THE 10 BEST-EVER ANXIETY MANAGEMENT TECHNIQUES

Understanding How Your Brain Makes You Anxious & What You Can Do to Change It

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How Your Brain Makes You Anxious

Without becoming an expert in brain chemistry, you can learn how your brain makes you anxious so that you will know why the 10 best-ever anxiety management techniques work. Of course, as I indicated, they work even if you do not know why they work, but it is my belief that you will apply them more effectively if you understand how doing these techniques will change your brain in ways that will make you less anxious for life.

NEURONS, NEUROTRANSMITTERS, AND COMMUNICATION IN YOUR BRAIN

Your brain is a complicated network of brain cells called *neurons*. You have 10 billion neurons, and each of them can connect with 10,000 other neurons. The possibilities for how those cells connect and network are virtually endless. There is more to know about how the brain works than we will learn in our lifetimes. But what we know so far is that every function in your body, every thought you have, every emotion you feel, is the result of activity in the brain. If your brain is dead, then even with healthy organs, nothing will work. And just like you do not feel your best if you have an organ in your body that is malfunctioning, your thoughts and emotions can be troubled unless every part of the brain is working well.

Neuroscience researchers have learned so much about the brain in recent years that it is now possible to describe how some parts of the brain contribute to feelings of anxiety. This has made quite a difference

to the way those of us in the mental health profession view the treatment of anxiety. Although many techniques we have used for years remain effective, we now know why those techniques work so well and we know more about when and how to use techniques for your benefit. And we also know now that you can at least get relief from anxiety symptoms even before you complete psychotherapy for other problems. Again, remember that you can *use* your brain to *change* your brain.

The 10 best-ever anxiety management techniques are designed to diminish or eliminate the most common problems of anxiety: panic attacks, worrying, and social fears. They take advantage of what we know about how these symptoms are caused by problems in brain functioning.

How Does Your Brain Communicate?

All those 10 billion neurons have to communicate with each other to create your thoughts, behaviors, and emotions (among the other many tasks we are not going to discuss here). So how do they do it? Neurons communicate by sending messengers back and forth in the space between brain cells, called the *synapse*. These messengers of the brain are called *neurotransmitters*. Different messages are carried by different neurotransmitters. I will describe those shortly.

Every message needs to be received. How a message is interpreted and how it affects brain function depends on where in the brain the message is received. The meaning of a message being sent is determined by who is reading it. For example, let's say you send an email that communicates your love for a coworker. If you send it to the object of your affections, it may be readily received and induce a feeling of warmth and happiness, but what if you accidentally send it to the person you just broke up with? The same message in the wrong mailbox causes agitation for the heartbroken person who reads it. And what if the boss gets that same note, and starts to fret about what you are doing on your work time? Same message, different result, depending on the receiver.

