Change Your Brain, Change Your Life

The Breakthrough Program for Conquering Anxiety, Depression, Obsessiveness, Anger, and Impulsiveness

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Looking Into Anxiety and Fear:

The Basal Ganglia

Functions of the Basal Ganglia System

- *integrates feeling and movement*
- *shifts and smoothes fine motor behavior*
- *suppresses unwanted motor behaviors*
- *sets the body's idle speed or anxiety level*
- *enhances motivation*
- *mediates pleasure/ecstasy.*

The basal ganglia are a set of large structures toward the center of the brain that surround the deep limbic system. The basal ganglia are involved with integrating feelings, thoughts, and movement, along with helping to shift and smooth motor behavior. In our clinic we have noticed that the basal ganglia are involved with setting the body's "idle speed", or anxiety level. In addition, they help to modulate motivation and are likely involved with feelings of pleasure and ecstasy. Let's look at each of these functions in more depth.

The integration of feelings, thoughts, and movement occurs in the basal ganglia. This is why you jump when you're excited, tremble when you're nervous, freeze when you're scared, or get tongue-tied when the boss is chewing you out. The basal ganglia allow for a smooth integration of emotions, thoughts, and physical movement, and when there is too much input, they tend to lock up. A patient of mine was badly burned in a motorcycle accident in San Francisco. As he lay burning on the ground, people stood nearby, frozen with fear, unable to move to help him. For years he was confounded by their actions, wondering why no one had moved to help him. "Didn't they care? Was I not worth trying to help?" he wondered. For years this man lived with both the physical pain from the accident and the emotional pain of feeling that others did not care enough to help him. He was relieved to learn a new interpretation of the situation: The intensity of emotion caused by the fiery accident had overwhelmed onlookers' basal ganglia and they had become unable to move, even though most of them probably wanted to help.

When the basal ganglia are overactive (as we have seen in the case of people with anxiety tendencies or disorders), people are more likely to be overwhelmed by stressful situations and have a tendency to freeze or become immobile (in thoughts or actions). When their basal ganglia are underactive (as we have seen in people who have attention deficit disorder (ADD)), often a stressful situation moves them to action. People with ADD are frequently the first ones on the scene of an accident, and they respond to stressful situations without fear. I know, for example, that one of my friends who has ADD is a lot quicker at responding to crises than I am (as mentioned in chapter 2, I have naturally overactive basal ganglia). I remember one situation where we were leaving a restaurant and paying the bill at the counter when the lady in front of us suddenly fell to the ground. My friend quickly went to her aid while I stood there frozen by the intensity of the situation. And I had medical training; my friend did not! I used to feel guilty about not moving quickly in those situations, but it has helped to learn that my brain just doesn't permit me to do so. The activity in my basal ganglia makes it harder to move quickly in anxiety-provoking situations.

Shifting and smoothing fine motor behavior is another basal ganglia function and is essential to handwriting and motor coordination. Again, let's use the example of attention deficit disorder. Many children and adults with ADD have very poor handwriting. The act of handwriting is difficult and often stressful for them. Their writing may be choppy or sloppy. In fact, many teens and adults with ADD print instead of writing in cursive. They find printing easier because it is not a smooth, continuous motor movement, but rather a start-and-stop motor activity. Many people with ADD also complain that they have trouble getting their thoughts out of their head and onto paper, a term called finger agnosia (the fingers cannot tell what the brain is thinking). We know that the medications that help ADD, such as the psychostimulants Ritalin, Dexedrine, or Adderall, work by enhancing the production of the neurotransmitter dopamine in the basal ganglia. These medications sometimes improve handwriting and enhance a person's ability to get his or her thoughts onto paper to an amazing extent. In addition, many people with ADD say that their overall motor coordination is improved by these medications.

Another clue about the motor control functions of the basal ganglia comes from the understanding of two other illnesses, Parkinson's disease (PD) and Tourette's syndrome (TS). PD is caused by a deficiency of dopamine within the basal ganglia system. It is characterized by a "pill rolling" hand tremor, muscle rigidity, cogwheeling (jerking, stop-and-start movements when trying to rotate a joint), loss of agility, loss of facial expression, and slow movements. Often, giving persons dopamine-enhancing drugs, such as L-dopa, significantly alleviates these symptoms, allowing smoother motor movements. The basal ganglia are also involved in suppressing unwanted motor activity. When there are abnormalities in this part of the brain, people are more at risk for Tourette's syndrome, which is a combination of motor and vocal tics (more on TS later in the chapter).

In our brain-imaging work, we have seen that the basal ganglia must also be involved in setting the body's "ideal", or anxiety, level. Overactive basal ganglia are often associated with anxiety, tension, increased awareness, and heightened fear. Underactive basal ganglia can cause problems with motivation, energy, and get-up-and-go.

Interestingly, some of the most highly motivated individuals we have scanned, such as company CEOs, have significant increased activity in this part of the brain. We theorize

that some people can use this increased activity in the form of motivation to become "movers" in society. My mother, for example, who like me has increased activity in this part of the brain, does tend to be a bit anxious, but she is a woman on the go. She plays golf four or five times a week, raised seven children without appearing stressed, and is always up "doing something" for other people. I believe that using the increased energy and drive from increased basal ganglia activity helps ward off anxiety.

Another interesting finding about this part of the brain is that the basal ganglia are likely involved in the pleasure control loops of the brain. One brain-imaging study performed by Nora Volkow's group at the Brookhaven National Laboratory in Upton, New York, looked at where cocaine and Ritalin work in the brain. Both were taken up mostly by the basal ganglia. Cocaine is an addictive substance; Ritalin, in doses prescribed for ADD, is not. The study clearly showed why. Cocaine is a powerful enhancer of dopamine availability in the brain, and it has both very fast uptake and clearance from the brain. It comes on strong in a powerful wave, and then it's gone. The user gets a high high, and when it's gone, he or she wants more. In contrast, while Ritalin also increases the availability of dopamine to the basal ganglia, its effects are less powerful and it clears from the brain at a much slower rate. Dr Volkow's group postulated that activation of the basal ganglia by cocaine perpetuates the compulsive desire for the drug. Ritalin, on the other hand, enhances motivation, focus, and follow-through, but does not give users a high or an intense desire to use more (unless at much higher doses than clinically prescribed). In fact, one of the biggest clinical problems I have with teenagers who have ADD is that they forget to take their medication.

Intense romantic love can also have a cocainelike effect on the brain, robustly releasing dopamine in the basal ganglia. Love has real physical effects. I had the opportunity to scan a close friend, Bill, shortly after he had met a new woman. He was head over heels for her. After their third date, when they spent the day at the beach in each other's arms, my friend came by my office to tell me about his newfound love. He was so happy he almost seemed to have a drug high. By coincidence, while Bill was talking, my nuclear technician came into my office and told me we had an extra dose of the isotope and could do another scan if I had someone who needed one. Since I had an earlier scan of Bill's brain as part of our normal control group, I decided we'd scan him again and get a look at the brain of new love. To my amazement, his brain looked as if he had just taken a lot of cocaine. The activity in both the right and left basal ganglia was very intense, almost to the point of resembling seizure activity. Love has real effects on the brain, as powerful as addictive drugs.

Problems with the Basal Ganglia System

- *anxiety, nervousness*
- *panic attacks*
- *physical sensations of anxiety*
- *tendency to predict the worst*
- *conflict avoidance*
- *Tourette's syndrome/tics*
- *muscle tension, soreness*
- *tremors*
- *fine motor problems*
- *headaches*
- *low/excessive motivation.*

Anxiety, Nervousness, and Panic Disorder

Excessive basal ganglia activity resets the body's ideal to a revved-up level and can make people feel anxious, nervous, tense, and pessimistic. Almost all of the patients we have treated with panic disorder whom we've scanned had heightened basal ganglia activity.

Here's one example of panic disorder.

Gary

Gary came to see me about eight years ago. He had first gone to his doctor complaining of back pain. The doctor examined Gary's back and found a tender sport over his kidneys. He asked Gary to get a kidney X ray. As soon as the doctor asked him to get his X ray, Gary's thoughts took off: "The doctor is going to find out I have cancer". (Notice the leap in logic!) But his thoughts didn't stop there. "The doctor's going to find out I have cancer. I'm going to have to have chemotherapy". Ten seconds later, he'd already put himself into treatment. "I'm going to vomit my guts out, lose all my hair, be in a tremendous amount of pain, and then I'm going to die!" His mind did this all in a span of thirty seconds. Then Gary had a panic attack. His heart began to race. His hands became ice cold. He started to hyperventilate. And he broke out in a heavy sweat. He turned to the doctor and said, "I can't have that X ray".

Bewildered, the doctor replied, "What do you mean? You came to see me to get help. I need this X ray, so I can figure out..."

Gary said, "No, you don't understand! I can't have the X ray!"

The doctor found my number, called me, and said, "Daniel, please help me with this guy".

As Gary told me this story, I knew that he had a lifelong panic disorder. Gary was also an expert at predicting the worst, which was driving his panic symptoms.

In treating Gary, I taught him the Basal Ganglia Prescriptions given in Chapter 6. I even went with him to have the kidney X rays because it was important to have it done quickly. I hypnotized him, enabling him to be calm through the procedure. He did wonderfully. He breathed in a relaxed way, and he went through the procedure without any problems - until the X-ray technician came back into the room with a worried look on his face and asked Gary which side of his body was giving him pain. Gary grabbed his chest and looked at me like "You SOB! I knew you were lying to be about this! I'm going to die!" I patted him on the leg and said, "Look, Gary, before you die, let me take a look at the X ray" (psychiatrists are also medical doctors). As I looked at his X ray I could see that Gary had a big kidney stone, which can be terribly painful - but kidney stones don't usually kill anybody! Gary's basal ganglia, which were working too hard, put him through tremendous emotional pain by causing him to predict the worst possible outcome to situations.

Basal ganglia anxiety can make pain worse. As Gary became more anxious about his pain, the anxiety signals caused his muscles to contract; the smooth muscles in the ureter (the tube from the kidneys to the bladder) contracted, clamping down on the stone and intensifying the pain. A combination of psychotherapy, Nardil (a MAO-inhibitor antidepressant with antipanic qualities), and occasional use of Valium helped Gary live a more normal life.

Anxiety-provoking situations also cause many people with overactive basal ganglia to become frozen with fear and unable to leave their homes, a condition called agoraphobia (fear of being in public). I have treated many people who have been housebound for years (one woman for forty years) because of fear of having a panic attack.

Marsha

Marsha, a critical care nurse, was forced into treatment by her husband. She was thirty-six years old when she first began experiencing panic attacks. She was in a grocery store when all of a sudden she felt dizzy and short of breath, with a racing heart and a terrible sense of impending doom. She left her cart in the store and ran to her car, where she cried for over an hour. After her first episode, the panic attacks increased in frequency to the point where she stopped going out of her house, fearing that she'd have an attack and be unable to get help. She stopped working and made her husband take the children to and from school. She was opposed to any medication, because in the past her mother, in attempting to treat her own panic attacks, had become addicted to Valium and had often been quite mean to Marsha. Marsha did not want to see herself as being in any way like her mother. She believed that she "should" be able to control these attacks. Her husband, seeing her dysfunction only worsen, took her to see a family counselor. The counselor taught her relaxation and how to talk back to her negative thoughts, but it didn't help. Her condition worsened, and her husband brought her to see me. Given her resistance to medication, I decided to order a SPECT study to evaluate Marsha and then show her her own brain function.

Her SPECT study revealed marked increased focal activity in the right side of her basal ganglia. This is a very common finding in patients who have a panic disorder. Interestingly, patients who have active seizure activity also have focal areas of increased activity in their brains. Due to the intense level of emotions associated with panic attacks, my colleagues and I wonder if the basal ganglia findings are equivalent to behavioral seizures.

The findings on her scan convinced Marsha to try medication. I put her on Klonopin, an antianxiety medication that is also used for seizure control. In a short period of time she was able to leave her house, go back to work, and resume her life. In addition to the medication, I taught her the group of Basal Ganglia Prescriptions (given later), including sophisticated biofeedback and relaxation techniques, and worked with her to correct her negative "fortune-telling" thoughts. Several years later she was able to completely stop her medication and has remained panic free.

Post-Traumatic Stress Disorder

Mark

Mark, a fifty-year-old business executive, was admitted to the hospital shortly after he tried to kill himself. His wife had just started divorce proceedings, and he felt as though his life was falling apart. He was angry, hostile, frustrated, distrusting, and chronically anxious. His coworkers felt that he was "mad all the time". He also complained of a constant headache. Mark was a decorated Vietnam veteran, an infantry soldier with over one hundred kills. He told me that he had lost his humanity in Vietnam and that the experience had made him "numb".

