

NIMH Fact Sheet

Post-Traumatic Stress Disorder Research

U.S. Department of Health & Human Services • National Institutes of Health • National Institute of Mental Health

What is Post-Traumatic Stress Disorder?

Post-traumatic stress disorder (PTSD) is an anxiety disorder that some people develop after seeing or living through an event that caused or threatened serious harm or death. Symptoms include flashbacks or bad dreams, emotional numbness, intense guilt or worry, angry outbursts, feeling “on edge,” or avoiding thoughts and situations that remind them of the trauma. In PTSD, these symptoms last at least one month.

To aid those who suffer with PTSD, the National Institute of Mental Health (NIMH) is supporting PTSD-focused research, and related studies on anxiety and fear, to find better ways of helping people cope with trauma, as well as better ways to treat and ultimately prevent the disorder. This research fact sheet will highlight several important areas that NIMH researchers have recently learned about:

- possible risk factors,
- treating the disorder, and
- next steps for PTSD research.

For more information about PTSD, please see the NIMH Post-Traumatic Stress Disorder booklet. You can also find a list of places to find more information about PTSD and NIMH at the end of this fact sheet.

Research on Possible Risk Factors for PTSD

Currently, many scientists are focusing on genes that play a role in creating fear memories. Understanding how fear memories are created may help to refine or find new interventions for

reducing the symptoms of PTSD. For example, PTSD researchers have pinpointed genes that make:

- Stathmin, a protein needed to form fear memories. In one study, mice that did not make stathmin were less likely than normal mice to “freeze,” a natural, protective response to danger, after being exposed to a fearful experience. They also showed less innate fear by exploring open spaces more willingly than normal mice.¹
- GRP (gastrin-releasing peptide), a signaling chemical in the brain released during emotional events. In mice, GRP seems to help control the fear response, and lack of GRP may lead to the creation of greater and more lasting memories of fear.²

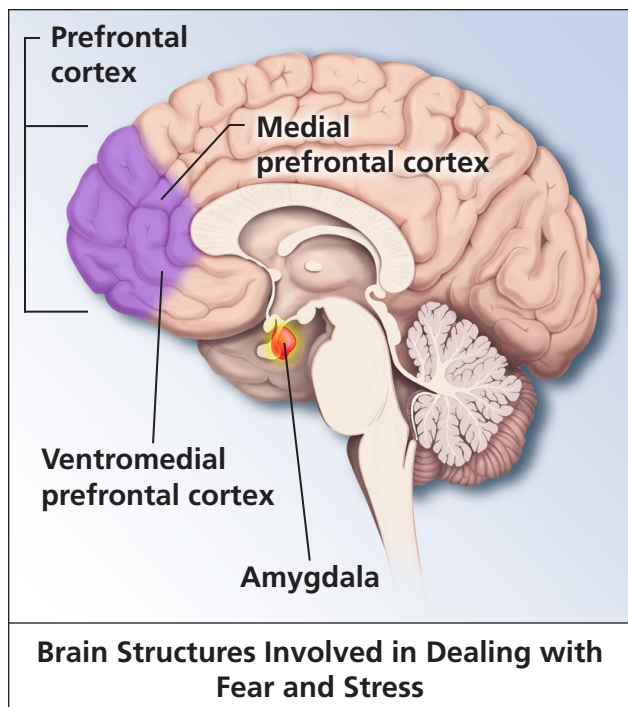
Researchers have also found a version of the 5-HTTLPR gene, which controls levels of serotonin—a brain chemical related to mood—that appears to fuel the fear response.³ Like other mental disorders, it is likely that many genes with small effects are at work in PTSD.

Studying parts of the brain involved in dealing with fear and stress also helps researchers to better understand possible causes of PTSD. One such brain structure is the amygdala, known for its role in emotion, learning, and memory. The amygdala appears to be active in fear acquisition, or learning to fear an event (such as touching a hot stove), as well as in the early stages of fear extinction, or learning not to fear.⁴

Storing extinction memories and dampening the original fear response appears to involve the prefrontal cortex (PFC) area of the brain,⁴ involved in tasks such as decision-making,

NIMH Fact Sheet

Post-Traumatic Stress Disorder Research



problem-solving, and judgment. Certain areas of the PFC play slightly different roles. For example, when it deems a source of stress controllable, the medial PFC suppresses an alarm center deep in the brainstem and controls the stress response.⁵ The ventromedial PFC helps sustain long-term extinction of fearful memories, and the size of this brain area may affect its ability to do so.⁶

Individual differences in these genes or brain areas may only set the stage for PTSD without actually causing symptoms. Environmental factors, such as childhood trauma, head injury, or a history of mental illness, may further increase a person's risk by affecting the early growth of the brain.⁷ Also, personality and cognitive factors, such as optimism and the tendency to view challenges in a positive or negative way, as well as social factors, such as the availability and use of social support, appear to influence how people adjust to trauma.⁸ More research may show what combinations of these or perhaps other factors could be used someday to predict who will develop PTSD following a traumatic event.