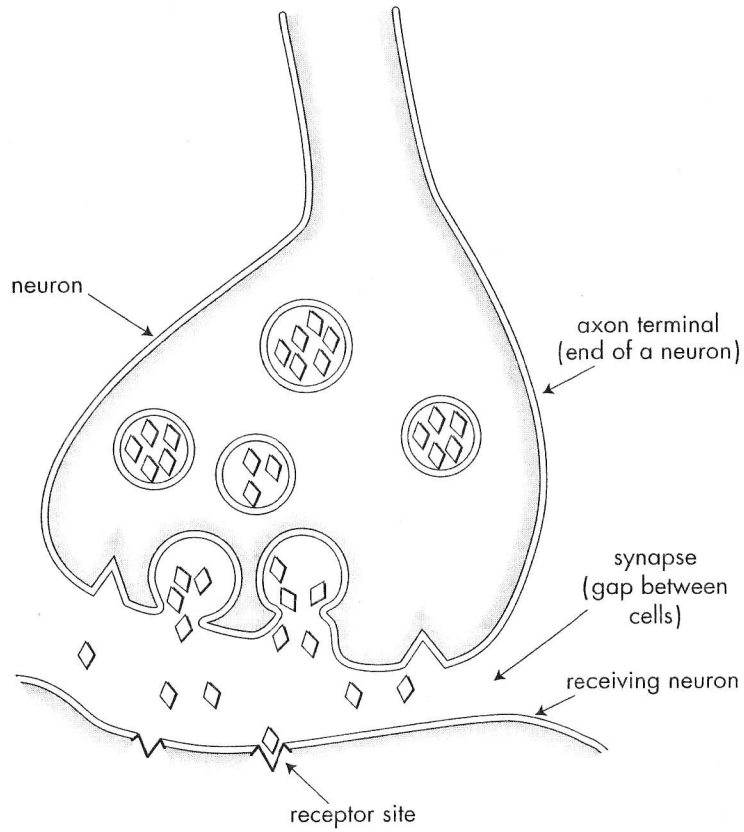

Figure 1.1 Neurotransmitters, represented as diamonds, are released from a neuron into the synapse to be received by another neuron.

In a way, this happens with neurotransmitters. Take dopamine, for example. Dopamine is a neurotransmitter that is received in one part of your brain as "I feel good." (And not just ho-hum good, but the James Brown version, "I *fee-eel* good!") But, if it is received in the thinking part of your brain, it works more to cause you to pay attention to what is going on. In yet another part of your brain, dopamine helps you have smooth motor functioning. People with Parkinson's disease are losing dopamine. So, as you can see, dopamine produces different results depending on where in the brain it is received.

When you learn about dopamine as it relates to anxiety, you will be interested in that first function—pleasure—because it is what helps people feel motivated to overcome anxiety. And when you want to learn how to decrease your reactions to scary incidents, you might want to know how dopamine causes you to pay extra attention when you are very scared. Certain therapy methods help you un-learn scary situations by taking charge of what you pay attention to.

In order for messages to get sent from one neuron to another in the first place, there needs to be enough neurotransmitters available to get the message across. One reason people with anxiety might use medication is to increase the number of neurotransmitters that will help get the message sent.

It is also possible that there are problems with transmission. Maybe there are enough neurotransmitters to send the message, but they cannot get from one neuron to another. One neurotransmitter called serotonin gets received in a lot of different places, and if it has trouble getting through, one result is worrying. One of the places in your brain where serotonin is needed is responsible for shifting gears in your thoughts. When you get stuck on a thought—going over and over it—you start to worry. You can use your decision-making ability to overrule worry, thus taking charge of worry on purpose (as I will describe later in the worry management techniques). This tries to make up for the effect of serotonin not getting through to where it is needed. Of course, I will also discuss how to make sure that serotonin has the best chance of getting through, so worry is less of a problem to begin with.

Alternatively, there may be too *many* messages being sent. Excessive amounts of neurotransmitters may cause you to make a big deal over nothing. It will FEEL LIKE A BIG DEAL, but that is only because the flurry of neurotransmitters is excessive. This happens to people who have too many stress response neurotransmitters. The phrase "making a mountain out of a molehill" is exactly what your brain may do—send out too many messages that communicate "This is stressful!" Your brain and your body will overreact with lots of stress because the extra neurotransmitters make the situation seem urgent. Techniques to help you calm down on purpose will help with this kind of problem.

Receiving Messages

Even if the number of neurotransmitters and their transmission are fine, anxiety can still occur if the message has problems at the receiving end. The neurons whose role it is to pick up messages may not do so easily. If that is the case, a neurotransmitter may not be received and the message (such as to calm down or feel good) does not get received. In particular, a neurotransmitter called GABA is responsible for slowing down activity in the brain so that you can stop brain cells from firing off messages. The networks of communication have to get cleared for new messages to be sent. So, if GABA is not being received very well, you may end up feeling very anxious or even panicky, depending on where in the brain the GABA is working (or not, as the case may be).

