Change Your Brain, Change Your Life

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

Daniel G Amen

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Looking Into Worry and Obsessiveness:

The Cingulate System

Functions of the Cingulate System

- *ability to shift attention*
- *cognitive flexibility*
- *adaptability*
- *movement from idea to idea*
- *ability to see options*
- *ability to "go with the flow"*
- *ability to cooperate.*

Traversing longitudinally through the central deep aspects of the frontal lobes is the cingulate gyrus. It's the part of the brain that allows you to shift your attention from one thing to another, to move from idea to idea, to see the options in life. Feelings of safety and security have also been attributed to this part of the brain. In my experience, the term that best relates to this part of the brain is *cognitive flexibility.*

Cognitive flexibility defines a person's ability to go with the flow, adapt to change, deal successfully with new problems. Many situations in life demand cognitive flexibility. For example, when you start a new job, you need to learn a new system of doing things. Even if you did something another way at a previous job, learning how to shift to please a new boss or adapt to a new system is critical to job success. Junior high school students need cognitive flexibility in order to be successful in school. In seventh grade, many students begin having various teachers throughout the day. It is necessary to shift learning styles in order to adapt to the different styles of the teachers. Flexibility is also important in friendships. What works in a friendship with one person may not be at all effective with someone else.

Effectively managing change and transitions is an essential ingredient in personal, interpersonal, and professional growth. The cingulate system can be of great help or hindrance to this process. When it is working properly, we are more able to roll with the circumstances of the day. When it is impaired or overactive, cognitive flexibility is diminished.

Along with shifting attention, we have seen that cooperation is also influenced by this part of the brain. When the cingulate works effectively, it's easy to shift into cooperative modes of behavior. People with cingulate problems have difficulty shifting attention and get stuck in ineffective behavior patterns.

The cingulate system has also been implicated (along with the other aspects of the pfc) in "future-oriented thinking", such as planning and goal setting. When this part of the brain works well, it is easier to plan and set reasonable goals. On the negative side, difficulties in this part o the brain can cause a person to perceive fearful situations where there are none, predict negative events, and feel very unsafe in the world.

Seeing options is crucial to adaptable behavior. In my profession, adaptable physicians readily utilize new ideas and technology (after a scientific basis is developed), and they are open to give their patients the latest information on what is new and exciting. Physicians who have cingulate problems (I have scanned many) tend to be rigid, do things the way they have always been done, and be autocratic ("Do it my way if you want me to treat you"). Being able to see options and new ideas protects against stagnation, depression, and hostile behavior.

Problems with the Cingulate System

- *worrying*
- *holding on to hurts from the past*
- *getting stuck on thoughts (obsessions)*
- *getting stuck on behaviors (compulsions)*
- *oppositional behavior*
- *argumentativeness*
- *uncooperativeness; tendency to say no automatically*
- *addictive behaviors (alcohol or drug abuse, eating disorders)*
- *chronic pain*
- *cognitive inflexibility*
- *obsessive-compulsive disorder (OCD)*
- *OCD spectrum disorders*
- *eating disorders*
- *road rage.*

When the cingulate system is abnormal, people have a tendency to get stuck on things, locked into things, to rethink the same thought over and over and over. They may become worriers and continually obsess on the same thought. They may hold on to hurts or grudges from the past, unable to let them go. They may also get stuck on negative behaviors or develop compulsions such as hand washing or excessively checking locks.

One patient who had difficulties in this part of the brain described this phenomenon as "like being on a rat's exercise wheel, where the thoughts just go over and over and over". Another patient told me, "It's like having a reset button that is always on. Even though I don't want to have the thought anymore, it just keeps coming back."

The clinical problems associated with the cingulate will be discussed shortly. There are also a number of what I call "subclinical patterns" associated with abnormalities in this part of the brain. Subclinical problems are those that don't reach the intensity or cause the dysfunction of a full-fledged disorder, but can nonetheless erode our quality of life. Worrying, holding on to hurts from the past, cognitive inflexibility, and rigidity may not send you to the therapist, but they can make your life unnecessarily gloomy.