In the hospital, he said that he was tormented by the memories of the past. Mark had post-traumatic stress disorder (PTSD). With his wife leaving him, he felt that he had no reason to live. Due to the severity of his symptoms, along with a history of a head injury in Vietnam, I ordered a brain SPECT study. It was abnormal, showing marked increased activity in the left side of his basal ganglia, the most intense activity in that part of the brain I had ever seen.

Left-sided basal ganglia findings are often seen in people who are chronically irritable or angry. Mood stabilizers, such as lithium, Tegretol, or Depakote, can be helpful in decreasing the irritability and calming down focal "hot" areas in the brain. I placed Mark on Depakote. Almost immediately, his headaches disappeared and he began to feel calmer. He stopped snapping at everyone, and he became more able to do the psychological work of healing from his divorce and the wounds from Vietnam.

In working with Mark, I often felt that his experience in Vietnam had reset his basal ganglia to be constantly on the alert. Nearly every day for thirteen months of the war, he had had to be "on alert" in order to avoid being shot. Through the years, he had never had the chance to learn how to reset his brain back to normal. The medication and therapy allowed him to relax and feel, for the first time in twenty-five years, that he had truly left the war zone.

Conflict Avoidance

Anxiety is, by definition, very uncomfortable. Thus, people who are anxious tend to avoid any situations that make them more uncomfortable, especially dealing with conflict. People who have basal ganglia problems tend to be frozen by conflict and consequently do what they can to avoid it. Unfortunately, conflict avoidance can have a serious negative impact on your life.

Loren

Loren, the owner of a neighborhood deli, hated conflict. He also had problems with chronic feelings of tension and anxiety. Out of fear of confrontation, these problem prevented him from firing employees who were not good for his business. They also caused him to be overly nice to people who were negative to him, so Loren grew to resent his own lack of assertiveness. His problems even caused marital difficulties. For years Loren wouldn't talk about the things in his marriage that made him unhappy. He would just hold them in until he finally exploded. Learning to deal with conflict was the centerpiece of his treatment.

Betsy

In a similar way, Betsy's conflict-avoidant tendencies were ruining her career. She worked at a local oil company. Being very bright, she advanced quickly until she got to a position in which she had to deal with high-powered men who were competitive and accustomed to conflict and confrontation. Betsy reacted to these men by becoming quiet and deferential. She looked for ways to please them, in order to avoid the anxiety that she perceived would overwhelm her if open conflict were to occur. Guess what happened? She stopped dead in her career. She was unable to be assertive and express her own ideas if they differed from those of others.

Betsy initially came to see me for a severe panic disorder that prevented her from driving. Her husband and friends had to drive her everywhere because she was afraid she'd have a panic attack.

In treatment, I taught her how to deal with conflict. I taught her how to face these men and not run away from them. Subsequently she began to speak up in meetings and stand up for her positions in the company. Upper management began to pay attention to her in a positive way.

It's very important to learn ways to soothe your basal ganglia. Otherwise, the anxiety and programming from the past will rule your life.

Tourette's Syndrome (TS)

TS is a very interesting disorder that provides the bridge between the basal ganglia and two seemingly opposite disorders, attention deficit disorder (ADD) and obsessive-compulsive disorder (OCD). TS is characterized by motor and vocal tics lasting more than a year. Motor tics are involuntary physical movements such as eye blinking, head jerking, shoulder shrugging, and arm or leg jerking. Vocal tics typically involve making involuntary noises such as coughing, puffing, blowing, barking, and sometimes swearing (coprolalia). TS runs in families and may be associated with several genetic abnormalities found in the dopamine family of genes. SPECT studies of TS patients, by my clinic and others, have found abnormalities in the basal ganglia of the brain. One of the most fascinating aspects of TS is its high association with both ADD and OCD. It is estimated that 60 percent of people with TS have ADD and 50 percent have OCD. On the surface it would appear that these are opposing disorders. People with ADD have trouble paying attention, while people with OCD pay too much attention to their negative thoughts (obsessions) or behaviors (compulsions). In

looking further at patients with both ADD and OCD, I have found a high association of each disease in their family histories. So, for example, people with ADD often have relatives with OCD-like features and people with OCD have people in their families with ADD. There is even a subtype of ADD that has been termed overfocused ADD; affected people have symptoms of both inattention and overfocus.

A crash course in the neurotransmitters (chemical messengers that help the brain to function) dopamine and serotonin is necessary here. In the brain there tends to be a balancing mechanism between dopamine and serotonin. This balance tends to be tipped in the basal ganglia. Dopamine is involved with motor movements, motivation, attention span, and setting the body's idle speed. Serotonin is more involved with mood control, shifting attention, and cognitive flexibility. When something happens in the brain to raise dopamine levels, serotonin becomes less effective; and when serotonin levels are raised, dopamine becomes less effective. For example, when I give someone a psychostimulant to treat ADD, it works by effectively raising the availability of dopamine in the basal ganglia. This helps with focus, follow-through, and motivation. If I give him too much, he may become obsessive, moody, and inflexible (symptoms of too little serotonin). Likewise, if I give someone who has ADD a medication that enhances serotonin availability in the brain, such as Prozac (a selective serotonin reuptake inhibitor), his ADD symptoms are likely to become worse, but he won't care that they are worse and will also show lowered motivation.

Since the basal ganglia are involved with dopamine production (low in ADD) and shifting and suppressing motor movements (lack of smoothness or cogwheeling may result in tics) and have been found to be overactive in OCD (in conjunction with the cingulate gyrus), the basal ganglia are likely significantly involved in all three of these disorders. Blocking dopamine with certain antipsychotic medications, such as Haldol (haloperidol) and Orap (pimozide), helps to suppress tics but makes ADD symptoms worse. Psychostimulants, such as Ritalin (methylphenidate), Dexedrine (dextroamphetamine), or Adderall (a combination of amphetamine salts), help ADD symptoms but have a variable effect on tics (they may make them better or worse). In addition, as mentioned, psychostimulants tend to exacerbate OCD symptoms and cause people to focus more on the thoughts or behaviors that bother them. An interference mechanism in the basal ganglia is likely to be part of the picture, upsetting the dopamine-serotonin balance in the brain.

Fine Motor Problems

As discussed earlier, fine motor problems are often associated with basal ganglia abnormalities. We discussed handwriting problems earlier in this chapter. Another interesting connection probably related to basal ganglia activity is the development of fine motor tremors when we become anxious. When I lecture in front of an audience, I don't hold papers in my hands because the paper may start to rattle or shake in response to anxiety I feel. When the basal ganglia are overactive, we are more at risk for increased muscle tone or tremors. In my practice I have often prescribed the medication propranolol to calm the tremors musicians get during a performance.

Increased muscle tension related to overactive basal ganglia activity is often associated with headaches. I have noticed that a number of people with resistant headaches have intense focal areas of increased activity in the basal ganglia. This seems to occur with both muscle

contraction headaches (often described as a pain in the back of the neck or as a tight band around the forehead) and migraines (usually one-sided throbbing headaches that may be preceded by a visual aura or other warning phenomena). Interestingly, often anticonvulsant medication such as Depakote or Tegretol, which decreases areas of overactivity in the brain, is helpful in decreasing some types of headaches.

Low and High Motivation

As mentioned, motivation tends to be low in dopamine-deficient states, such as ADD. Interestingly, when serotonin levels are raised too high, decreased motivation also becomes a problem. Physicians know that when they overshoot the dose of serotonin-enhancing antidepressants (such as Prozac (fluoxetine), Zoloft (sertraline), Paxil (paroxetine), or Luvox (fluvoxamine)), lowered motivation is often the result. Many people have told me they stopped these medications because they stopped doing things that were important to their business or home life. One CEO told me he had stopped taking Zoloft because he wasn't keeping up with his paperwork and he really didn't care. "That's not like me", he said.

Heightened dopamine or basal ganglia states may also cause increased or even excessive motivation. As I mentioned earlier, we found that many CEOs of corporations have enhanced basal ganglia activity. They also tend to work excessive hours. In fact, weekends tend to be the hardest time for these people. During the week, they charge through each day, getting things done. On the weekend, during unstructured time, they often complain of feeling restless, anxious, and out of sorts. Relaxation is foreign to them. In fact, it is downright uncomfortable. Workaholics may be made in the basal ganglia. Their internal idle speed, or energy level, doesn't allow them to rest. Of course, there is a positive correlate. Many of the people in society who make things happen are driven by basal ganglia that keep them working for long periods of time.

Basal Ganglia Checklist

Here is a basal ganglia system checklist. Please read this list of behaviors and rate yourself (or the person you are evaluating) on each behavior listed. Use the following scale and place the appropriate number next to the item. Five or more symptoms marked 3 or 4 indicate a high likelihood of basal ganglia problems.

0 = never
1 = rarely
2 = occasionally
3 = frequently
4 = very frequently

1. Feelings of nervousness or anxiety.
2. Panic attacks.
3. Symptoms of heightened muscle tension (headaches, sore muscles, hand tremor).
4. Periods of heart pounding, rapid heart rate, or chest pain.
5. Periods of trouble breathing or feeling smothered.
6. Periods of feeling dizzy, faint, or unsteady on your feet.
7. Periods of nausea or abdominal upset.
8. Periods of sweating, hot or cold flashes, cold hands.
9. Tendency to predict the worst.
10. Fear of dying or doing something crazy.
11. Avoidance of public places for fear of having an anxiety attack.
12. Conflict avoidance.
13. Excessive fear of being judged or scrutinized by others.
14. Persistent phobias.
15. Low motivation.
16. Excessive motivation.
17. Tics.
18. Poor handwriting.
19. Quick startle reaction.
20. Tendency to freeze in anxiety-provoking situations.
21. Excessive worry about what others think.
22. Shyness or timidity.
23. Low threshold of embarrassment.

6

Mastering Fear:

Basal Ganglia Prescriptions

The following prescriptions will help you optimize and heal problems with the basal ganglia. They are based on what we have learned about the basal ganglia, as well as clinical experience with my patients. Remember, the basal ganglia are involved with integrating feelings and movement, shifting and smoothing motor behavior, setting the body's idle speed or anxiety level, modulating motivation, and driving feelings of pleasure and ecstasy.

BG Prescription 1: Kill the Fortune-telling Ants

People who have basal ganglia problems are often experts at predicting the worst. They have an abundance of fortune-telling ANTs (automatic negative thoughts). Learning to overcome the tendency toward pessimistic predictions is very helpful in healing this part of the brain. Through the years, I have met many people who tell me that they're pessimists. They say that if they expect the worst to happen in a situation, they will never be disappointed. Even though they may never be disappointed, they are likely to die earlier. The constant stress from negative predictions lowers immune system effectiveness and increases the risk of becoming ill. Your thoughts affect every cell in your body.

Learning how to kill the fortune-telling ANTs that go through your mind is essential to effectively dealing with the anxiety generated in this part of the brain. Whenever you feel anxious or tense, try the following steps.

Step 1

Write down the event that is causing you anxiety, for example, having to get up in front of people to give a speech.

Step 2

Notice and write down the autonomic thoughts that come into your mind. Odds are, when you are anxious, your thoughts are predicting a negative outcome to a situation. Common anxiety-provoking thoughts include "They will think I'm stupid. Others will laugh at me. I will stumble on my words. I will shake and look nervous".

Step 3

Label or identify the thought as a fortune-telling ANT. Often, just naming the thought can help take away its power.

Step 4

Talk back to the automatic negative thought and "kill the ANT". Write down a response to defuse the negative thought. In this example, write something like "Odds are they won't laugh and I'll do a good job. If they do laugh, I'll laugh with them. I know that speaking in public is nerve-racking for many people, and probably some people will feel empathy for me if I'm nervous".

Do not accept every thought that comes into your mind. Thoughts are just thoughts, not facts. As such, when they are based on basal ganglia anxiety, they are often inaccurate. You do not have to believe every thought that comes into your mind. You can learn to change this pattern and help your basal ganglia cool down by predicting the best things.

BG Prescription 2: Use Guided Imagery

It is important to set (or reset) your basal ganglia to a relaxed, healthy level. This is best done by a regimen of daily relaxation. Taking twenty to thirty minutes a day to train relaxation into your body will have many beneficial effects, including decreasing anxiety, lowering blood pressure, lowering tension and pain in the muscles, and improving your temperament around others. Guided imagery is a wonderful technique to use on a daily basis.

Instruction: Find a quiet place where you can go and be alone for twenty to thirty minutes every day. Sit in a comfortable chair (you can lie down if you won't fall asleep) and train your mind to be quiet. In your mind's eye, choose your own special haven. I ask my patients, "If you could go anywhere in the world to feel relaxed and content, where would you go?" Imagine your special place with all of your senses. See what you want to see; hear the sounds you'd love to hear; smell and taste all the fragrances and tastes in the air; and feel what you would want to feel. The more vivid your imagination, the more you'll be able to let yourself go into the image. If negative thoughts intrude, notice them but don't dwell on them. Refocus on your safe have. Breathe slowly, calmly, deeply. Enjoy your minivacation.