You know that there are radio waves and cell phone signals in the air all around you, but you need to have your equipment tuned in to make sense of the message. Once the signal is received, your equipment has to interpret and send information along. That is where brain function comes in. Different parts of the brain receive, send, interpret, and create responses to the signals they receive. The parts of the brain that are of most interest in discussing anxiety play those roles—receivers and relayers of information, coordinators and interpreters of signals that help to form a coherent picture of information and parts of the brain that create new responses to information as it comes in. Different parts of the brain have different functions, but just like completing a call on a wireless phone requires the phone to receive a signal, interpret it, and then reverse that to transmit back what you say, the parts of your brain all need to function smoothly for messages to be clearly received and sent.

Balance Is Necessary for Healthy Functioning

Before I discuss individual neurotransmitters and their role in creating anxiety symptoms, you should think for a minute about how much the brain likes everything to be in balance. You already know your brain

carefully monitors everything going on in your body, trying to keep your whole body balanced. Think about what happens when you exercise. You increase the demand for oxygen, and when you start to run out of oxygen, your respiration increases and your heart rate may increase too. You can decide to direct your breathing on purpose, as when you lift weights or do yoga or martial arts, but even if you do not think about it, your brain will make sure you get the right balance of oxygen by directing your body to breathe faster and telling your heart rate to pick up.

Similarly, your brain monitors the balance of neurotransmitters. If an imbalance occurs, the brain initiates activity to achieve balance. It functions best when only minor imbalances between levels of neurotransmitters exist. Just like a deficiency of oxygen is felt as shortness of breath, excesses and deficiencies of neurotransmitters produce symptoms too, and what kinds of symptoms you experience depend on which neurotransmitter in which part of the brain is having a problem. Insufficient or excessive amounts of neurotransmitters show up as problems in mood, behavior, or thought. The techniques presented in this book can help the brain to rebalance itself. When your brain cannot achieve balance because you are sick, not eating right, not sleeping, or have some other physical problem, then you will probably also have to make changes in your eating or sleeping or get some medical help.

Specific Neurotransmitters and Their Activities

The neurotransmitters that are of most interest in understanding anxiety are:

- Glutamate
- GABA (or gamma aminobutyric acid, but no one uses the long name)
- Serotonin
- Norepinephrine
- Dopamine

Briefly, the function of each neurotransmitter in relation to causing anxiety is as follows:

Glutamate. Think of glutamate as the brain's "go" signal. Glutamate signals or excites neurons to fire, that is, to send out their neurotransmitters. It is distributed through the whole brain, because all the neurons need signals to fire.

GABA. Every "go" signal needs a "stop" signal. GABA is the stop signal. It slows and stops the firing of neurons. GABA is also found throughout the brain. When GABA is not slowing things down effectively or if GABA and glutamate are not in balance with one another and glutamate is too high, you may feel agitated, which is a set-up for anxiety.

Serotonin. Serotonin neurotransmitters are few in number compared to GABA and glutamate, but mighty in their effects. You need serotonin to regulate your mood so you are not too negative, to keep appetite and sleep patterns stable, to help with impulse control, and to modulate your pain perception. With so many functions, it is clear that if serotonin is off balance, you could have a lot of different problems. The kinds of problems you have depend on how seriously serotonin is off balance and which part of the brain does not have enough of it. Later in this chapter, as I discuss areas of the brain that affect anxiety, I will refer to the problems that each neurotransmitter can cause in these areas.

Norepinephrine. If your brain had an energizer bunny, norepinephrine would be it. Norepinephrine keeps you mentally alert, and your body energetic in general. For example, it is important for keeping blood pressure balanced. When you need fast energy to handle stress—like you are suddenly scared you will miss the bus—you get a little help from norepinephrine for energy. When you have too much norepinephrine (and there are many reasons why that might be) you will feel jittery, "wired," "uptight," or generally too tense.

Dopamine. As in my earlier example, dopamine's message depends a lot on which part of the brain is receiving it. In one part of your brain, dopamine can send the message "mm-mmmm good," so it is responsible

for your feelings of pleasure. But if it is received in the thinking part of your brain, it helps you to pay attention. Knowing what pleasure feels like motivates you to do what felt good, so dopamine is very important in anxiety. Getting motivated to achieve your goals will help you face your fears to overcome anxiety. Paying attention is also important because it can either cause anxiety by forcing you to concentrate on what is negative or frightening, or it can help you stop anxiety by forcing you to concentrate on what is positive or soothing.

