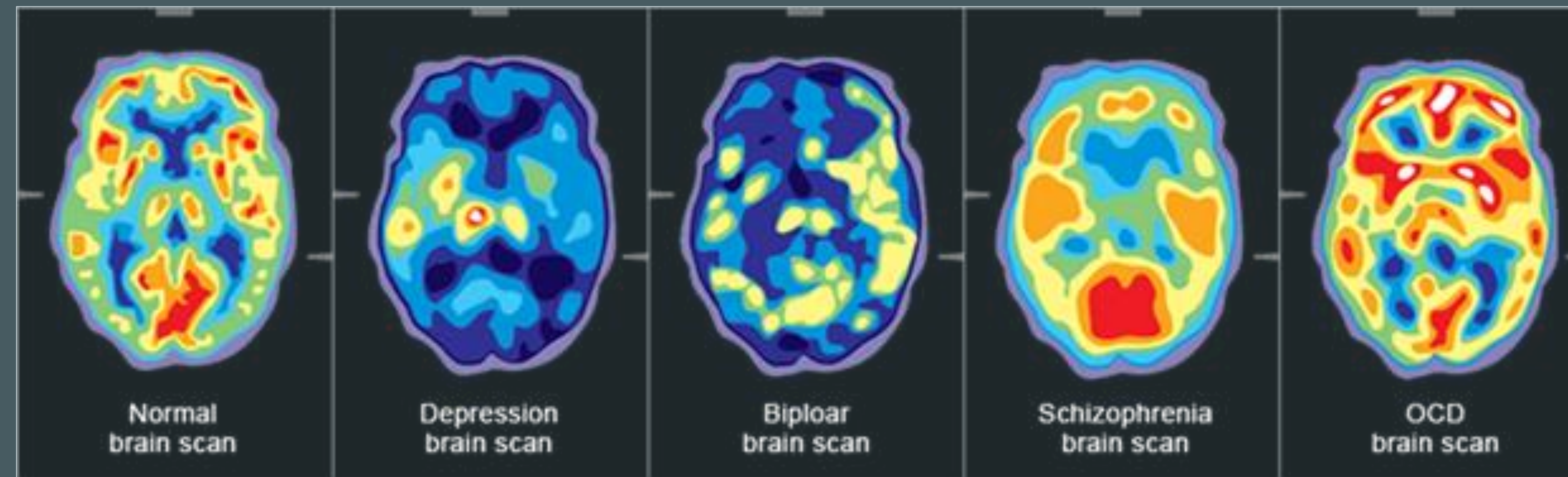


Neuroimaging the Psychologically Disturbed Brain

Introduction

Physicians are beginning to use neuroimaging modalities to visualize mental disorders in psychologically disturbed brains. Structural and functional studies performed on diseased brains demonstrate biomarkers that correlate to mental illness.

Post-traumatic stress disorder (PTSD), bipolar disorder, and major depressive disorder (MDD) are examples of mental illness that alter the brain and can be seen by neuroimaging.



Picture 2: PET scans of psychologically disturbed brains compared with a normal brain scan.⁴

Conclusion

In closing, neuroimaging of the psychologically disturbed brain can present abnormalities structurally or functionally when mental illness such as PTSD, bipolar disorder or MDD has been suspected. Additionally, not all psychiatric disorders are treated the same, but by imaging the patient, physicians can diagnose and treat the patient properly.