BG Prescription 3: Try Diaphragmatic Breathing

Breath slowly and deeply, mostly with your belly. This is one of the main exercises I teach my patients who have panic disorders. I actually write out a panic plan for them to carry with them. On the prescription it says: "Whenever you feel anxious or panicky, do the following:

- breathe slowly and deeply with your belly,
- kill the fortune-telling ANTs,
- distract yourself from the anxiety,
- and if the above strategies are not completely effective, take the medication I prescribe for anxiety."

Breathing is a very important part of the prescription. The purpose of breathing is to get oxygen from the air into your body and to blow off waste products such as carbon dioxide. Every cell in your body needs oxygen in order to function. Brain cells are particularly sensitive to oxygen, as they start to die within four minutes when they are deprived of it. Slight changes in oxygen content in the brain can alter the way a person feels and behaves. When a person gets angry, his or her breathing pattern changes almost immediately. Breathing becomes shallower and significantly faster. This breathing pattern is inefficient, and the oxygen content in the angry person's blood is lowered. Subsequently there is less oxygen available to a person's brain and he or she may become more irritable, impulsive, confused, and prone to negative behavior (such as yelling, threatening, or hitting another person).

Learn to breathe properly. Try this exercise.

Sit in a chair. Get comfortable. Close your eyes. Put one hand on your chest and one hand on your belly. Then, for several minutes, feel the rhythm of your breathing.

Do you breathe mostly with your chest? Mostly with your belly? Or with both your chest and belly?

The way you breathe has a huge impact on how you feel moment by moment. Have you ever watched a baby breathe? Or a puppy? They breathe almost exclusively with their bellies. They move their upper chest very little in breathing. Yet most adults breathe almost totally from the upper part of their chest.

To correct this negative breathing pattern, I teach my patients to become experts at breathing slowly and deeply, mostly with their bellies. In my office, I have some very sophisticated biofeedback equipment that uses strain gauges to measure breathing activity. I place one gauge around a person's chest and a second one around his or her belly. The biofeedback equipment measures the movement of the chest and belly as the person breathes in and out. If you expand your belly (using the diaphragm muscles there) when you breathe in, it allows room for your lungs to inflate downward, increasing the amount of air available to your body. I teach my patients to breathe with their bellies by watching their pattern on the computer screen. In about a half hour's time, most people can learn how to change their breathing patterns, which relaxes them and gives them better control over how they feel and behave.

If you do not have access to sophisticated biofeedback equipment, lie on your back and place a small book on your belly. When you breathe in, make the book go up, and when you breathe out, make the book go down. Shifting the center of breathing lower in your body will help you feel more relaxed and in better control of yourself. Practice this diaphragmatic breathing for five or ten minutes a day to settle down your basal ganglia.

This has been one of the most helpful exercises for me personally. When I first learned how to breathe diaphragmatically, I discovered that my baseline breathing rate was twenty-four breaths a minute and I breathed mostly with my upper chest. I had spent ten years in the military, being taught to stick my chest out and suck my gut in (the opposite of what is good for breathing). Quickly I learned how to quiet my breathing and help it be more efficient. Not only did it help my feelings of anxiety, it also helped me feel more settled overall. I still use it to calm my nerves before tough meetings, speaking engagements, and media appearances. I also use it, in conjunction with self-hypnosis, to help me sleep when I feel stressed. My current baseline breathing rate is less than ten times a minute.

BG Prescription 4: Try Meditation/Self-Hypnosis

There are many forms of meditation. They often involve diaphragmatic breathing and guided imagery. Herbert Benson, MD, in his classic book, *The Relaxation Response,* describes how he had his patients focus on one word, and do nothing but that for a period of time each day. If other thoughts started to distract them, they were to train their mind to refocus on that one word. He reported startling results from this simple exercise: His patients had significant decreases in blood pressure and muscle tension.

Self-hypnosis taps into a natural "basal ganglia soothing" power source that most people do not even know exists. It is found within you, within your ability to focus your concentration. Many people do not understand that hypnosis is a natural phenomenon. It is

an altered state we frequently go into and out of. Some natural examples of hypnosis include "highway hypnosis", in which our sense of time and consciousness becomes altered. Have you ever taken a long trip and not remembered a town you drove through? Or has a period of a couple of hours passed in what seemed like only twenty or thirty minutes? Time distortion is a common trait of hypnotic states. Have you ever become so engrossed in a good book or a good movie that two hours rushed by in what seemed like minutes? We become so focused that we enter a hypnotic state.

As you might imagine, because I have naturally overactive basal ganglia with a tendency toward anxiety, my medical internship year produced only more anxiety. When I worked on the cardiac intensive care unit, I had a lot of trouble getting to sleep at night because I was so anxious over the condition of the patients under my care. Being tired the next day didn't help matters much. I had learned hypnosis as a medical student, and even used it with the nursing staff to help them stop smoking and lose weight. I hadn't thought of using it on myself. Besides, I rationalized, I wasn't really very hypnotizable. Late one evening, one of my patients had problems getting to sleep. He requested a sleeping pill. I thought it might be a better idea to use hypnosis to help him sleep. He was agreeable, and it worked quickly. When I made rounds the next morning, the patient asked me what he was going to do that night when I wasn't on call. I taught him self-hypnosis and came up with several sleep prescriptions. It then dawned on me to use self-hypnosis on myself. I learned that self-hypnosis, like most things, is a skill that gets better with practice. I got to the point where I could put myself to sleep in less than one minute through a simple self-hypnotic technique. Good sleep also helps calm anxiety. Sleep deprivation makes everything worse.

Here are the easy self-hypnotic steps I use personally. Set aside two to three ten-minute periods the first day and just go through the following six steps.

Relaxation

Step 1

Sit in a comfortable chair with your feet on the floor and your hands in your lap.

Step 2

Pick a spot on a wall that is a little bit above your eye level. Stare at the spot. As you do, count slowly to twenty. Notice that in a short while your eyelids begin to feel heavy. Let your eyes close. In fact, even if the don't feel as if they want to close, slowly close them anyway as you get to twenty.

Step 3

Next, take a deep breath, as you can, and very slowly exhale. Repeat the deep breath and slowly exhale three times. With each breath in, feel your chest and belly rise and imagine breathing in peace and calmness. With each breath out, feel your chest and belly relax and blow out all the tension, all the things getting in the way of your relaxing. By this time, you'll notice a calm come over you.

Step 4

Next, tightly squeeze the muscles in your eyelids. Close your eyes as tightly as you can. Then slowly let the muscles in your eyelids relax. Notice how much more they have relaxed. Then imagine that relaxation spreading from the muscles in your eyelids to the muscles in your face - down your neck into your shoulders and arms - into your chest and throughout the rest of your body. The muscles will take the relaxation cue from your eyelids and relax progressively all the way down to the bottom of your feet.

Step 5

After your whole body feels relaxed, imagine yourself at the top of an escalator. Step on the escalator and ride down, slowly counting backwards from twenty. By the time you reach the bottom, you're likely to be very relaxed.

Step 6

Enjoy the tranquility for several moments. Then get back on the escalator, riding up. Count to ten. When you get to ten, open your eyes, feel relaxed, refreshed, and wide awake.

To make these steps easy to remember, think of the following words:

FOCUS (focus on the spot)
BREATHE (slow, deep breaths)
RELAX (progressive muscle relaxation)
DOWN (ride down the escalator)
UP (ride up the escalator and open your eyes).

If you have trouble remembering these steps, you may want to record them and do the exercise as you listen to the tape.

When you do this the first several times, allow yourself plenty of time. Some people become so relaxed that they fall asleep for several minutes. If that happens, don't worry. It's actually a good sign - you're really relaxed!

When you've practiced this technique a few times, add visual imagery:

Visual Imagery

Choose a haven - a place where you feel comfortable, a place that you can imagine with all your senses. I usually "go" to the beach. I can relax there, and it calls up beautiful imagery for me. I can see the ocean, feel the sand between my toes, feel the warm sun and breeze on my skin, smell the salt air and taste it faintly on my tongue, hear the seagulls, the waves, children playing. Your haven can be a real or imagined place. It can be anyplace you'd like to spend time.

After you reach the bottom of the escalator, imagine yourself in your very special haven. Imagine it with all of your senses for several minutes.

This is where the fun starts. After you've gone through the relaxation steps and have imagined yourself in your haven, your mind is ripe for change.

Begin to experience yourself as you want to be - not as you currently are but as you *want* to be. Plan on spending at least twenty minutes a day on this refueling, life-changing exercise. You'll be amazed at the results.

During each session, choose an idea, ideal, or feeling state to focus on. Stay with the idea, ideal, or feeling state until you can imagine yourself engulfed in it. For example, if you want to be more relaxed, see yourself in a calm state, imagining it with all your senses. See yourself relaxed. Interact with others in a positive, relaxed way. Smell the environment around you. Feel your muscles relax. Taste a warm beverage on your tongue, smell the aroma, feel the warm cup in your hands. Experience the relaxation. Make it real in your imagination, thereby beginning to make it real in your life.

If the relaxation does not come immediately, remember that self-hypnosis is not magic; it is a skill that needs attention and practice. It is well worth the effort.

Of note, I have a patient who tells me that whenever he comes out of a self-hypnotic state, his handwriting is better and he is much better coordinated overall. Sounds like basal ganglia soothing to me.

BG Prescription 5: Think About the "18/40/60 Rule"

People with basal ganglia problems often spend their days worrying about what other people think of them. To help them with this problem, I teach them the "18/40/60 Rule":

When you're eighteen, you worry about what everybody is thinking of you.

When you're forty, you don't give a damn about what anybody thinks of you.

When you're sixty, you realize nobody's been thinking about you at all.

People spend their days worrying and thinking about themselves, not you. Think about your day. What have you thought about today - what others are doing or what you have to do or want to do? Odds are you've been thinking about yourself: what you have to do that day, who you're going to be with, what your bills are, the headaches your boss or children are giving you, whether your spouse will have any affection for you, and so on. People think about themselves, not you! You need to base your thoughts and the decisions you make on your goals - not your parents' goals, not your friends' goals, and your coworkers' goals.

Worrying about what others think of them is the essence of people who have "social" phobias or those who are fearful or uncomfortable in social situations. The underlying problem is often that these people feel that others are judging them: their appearance, their clothes, their conversation, and so on.

My patients are amazed to learn that all of the energy they put into worrying about what others think of them is a total waste, energy they could more constructively put into meeting their own goals.

Did you know that one of the most common fears in America is the fear of public speaking? I have had a number of patients tell me that they failed a class in college because they refused to get up in front of the class and give a speech. That fear was based on how they felt others would judge them or their presentation. Those who have a fear of public speaking often tell themselves that people in the crowd will silently mock them or think bad things about them. The truth is, however, that probably some of the people in the audience aren't even listening to their presentation because they are thinking about their anxiety over their own presentation or about their own personal problems. The people in the audience who are listening are probably rooting for the speaker to do a good job, because they know from personal experience how hard it is to get up in front of a group of people to speak.

Stop worrying about what other think of you. Base your thoughts, your decisions, and your goals on what you want and what is important in your life. I am not advocating a self-centered life; most of us want to see ourselves in caring relationships with others and being able to be helpful to others. But you need to base your behavior on what *you* think, not on what you think others think.

BG Prescription 6: Learn How to Deal With Conflict

As with relationships between countries, peace at any price is often devastating for relationships between people. Many people are so afraid of conflict with others that they do everything they can to avoid any turmoil. This "conflict phobia" actually sets up relationships for more turmoil rather than less.

Here are four typical scenarios of people who fear conflict:

1. In an attempt to be a "loving parent", Sara finds herself always giving in to her four-year-old son's temper tantrums. She is frustrated by how much the tantrums have increased in frequency over the past year. She now feels powerless and gives in just to keep the peace.

2. Billy, a ten-year-old boy, was bullied by a bigger ten-year-old named Ryan. Ryan threatened to hurt Billy if he didn't give him his lunch money. To avoid being hurt, Billy spent the year terrified by Ryan.

3. Kelly found herself feeling very distant from her husband, Carl. She felt that he always tried to control her and treated her like a child. He would complain about how much money she spent, what she wore, and who her friends were. Even though this really bothered Kelly, she said little because she didn't want to fight. However, she found that her interest in sex was nonexistent, she often felt tired and irritable, and she preferred to spend her free time with her friends rather than with Carl.

4. Bill worked as the foreman for Chet's company for six years. Over the past four years, Chet had become increasingly critical of Bill and belittled him in front of others. For

fear of losing his job, Bill said nothing, but he became more depressed, started drinking more at home, and lost interest in his job.

Whenever we give in to the temper tantrums of a child or allow someone to bully or control us, we feel terrible about ourselves. Our self-esteem suffers, and the relationship with that other person is damaged. In many ways we teach other people how to treat us by what we tolerate and what we refuse to tolerate. "Conflict phobics" teach other people that it is okay to walk all over them, that there will be no consequences for misbehavior.