THE STRUCTURES OF THE BRAIN AND ANXIETY

The messengers of the brain, the neurotransmitters, are received in different parts of the brain, and where they are received affects the message. Your brain has many different structures within it, and some of those work together in systems to get a task done. Also, different systems can work together. Keeping it simple and looking only at how your brain might generate anxiety, I am going to discuss the parts of these systems:

- *The nervous system*, which has nerves that get your organs going and nerves that calm down the activity in your organs
- *The stress response system*, which gets hormones such as adrenalin pumping
- *The limbic system*, the center of emotion and memory
- *The basal ganglia*, which together coordinate motivation and movement
- *The cortex*, which is responsible for language, thinking, decision-making—essentially, all the conscious aspects of your brain

The Nervous System

The nervous system is all the nerves that run through the body and connect to the spinal cord and the brain. Nerves tell your muscles to

move and carry signals to your brain about how your body is doing. Nerves carry messages to and from the organs of your body. The nervous system has three major divisions of nerve activity that are related to anxiety.

The peripheral nervous system (PNS). The PNS carries messages to and from the skin. So when you blush, as people who are shy tend to do, this is the system that is working.

The sympathetic nervous system (SNS). This is the system that tells organs in your body to get busy and respond to a demand for action. If you walk up a steep flight of stairs, the SNS will demand a little extra heart activity and respiration so that your muscles can get more oxygen while they work harder. If you think you are about to be mugged, your SNS will immediately get your heart rate and respiration ready for a fight or a fast run out of danger.

The parasympathetic nervous system (PSNS). This part of the nervous system kicks in to calm down action in the body. It takes over when you need to calm down. You can initiate activity in the sympathetic system by deciding to breathe faster, and you can initiate the parasympathetic system to calm down by breathing more slowly and deeply. When talking about anxiety and how to control it, it is important to understand that the nervous system is *automatic* and operates without your control, but you can take it over on purpose. Mostly we want to take over calming ourselves down, so the anxiety management techniques aim at encouraging parasympathetic calming by focusing on self-soothing through breathing, relaxation, and thought management.

The Stress Response System

In order for your body to have the energy it needs when the sympathetic nervous system (SNS) cranks up the organs of your body, you need some chemical assistance from hormones. Your hypothalamus, which I will discuss in the next section, will send a message to your adrenal glands to release adrenalin and cortisol, two of the hormones needed for stress.

These hormones travel through your bloodstream and mobilize your body to release stores of fuel (glucose and fat) to be used in the energy-burning that muscles perform when they have to work hard. This is the stress response: a system to get you energy when you need it. It can work for any length of time, from brief and inconsequential little releases of energy to short, powerful bursts of energy, to sustained and extended stress response such as when you are under the burden of difficult emotions or expectations. Whether you are sitting by a sick child in the hospital emergency room or on your third day of 16-hour workdays to meet a project deadline, your stress response is working to make energy available. As you might imagine, a stress response cannot go on forever without relief. You can become very anxious as the result of unremitting stress.

The Limbic System

The emotional work of the brain is done in the parts of the brain that together are called the limbic system. The term "limbic" comes from a word that means *ring*, and it refers to the location in the center of the brain where these various structures are grouped. They work together to help form emotions and memories. The names and basic functions of the parts of the limbic system are:

- Thalamus
- Hypothalamus
- Hippocampus
- Amygdala

Each part or structure in the limbic system plays a specific role in the creation of emotional responses, and each part is connected to other parts of the brain and the nervous systems so that some of their work can be done without thinking about it. For example, if you are faced with an emergency, like a child running away from you into traffic, you don't want to take time to think about whether you need energy. Your body gives it to you without intentional thought. (I will discuss the relationship of thought and feeling in many places throughout the book.) How

these parts of the limbic system function are very relevant to understanding how your brain makes you feel anxious, even when you do not want to.