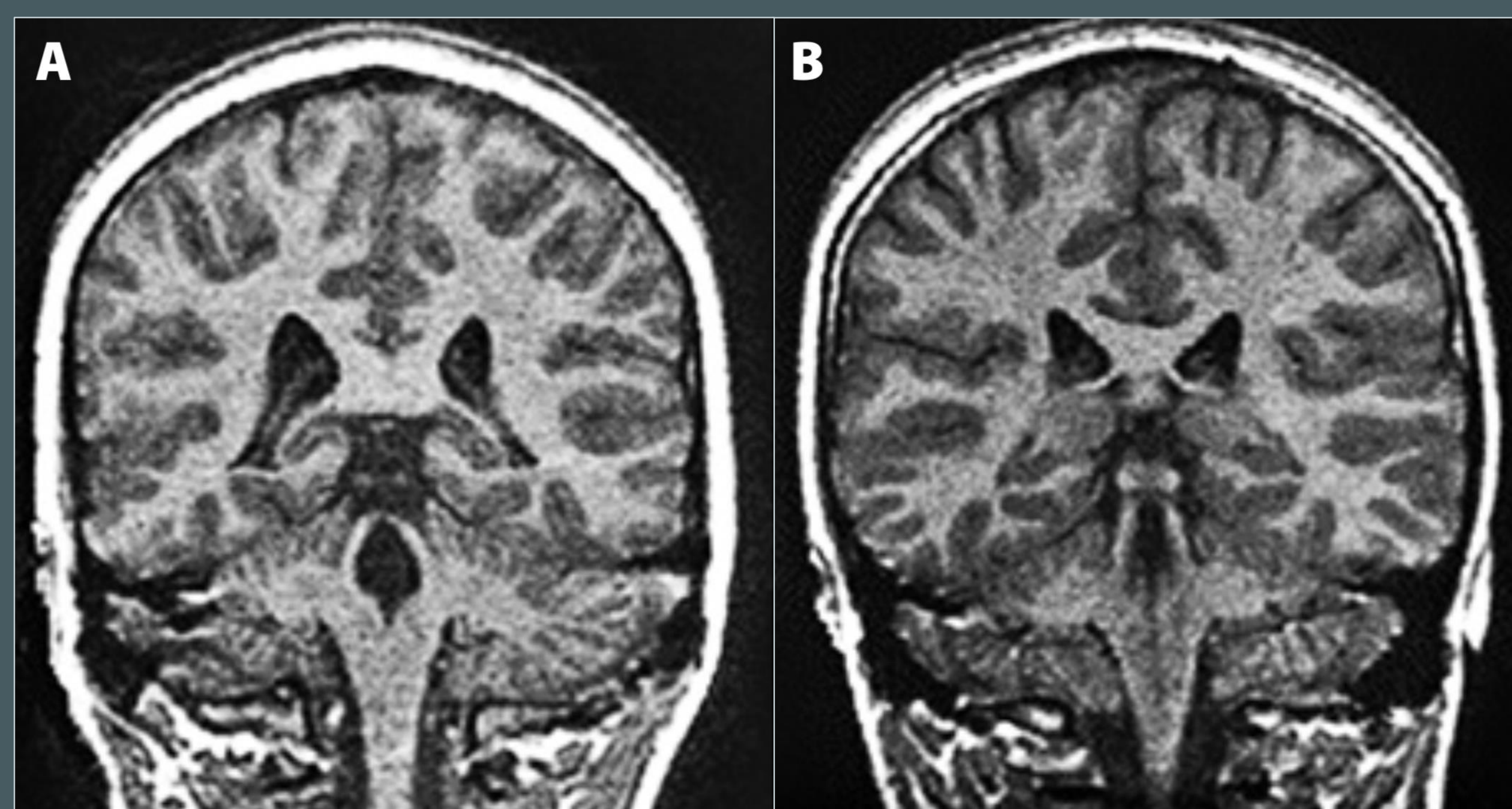
More research needs to be done on how to make studies of mental illness better, but neuroimaging has come a long way, and there is no telling where future research will take us.

PTSD

PTSD is defined as "a debilitating illness which occurs after a traumatic event."¹ PTSD affects a wide population from soldiers to abused children.

MRI scans demonstrate signs of this psychological disorder. These indications include thinning of the cortex, hyperactivation of the amygdala, and ventriculomegaly of the lateral ventricles.²

When presented a stimulus related to the trauma experience, a patient with PTSD has increased amygdala activity along with less activation in the prefrontal cortex. This technique can not only help physicians diagnose PTSD but also demonstrate what is causing it by showing a variety of stimuli.²



Picture 1: Lateral ventricles of an abused patient with chronic PTSD (left) compared with a nonmaltreated control patient (right).²

Bipolar Disorder

Bipolar disorder can be visualized best through fMRI and SMRI scans. Physicians can use these scans to differentiate between unipolar disorder and bipolar disorder. These indications include more abnormalities in white matter connectivity in bipolar disorder than in unipolar disorder and increased amygdala activity in bipolar disorder.³ Unipolar and bipolar disorder are treated differently, so it is life changing for neuroimaging scans to be done to ensure proper treatment is started.

MDD

MRI and PET scans can be used to measure SERT levels in the brain. A study performed on 11 depressed patients and 10 healthy patients concluded that the depressed patients had reduced levels of SERT binding potential and therefore lacked serotonin, the happy hormone.⁴

Another study through neuroimaging found reduced hippocampal volumes. These results were found postmortem on a 52-year-old male who completed suicide.⁵

Anatomical Part	Function
Prefrontal Cortex	Plays a major part in personality development, response to stress, impulse control, and social relationships ²
Lateral Ventricles	Contains cerebrospinal fluid that protects and cushions the brain ²
Amygdala	Links memory to emotion, primary center for fear and the fight or flight response ²
Hippocampus	Aids in short-term memory, plays a role in emotional memory and processing fear ²
Serotonin	Neurotransmitter that affects moods, digestion, sleep, memory, etc., also known as the happy hormone ⁴
Serotonin Transporter (SERT)	Regulates the release of serotonin ⁴

Chart 1: Parts of the brain that are visualized through neuroimaging and their functions.

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