Research on Treating PTSD

Currently, people with PTSD may be treated with psychotherapy ("talk" therapy), medications, or a combination of the two.

Psychotherapy

Cognitive behavioral therapy (CBT) teaches different ways of thinking and reacting to the frightening events that trigger PTSD symptoms and can help bring those symptoms under control. There are several types of CBT, including:

- exposure therapy – uses mental imagery, writing, or visiting the scene of a trauma to help survivors face and gain control of overwhelming fear and distress.
- cognitive restructuring – encourages survivors to talk about upsetting (often incorrect) thoughts about the trauma, question those thoughts, and replace them with more balanced and correct ones.
- stress inoculation training – teaches anxiety reduction techniques and coping skills to reduce PTSD symptoms, and helps correct inaccurate thoughts related to the trauma.

NIMH is currently studying how the brain responds to CBT compared to sertraline (Zoloft), one of the two medications recommended and approved by the U.S. Food and Drug Administration (FDA) for treating PTSD. This research may help clarify why some people respond well to medication and others to psychotherapy.

Medications

In a small study, NIMH researchers recently found that for people already taking a bedtime dose of the medication prazosin (Minipress), adding a daytime dose helped to reduce overall PTSD symptom severity, as well as stressful responses to trauma reminders.⁹

NIMH Fact Sheet

Post-Traumatic Stress Disorder Research

Another medication of interest is D-cycloserine (Seromycin), which boosts the activity of a brain chemical called NMDA, which is needed for fear extinction. In a study of 28 people with a fear of heights, scientists found that those treated with D-cycloserine before exposure therapy showed reduced fear during the therapy sessions compared to those who did not receive the drug.¹⁰ Researchers are currently studying the effects of using D-cycloserine with therapy to treat PTSD.

Propranolol (Inderal), a type of medicine called a beta-blocker, is also being studied to see if it may help reduce stress following a traumatic event and interrupt the creation of fearful memories. Early studies have successfully reduced or seemingly prevented PTSD in small numbers of trauma victims.¹¹

Treatment After Mass Trauma

NIMH researchers are testing creative approaches to making CBT widely available, such as with Internet-based self-help therapy and telephone-assisted therapy. Less formal treatments for those experiencing acute stress reactions are also being explored to reduce chances of developing full blown PTSD.

For example, in one preliminary study, researchers created a self-help website using concepts of stress inoculation training. People with PTSD first met face-to-face with a therapist. After this meeting, participants could log onto the website to find more information about PTSD and ways to cope, and their therapists could also log on to give advice or coaching as needed. Overall, the scientists found delivering therapy this way to be a promising method for reaching a large number of people suffering with PTSD symptoms.¹²

Researchers are also working to improve methods of screening, providing early treatment, and tracking mass trauma survivors; and approaches for guiding survivors through self-evaluation/

screening and prompting referral to mental health care providers based on need.

The Next Steps for PTSD Research

In the last decade, rapid progress in research on the mental and biological foundations of PTSD has lead scientists to focus on prevention as a realistic and important goal.

For example, NIMH-funded researchers are exploring new and orphan medications thought to target underlying causes of PTSD in an effort to prevent the disorder. Other research is attempting to enhance cognitive, personality, and social protective factors and to minimize risk factors to ward off full-blown PTSD after trauma. Still other research is attempting to identify what factors determine whether someone with PTSD will respond well to one type of intervention or another, aiming to develop more personalized, effective, and efficient treatments.

The examples described here are only a small sampling of the ongoing work at NIMH. To find more information about ongoing PTSD clinical studies, see NIMH's PTSD clinical trials webpage at http://www.nimh.nih.gov/studies/studies_ct.cfm?id=11. As gene research and brain imaging technologies continue to improve, scientists are more likely to be able to pinpoint when and where in the brain PTSD begins. This understanding may then lead to better targeted treatments to suit each person's own needs or even prevent the disorder before it causes harm.

Where Can I Get More Information?

MedlinePlus, a service of the U.S. National Library of Medicine and the National Institutes of Health, provides updated information and resource lists for many health topics. Find out more about PTSD at: <http://www.nlm.nih.gov/medlineplus/posttraumaticstressdisorder.html>.