Thalamus. The thalamus has many important functions, but among the most important is its role in receiving information from the outside world through the senses, and sending that information where it needs to go. It might be considered the quarterback for sensory information from the external environment. That is, it receives information and relays it onward for another part of the brain to take action on it. The "ball" of sensory information, hiked to your thalamus, is passed on to the amygdala for immediate action. Among the many jobs the thalamus does, it passes that information also to your thinking brain, the cortex.

Hypothalamus. The hypothalamus is like a quarterback for your internal team, gathering information from your internal environment. It receives and relays signals from and to the organs of the body. The hypothalamus is directly responsible for starting your stress response by handing off the "ball" of information that you are under stress. It passes that information to your adrenal glands so it can run with the information and get you the energy you need. Your hypothalamus may have too many of the neurons that respond to stress, so it may send out of flood of demands for a stress response. This is one way that small things feel very big to anxious people and may be a cause of overreacting emotionally and physically to normal, not-so-big stresses. Because it is your way of feeling things, you would probably need some convincing that the small things really are small. But once you are convinced, you can take charge of calming down your stress response by talking to the hypothalamus and providing it with physical calming messages, like breathing.

Hippocampus. The hippocampus is the part of the limbic system that registers details for you. It is without emotion, functioning like the Joe Friday of your brain—"Just the facts, Ma'am." It records details—data and facts—and sends them up to your cortex, which thinks about them. If you need short-term or long-term memory to be made from the details the hippocampus is recording, then other parts of the brain get involved to make those memories happen.

Amygdala. Your amygdala is a key player in developing anxiety. It can be like the Little Red Hen, whenever something negative shakes it up, it cries out, "The sky is falling!" This is not detailed information. It is purely emotional. Your amygdala is an importance meter, registering only tone and intensity and notifying your brain instantaneously if it should prepare for problems. The amygdala can set off the hypothalamus to get the stress response going and it can immediately get norepinephrine (the "energizer" neurotransmitter) pumping to prepare for fight or flight. All that excitement occurs long before the cortex of the brain can form context so you can think about how serious the situation might actually be.

The amygdala registers *all* emotions, not just negative ones, but it *prefers* noticing the threatening, scary ones. The action of the amygdala is something like a smoke detector for your body and brain. A smoke detector does not respond to the pleasant aroma of baking bread, but if that bread starts to burn, it causes quite an alarm. You do not have to be alert to incoming joy in order to survive in this world. But if you want to survive, you better do a good job of noticing incoming trouble, such as someone looking angry or intending to hurt you. Once your amygdala learns what is dangerous, it tries ever after to protect you from whatever scared you. This is how cues and triggers develop to cause anxiety or panic, from the amygdala and the hippocampus working together to learn what is dangerous.

The Basal Ganglia (BG)

A ganglia is a concentrated group of neurons. The basal ganglia (BG) are several ganglia that work together to induce motivation, create energy to meet goals, and even coordinate physical movement with emotion. The BG are located under the cortex (covering) of the brain, where you do your thinking, and over the limbic area. One part of the BG, called the nucleus accumbens, is specialized to interpret pleasure when it receives the messenger dopamine. When you do something that stimulates dopamine and it flows through to this part, you feel good. This makes you want to repeat whatever you were doing that made

you feel good. For this reason, the BG strongly affect motivation and energy.

A person with a good supply of dopamine in the BG will feel motivated and full of energy or high drive, but if GABA is not working effectively, then the energy can get too high and result in tension. Additionally, even for no real reason but just out-of-the-blue because GABA is not working as it should, over-excited activity in the neurons of the BG can trigger panic attacks. In the case of BG energy, some is good, a lot can give you drive but make you tense, and too much can flip over into panic.