Worrying

Even though we all worry at times (and some worry is necessary to keep us working or studying in school), people who have an overactive cingulate may have integrated chronic worrying into their personality. They may worry to the point of causing emotional and physical harm to themselves. Whenever repetitive negative concerns circle through the mind, it can cause tension, stress, stomachaches, headaches, and irritability. Chronically expressing worries often irritates others and makes a person seem less powerful and perhaps even less mature.

At a dinner party, an old friend of mine who is also a physician complained that his wife worried "all the time". She worries for the whole family," he told me. "It upsets me and the children. Her constant worry seems to be associated with her chronic headaches and irritability. How do I help her relax so that she won't get so upset about the little things in life?" he queried. I had known by friend's wife for many years. Even though she had never been clinically depressed and wouldn't fit the diagnostic criteria for panic disorder or OCD (obsessive-compulsive disorder), I knew that it was in her personality to worry. Members of her family, which she had discussed with me on several occasions, did have clinical problems (such as alcoholism, drug abuse, and compulsive behaviors) associated with the cingulate system.

Holding on to Hurts

Holding tightly on to hurts from the past can cause serious problems in a person's life. I once treated a woman who was very angry with her husband. On a trip to Hawaii, her husband had allowed his eyes to wander toward some of the scantily dressed women on the beach at Waikiki. The wife had become irate. She felt he had been unfaithful to her with his eyes. Her anger had ruined the whole trip, and she continued to bring up the incident years later.

Another cingulate example occurred in a newly blended family. Don married Laura, who had a three-year-old son, Aaron. Laura and Aaron had been living with her parents. Shortly after the wedding Don, Laura, and Aaron went to visit Laura's parents. During the visit Aaron asked for a second bowl of ice cream. Don told him no because it might ruin his dinner. Laura's parents undermined Don's new authority in front of the little boy by saying he could have the second helping of ice cream. Frustrated, Don tried to discuss the issue. The grandparents told him he was being silly. What did he know, they thought, he was new to fatherhood. When Don tried further to talk to them, they just dismissed him. The grandparents, unable to let go of the incident, refused to even speak to Don or Laura for the next eighteen months. Many family cutoffs are due to excessive cingulate activity.

Cognitive Inflexibility

Cognitive inflexibility, the inability to roll with the ups and downs of everyday life, is at the root of most cingulate problems. A friend's six-year-old daughter, Kimmy, provides a perfect example of cognitive inflexibility. Her older sister was instructed by her mother to get Kimmy ready to go out for the day. The older sister picked out a shirt and pair of pants for Kimmy. Kimmy complained that the shirt and pants looked stupid. She had the same complaint for the next three outfits that her sister chose for her. Kimmy wanted to wear a sundress (it was February and cold outside). She cried and cried to get her way. Nothing else would do. Once she got the idea of the sundress in her head, she couldn't shift away from it.

In couples counseling through the years, I have frequently heard another example of cognitive inflexibility: the need to do something *now.* Not five minutes from now, but *now!* Here's a fairly common scenario: A wife asks her husband to get some clothes out of the dryer and put the clothes from the washer into the dryer. He asks her to wait a few minutes because he's watching the end of a basketball game. She becomes irate and says that it needs to be done *now.* They get into a fight. She doesn't feel comfortable until the chore is finished. He feels intruded upon, pushed around, and generally degraded. The need to *do it now* can cause some serious relational problems. Of course, if the husband said he would help, then didn't, we could understand her need to have it done now.

There are many more everyday examples of trouble shifting attention or cognitive inflexibility. Here's a short list:

- Only eating specific foods, being unwilling to try new tastes.

- Having to keep a room a certain way.

- Having to make love the same way every time (or avoiding love-making because of feeling uncomfortable about the messiness that is involved with it).

- Becoming upset if the plans for the evening change at the last minute.

- Having to do things a certain way at work, even if it's not in the business's best interest (eg, not being flexible enough to meet an important customer's needs).

- Making other family members do chores such as the dishes in a certain way (this often alienates others and they become less willing to help).

Cognitive inflexibility can insidiously destroy happiness, joy, and intimacy.