In order to have any personal power in a relationship, we must be willing to stand up for ourselves and for what we know is right. This does not mean we have to be mean or nasty; there are rational and kind ways to be firm. But firmness is essential.

Let's look at how the people in each of the four examples could handle their situations in more productive ways that would give them more power and more say in their lives.

1. Sara needs to make a rule that whenever her son throws a tantrum to get his way, he will not get what he wants, *period. No exceptions.* By giving in to his tantrums, Sara has taught her son to throw them, which not only hurts his relationship with his mother but will also teach him to be overdemanding with others and will hurt his ability to relate socially to others. If Sara can be firm, kind, and consistent, she'll notice remarkable changes in a short time.

2. By giving in to the bully, Billy taught Ryan that his intimidating behavior was okay. Standing up to him early, even if it meant being beaten up, would have been better than spending a whole year in pain. Almost all bullies pick on people who won't fight back. They use intimidation and are rarely interested in real conflict.

3. Kelly made a strategic mistake by avoiding conflict early in her relationship with Carl. By giving in to his demands early on, she taught him that it was okay for him to control her. Standing up to him after years of giving in is very difficult but essential to saving the relationship. I see many, many people who even after years of giving in learn to stand up for themselves and change their relationship. Sometimes it takes a separation to convince the other person of your resolve, but the consequences of being controlled in a marriage are often depression and a lack of sexual desire. Standing up for oneself in a firm yet kind way is often marriage-saving.

4. Bill gave up his power when he allowed Chet to belittle him in front of others. No job is worth being tormented by your boss. Yet most people find that if they respectfully stand up to their boss, he or she is less likely to walk over them in the future. If, after standing up for yourself in a reasonable way, the boss continues to belittle you, it's time to look for a new job. Being in a job you hate will take years off your life.

Assertiveness means expressing your feelings in a firm, yet reasonable way. Assertiveness does not mean becoming mean or aggressive. Here are five rules to help you assert yourself in a healthy manner:

1. Don't give in to the anger of others just because it makes you uncomfortable.

2. Don't allow the opinions of others to control how you feel about yourself. Your opinion, within reason, needs to be the one that counts.

3. Say what you mean and stick up for what you believe is right.

4. Maintain self-control.

5. Be kind, if possible, but above all be firm in your stance.

Remember that we teach others how to treat us. When we give in to their temper tantrums, we teach them that that is how to control us. When we assert ourselves in a firm yet kind way, others have more respected for us and treat us accordingly. If you have allowed others to run over you emotionally for a long time, they'll be a little resistant to your newfound assertiveness. But stick to it, and you'll help them learn a new way of relating. You'll also help cool down your basal ganglia.

BG Prescription 7: Consider Basal Ganglia Medications

Antianxiety medications are often very helpful for severe basal ganglia problems. Nervousness, chronic stress, panic attacks, and muscle tension often respond to medications when the other techniques are ineffective. There are five classes of medication helpful in treating anxiety.

Benzodiazepines are common antianxiety medications that have been available for many years. Valium (diazepam), Xanax (alprazolam), Ativan (lorazepam), Serax (oxazepam), and Tranxene (clorazepate) are examples of benzodiazepines. There are several advantages to these medications: They work quickly, they generally have few side effects, and they are very effective. On the negative side, long-term use can cause addiction. In the panic plan I discussed earlier, I often prescribe Xanax as a short-term antianxiety medication to use in conjunction with the other basal ganglia prescriptions.

BuSpar (buspirone) is often very effective in treating long-term anxiety. It also has the benefit of not being addictive. On the negative side, it takes a few weeks to be effective and it must be taken all of the time to be effective. It has been shown to have a calming effect on aggressive behavior.

Certain antidepressants, such as Tofranil (imipramine) and the MAO inhibitor Nardil (phenelzine), are especially helpful for people who have panic disorders. I have found these medications to be helpful in patients who have both limbic system and basal ganglia problems.

Focal basal ganglia abnormalities, like focal limbic system changes, are often helped with nerve-stabilizing medications, such as lithium, Tegretol, or Depakote.

The last class of medications I find helpful in severe cases of anxiety is antipsychotic medications, such as Risperdal (risperidone), Melleril (thioridazine), and Haldol (haloperidol). Because of their side effects, I usually save these medications until I have tried other options. When psychotic symptoms are present, these medications are often lifesaving.

BG Prescription 8: Watch Your Basal Ganglia Nutritionš

As mentioned in the Deep Limbic System Prescriptions chapter, what you eat has an important effect on how you feel. If your symptoms reflect heightened basal ganglia activity and anxiety, you'll do better with a balanced diet that does not allow you to get too hungry during the day. Hypoglycemic episodes make anxiety much worse. If you have low basal ganglia activity and low motivation, you will likely do better with a high-protein, low-carbohydrate diet to give yourself more energy during the day. It is also often helpful to eliminate caffeine, as it may worsen anxiety. Eliminating alcohol is often a good idea as well. Even though alcohol decreases anxiety in the short term, withdrawal from alcohol causes anxiety and places a person with anxiety at more risk for alcohol addiction.

Some herbal preparations such as kava extract and valerian root have also been reported to help anxiety and likely have a calming effect on the basal ganglia. The B vitamins, especially vitamin B_6 in doses of 100 to 400 milligrams, are also helpful. If you taken B_6 at these doses, it is important to take a B complex supplement as well. My patients have also found the scents from essential oils of chamomile and lavender to be calming.

7

Looking Into Inattention and Impulsivity:

The Prefrontal Cortex

Functions of the Prefrontal Cortex

- *attention span*
- *perseverance*
- *judgment*
- *impulse control*
- *organization*
- *self-monitoring and supervision*
- *problem solving*
- *critical thinking*
- *forward thinking*
- *learning from experience*
- *ability to feel and express emotions*
- *interaction with the limbic system*
- *empathy.*

The prefrontal cortex (pfc) is the most evolved part of the brain. It occupies the front third of the brain, underneath the forehead. It is often divided into three sections: the dorsal lateral section (on the outside surface of the pfc), the inferior orbital section (on the front undersurface of the brain), and the cingulate gyrus (which runs through the middle of the frontal lobes). The cingulate gyrus, often considered to be part of the limbic system, will be covered in its own chapter. The dorsal lateral and inferior orbital gyrus are often termed the executive control center of the brain and will be discussed together in this chapter. When necessary, I'll distinguish what is known about their function.

Overall, the pfc is the part of the brain that watches, supervises, guides, directs, and focuses your behavior. It supervises "executive functions", governing abilities such as time management, judgment, impulse control, planning, organization, and critical thinking. Our ability as a species to think, plan ahead, use time wisely, and communicate with others is heavily influenced by this part of the brain. The pfc is responsible for behaviors that are necessary for you to be goal-directed, socially responsible, and effective.

North Carolina neuropsychiatrist Thomas Gualtieri succinctly summarized the human functions of the pfc as "the capacity to formulate goals, to make plans for their executions, to carry them out in an effective way, and to change course and improvise in the face of obstacles or failure, *and to do so successfully, in the absence of external direction or structure.* The capacity of the individual to generate goals and to achieve them is considered to be an essential aspect of a mature and effective personality. It is not a social convention or an artifact of culture. It is hard wired in the construction of the prefrontal cortex and its connections."

The pfc (especially the inferior orbital pfc) helps you think about what you say or do before you say or do it. For example, if you are having a disagreement with your spouse and you have good pfc function, you are more likely to give a thoughtful response that helps the situation. If you have poor pfc function, you are more likely to do or say something that will make the situation worse. The pfc helps you problem-solve, see ahead of a situation, and through experience, choose among the most helpful alternatives. Playing a game such as chess effectively requires good pfc function.

This is also the part of the brain that helps you learn from mistakes. Good pfc function doesn't mean that you won't make mistakes. Rather, it generally means that you won't make the same mistake over and over. You are able to learn from the past and apply its lessons. For example, a student with good pfc function is likely to learn that if he or she starts a long-term project early, there is more time for research and less anxiety over getting it done. A student with decreased pfc function doesn't learn from past frustrations and may tend to put everything off until the last minute. Poor pfc function tends to appear in people who have trouble learning from experience. They tend to make repetitive mistakes. Their actions are based not on experience, but rather on the moment, and on their immediate wants and needs.

The pfc (especially the dorsolateral pfc) is also involved with sustaining attention span. It helps you focus on important information while filtering out less significant thoughts and sensations. Attention span is required for short-term memory and learning. The pfc, through its many connections within the brain, helps you keep on task and allows you to stay with a project until it is finished. The pfc actually sends quieting signals to the limbic and sensory

parts of the brain when you need to focus, and decreases the distracting input from other brain areas. When the pfc is underactive, you become more distractible (this will be discussed in detail under attention deficit disorder, below).

The pfc (especially the dorsolateral pfc) is also the part of the brain that allows you to feel and express emotions; to feel happiness, sadness, joy, and love. It is different from the more primitive limbic system. Even though the limbic system controls mood and libido, the prefrontal cortex is able to translate the workings of the limbic system into recognizable feelings, emotions, and words, such as love, passion, or hate. Underactivity or damage in this part of the brain often leads to a decreased ability to express thoughts and feelings.

Thoughtfulness and impulse control are heavily influenced by the pfc. The ability to think through the consequences of behavior - choosing a good mate, interacting with customers, dealing with difficult children, spending money, driving on the freeway - is essential to effective living, in nearly every aspect of human life. Without proper pfc function, it is difficult to act in consistent, thoughtful ways, and impulses can take over.

The pfc has many connections to the limbic system. It sends inhibitory messages that help keep it under control. It helps you "use your head along with your emotions". When there is damage or underactivity in this part of the brain, especially on the left side, the pfc cannot appropriately inhibit the limbic system, causing an increased vulnerability to depression if the limbic system becomes overactive. A classic example of this problem occurs in people who have had left frontal lobe strokes. Sixty percent of patients with these strokes develop a major depression within a year.

When scientists scan the prefrontal cortex with neuroimaging studies like SPECT, they often do two studies, one in a resting state and a second during a concentration task. In evaluating brain function, it is important to look at a working brain. When the normal brain is challenged by a concentration task, such as math problems or sorting cards, the pfc activity increases. In certain brain conditions, such as attention deficit disorder and schizophrenia, prefrontal cortex activity decreases in response to an intellectual challenge.

Problems with the Prefrontal Cortex

- *short attention span*
- *distractibility*
- *lack of perseverance*
- *impulse control problems*
- *hyperactivity*
- *chronic lateness, poor time management*
- *disorganization*
- *procrastination*
- *unavailability of emotions*
- *misperceptions*
- *poor judgment*
- *trouble learning from experience*
- *short-term memory problems*
- *social and test anxiety.*

Problems in the dorsal lateral prefrontal cortex often lead to decreased attention span, distractibility, impaired short-term memory, decreased mental speed, apathy, and decreased verbal expression. Problems in the inferior orbital cortex often lead to poor impulse control, mood control problems (due to its connections with the limbic system), decreased social skills, and decreased control over behavior.

People with pfc problems often do things they later regret, exhibiting problems with impulse control. They also experience problems with attention span, distractibility, procrastination, poor judgment, and problems expressing themselves. Situations that require concentration, impulse control, and quick reactions are often hampered by pfc problems. Test anxiety and social anxiety may be hallmarks of problems in the pfc. Tests require concentration and the retrieval of information. Many people with pfc problems experience difficulties in test situations because they have trouble activating this part of the brain under stress, even if they have adequately prepared for the test. In a similar way, social situations require concentration, impulse control, and dealing with uncertainty. Pfc deactivation often causes a person's mind to "go blank" in conversation, which naturally causes discomfort in social situations.

When men have problems in this part of the brain, their emotions are often unavailable to them and their partners complain that they do not share their feelings. This can cause serious problems in a relationship. Many women, for example, blame their partners for being cold or unfeeling, when it is really a problem in the pfc that causes a lack of being "tuned in" to the feelings of the moment.

Attention Deficit Disorder (ADD)

ADD occurs as a result of neurological dysfunction in the prefrontal cortex. As I've mentioned, when people with ADD try to concentrate, pfc activity decreases rather than increasing as it does in the normal brains of control group subjects. As such, people with ADD show many of the symptoms discussed in this chapter, such as poor internal supervision,

short attention span, distractibility, disorganization, hyperactivity (although only half the people with ADD are hyperactive), impulse control problems, difficulty learning from past errors, lack of forethought, and procrastination.

ADD has been a particular interest of mine over the past fifteen years. Of note, two of my three children have this disorder. I tell people I know more about ADD than I want to. Through the SPECT research done in my clinic, along with the brain-imaging and genetic work done by others, we have found that ADD is basically genetically inherited disorder of the pfc, due in part to a deficiency of the neurotransmitter dopamine.