The Cortex

The structures of the limbic system work together to send messages to the thinking parts of the brain—the cortex. *Cortex* means "bark" or covering, and in human beings that covering on the lower brain is very thick. Such a thick cortex is necessary to deal with social information. Our ability to think about thinking and about emotions, and our ability to think about what others are thinking and feeling, is possible because of the cortex. To understand anxiety, it will be useful to look at activity in these parts of the cortex:

- *The anterior cingulate gyrus* (ACG), the filter and amplifier of information
- *The orbito frontal cortex* (OFC), the place where working memory is held
- *The prefrontal cortex* (PFC), the CEO where all information is ultimately received, analyzed, and responded to

A lot of information from your senses and from the organs of your body needs review by the prefrontal cortex. To be efficiently handled, the information has to be organized, so the responses from the cortex back to the emotional brain can return swiftly and appropriately.

The anterior cingulate gyrus (ACG). This area of the cortex helps to organize information. Located between the limbic system and the

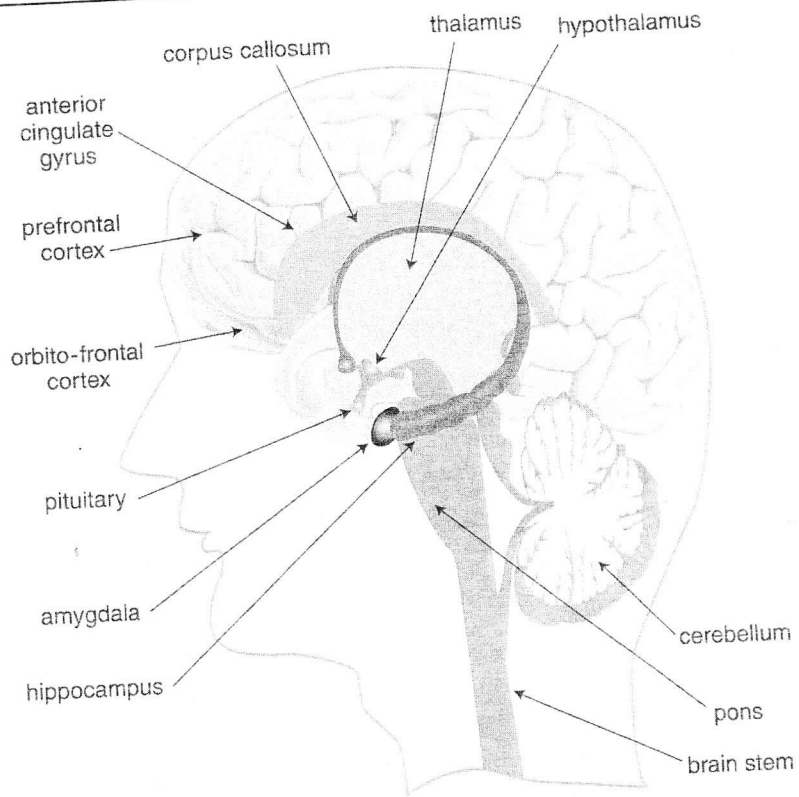

Figure 1.2 Lateral (side) view of the brain.

cortex, it is like the vice-president in charge of forming context, preparing reports for the CEO of the brain—the PFC—the left prefrontal cortex, and sending the CEO's recommendations back out. It takes the details sent in from the hippocampus and the emotional tone from the amygdala. It also gathers data on the way your body is feeling, which, when put together with the limbic system data, creates the whole context of a situation for your thinking brain to work with. The details and their importance, along with somatic (bodily) experience of the situation, get put together for analysis. This filtering of incoming information has to occur smoothly. When the ACG does not have a good balance of neurotransmitters, it can get stuck on negative feelings and be unable to shift them forward, thereby making it less efficient at sending analysis back on to the amygdala. If your ACG gets stuck, qualities you may see and feel

are worry and rumination on negative thoughts, oppositional behavior, or inflexibility about trying new options or responses to situations.

The orbitofrontal cortex (OFC). This area of the cortex is like the vice-president in charge of brain-storming. It commands the process called working memory, which holds pieces of information just long enough to use them to complete tasks of everyday mental functioning. Also, working memory—or short term storage—allows the OFC to compare information with other memories of other similar situations. This work is necessary to generate several possible, reasonable responses to problems, and then sends the data forward to the prefrontal cortex for analysis and decision-making.