The Automatic No

Because they have problems shifting attention, many people with cingulate overactivity become stuck on the word *no. No* seems to be the first word they say, without every really thinking about whether or not *no* is even in their best interest. One of my patients told me about his father. Whenever my patient would ask his father for something, such as permission to borrow the car, the father would automatically say no. The children in the family all knew that if they wanted something from their father, he would first say no to them, and then a week or two later he would think about the request and sometimes change his mind. "No" was always his first response.

I have had several employees who clearly had cingulate problems. Frequently they would be uncooperative and find ways not to do what was asked of them. They seemed to frequently argue with requests and tell me why things couldn't be done, rather than constructively try to solve problems.

When partners have cingulate problems, they often get the opposite of what they want. One man told me that whenever he wanted to make love with his wife, he had to act as if he really didn't want to make love. He said, "If I would ask her directly, she would say no ninety-nine out of one hundred times. If I would lock our bedroom door at night (a sign that he wanted to be intimate with her), she would automatically become tense and say she wasn't interested. If I acted uninterested, just rubbed her back for a long time, then maybe I would have a chance. The amount of work and planning it took to make it happen often wasn't worth the effort." The "automatic no" puts a great strain on many different types of relationships.

Road Rage

Something happens to many people when they get behind the wheel of a car; a territorial animal comes growling to the surface. Cingulate people tend to be the worst. The problem again is trouble shifting attention. For example, if you are driving on a highway and someone accidentally cuts you off, most people would think to themselves, "You bastard", and then leave the situation alone. People with cingulate problems say to themselves, "You bastard, you bastard, you bastard, you bastard..." and they cannot get the thought out of their head. I have known many cingulate people who have acted out their frustrations by doing crazy things on the road, such as swearing, gesturing, chasing, or harassing the other driver. I have one patient, a very bright, successful professional, who on several occasions, chased other drivers who had cut him off and on two occasions got out of the car and bashed their windows in with a baseball but he kept in the car. After the second incident, he came to see me. He said, "If I don't get help for this, I'm sure I'll end up in jail". His cingulate gyrus was markedly overactive, causing him to get locked into the negative thoughts and subsequently be less able to control his frustration.

Obsessive-Compulsive Disorder

Gail

On the outside, Gail was normal. She went to work every day, she was married to her high school sweetheart, and she had two small children. On the inside, she felt like a mess. Her husband was ready to leave her, and her children were often withdrawn and upset. She was distant from her family and locked into the private hell of obsessive-compulsive disorder. She cleaned her house for hours every night after work. She screamed at her husband and children when anything was out of place. She would become especially hysterical if she saw a piece of hair on the floor, and she was often at the sink washing her hands. She also made her husband and children wash their hands more than ten times a day. She stopped making love to her husband because she couldn't stand the feeling of being messy.

On the verge of divorce, Gail and her husband came to see me. At first, her husband was very skeptical about the biological nature of her illness. Gail's brain SPECT study showed

marked increased activity in the cingulate system, demonstrating that she really did have trouble shifting her attention.

With this information, I placed Gail on Zoloft. Within six weeks, she had significantly relaxed, her ritualistic behavior had diminished, and she stopped making her kids wash their hands every time they turned around. Her husband couldn't believe the change. Gail was more like the woman he had married.

Obsessive-compulsive disorder (OCD) affects somewhat between two and four million people in the USA. This disorder, almost without exception, dramatically impairs a person's functioning and often affects the whole family. OCD is often unnoticed by people in the outside world, but not by those who live with the obsessive-compulsive person.

The hallmarks of this disorder are obsessions (recurrent disgusting or frightening thoughts) or compulsions (behaviors that a person knows make no sense but feels compelled to do anyway). The obsessive thoughts are usually senseless and repugnant. They may involve repetitive thoughts of violence (such as killing one's child), contamination (such as becoming infected by shaking hands), or doubt (such as having hurt someone in a traffic accident, even though no such accident occurred). The more a person tries to control them, the more powerful they become.