Here are some of the common characteristics of ADD that clearly relate this disorder to the pfc.

The Harder You Try, the Worse It Gets

Research has shown that the more people with ADD try to concentrate, the worse things get for them. The activity in the pfc actually turns down, rather than turning up. When a parent, teacher, supervisor, or manager puts more pressure on a person with ADD to perform, he or she often becomes less effective. Too frequently when this happens the parent, teacher, or boss interprets this decreased performance as willful misconduct, and serious problems arise. One man with ADD whom I treat told me that whenever his boss puts intense pressure on him to do a better job, his performance becomes much worse, even though he really tries to do better. While it is true that almost all of us perform better with praise, I've found that it is essential for people with ADD. When the boss encourages him to do better in a positive way, he becomes more productive. In parenting, teaching, supervising, or managing someone with ADD, it is much more effective to use praise and encouragement, rather than pressure. People with ADD do best in environments that are highly interesting or stimulating and relatively relaxed.

Short Attention Span

A short attention span is the hallmark of this disorder. People with ADD have trouble sustaining attention and effort over prolonged periods of time. Their attention tends to wander and they are frequently off task, thinking about or doing things other than the task at hand. Yet one of the things that often fools inexperienced clinicians assessing this disorder is that people with ADD do not have a short attention span for everything. Often, people with ADD can pay attention just fine to things that are new, novel, highly stimulating, interesting, or frightening. These things provide enough intrinsic stimulation that they activate the pfc so the person can focus and concentrate. A child with ADD might do very well in a one-on-one situation and completely fall apart in a classroom of thirty children. My son with ADD, for example, used to take four hours to do half an hour's worth of homework, frequently getting off task. Yet if you gave him a car stereo magazine, he would quickly read it from cover to cover and remember every little detail in it. People with ADD have long-standing problems paying attention to regular, routine, everyday matters such as homework, schoolwork, chores, or paperwork. The mundane is terrible for them, and it is *not* a choice. They need excitement and interest to kick in their pfc function.

Many adult couples tell me that in the beginning of their relationship, the partner with adult ADD could pay attention to the other person for hours. The stimulation of new love helped him or her focus. But as the "newness" and excitement of the relationship began to fade (as it does in nearly all relationships), the person with ADD had a much harder time paying attention, and his or her ability to listen faltered.

Distractibility

As mentioned above, the pfc sends inhibitory signals to other areas of the brain, quieting intake from the environment so that you can concentrate. When the pfc is underactive, it doesn't adequately dampen the sensory parts of the brain, and too many stimuli bombard the brain as a result. Distractibility is evident in many different settings for the person with ADD. In class, during meetings, or while listening to a partner, the person with ADD tends to notice other things going on and has trouble staying focused on the issue at hand. People with ADD tend to look around the room, drift off, appear bored, forget where the conversation is going, and interrupt with extraneous information. Their distractibility and short attention span may also cause them to take much longer to complete their work.

Impulsivity

Lack of impulse control gets many ADD people into hot warm. They may say inappropriate things to parents, friends, teachers, supervisors, other employees, or customers. I once had a patient who had been fired from thirteen jobs because he had trouble controlling what he said. Even though he really wanted to keep several of the jobs, he would just blurt out what he was thinking before he had a chance to process the thought. Poorly thought-out decisions also relate to impulsivity. Rather than thinking a problem through, many ADD people want an immediate solution and act without the necessary forethought. In a similar vein, impulsivity causes these people to have trouble going through the established channels at work. They often go right to the top to solve problems, rather than working through the system. This may cause resentment from coworkers and immediate supervisors. Impulsivity may also lead to such problem behaviors as lying (saying the first thing that comes into your mind), stealing, having affairs, and excessive spending. I have treated many ADD people who have suffered with the shame and guilt of these behaviors.

In my lectures I often ask the audience, "How many people here are married?" A large percentage of the audience raises their hands. I then ask, "Is it helpful for you to say everything you think in your marriage?" The audience laughs, because they know the answer. "Of course not", I continue. "Relationships require tact. Yet because of impulsivity and a lack of forethought, many people with ADD say the first thing that comes to mind. And instead of apologizing for saying something hurtful, many ADD people will justify why they said the hurtful remark, only making the situation worse. An impulsive comment can ruin a nice evening, a weekend, even a whole marriage."

Conflict Seeking

Many people with ADD unconsciously seek conflict as a way to stimulate their own pfc. They do not know they do it. They do not plan to do it. They deny that they do it. And yet they do it just the same. The relative lack of activity and stimulation to the pfc craves

more activity. Hyperactivity, restlessness, and humming are common forms of self-stimulation. Another way I have seen people with ADD "try to turn on their brains" is by causing turmoil. If they can get their parents or spouses to be emotionally intense or yell at them, that might increase activity in their frontal lobes and help them to feel more tuned in. Again, this is not a conscious phenomenon. But it seems that many ADD people become addicted to the turmoil.

I once treated a man who would quietly stand behind a corner in his house and jump out and scare his wife when she walked by. He liked the charge he got out of her screams. Unfortunately for his wife, she developed an irregular heart rhythm because of the repetitive scares. I have also treated many adults and children with ADD who seemed driven to get their pets upset by playing rough with or teasing them.

The parents of children with ADD commonly report that the kids are experts at upsetting them. One mother told me that when she wakes up in the morning, she promises herself that she won't yell at or get upset with her eight-year-old son. Yet invariably by the time he is off to school, there have been at least three fights and both of them feel terrible. When I explained the child's unconscious need for stimulation to the mother, she stopped yelling at him. When parents stop providing the negative stimulation (yelling, spanking, lecturing, etc), these children decrease the negative behaviors. Whenever you feel like screaming at one of these kids, stop yourself and instead talk as softly as you can. At least in that way you're helping to break their addiction to turmoil and lowering your own blood pressure.

Another self-stimulating behavior common in people with ADD is worrying or focusing on problems. The emotional turmoil generated by worrying or being upset produces stress chemicals that keep the brain active. I once treated a women who had depression and ADD. She started each session by telling me she was going to kill herself. She noted that this would make me anxious and seemed to enjoy telling me the gruesome details of how she would do it. After about a year of listening to her, I finally figured out that she wasn't really going to kill herself, she was using my reaction as a source of stimulation for her. After getting to know her well, I told her, "Stop talking about suicide. I don't believe you'll kill yourself. You love your four children, and I can't believe you would ever abandon them. I think you use this talk as a way to keep things stirred up. Without knowing, your ADD causes you to play the game of 'Let's have a problem'. This ruins any joy you could have in your life." Initially she was very upset with me (another source of conflict, I told her), but she trusted me enough to at least look at the behavior. Decreasing her need for turmoil became the major focus of psychotherapy.

A significant problem with using anger, emotional turmoil, and negative emotion for self-stimulation is damage to the immune system. The high levels of adrenaline produced by conflict-driven behavior decrease the immune system's effectiveness and increase vulnerability to illness. I have seen evidence of this deficiency over and over with the connection between ADD and chronic infections, and in the increased incidence of fibromyalgia, chronic muscle pain thought to be associated with immune deficiency.

As noted, many folks with ADD tend to be in constant turmoil with one or more people, at home, work, or school. They seem to unconsciously choose people who are

vulnerable and pick verbal battles with them. Many mothers of children with ADD have told me that they feel like running away from home. They cannot stand the constant turmoil in their relationship with the child with ADD. Many children and adults with ADD have a tendency to embarrass others for little or no good reason, which consequently distances their "victims" from them and can result in social isolation. They may be the class clowns in school or the wisecrackers at work. *Witzelsucht* is a term the neuropsychiatric literature that characterizes "an addiction to making bad jokes". It was first described in patients who had frontal lobe brain tumors, especially on the right side.

Disorganization

Disorganization is another hallmark of ADD. It includes disorganization of physical space, such as rooms, desks, book bags, filing cabinets, and closets, as well as disorganization of time. Often when you look at work areas of people with ADD, it is a wonder they can work there at all. They tend to have many piles of "stuff"; paperwork is often hard for them to keep straight; and they seem to have a filing system that only they can figure out (and then only on good days). Many people with ADD are chronically late or put things off until the last possible minute. I've had several patients who have bought sirens from alarm companies to help them wake up. Imagine what their neighbors thought! They also tend to lose track of time, which contributes to lateness.

Start Many Projects, but Finish Few

The energy and enthusiasm of people with ADD often push them to start many projects. Unfortunately, their distractibility and short attention span impair their ability to complete them. One radio station manager told me that he had started over thirty special projects the year before but completed only a handful. He told me, "I'm always going to get back to them, but I get new ideas that get in the way". I also treat a college professor who told me that the year before he saw me he had started three hundred different projects. His wife finished the thought by telling me he had completed only three.

Moodiness and Negative Thinking

Many people with ADD tend to be moody, irritable, and negative. Since the pfc is underactive, it cannot fully temper the limbic system, which become overactive, leading to mood control issues. In another subtle way, as mentioned, many people with ADD worry or become overfocused on negative thoughts as a form of self-stimulation. If they cannot seek turmoil from others in the environment, they seek it within themselves. They often have a "sky is falling" attitude that distances them from others.

ADD used to be thought of as a disorder of hyperactive boys who outgrew it before puberty. We now know that most people with ADD do not outgrow the symptoms of this disorder and that it frequently occurs in girls and women. It is estimated that ADD affects seventeen million Americans.

Kent

Kent was twenty-four years old when he first came to see me. He came for help because he had gone to junior college six straight semesters. He hadn't been able to finish one class! He wanted to go to medical school. Everybody told him he was nuts! How could he go to medical school if he couldn't even finish a junior college semester? Then his mother read my book *Windows into the ADD Mind.* She wondered if Kent didn't have attention deficit disorder.

After I took Kent's history, it was clear he has suffered from an undiagnosed lifelong case of ADD. From the time he had been in kindergarten, he had had problems staying in his seat; he had been restless, distractible, disorganized, and labeled as an underachiever.

Kent's father requested that we do a brain SPECT study to look at his brain. He wanted to make sure Kent wasn't just looking for another excuse as to why he was failing in life. Kent's brain SPECT study at rest was normal. When Kent tried to concentrate, however, the prefrontal cortex of his brain turned off.

After the results of the clinical examination and brain SPECT studies, I put Ken on Adderall, a stimulant medication that is used to treat symptoms of ADD. Kent had a remarkable response. He completed all of his classes at school the next semester. In eighteen months he got his associate of arts degree, and three years later he finished his bachelor's degree in biology. He has been accepted to medical school! I did a follow-up study of Kent's brain on Adderall several months after starting the medication. Not only did he have a positive clinical response, he also had significant increased activity in the prefrontal cortex.

It's amazing how much his father's attitude has changed toward him. The father told me, "I thought he was just lazy. It makes me sad to think of all those years that he had a medical problem and I just hassled him for being lazy. I wish I could have those years back."

I have one man in my practice who has ten businesses because that's what he needs in order to keep himself turned on! When the brain is underactive, it's uncomfortable. Unconsciously, people learn how to turn it on, by conflict, coffee or cigarettes (both mild stimulants), anger, a fast-paced life, or highly stimulating physical activities, such as bungee jumping. (Bungee jumpers need to be screened for this problem!)

ADD in the Family

Many psychiatric disorders are now thought to have significant genetic influences. ADD is no exception. Here's a family case example.

Paul, age twenty, first came to see me because he was having trouble finishing his senior year at college. He was having difficulty completing term papers, he could not focus in class, and he had little motivation. He began to believe that he should drop out of school and go to work for his father. He hated the idea of quitting school so close to graduation. While I was writing up his history, Paul told me about bouts of depression that had been treated with Prozac in the past with little benefit. Paul's brain SPECT study showed increased activity in his limbic system (consistent with depression) and deactivation of his prefrontal

cortex during a concentration task (consistent with ADD). He had a wonderful response to a combination of an antidepressant and a stimulant medication. He finished college and got the kind of job he wanted.

When Paul's mother, Pam, saw his good response to treatment, she came to see me for herself. As a child, she had had trouble learning. Even though she was very artistic, she had little motivation for school and her teachers labeled her as an underachiever. As an adult, Pam went back to school and earned a degree in elementary school teaching. In order to student teach, however, she had to pass the National Teacher's Exam. She had failed the test on four occasions. Pam was ready to give up and try a new avenue of study when she saw Paul get better. She thought maybe there was help for her. In fact, her brain SPECT studies were similar to Paul's studies, and she responded well to the same combination of medications. Four months later, she passed the National Teacher's Exam.

With two successes in the family, the mother then sent her teenage daughter, Karen, to see me. Like her brother, Karen was a bright child who had underachieved in school. At the time she came to see me, she lived in Los Angeles and was enrolled in a broadcast journalism course. She complained that learning the material was hard for her. She was also moody, restless, easily distracted, and impulsive, and had a quick temper. Several years earlier she had been treated for alcohol and amphetamine abuse. She said that the alcohol settler her restlessness and the amphetamines helped her to concentrate. Karen's brain SPECT studies were very similar to her brother's and mother's. Once on medication, she was amazed at the difference. She could concentrate in class and finished her work in half the time it had taken before. Karen's level of confidence increased to the point where she could look for work as a broadcaster, something she had been unable to do previously.