When this part of the cortex is functioning correctly people have good impulse control; that is, they don't jump the gun on "half-baked" ideas. Rather, they make decisions based on information. When neurotransmitters are in balance in the OFC, then your mood is optimistic and it seems things can be explained or solved and are not hopeless. For this reason, the OFC is quite important in anxiety because this solution-oriented part of the cortex helps control fear by its optimistic, problem-solving activity.

The prefrontal cortex (PFC). The prefrontal cortex (PFC) is the CEO of the brain. This is where all the information from your entire body and all the other parts of your brain is ultimately received and where decisions are made about how to respond to it. The buck stops here. When the PFC gets good data from the rest of the brain, it has what it needs to analyze whether a situation is actually threatening or not. It decides whether the data should be put into long-term memory storage or dismissed as unnecessary. It creates new solutions to problems and plans how to carry those out. The PFC needs clarity and energy to do this. When it is short on neurotransmitters or they are out of balance or excessive, then thinking is impaired.

You may have heard about differences between right-brain and left-brain activity and wonder if this is important to anxiety as well. The short answer is that every part of the brain described above has two sides, right and left. Your brain is efficient—it does not double up on activity—so the right and the left sides, called "hemispheres", in effect have subspecialties

within their individual functions. For example, the right side of the amygdala (which, you will recall, is overall responsible for noticing what is important, especially if it is threatening) recognizes swiftly cues of danger. The left side of the amygdala compares the current cue of danger to see if the situation is as dangerous as it seems. If the situation turns out to be different than a former situation, it adjusts the reaction accordingly, so the next time the cue comes in, the amygdala will be able to use the new information.

The two hemispheres of the cortex also share the load of analyzing, although the left prefrontal cortex is the final decision maker. In general, the right hemisphere of your cortex handles nonverbal information. It hears the tone and sees the facial expressions that communicate what the words you hear really mean. It contributes to understanding spatial information. The left brain provides the vocabulary of words and math symbols and the analytic work of the meaning of experiences.

Anxiety management techniques aim to control your anxious symptoms primarily through the left brain, using words, analysis, and decision-making to control the rest of your brain and your body. Psychotherapy methods that activate other parts of the brain are certainly available, and necessarily so, because difficult problems such as resolving long-standing trauma, changing the impact of childhood experiences, or altering dark moods such as despair, require different work than just anxiety management techniques. If your anxiety stems from a history of trauma, then you will likely need psychotherapy to release the impact of that trauma. Your anxiety may be hard to diminish or it may repeatedly return if deeper therapeutic work is not done. However, the 10 best-ever techniques presented in this book will put your left prefrontal cortex to work.

HOW THE PARTS OF THE BRAIN WORK TOGETHER TO CREATE ANXIETY SYMPTOMS

The impact of the neurotransmitters in different parts of the brain affects what kinds of anxiety symptoms you experience. Having described the neurotransmitters and the parts of the brain relevant to understanding

anxiety, I want to review briefly how it may be that you do not have a good supply of neurotransmitters. Then I will chart how symptoms of anxiety might be generated by the activity of neurotransmitters in different parts of the brain.

A person may not have enough neurotransmitters for any number of reasons. For example, you might just not have been born with a plentiful supply. You may not have enough to feel good. This is likely true when people feel they have been depressed or anxious most of their lives. Life circumstances can make that problem worse. Trauma or illness can deplete the supply of some neurotransmitters, like serotonin, or intensify levels of norepinephrine and therefore intensify the impact of the trauma or illness, which, if left untreated, can continue for years. Chronic stress uses up your extra supplies of neurotransmitters and creates a deficit while preventing the opportunity to rebuild your supply. Poor sleep and nutrition also diminish neurotransmitter supplies. So, depending on your circumstances, there could be one or many reasons your neurotransmitters get out of balance.