The most common compulsions involve hand washing, counting, checking, and touching. These behaviors are often performed according to certain rules in a very strict or rigid manner. For example, a person with a counting compulsion may feel the need to count every crack on the pavement on the way to work or school. What would be a five-minute walk for most people could turn into a three- or four-hour trip for a person with obsessive-compulsive disorder. A part of the individual generally recognizes the senselessness of the behavior and doesn't get pleasure from carrying it out, although doing it often provides a release of tension.

The intensity of OCD varies widely. Some people have mild versions, where, for example, they have to make the house perfect before they go on vacation or they spend the vacation worrying about the condition of the house. The more serious forms can cause a person to be housebound for years. I once treated an eighty-three-year old woman who had obsessive sexual thoughts that made her feel dirty inside. It got to the point where she would lock all her doors, draw the shades, turn off the lights, take the phone off the hook, and sit in the middle of a dark room, trying to stop abhorrent sexual thoughts as they came into her mind. Her life became paralyzed by this behavior, and she needed to be hospitalized.

Exciting research in the past few years has shown a biological pattern associated with OCD. Brain SPECT studies have shown increased blood flow in the cingulate system, along with increased activity in the basal ganglia (often the anxiety component of the problem).

Like most forms of psychiatric illness, part of effective treatment for OCD often involves medication. At this writing, there are eight "antiobsessive medications" and more on the way. The current medications that have shown effectiveness with OCD are Anafranil (clomipramine), Prozac (fluoxetine), Zoloft (sertraline), Paxil (paraxetine), Effexor

(venlafaxine), Serzone (nefazodone), Remeron (mirtazapine), and Luvox (fluvoxamine). These medications have provided many patients with profound relief from OCD symptoms.

In addition, behavior therapy is often helpful. The patient is gradually exposed to the situations most likely to bring out the rituals and habits. The therapist teaches the patient thought-stopping techniques and strongly encourages him or her to face his or her worst fear (for example, by persuading a patient with a fear of dirt or contamination to play in the mud).

OCD Spectrum Disorders

There is a group of disorders that have been recently labeled obsessive-compulsive spectrum disorders. People with these disorders get stuck on unwanted, repetitive thoughts and cannot get them out of their minds unless they act in a specific manner. According to psychiatrist Ronald Pies, postulated OCD spectrum disorders include: trichotillomania (pulling out one's own hair), onychophagia (nail biting), Tourette's syndrome (involuntary motor and vocal tics), kleptomania, body dysmorphic disorder (feeling that a part of the body is excessively ugly), hypochondria, autism, compulsive shopping, pathological gambling, chronic pain, addictive disorders, and eating disorders. I would also add oppositional defiant disorder.

A sample of repetitive thoughts that significantly interfere with behavior might include:

- *Chronic pain: "I hurt! I hurt! I hurt!"*
- *Eating disorders, such as anorexia and bulimia: "I'm too fat! I'm too fat! I'm too fat!" despite rational evidence to the contrary.*
- *Addictive disorder: "I need a drink! I need a drink!"*
- *Pathological gambling: "Next time I'll win! Next time I'll win! Next time I'll win!"*
- *Compulsive shopping: "I need to buy this one thing! I need to buy this one thing! I need to buy this one thing!"*
- *Oppositional defiant disorder: "No I won't! No I won't! You can't make me!"*

In 1991, Susan Swedo, MD, at the National Institutes of Mental Health in Bethesda, Maryland, hypothesized that patients with trichotillomania would exhibit the same brain imaging as those with OCD. At rest, these patients exhibited a different brain pattern. Yet when these patients were treated with the antiobsessive antidepressant Anafranil, there was decreased activity in the cingulate aspect of the frontal lobes, which has also been found with successful treatment of OCD with antiobsessive antidepressants.

Here are several case examples from my own practice to illustrate OCD spectrum disorders.