The most reluctant member of the family to seem me was the father, Tim - even though Pam, Paul, and Karen told him that he should. He said, "There's nothing wrong with me; look at how successful I am". But his family knew different. Even though Tim owned a successful grocery store, he was reclusive and distant. He got tired early in the day, was easily distracted, and had a scattered approach to work. His success at work was due in part to his good employees, who made his ideas happen. He also had trouble learning new games, such as cards, which caused him to avoid certain social situations. Tim enjoyed high-stimulation activities, such as riding motorcycles, even at the age of fifty-five. Looking back, Tim had done poorly in high school. He had barely gotten through college even though he had a very high IQ. He had tended to drift from job to job until he was able to buy the grocery store. Tim's wife finally convinced him to see me. She was getting ready to divorce him because she felt that he didn't care about her. He later told me that he was too physically and emotionally drained to share much of his life with her.

During our first session, Tim told me that he couldn't possibly have ADD because he was a success in business. But the more questions I asked him about his past, the more lights went on in his mind. His childhood nickname had been "Speedy". He often hadn't done his homework. He had often been distracted or bored in school. His energy was gone by the end of the morning. When I asked about his organization at work, he replied that her name was Elsa, his assistant. At the end of the interview, I commented, "If you really do have ADD, I wonder how successful you could be given what you've already accomplished". Tim's brain SPECT studies showed the classic pattern for ADD. When he tried to concentrate, the

prefrontal cortex of his brain turned off, rather than on. When I told him this, it really sank in. "Maybe that's why it is hard for me to learn games. When I'm in a social situation and I'm pressed to learn or respond, I just freeze up. So I avoid these situations".

Tim had a remarkable response to Ritalin. He was more awake during the day, he accomplished more in less time, and his relationship with his wife dramatically improved. In fact, they both said they couldn't believe that their relationship could be so good, after all the years of distance and hurt.

Psychotic Disorders

Psychotic disorders, such as schizophrenia, affect a person's ability to distinguish reality from fantasy. These disorders are complex and involve several brain areas, but at least in part, the neurotransmitter abnormalities cause decreased prefrontal cortex activity.

Schizophrenia is a chronic, long-standing disorder characterized by delusions, hallucinations, and distorted thinking. When I first started ordering SPECT studies on schizophrenic patients, I began to understand why they distorted incoming information. The following case is a good example.

Julie

Julie was forty-eight years old when we met. She had a history of hospitalization for paranoid thinking, hearing voices, and delusional thinking. Her main delusion centered around being assaulted by someone who put an electrical probe inside her head that "blasted her with electricity". She had been on multiple medication trials without success. Due to her lack of responsiveness to standard treatments, I ordered a brain SPECT study.

In a sense, Julie was right. She *was* being blasted with electricity (note the multiple hot spots across her brain), but because she had such poor prefrontal cortex activity, she was unable to process the physiological nature of her illness and developed delusions to explain the pain she experienced. With the information from the SPECT study, Julie was placed on a high therapeutic dose of Depakote, which lessened her pain and anxiety. For the first time, she was willing to entertain the possibility that her symptoms were the result of abnormal brain activity rather than an outside attack. A repeat SPECT study eight months later showed a marked decrease in the hot spots in her brain along with subsequent increased activity in her prefrontal cortex.

Derrick

Derrick, a thirteen-year-old boy, was brought to see me because he was severely anxious. He was displaying psychotic symptoms, feeling that other children were talking about him behind his back and that they were out to embarrass him in front of his whole school. He started to avoid all contact with his peer group. He would hide in the middle of clothes racks at the mall if he saw people he knew, for fear they might laugh at him or talk about him to others. He was petrified by his thoughts and stopped going to school. He even seriously entertained the idea of suicide. He had crying spells, sleeplessness, and intense anxiety. He wasn't able to rationally discuss any of these feelings. I saw him for months in

psychotherapy and tried him on several antidepressant and antipsychotic medications without a therapeutic response. A SPECT scan was done when he was off all medication to help us understand what was going on.

Derrick's SPECT study showed marked decreased activity in his prefrontal cortex at rest, a common finding in psychotic disorders. It is also a finding in some psychotic depressions. The study led me to try alternative medications that were more effective. Within two months there was a dramatic clinical improvement in his condition. His mood was better, he had no suicidal thoughts, he was less sensitive to others, and he was more able to entertain alternatives to his distorted thoughts. Seven months later, he was much more like a normal teenager. A repeated SPECT study performed six months later showed normalization of his prefrontal cortex activity. Six years later, I see Derrick every six months. He is an honors student at a highly prestigious university.

The SPECT study was very important in the treatment process. It clearly showed Derrick's parents that his problems were based on brain abnormalities and that he couldn't help what he thought or felt. They were able to respond in a more understanding and helpful manner, lowering the level of stress at home.

Head Injuries

Due to its location, the pfc is especially susceptible to head injury. Many people do not fully understand how head injuries, sometimes even "minor" ones in which no loss of consciousness occurs, can alter a person's character and ability to learn. This is particularly true when the head injury occurs in the brain's executive director, or pfc. Your brain is very soft. Your skull is very hard. Your brain sits in a closed space that has many sharp edges. Unfortunately for the pfc, the inferior orbital cortex sits on top of several sharp, bony ridges, and the dorsal lateral prefrontal cortex lies just beneath the place where many blows to the head occur.

It is important to note that many people forget they've had a significant head injury in their lifetime. In our clinic we ask patients several times whether or not they have had a significant head injury. Our intake paperwork asks the question "Have you ever had a head injury?" The historian, who gathers patients' histories before they see the physician, asks them again about head injuries. The computer testing we have patients complete asks a third time about head injuries. If I see *no, no, no* to the question of head injuries, I'll ask again. If I get a fourth no, I will then say, "Are you sure? have you ever fallen out of a tree, fallen off a fence, or dove into a shallow pool?" I am constantly amazed at how many people remember head injuries that they'd long forgotten or felt were too insignificant to remember. One patient, when asked the question for the fifth time, put his hand on his forehead and said, "Oh yeah! When I was five years old, I fell out of a second-story window". Likewise, I have had other patients forget they went through windshields, fell out of moving vehicles, or were knocked unconscious when they fell off their bicycles.

Head injuries are very important. I often tell my patients that their brain is more sophisticated than any computer we can think of designing. You can't drop a computer without the potential of causing serious damage. In the same way, the brain is fragile, and if

trauma occurs in sensitive parts of the brain, it has the potential to alter one's ability to function.

Phineas P Gage provided scientists with an extreme example of pfc dysfunction secondary to a head injury. This was one of the first cases in the medical literature about the outcome of prefrontal cortex damage. In 1848, at the age of twenty-five, Gage was an up-and-coming railroad construction foreman in Vermont working for the Rutland and Burlington Railroad. His job involved using a long tamping iron to ignite explosives to forge a path for the railroad. One day a horrible accident occurred; the explosion sent the tamping iron, which was 1.25 inches in diameter, 3.5 feet long, and weighed 13.5 pounds, through the front part of Gage's skull. It went through his left eye, through the left prefrontal cortex, and out the top front part of his skull, leaving a circular 3.5-inch opening, destroying his left prefrontal cortex and surrounding areas of the brain. Initially the interest in the case was due to Gage's survival, which was called "unprecedented in surgical history". Later, in 1868, his physician turned his attention to the personality changes in Gage. Before the accident, Gage had been an honest, reliable, deliberate person and a good worker. After the accident, even though he did not appear to suffer any intellectual impairment, he was described as childish, capricious, and obstinate, showed poor judgment, used profane language, and was inconsiderate of others. In short, his physician concluded that "Gage was no longer Gage". In many ways, the pfc contains our ability to be ourselves.

Zachary

The two following cases provide modern-day examples similar to that of Gage.

Zachary, age ten, was a fun-loving, active boy who was loving, sweet, and eager to please. He did well in kindergarten and was liked by the other children. One summer, between kindergarten and first grade, Zachary was riding in the front seat of a car with his mother on a trip to his grandparents' house. All of a sudden a drunk driver swerved into their lane, causing Zachary's mother to quickly jerk the car to the side of the road. She lost control, and the car hit a tree. Zachary's mother's leg was broken in the accident, and Zachary, thankfully restrained by a seat belt, hit his head against the side window. He was unconscious, but only for about ten minutes.

About six weeks later, Zachary began to change. He exhibited aggressive behavior, breaking his own toys and hurting his younger brother. He began swearing, blurted out statements at inappropriate times, and interrupted frequently. He became rude, contrary, argumentative, and conflict-seeking. He lost his friends at school the next year because he said things that hurt their feelings. He started to tease the two cats at home, so much so that they started to avoid him whenever he came into the house. Six months after the accident, his mother knew that something was seriously wrong. She took him to a counselor, who thought the problem was psychological, a result of the accident. The counselor thought that Zachary and his mother were too close and developed strategies to help Zachary become more independent. That only seemed to make things worse. After two years of counseling, which didn't seem to help much, the mother consulted Zachary's pediatrician. He diagnosed Zachary with ADD and put him on Ritalin. But that didn't help very much either. In fact, it only seemed to make him more aggressive. When Zachary was brought to see me at age nine, I though he might have a chronic post-concussive syndrome, secondary to the accident. His

brain SPECT study revealed marked decreased activity in the left pfc and decreased activity in the left occipital cortex, indicating both a front and back injury (common in head injuries. In addition, there was decreased activity in his left temporal lobe. Given this constellation of findings, I put Zachary on a combination of medication (an anticonvulsant, to stabilize his aggressiveness and help his temporal lobe function, and amantadine (Symmetrel) to help with focus, concentration, and impulse control). He was also placed in a special class at school and given cognitive retraining exercises. Over the next several months, his behavior began to improve.

Tim

Tim, age fifteen, was a high school sophomore. From his early youth he had exhibited several severe conduct problems. He was hyperactive, impulsive, moody, and frequently angry, especially whenever someone would tell him no. His temper flared quickly, often over minor or trivial incidents. He had already been arrested for shoplifting, he frequently cut school, and he was defiant and abusive toward his parents. He did not get along with other teens at school and seemed to "never fit in". He smoked a pack of cigarettes a day and frequently used marijuana and cocaine. He had already been in one treatment program and was on his way to a second when his parents brought him to our clinic. He had tried numerous medications without success.

His brain SPECT study showed one of the most severe cases of damage to the left prefrontal cortex that I have ever seen. When he was eighteen months old, he had fallen down a flight of stairs. His mother said he had never been quite the same since then. She knew there was a difference in his personality. Given the level of functional damage to Tim's brain, I decided to put him on a combination of an anticonvulsant medication and a stimulant. It helped lessen the rage and improve his impulse control. Given the level of damage, Tim's chance to gain full executive function are not very promising. The goal of treatment is to utilize every prescription available to help him develop auxiliary internal supervision mechanisms. Otherwise, legal authorities may have to impose external supervision in some form of a contained setting, basically through no fault of Tim's. He doesn't have the capacity for internal supervision that is housed in the prefrontal cortex.

Understanding the functions and problems of this part of the brain is often essential to the healing process of people who suffer.

Prefrontal Cortex Checklist

Here is the prefrontal cortex checklist. Please read this list of behaviors and rate yourself (or the person you are evaluating) on each behavior listed. Use the following scale and place the appropriate number next to the item. Five or more symptoms marked 3 or 4 indicate a high likelihood of prefrontal cortex problems.

0 = never
1 = rarely
2 = occasionally
3 = frequently
4 = very frequently

1. Inability to give close attention to details or avoid careless mistakes.
2. Trouble sustaining attention in routine situations (homework, chores, paperwork, etc).
3. Trouble listening.
4. Inability to finish things, poor follow-through.
5. Poor organization of time or space.
6. Distractibility.
7. Poor planning skills.
8. Lack of clear goals or forward thinking.
9. Difficulty expressing feelings.
10. Difficulty expressing empathy for others.
11. Excessive daydreaming.
12. Boredom.
13. Apathy or lack of motivation.
14. Lethargy.
15. A feeling of spaciness or being "in a fog".
16. Restlessness or trouble sitting still.
17. Difficulty remaining seated in situations where remaining seated is expected.
18. Conflict seeking.
19. Talking too much or too little.
20. Blurting out of answers before questions have been completed.
21, Difficulty awaiting turn.
22. Interruption of or intrusion on others (eg, butting into conversations or games).
23. Impulsivity (saying or doing things without thinking first).
24. Trouble learning from experience; tendency to make repetitive mistakes.

