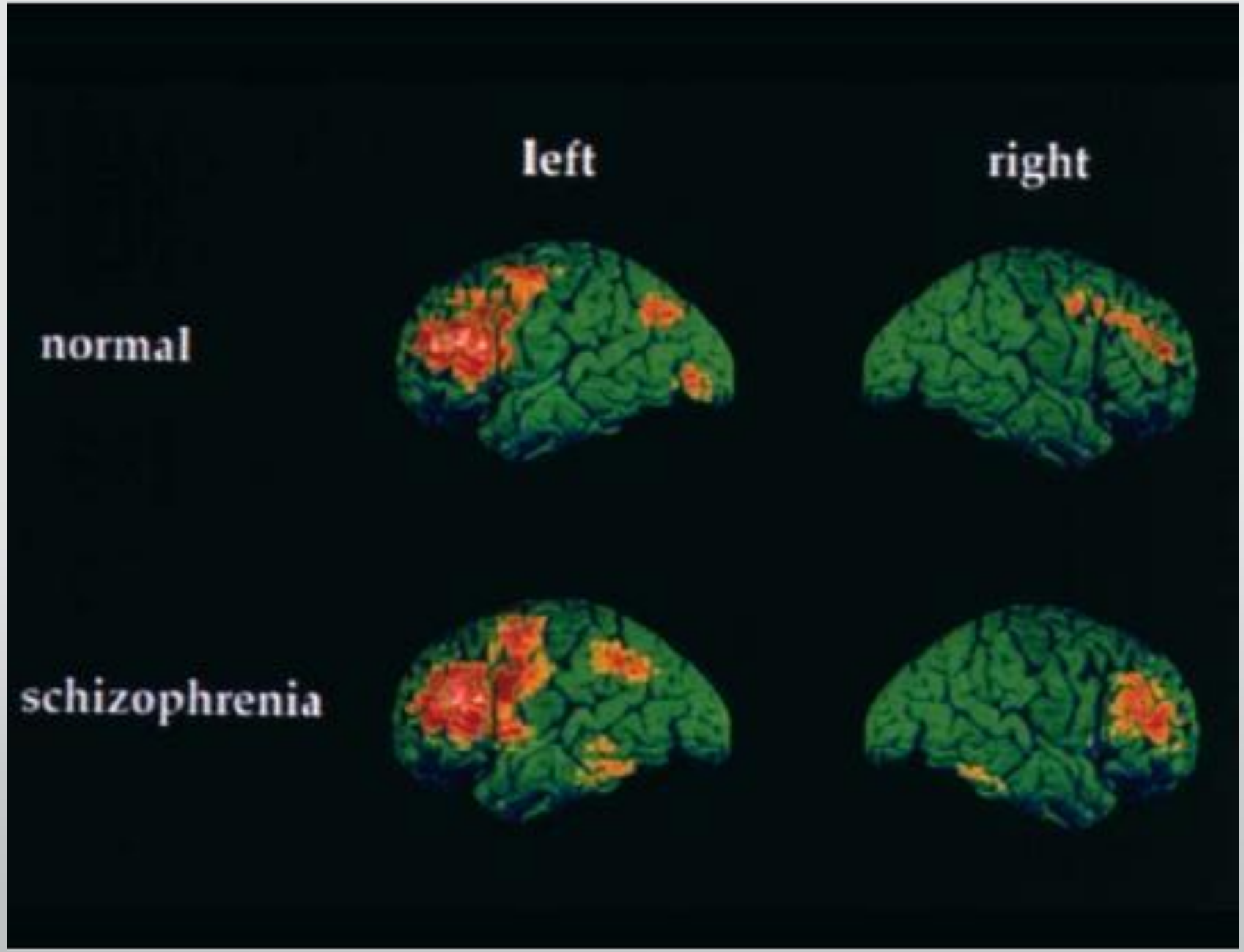
Medical model treatment actually **causes** brain disease and very likely significantly reduces rates of recovery.

Brain Scans Difference due to Schizophrenia

- In small ways the brains of people with schizophrenia look different than those of healthy people.
- For example, fluid-filled cavities at the center of the brain, called ventricles, are larger in some people with schizophrenia.
- The brains of people with the illness also tend to have less gray matter, and some areas of the brain may have less or more activity.

Early Development of Schizophrenia

- Studies of brain tissue after death also have revealed differences in the brains of people with schizophrenia.
- Scientists found small changes in the distribution or characteristics of brain cells that likely occurred before birth.
- Some experts think problems during brain development before birth may lead to faulty connections.
- The problem may not show up in a person until puberty.
- The brain undergoes major changes during puberty, and these changes could trigger psychotic symptoms.
- Scientists have learned a lot about schizophrenia, but more research is needed to help explain how it develops.


left
right
normal
schizophrenia

Risk Factors for Schizophrenia

You could be at risk for schizophrenia if:

- Your mother, father, brother, or sister has schizophrenia.
- Your mother had certain problems while she was pregnant with you. For example, if your mother didn't get enough to eat (malnutrition), had a viral infection, or took certain medicines for high blood pressure, you may be at increased risk.
- You or a family member have another disorder that is like schizophrenia. An example of this is a delusional disorder, which means you believe things that you know are false.
- You have a problem with alcohol or drugs. Experts don't know whether substance abuse triggers schizophrenia or whether schizophrenia makes a person more likely to have this problem.