Chronic Pain

Stewart

Stewart, a forty-year-old roofer, had hurt his back ten years earlier when he fell off a roof. He had undergone six back operations but remained in constant pain. He was

essentially bedridden and about to lose his family because all he could think about was the pain. The threat of losing his family catalyzed him to get a psychiatric evaluation. His SPECT revealed marked overactivity in the cingulate system. He was placed on 200 milligrams of Anafranil per day. After five weeks, he reported that his back still hurt, but he was much less focused on the pain. He was able to get out of bed and start back to school. Other researchers have also reported several cases of intractable pain that were responsive to treatment with antiobsessive medications.

Eating Disorders

Leslie

Twenty-year-old Leslie suffered from bulimia for three years. She got to the point where she was using laxatives several times a day in increasing doses, along with exercising for two to three hours a day. Her binges were also becoming more frequent. When she sought treatment, she felt totally out of control. During her initial evaluation, she felt totally out of control. During her initial evaluation, she said she knew her behavior was abnormal and she hated it. However, when she got the urge to eat, she felt she had to give in to it, and afterward she could not get the thoughts of being overweight out of her head. She had a maternal aunt who had been diagnosed with obsessive-compulsive disorder. Leslie's brain SPECT study revealed increased activity in the cingulate system along with increased activity in her right basal ganglia. With this information, she was placed in an eating disorders group and given Prozac (an antiobsessive antidepressant). Over the next three months, she improved markedly, to the point where she was eating normally, not taking any laxatives at all, and exercising less than an hour a day.

In 1992, the Prozac Bulimia Nervosa Collaborative Study Group reported that daily therapy with 60 milligrams of Prozac significantly decreased the frequency of binge eating and self-induced vomiting. In the medical literature Prozac has been reported to decrease activity in the cingulate in obsessive-compulsive patients.

Drug or Alcohol Addiction

Joshua

Joshua began using drugs and alcohol at the age of twelve. When his parents finally caught on to his drug abuse at the age of sixteen, Joshua reported that he had used LSD more than a hundred times and he was drinking a pint of whiskey a day. He said that he was unable to stop, even though he had wanted to many times. When his parents brought him in for evaluation, it was revealed that there was a strong history of drug and alcohol abuse on both sides of his family, even though neither of his parents drank alcohol or abused drugs. After his SPECT study revealed significant overactivity in the cingulate system, Joshua was placed on Zoloft in addition to his individual and support group therapy. He reported that he still had periodic cravings for the substances, but that he could avoid them more easily with the behavioral techniques he learned. He was able to get the thoughts about drugs and alcohol out of his head.

Pathological Gambling

Many people enjoy gambling. They feel happy when they win, discouraged when they lose. And they realize that gambling is a game of chance, like many things in life. Some people, however, become addicted to gambling and it can ruin every aspect of their lives. Pathological gambling is defined by the American Psychiatric Association as persistent and recurrent maladaptive gambling behavior that disrupts personal, family, or vocational pursuits. Pathological gambling usually starts with an important "big win". The high from the win gets "stuck" in a gambler's head, and he or she begins to chase it, even to the point of self-destruction.

Adam

Adam came to our office out of desperation. His wife had just left him, and he had seen an attorney to discuss filing for bankruptcy. His gambling had gotten out of control. He was a successful entrepreneur who had worked hard at starting his own business, but in the few years before he came to see me he had begun neglecting his business to spend more of his time at the racetrack and drive back and forth to Reno and Lake Tahoe. In our first session he told me, "I feel compelled to gamble. I know it is ruining my life, but it seems I have to place a bet or the tension just builds and builds. Before I started losing everything, I knew I could win. I was all I thought about!" Adam came from an alcoholic home; both his father and paternal grandfather were alcoholics. Even though Adam himself had never had a problem with alcohol, he clearly had an addiction. Explaining the cingulate system to Adam was helpful. He could identify many people in his family who had problems shifting attention. "You should see our family gatherings", he told me. "Someone is always mad at someone else. People in my family can hold grudges for years and years." In addition to going to Gamblers Anonymous and psychotherapy, Adam took a small daily dose of Prozac to help him shift away from the obsessive thoughts about gambling. Eventually he was able to reconnect with his wife and rebuild his business.