8

Becoming Focused:

Prefrontal Cortex Prescriptions

The prefrontal cortex is the most evolved part of the bran. As such, it is essential in helping you reach your goals. To review, the prefrontal cortex is involved with concentration, attention span, judgment, impulse control, and critical thinking. It controls your ability to look

at situations, organize your thoughts, plan what you want to do, and carry out your plans. Healing this part of the brain requires the development of a concept I call "total focus".

PFC Prescription 1: Develop and Maintain Clear Focus (The One-Page Miracle)

Developing an ability to stay totally focused will help guide your thoughts and behavior and give you an "auxiliary prefrontal cortex". It will help strengthen the conscious part of your mind.

In order to be successful in the world, we need to have clearly defined goals. Specifically, we need to know who we are and what we want to accomplish in our relationships, at work, and within ourselves. When we know what we want, we are more likely to change our behavior to get it. Being goal-directed helps keep our behavior on track.

When I first mention goal setting to my patients, they generally look at me with blank stares or mutter something vague about a career or money. Goal setting is not for some far-off dream. It is for now, and it is very specific. Making goals that you can focus on daily will make a big difference in your life.

I have my patients, whether they are six or seventy-five years old, do a goal-setting exercise I developed called the One-Page Miracle (OPM). In studying successful children and adults, I have found that the one thing they have in common in a sense of personal responsibility and clear goals. The One-Page Miracle will help guide nearly all of your thoughts, words, and actions. I've seen this exercise quickly focus and change many people.

Here's how to develop your own OPM. Take one sheet of paper and clearly write out your major goals. Use the following main headings: Relationships, Work, Money, and Myself. Under "Relationships", write the subheadings spouse/lover, children, extended family, and friends. Under "Work", write current and future work goals, and include a section on how you want to get along with your employer. Under "Money", write your current and future financial goals. Under "Myself", write out body, mind, spirit, and interests.

Next to each subheading, clearly write out what's important to you in that area; write what you want, *not* what you don't want. Be positive and write in the first person. Keep a copy with you for several days so you can work on it over time. After you finish the initial draft (you'll want to update it frequently), place this piece of paper where you can see it every day, such as in your briefcase, on your refrigerator, by your bed, or on the bathroom mirror. In that way, every day you can focus your eyes on what's important to you. This makes it easier for you to supervise yourself and to match your behavior to get what you want. Your life will become more conscious, and you will spend your energy on goals that are important to you.

I separate the areas of relationships, work, money, and self in order to encourage a more balanced approach to life. We burn out when our lives become unbalanced and overextended in one area at the expense of others.

Here is an actual example of an OPM I did with one of my patients who had a prefrontal cortex injury. Jarred was married with three children, and he was an attorney in private practice. Since the injury he had significant impulse control problems and spent excessive time at work, which were the reasons he came to see me.

After you look at the example, fill out an OPM for yourself. After you complete this exercise, put it up where you can see and read it every day. It is a great idea to start the day off by reading the OPM to get focused for the day.

Jarred's One-Page Miracle
What Do I Want for My Life?

Relationships

Spouse: A close, kind, caring, loving partnership with my wife.

Children: To be a firm, kind, positive force in my children's lives. To be continually present in their lives in a way that enhances their development as responsible, happy people.

Extended Family: To continue to keep close contact with my parents and siblings, to provide support and love.

Friends: To take time to maintain and nurture my friendships.

Work (To be the best attorney I can be)

To have the best business possible, while maintaining a balanced life. Specifically, my work activities focus on spending time taking care of my current clients, doing activities to obtain new clients, and giving back by doing some pro bon work each month. I will focus on my goals at work and not get distracted by things not directly related to my goals.

Money (Money is for needs, wants, and security)

Short term: To be thoughtful of how our money is spent, to ensure it is directly related to my family's and my needs and goals.

Long term: To save 10 percent of everything I earn. I pay myself and my family before other things. I'll put away $2.500 each month in pension plan, giving me the desired results of $5.000 per month after the age of sixty-five.

Myself (To be the healthiest person I can be)

Body: To take care of my body on a daily basis.

Mind: To feel stable, positive, and grateful, to live in a way that makes me feel proud.

Spirit: To live close to God and be the kind of person He would want me to be.

Teach yourself to be focused on what's important to you. This auxiliary prefrontal cortex will help you keep your life on track.

PFC Prescription 2: Focus on What You like a Lot More than What You Don't like

The prefrontal cortex is intimately involved with focus, concentration, and attention span. What we attend to and focus on has a very significant impact on how we feel and act day to day. As I mentioned, many people with pfc challenges, especially people with ADD, tend to be conflict-driven as a way to "turn on" prefrontal cortex activity. Unfortunately, this behavior has many negative side effects, especially on relationships and immune system functioning. Focusing on what you like about your life and on what you like about others is a powerful way to keep your prefrontal cortex healthy.

To that end, I collect penguins. I have six hundred of them in my office, everything that you could imagine in penguin, including a penguin weather vane, penguin clocks, pens, pencils, puppets, dolls, watches, ties, a penguin sewing kit, a penguin vacuum cleaner, and even a pair of penguin boxer shorts given to me by a nine-year-old patient. I know this might sound a bit odd, but I tell people that given that I'm a psychiatrist I'm allowed to be a bit odd. My friends and family have an easy time buying for me at Christmas. Let me tell you why I collect penguins and how they relate to the prefrontal cortex.

While I was doing my fellowship in child and adolescent psychiatry, my family and I lived in Hawaii. When my son was seven years old, I took him to a marine life educational and entertainment park for the day. We went to the killer whale show, the dolphin show, and finally the penguin show. The penguin's name was Fat Freddie. He did amazing things: He jumped off a twenty-foot diving board; he bowled with his nose; he counted with his flippers; he even jumped through a hoop of fire. I had my arm around my son, enjoying the show, when the trainer asked Freddie to get something. Freddie went and got it, and he brought it right back. I thought, "Whoa, I ask this kid to get something for me, and he wants to have a discussion with me for twenty minutes, and then he doesn't want to do it!" I knew my son was smarter than this penguin.

I went up to the trainer afterward and asked, "How did you get Freddie to do all these really neat things?" The trainer looked at my son, and then she looked at me and said, "Unlike parents, whenever Freddie does anything like what I want him to do, I notice him! I give him a hug, and I give him a fish." The light went on in my head. Whenever my son *did* what I wanted him to do, I paid little attention to him, because I was a busy guy, like my own father. However, when he *didn't* do what I wanted him to do, I gave him a lot of attention because I didn't want to raise a bad kid! I was inadvertently teaching him to be a little monster in order to get my attention. Since that day, I have tried hard to notice my son's good acts and fair attempts (although I don't toss him a fish, since he doesn't care for them) and to downplay his mistakes. We're both better people for it.

I collect penguins as a way to remind myself to notice the *good* things about the people in my life a lot more than the bad things. This has been so helpful for me as well as for many of my patients. It is often necessary to have something that reminds us of this prescription. It's not natural for most of us to notice what we like about our life or what we

like about others, especially if we unconsciously use turmoil to stimulate our prefrontal cortex.

Focusing on the negative aspects of others or of your own life makes you more vulnerable to depression and can damage your relationships.

Jamie

Let me give you a clear example of how powerfully this prescription can work. Seven years ago I met Jamie, a fourteen-year-old teenager who was admitted to the hospital after a suicide attempt. She had tried to kill herself because she was doing so poorly in school and couldn't keep up academically with her friends. On the night of her suicide attempt, she had a terrible fight with her mother, who berated her poor performance in school. Jamie had a family history of depression on her father's side, and her mother had many ADD symptoms (although her mother refused to be evaluated and treated for it). Jamie felt sad and had a tendency to look at the negative side of things. She was also disorganized, had lifelong trouble focusing on her schoolwork, and was impulsive. She was diagnosed with depression and ADD. Jamie's SPECT study showed decreased pfc activity and increased limbic activity. I started her on medication (which over time became a combination of Prozac and Ritalin) and began seeing her in psychotherapy. Over several months, Jamie's condition significantly improved. Her mood was better. School was easier for her. She had better frustration tolerance and impulse control. Our initial weekly visits after leaving the hospital turned into every two weeks and then monthly by the end of the first year. She maintained good stability, except for one area of her life: She continued to fight with her mother.

Two years after I began seeing Jamie, she came into my office and burst into tears. "I just can't stand my mother", she started the session. "All she does is pick on me and try to get me upset. I know you've told me not to react to her, but I can't help it. She knows every button on my body". As she finished telling be about her latest fight with her mother, she looked around my office and asked, "Dr Amen, how come a grown man collects penguins?" A bit amazed, I asked, "You've just noticed the penguins? After two years?" I then told her the story about Fat Freddie. Then I taught her about the concept of *behavioral shaping*, what the trainer had done to get Fat Freddie to be a star performer. I told her, "Let me teach you how to shape the behavior of your mother. Every time your mother is inappropriate to you, conflict-seeking toward you, rude, or mean to you, I want you to keep quiet and not react".

"Oh, Dr Amen", she said, "I don't know if I can do that. I've tried".

I replied, "I know, but I want you to try with this new understanding. And every time your mother is appropriate with you, listens to you, and is helpful to you, I want you to put your arms around her and tell her how much you love and appreciate her". Jamie said she would try her best.

When she came back a month later, she told me that she had had the best month she had ever had with her mother. Her mother had yelled at her only once, and she hadn't reacted. And she had given her mother a lot of hugs. "I think I get what you're teaching me, Dr Amen", she said with a smile. "I have power to help things or make things worse. Even

though I'm not responsible for how my mom acts, I have a big influence on the situation". I was proud of Jamie. She had learned that by focusing on what she liked about her mother a lot more than on what she didn't like, she could have a positive impact on a negative situation. I taught her not to be a victim of her mother, but to use her own positive power in the situation.

PFC Prescription 3: Have Meaning, Purpose, Stimulation, and Excitement in Your Life

Meaning, purpose, stimulation, and excitement in your life help prevent shutdown and encourage you to focus by activating your prefrontal cortex. As I mentioned, in my clinical practice I treat my patients with ADD. One of the most interesting parts of the disorder is that there is often an inconsistency of symptoms. People with ADD often struggle with routine, mundane activities. However, when they are engaged in interesting, exciting, stimulating tasks, they often excel. A very important prescription I give my patients is to ensure that they have positive meaning and stimulation in their lives, whether it is in their work, their relationships, or their spirituality. It can make all the difference between success and chronic failure. A man with ADD in a boring job he dislikes is likely to need more medication to be effective. If he is in a job that excites and motivates him, he is likely to need less medication. The situation will provide the stimulation. Let me give you an example.

Seth

Seth, a very successful owner of several video outlets in the Bay Area, came into my office feeling very frustrated. He had had a nice response to treatment for his ADD, so I wondered what had gone wrong. "Doc", he started, "I just feel like I have a bad character. I must be a bad person. I try and try to get my paperwork done, but I just can't bring myself to do it. It bores me literally to tears. Even with the medication and therapy, I still can't get it done". I asked for more information. "I sit down to do it", he continued, "when the meds are fully effective, and I just stare at my paperwork. I don't know what holds me back", "Seth", I replied, "it may have nothing to do with character. You are a loving husband and father, you have a successful business that gives jobs to lots of people, and you care about others. Maybe what you have is a paperwork disability. Many people with ADD excel at things they like to do and are terrible at things that provide little motivation, like paperwork. Maybe you need to hire someone to do the paperwork. That will leave you more time to grow the business further".

What Seth said next hit the mark. "That makes perfect sense to me. When I was a teenager, I loved to sail. But I never wanted to go out when the water was calm. I waited for the storm warnings to come up before I went out. During the storm I would be scared to death and wondered why I would do such a crazy thing. But when the storm was over and I got back to shore, I couldn't wait to go out again. It was the excitement and stimulation that motivated me".

Seth hired someone to do his paperwork. His business grew as he spent more time on the things he did best.

PFC Prescription 4: Get Organized; Get Help When You Need It

People who have pfc difficulties often have problems with organization. Learning organizational skills can be very helpful. Day planners and computer organizational programs can be lifesaving. It is also important to know your limitations and, when possible, surround yourself with people who can help organize you. These people can be intimately involved with your life, such as a spouse or friend, or they can be people who work for you. The most successful people I have seen who have ADD or other prefrontal cortex problems are those people who have others help them with organization. Don't be embarrassed to ask for help.

Here are some tips to help with organization:

- Set clear goals for your life (as mentioned in pfc Prescription 1) in the following areas: relationships (spouse/lover, children, family, and friends), work, money, physical health, emotional health, and spirituality. Then ask yourself every day, "Is my behavior getting me what I want?" This critical exercise will help you stay on track in your life. Manage your time in a way that is consistent with the goals you have for your life.

- Take the extra time to organize your work area on a regularly scheduled basis. Devote some time each week to organization. Otherwise procrastination will take over.

- Keep up with the paperwork or have someone do it for you.