Take a look at the neurotransmitters, one at a time, to see how they interact with the parts of the brain to cause anxiety symptoms (Table 1.1). The neurotransmitter with the most wide-ranging impact in creating anxious symptoms is serotonin (SE). When serotonin is low, it wreaks havoc in most of the brain system. If serotonin's main function is to regulate, then losing regulation has predictable results for the calm, orderly assessment of a threat and your response to it.

Table 1.1 How Brain Structures Are Affected When Serotonin Levels Are Low

Brain Structure		Anxious Symptom
limbic system (amygdala)	→	negativity, worry, sensitivity to threat
prefrontal cortex (PFC)	→	poor planning, unable to push negativity away or find a positive frame, loss of emotional control or affect regulation
orbitofrontal cortex (OFC)	→	poor impulse control, irrational responses to problems
anterior cingulate gyrus (ACG)	→	ruminating worry, inflexible attitude

Table 1.2 How Brain Structures Are Affected When Norepinephrine Levels Are High

Brain Structure		Anxious Symptom
throughout the brain	→	general overarousal, inner jitteriness, physical and mental tension
prefrontal cortex (PFC)	→	hypervigilance, scattered thoughts
basal ganglia (BG)	→	restlessness, "wired" sensation
sympathetic nervous system	→	panic attacks or acute anxiety, sense of doom

The next neurotransmitter with powerful influence to create anxiety is norepinephrine (NE). NE is trouble primarily when it is too high. The level of NE sets a tone of tension throughout the brain and body. Like the energizer it is, NE causes small stresses to trigger big responses. Because the level of tension in an anxious person is already so high, it does not take much of a bump from NE to push their tension level over the top into panic or acute anxiety. Table 1.2 shows some of the major ways high NE can result in anxiety.

Dopamine (DA) is an interesting neurotransmitter because it has implications for anxiety when it is too low *and* when it is too high, again depending on where its message is being received. In the basal ganglia (BG) it affects pleasure, which translates into motivation. When levels are low there is an absence of good feelings. When levels are too high, DA may foster too much drive. In the prefrontal cortex DA is necessary for paying attention, so when it is low you might be inattentive, but when it is sufficient you can pay attention and focus on tasks. Dopamine can be temporarily high during a time of trauma, and during that time it contributes to the creation of powerful cues for anxiety. The very high, but temporary, levels of dopamine during crisis affect the brain differently than chronically high levels of DA. Table 1.3 summarizes the impact of high or low DA levels in different areas of the brain.

The final neurotransmitter that is very important in creating anxiety is GABA. GABA neurons are found throughout the brain in vast numbers because GABA is the brain's "stop" signal, needed to slow down the firing of neurons in your brain. It balances the effects of glutamate,

Table 1.3 How Brain Structures Are Affected When Dopamine (DA) Levels Are Low

Brain Structure		Anxious Symptom
basal ganglia		
high DA	→	high drive, high motivation, perfectionism
low DA	→	loss of interest or pleasure, low motivation
prefrontal cortex (PFC)		
temporarily high DA	→	over-focus on detail may trigger subsequent panic or acute anxiety
chronically high DA	→	psychosis or delusional states

Table 1.4 How Brain Structures Are Affected When GABA Is Ineffective

Brain Structure		Anxious Symptom
entire brain	→	agitation from glutamate imbalance exacerbates other problems caused by neurotransmitter imbalances
basal ganglia (BG)	→	heightened energy tone, panic attacks

the neurotransmitter that acts as the "go" signal. When GABA is insufficient or is not being easily received by neurons waiting for its signal to stop firing, the result is overactivity in whatever part of the brain in which GABA is not working. Table 1.4 shows the most significant disruptions from ineffective GABA.

CONCLUSION

When you feel anxious and are thinking over what to do to handle a situation, you might remember what part of your brain is contributing to that feeling or you might not. All you really need to remember is which techniques to apply to manage the symptom. The more you apply the techniques, the better chance you have of calming down your brain and decreasing the likelihood that the symptoms will continue to bother you. So read on—the 10 best-ever anxiety management techniques are in the chapters ahead!