Compulsive Spending

Compulsive shopping is another manifestation of problems in the cingulate system. Compulsive shoppers get high from the pursuit and purchase of goods. They spend inordinate amounts of time thinking about shopping activities. This addiction can ruin their financial status and their relationships and have a negative impact on their work.

Jill

Jill worked as the office manager for a big law firm in San Francisco. Before work, during her lunch hours, and after work she found herself drawn to the stores at Union Square, near her office. She felt a rush of internal excitement as she picked out clothes for herself and her family members. She also enjoyed buying presents for others, even if they were just acquaintances. It was the act of shopping that was important. Even though she knew she couldn't be spending the money, it felt too good to stop. She and her husband had many fights over the money she spent during her shopping sprees. She began embezzling money from work. She took care of the company checkbook and began to write and cash checks to fictitious vendors in order to cover her personal debt. When a business audit almost found her

out, she stopped. But her addiction didn't. Her husband finally divorced her when he uncovered credit card debt in the amount of thirty thousand dollars. Ashamed, scared, and depressed, Jill entered treatment. All her life she had been a worrier. In her teens she had had an eating disorder, and she had a cousin who had obsessive-compulsive disorder. Her SPECT study revealed a markedly overactive cingulate system. When she got locked into a train of thought or behavior (spending) she had real problems shifting away from it. Zoloft (an antiobsessive antidepressant) was helpful for her as part of the healing process.

Oppositional Defiant Disorder

Oppositional defiant disorder (ODD) is considered a behavioral disorder of children and teenagers who are negativistic, hostile, defiant, and contrary. They tend to be argumentative, are easily annoyed, and lose their temper often, especially when they do not get their way. These children are chronically uncooperative. They tend to say no even when saying yes is clearly in their own best interest. The question I ask parents to help me diagnose this disorder is "How many times out of ten when you ask this child to do something will he (or she) do it the first time without arguing or fighting?" Most children will comply seven to eight times out of ten without a problem. For most ODD children the answer is usually three or fewer; for many of them it is zero.

David

I first met David when he was seven years old. He came into my office with his mother. He was wearing typically dirty shoes, and the minute he sat down, he put his feet up on my navy-blue leather couch. His mother, embarrassed by his rudeness, took his feet off the couch. He put them back on the couch. She took them off. He put them back on again. Looking angry, she took them off again. Right away, he put them back on and she took them off. I was watching the cingulate of the mother/son pair in action. David had to have his feet on the couch, mostly because his mother didn't want them on the couch (he also probably wanted to see what would happen if he irritated me). His mother couldn't stand the fact that he wouldn't listen to her, and she had to have his feet off the couch. Seeing the mother/son cingulate in action, I knew that many of their problems probably stemmed from an inability to shift attention and to hold their own positions. To confirm my suspicions about David, I said ten innocuous things, such as "The weather is good today... Don't you think California is nice? (he was from out of state)... I like your outfit" and so on. David argued with eight of ten things I said. "The weather is awful... I hate California... My mother made me wear this stupid outfit..." With an incredulous look on her face, David's mother argued with him: "This is beautiful weather... Yesterday you said you wanted to live in California... This is your favorite outfit..." Further conversation with his mother suggested we had a generational cingulate problem.

When I first suggested a connection between cingulate overactivity and oppositional defiant disorder, many of my colleagues did not take me seriously. How cold ODD, which is an externalizing behavior disorder, be related to OCD, an internal anxiety disorder? After seeing this pattern over years it makes perfect sense to me. These children cannot shift their attention. They get stuck on *No, No way, Never, You can't make me do it.* They often have "cingulate parents", and many of them have a family history of OCD and other cingulate problems.

One of the most interesting findings among the patients we studied was that mothers or fathers who had obsessive thoughts, compulsive behaviors, or inflexible personality styles tended to have children with ODD. We studied eleven cases that exhibited this parent-child pattern and obtained brain SPECT studies on both the parent and the child. In nine out of the eleven, both the parent's and the child's brain SPECT study revealed increased cingulate activity. Both a biological explanation for this finding and behavioral etiology can be entertained. One can postulate that the finding of increased cingulate activity (biological component) can cause parents to have problems shifting attention and become stuck on thoughts or behaviors and cause them to be inflexible, while the child's inability to shift attention causes his behavior to appear oppositional. It is also possible that the parent's rigid style causes the child to react in an oppositional way (the behavioral part) as a way to gain independence and autonomy, which induces the subsequent SPECT finding.