NIMH Fact Sheet

Post-Traumatic Stress Disorder Research

En Español:

<http://www.nlm.nih.gov/medlineplus/spanish/posttraumaticstressdisorder.html>.

Information from NIMH is available online, in PDF, or as paper brochures sent through the mail. If you would like to have NIMH publications, you can order them at <http://www.nimh.nih.gov> or contact NIMH at the numbers listed below.

National Institute of Mental Health

Office of Science Policy, Planning, and Communications
6001 Executive Boulevard

Room 8184, MSC 9663

Bethesda, MD 20892-9663

Phone: 301-443- 4513

Toll-free Voice: 1-866-615-NIMH (6464)

TTY: 1-866-415-8051 toll free

Fax: 301-443-4279

E-mail: nimhinfo@nih.gov

References

1. Shumyatsky GP, Malleret G, Shin RM, et al. stathmin, a Gene Enriched in the Amygdala, Controls Both Learned and Innate Fear. *Cell*. Nov 18 2005;123(4):697-709.
2. Shumyatsky GP, Tsvetkov E, Malleret G, et al. Identification of a signaling network in lateral nucleus of amygdala important for inhibiting memory specifically related to learned fear. *Cell*. Dec 13 2002;111(6):905-918.
3. Hariri AR, Mattay VS, Tessitore A, et al. Serotonin transporter genetic variation and the response of the human amygdala. *Science*. Jul 19 2002;297(5580):400-403.
4. Milad MR, Quirk GJ. Neurons in medial prefrontal cortex signal memory for fear extinction. *Nature*. Nov 7 2002;420(6911):70-74.
5. Amat J, Baratta MV, Paul E, Bland ST, Watkins LR, Maier SF. Medial prefrontal cortex determines how stressor controllability affects behavior and dorsal raphe nucleus. *Nat Neurosci*. Mar 2005;8(3):365-371.
6. Milad MR, Quinn BT, Pitman RK, Orr SP, Fischl B, Rauch SL. Thickness of ventromedial prefrontal cortex in humans is correlated with extinction memory. *Proc Natl Acad Sci U S A*. Jul 26 2005;102(30):10706-10711.
7. Gurvits TV, Gilbertson MW, Lasko NB, et al. Neurologic soft signs in chronic posttraumatic stress disorder. *Arch Gen Psychiatry*. Feb 2000;57(2):181-186.
8. Brewin CR. Risk factor effect sizes in PTSD: what this means for intervention. *J Trauma Dissociation*. 2005;6(2):123-130.
9. Taylor FB, Lowe K, Thompson C, et al. Daytime Prazosin Reduces Psychological Distress to Trauma Specific Cues in Civilian Trauma Posttraumatic Stress Disorder. *Biol Psychiatry*. Feb 3 2006.
10. Ressler KJ, Rothbaum BO, Tannenbaum L, et al. Cognitive enhancers as adjuncts to psychotherapy: use of D-cycloserine in phobic individuals to facilitate extinction of fear. *Arch Gen Psychiatry*. Nov 2004;61(11):1136-1144.
11. Pitman RK, Sanders KM, Zusman RM, et al. Pilot study of secondary prevention of posttraumatic stress disorder with propranolol. *Biol Psychiatry*. Jan 15 2002;51(2):189-192.
12. Litz BT WL, Wang J, Bryant R, Engel CC. A therapist-assisted Internet self-help program for traumatic stress. *Prof Psychol Res Pr*. December 2004;35(6):628-634.

NIMH Fact Sheet

Post-Traumatic Stress Disorder Research

NIMH publications are in the public domain and may be reproduced or copied without the permission from the National Institute of Mental Health (NIMH). NIMH encourages you to reproduce them and use them in your efforts to improve public health. Citation of the National Institute of Mental Health as a source is appreciated. However, using government materials inappropriately can raise legal or ethical concerns, so we ask you to use these guidelines:

NIMH does not endorse or recommend any commercial products, processes, or services, and publications may not be used for advertising or endorsement purposes.

NIMH does not provide specific medical advice or treatment recommendations or referrals; these materials may not be used in a manner that has the appearance of such information.

NIMH requests that non-Federal organizations not alter publications in a way that will jeopardize the integrity and "brand" when using publications.

Addition of Non-Federal Government logos and website links may not have the appearance of NIMH endorsement of any specific commercial products or services or medical treatments or services.

If you have questions regarding these guidelines and use of NIMH publications, please contact the NIMH Information Center at 1-866-615-6464 or at nimhinfo@nih.gov.