- Prioritize your projects.

- Make deadlines for yourself.

- Keep TO DO lists, and revise them on a regular basis.

- Keep an appointment and planning book with you at all times.

- Use a portable cassette recorder to help you remember ideas throughout the day.

- Break down overwhelming tasks into small tasks. This happens on assembly lines every day. Remember, "A journey of a thousand miles begins with one step".

- Do unpleasant tasks first. That way, you'll have the more pleasurable ones to look forward to. If you save the unpleasant tasks for last, you'll have little incentive to get to them.

- Use file folders, desk organizers, and labeled storage boxes to organize your paperwork.

- Hire a professional organizer to help you get and stay organized.

When my son with ADD was sixteen years old, I hired a professional organizer to help him. He didn't want to listen to me (what did I know - I was only his dad). She was a gifted woman who helped him immensely. She organized his room with him, as well as his book bag

for school, his assignment book, and his study schedule. She helped him set up systems, and then she came back once a month to work with him and help him maintain what he learned. Today he is good with organization. Like many people with ADD, it's not natural for him, but he has the basics down and he is not a victim of his tendencies toward disorganization.

PFC Prescription 6: Consider Brain-Wave Biofeedback Training

I've discussed ADD as primarily a problem in the prefrontal cortex. Medication is the cornerstone of the "biological" treatments for ADD, but it is not the only biological treatment. Over the past fifteen years, researchers including Joel Lubar, PhD, of the University of Tennessee, have demonstrated the effectiveness of a powerful adjunctive tool in the treatment of ADD and other prefrontal cortex problems: brain-wave or EEG biofeedback.

Biofeedback in general is a treatment technique that utilizes instruments to measure physiological responses in a person's body (such as hand temperature, sweat gland activity, breathing rates, heart rates, blood pressure, and brain-wave patterns). The instruments feed the information on these body systems to the patient, who can then learn how to change them. In brain-wave biofeedback, we measure the level of brainwave activity throughout the brain.

There are five types of brain-wave patterns:

- delta brain waves (1-4 cycles per second): very slow brain waves, occurring mostly during sleep;

- theta brain waves (5-7 cycles per second): slow brain waves, occurring during daydreaming, relaxation, and twilight states;

- alpha brain waves (8-12 cycles per second): brain waves occurring during relaxed states;

- SMR (sensorimotor rhythm) brain waves (12-15 cycles per second): brain waves occurring during states of focused relaxation;

- beta brain waves (13-24 cycles per second): fast brain waves occurring during concentration or mental work states.

In evaluating more than six thousand children with ADD, Dr Lubar found that the basic problem with these children is that they lack the ability to maintain "beta" concentration states for sustained periods of time. He also found that these children have excessive "theta" daydreaming brain-wave activity. Dr Lubar found that through the use of EEG biofeedback, children could be taught to increase the amount of "beta" brain waves and decrease the amount of "theta", or daydreaming, brain waves.

The basic biofeedback technique teaches children to play games with their minds. The more they can concentrate and produce "beta" states, the more rewards they can accrue. With my clinic's EEG biofeedback equipment, for example, a child sits in front of a computer monitor and watches a game screen. If he increases the "beta" activity or decreases the "theta" activity, the game continues. The game stops, however, when the player is unable to maintain

the desired brain-wave state. Children find the screens fun, and we gradually shape their brain-wave pattern to a more normal one. From the research, we know that this treatment technique is not an overnight cure. Children often have to practice this form of biofeedback for between one and two years.

In my experience with EEG biofeedback and ADD, many people are able to improve their reading skills and decrease their need for medication. Also, EEG biofeedback has helped to decrease impulsivity and aggressiveness. It is a powerful tool, in part because the patient becomes part of the treatment process by taking more control over his own physiological processes.

The use of brain-wave biofeedback is considered controversial by some clinicians and researchers. More research needs to be done and published in order to demonstrate its effectiveness. Also, in some circles, EEG biofeedback has been oversold. Some clinics have advertised the ability to cure ADD with biofeedback, without the use of medication. Unfortunately, overselling this treatment technique has hurt its credibility. Still, in my clinical experience, I find EEG biofeedback to be a powerful and exciting treatment with a developing future.

PFC Prescription 7: Try Audiovisual Stimulation

A treatment similar to EEG biofeedback is called audiovisual stimulation. This technique was developed by psychologists Harold Russell, PhD, and John Carter, PhD, at the University of Texas in Galveston. Both Dr Russell and Dr Carter were involved in the development of treatment of ADD children with EEG biofeedback. They wanted to develop a treatment technique that could become widely available to children who needed it.

Based on a concept termed *entrainment,* in which brain waves tend to pick up the rhythm in the environment, they developed special glasses and headphones that flash lights and sounds at a person at specific frequencies to help the brain "tune in" and become more focused. Patients wear these glasses for twenty to thirty minutes a day.

I have tried this treatment on a number of patients with some encouraging results. One patient who developed tics on both Ritalin and Dexedrine tried the glasses for a month. His ADD symptoms significantly improved. When he went off the audiovisual stimulator, his symptoms returned. The symptoms again subsided when he retired the treatment.

I believe that audiovisual stimulation techniques show promise for the future, but more research is needed.

PFC Prescription 8: Don't Be Another Person's Stimulant

As mentioned, many people with prefrontal cortex problems tend to be conflict-seeking to stimulate their brain. It is critical for you to not feed the turmoil, but rather to starve it. The more someone with this pattern unknowingly tries to upset or anger you, the more you need to be quiet, calm, and steady. I teach parents of ADD children to stop yelling. The more they yell and increase the emotional intensity in the family, the more the children seek turmoil. I also teach siblings and spouses to maintain a low voice and a calm demeanor. The

harder the person with ADD tries to escalate the situation, the less intense the respondent should be.

It is fascinating how this prescription works. In general, the conflict-seeking people are used to being able to get you upset. They have mastered all your emotional buttons, and they push them with regularity. When you begin to deny them the drama and adrenaline rush (by being less reactive and calmer in stressful situations), they initially react very negatively, almost as if they are going through a drug withdrawal. In fact, when you first become calmer they may even get worse in the short term. Stick with it, and they'll improve in the long term.

Here are some strategies for dealing with a person who has a tendency toward conflict-seeking behavior:

- *Don't yell.*

- *The more their voice goes up, the more your voice should go down.*

- *If you feel the situation starting to get out of control, take a break. Saying you have to go to the bathroom may be a good prescription. Likely, the person who won't try to stop you. It may be a good idea to have a thick body ready if he or she is really upset and you need to stay away for a long time.*

- *Use humor (but not sarcasm or angry humor) to defuse the situation.*

- *Be a good listener.*

- *Say you want to understand and work on the situation, but you can do this only when things are calm.*

PFC Prescription 9: Consider Prefrontal Cortex Medication

Medications that aid prefrontal cortex performance need to be specifically tailored to the problem. Those people who have ADD often respond very well to stimulant medications, such as Ritalin (methylphenidate), Adderall (a combination of four amphetamine salts), Dexedrine (dextroamphetamine), Desoxyn (methamphetamine), or Cylert (pemoline). These medications work by stimulating the neurotransmitter dopamine, which in turn helps to prevent the prefrontal cortex shutdown that happens in ADD. Contrary to popular belief, these medications are very safe and well tolerated, and they make a difference almost immediately.

I have seen these medications change people's lives. I did SPECT studies of one ten-year-old boy with ADD on and off his medication. With 10 milligrams of Ritalin three times a day, he clearly has more access to the activity in the prefrontal cortex, so he's better able to focus, set goals, organize, plan, and control his impulses.

For a year, I kept a log of what my ADD adult patients told me about the effectiveness of their medication. The following are some of their comments.

"I experienced an increased awareness of the world around me. I saw the hills for the first time when driving to work. I saw the bay when I crossed over the bridge. I actually noticed the color of the sky!"

"I experienced a 180-degree difference in my attitude."

"I look at my children and say, 'Aren't they cute?' rather than complaining about them."

"I could sit and watch a movie for the first time in my life."

"I am able to handle situations where I used to be hysterical. I am able to see when I'm starting to overreact."

"The lens on my life is much clearer."

"It amazes me that a little yellow pill (5 mg of Ritalin) can take me from wanting to jump off the bridge to loving my husband and enjoying my children."

"I'm not running at train wreck speed."

"For the first time I felt in charge of my life."

"I used to think I was stupid. It seemed everyone else could do more things than me. I'm starting to believe that there may be intelligent life in my body."

"I sleep much better. Can you believe I'm taking a stimulant and it calms me down?"

"I used to be the kind of person who would go walking by myself in downtown Detroit at two AM. Now on the medication I would never do something so stupid. Before, I just wouldn't think about the consequences."

"Now I can give talks in front of groups. Before, my mind would always go blank. I organized my life around not speaking in public. Now my brain feels calmer, clearer."

"I'm not as intimidated by others as I used to be."

"My husband may not be as happy as before I was on medication. Now I can think, and he doesn't win all of the arguments. I'm going to have to retrain him to not always expect to get his way."

"I feel in control of my life."

"I can't stand useless confrontation, when I used to thrive on it!"

Certainly not everyone with ADD experiences a dramatically positive response to stimulant medication, but many do. When they gain access to their prefrontal cortex, it is often amazing at how much more effective they can be.

Several "stimulating" antidepressants are also helpful in ADD. Norpramin (desipramine) and Tofranil (imipramine) increase the neurotransmitter norepinephrine and are especially helpful for people with ADD and anxiety or depressive symptoms. Wellbutrin (bupropion) increases the neurotransmitter dopamine and is often helpful for people with ADD and depression or low energy. Effexor (venflaxine) increases the neurotransmitter serotonin, norepinephrine, and, in higher doses, dopamine, and is most helpful for people with ADD who overfocus or are obsessive.

PFC Prescription 10: Watch Your Prefrontal Cortex Nutrition

Nutritional intervention can be especially helpful in this part of the brain. For years I have recommended a high-protein, low-carbohydrate diet that is relatively low in fat to my patients with ADD. This diet has a stabilizing effect on blood sugar levels and helps both with energy level and concentration. Unfortunately, the great American diet is filled with refined carbohydrates, which have a negative impact on dopamine levels in the brain and concentration. With both parents working outside the home, there is less time to prepare healthy meals, and fast-food meals have become more the norm. The breakfast of today typically consists of foods that are high in simple carbohydrates, such as frozen waffles or pancakes, Pop Tarts, muffins, pastry, cereal. Sausage and eggs have gone by the wayside in many homes because of the lack of time and the perception that fat is bad for us. Even though it is important to be careful with fat intake, the breakfast of old is not such a bad idea for people with ADD or other dopamine-deficient states.

The major sources of protein I recommend include lean meats, eggs, low-fat cheese, nuts, and legumes. These are best mixed with a healthy portion of vegetables. An ideal breakfast is an omelet with low-fat cheese and lean meat, such as chicken. An ideal lunch is a tuna, chicken, or fresh fist salad, with mixed vegetables. An ideal dinner contains more carbohydrates for balance with lean meat and vegetables. Eliminating simple sugars (such as cakes, candy, ice cream, pastries) and simple carbohydrates that are readily broken down to sugar (such as bread, pasta, rice, potatoes) will have a positive impact on energy level and cognition. This diet is helpful in raising dopamine levels in the brain. It is important to note, however, that this diet is not ideal for people with cingulate or overfocus issues, which usually stem from a relative deficiency in serotonin. Serotonin and dopamine levels tend to counterbalance each other; whenever serotonin is raised, dopamine tends to be lowered and vice versa.

Nutritional supplements can also have a positive effect on brain dopamine levels and help with focus and energy. I often have my patients take a combination of tyrosine (500-1.500 milligrams two to three times a day); OPC (oligomeric procyanidius) grape seed or pine bark; found in health food stores (1 milligram per pound of body weight); and ginkgo biloba (60-120 milligrams twice a day). These supplements help increase dopamine and blood flow in the brain, and many of my patients report that they help with energy, focus, and impulse control. If you want to try these supplements, check with your doctor.

PFC Prescription 11: Try Mozart for Focus

One controlled study found that listening to Mozart was helpful for children with ADD. Rosalie Rebollo Pratt and colleagues studied nineteen children, ages seven to seventeen,

with ADD. They played recordings of Mozart for them three times a week during brain-wave biofeedback sessions. They used *100 Masterpieces, vol 3,* which included Piano Concerto no 21 in C, *The Marriage of Figaro,* Flute Concerto no 2 in D, *Don Giovanni,* and other concertos and sonatas. The group that listened to Mozart reduced their theta brain-wave activity (slow brain waves that are often excessive in ADD) in exact rhythm to the underlying beat of the music, and displayed better focus and mood control, diminished impulsivity, and improved social skill. Among the subjects who improved, 70 percent maintained that improvement six months after the end of the study without further training. (Findings reprinted in the *International Journal of Arts Medicine,* 1955).