As mentioned above, it has been observed that the brain SPECT abnormalities in the cingulate normalize with effective treatment. This does not appear to be merely variability from test to test, as researchers have shown that without intervening in some way, the brain SPECT patterns change very little. In the following case of ODD, follow-up data were obtained.

Jeremy

Jeremy, age nine, was evaluated for significant oppositional behavior. He had been suspended from school five times in second grade for refusing to do what he was told and being openly defiant with his teacher. His parents were told not to bring him back to school until they sought professional help. His clinical evaluation was consistent with a diagnosis of oppositional defiant disorder. His brain SPECT study revealed marked increased cingulate activity. When he improved only minimally with behavioral interventions, he was placed on Anafranil. Within two weeks, he showed marked clinical improvement. After two months, his brain SPECT study was repeated and revealed essentially normal cingulate activity. The following year, Jeremy did well in school; in fact, his teacher that year could not understand why his former teachers had warned her about him.

Stress Often Increases Activity in the Cingulate System

In many children and teenagers with ODD, I obtain both rest and concentration SPECT studies. Interestingly, in about half of the cases, I see a further increase in cingulate activity when these patients try to concentrate. Clinically, I find that this correlates with those oppositional children and teens who get worse ("more stuck") under pressure or when they are pushed to comply with certain requests. I have seen this occur frequently on an adolescent treatment unit. Some of these teens would become so "stuck" that they refused to comply with the staff requests and ended up on restriction or even, in some cases, in restraints because they could not shift their attention in order to behave more appropriately. It can be particularly bad if a cingulate teen meets up with a cingulate nurse who cannot back off a little to let the situation defuse.

Ken and Katie

Ken's family illustrates the problems an overactive cingulate can cause. His wife and two daughters came to his office to pick him up and go out to dinner. His youngest daughter, Katie, smiled when she saw him and gave him a big hug. As they were going to drive in two separate cars, Ken said to her, "Come on, Katie, ride with me in my car". Katie had been diagnosed with attention deficit disorder, and she was often oppositional with Ken. He wanted to spend some extra time with her on the way to the restaurant. As soon as he said, "Come with me", she said, "No. I don't want to". Ken's feelings were a little hurt. He replied, "Come on Katie, I want to be with you". She said, "*No!* I'm going with Mommy". Not one to give up easily, Ken physically picked her up and put her in the car. She yelled, screamed, and cried halfway to the restaurant (real quality time). All of a sudden she stopped crying, dried her eyes, and said, "I'm sorry, Daddy. I really wanted to go with you". When he had pushed Katie to go with him, her brain locked. She got stuck on her first reaction and became unable to think about what she actually wanted to do.

Katie's SPECT study showed increased activity in the cingulate system. All of Ken's children are grandchildren of alcoholics. I have seen a significant connection between a family history of alcoholism and increased activity in the cingulate system.

Given that children and teens with ODD tends to "lock up" cognitively when they are pushed to comply, I have found behavioral techniques, such as giving options and distraction, more effective in obtaining compliance. When you give oppositional children or teens an option as to *when* they might do something, they tend to be less likely to get stuck on "No, I won't do it". When they are stuck on a negative thought or behavior, I have found it helpful to distract them for a bit and then come back to the issue at hand later. Ken would have been better at getting Katie to go with him in the car if he had given her a choice rather than just telling her she was going to go with him.

Therapy for a Family with Similar Brain SPECT Findings

The following family case study demonstrates how the same brain finding can present itself clinically in different ways. Brain SPECT studies were obtained on a mother and two of her children.

Celina, Samuel, and Laura

Celina is a thirty-six-year old woman who had experienced depressive feelings after the birth of her first child ten years prior to her evaluation. She suffered from significant irritability, crying spells, sleeplessness, lack of appetite and weight loss, problems concentrating, and difficulty in managing her children. Her condition was brought to a crisis with suicidal behavior when she separated from her husband. She was initially seen by another psychiatrist and started on an antidepressant, which had little effect. I started to see her in psychotherapy and placed her on a different antidepressant. It had a positive effect, and she did well. After several months, she decided that she "should be stronger than the depression" and took herself off the medication. Within several weeks her depression worsened, but she was resistant to restarting the antidepressant.

In an effort to demonstrate to her that her depression existed on a biological level as well as on a psychological level, a brain SPECT study was performed. Celina's SPECT study revealed increased activity in her limbic system (consistent with the underlying depressive disorder) and markedly increased cingulate activity.

I asked her more pointed questions to see if she had obsessive-compulsive disorder. Although she denied it at the initial evaluation, in fact she was perfectionistic at home and had repetitive negative thoughts. She tearfully remarked, "You mean my husband was right when he thought it was strange that I had to have all the shirts in the drawer buttoned a certain way and put just so in the drawer or I would become very upset?"

Celina then reported rituals that her eight-year-old daughter Laura, would perform before entering a new room, such as running a finger under her nose and licking her lips. Laura also had a locking compulsion. Every time someone left the house, she would be right behind, locking the door. Imagine how irritated her brother and sister were because they could never go out of the house to play without being locked out!

I was also seeing Celina's ten-year-old son, Samuel, for attention deficit disorder and oppositional defiant disorder. Samuel's ADD symptoms did not respond to Ritalin, Dexedrine, or Cylert (stimulants used to treat ADD). Celina reported that once Samuel got a thought in his mind, he was unable to let it go. He would follow her around the house for two and a half hours asking her the same questions she had already answered. Samuel was also one of the most negative, hostile children I had ever met. Even though his mother was depressed, he defied her, yelled at his sisters, and seemed to do whatever he could to make the turmoil in the home worse.

Brain SPECT studies were done on both children to see if there might be a genetic component to their problems and/or a similar response to treatment. Interestingly, both of them also showed increased cingulate activity. Neither of the children had limbic system findings or showed evidence of clinical depression.

Based on the SPECT and clinical information, Celina was placed on Prozac (which has been shown to normalize or calm cingulate hyperactivity) to decrease her depression and help lessen her obsessive thinking and compulsive behaviors. She had a dramatically positive response and reported that she was no longer bothered when things weren't "just so". The scan also convinced her that her condition was at least, in part, biological and not her fault or the result of a weak will, which encouraged her to take her medication for a longer period of time.

Additionally, Samuel was started on Prozac and had a similarly positive response. His behavior became much less oppositional, and his school performance dramatically improved. He made the honor roll for the first time in his life and was placed in the gifted-and-talented program the following year.

Initially Laura refused to take medication, and her ritualistic behaviors continued. Approximately eight months later, she agreed to start Prozac, and her compulsive behavior diminished. The family dynamics improved significantly after the mother, Samuel, and Laura were treated with medication and psychotherapy.

It was clear that the family dynamics in this family operated and interacted on many levels. The mother's depression and obsessive thinking contributed to the anxiety and behavior problems in her children, and the cerebral blood flow abnormalities in the children probably added to their difficult behavior, which further stressed the mother.

Cingulate System Checklist

Here is the cingulate 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 cingulate problems.

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

1. Excessive or senseless worrying.
2. Being upset when things do not go your way.
3. Being upset when things are out of place.
4. Tendency to be oppositional or argumentative.
5. Tendency to have repetitive negative thoughts.
6. Tendency toward compulsive behaviors.
7. Intense dislike of change.
8. Tendency to hold grudges.
9. Trouble shifting attention from subject to subject.
10. Trouble shifting behavior from task to task.
11. Difficulties seeing options in situations.
12. Tendency to hold on to own opinion and not listen to others.
13. Tendency to get locked into a course of action, whether or not it is good.
14. Being very upset unless things are done a certain way.
15. Perception by others that you worry too much.
16. Tendency to say no without first thinking about question.
17. Tendency to predict negative outcomes.

10

Getting Unstuck:

Cingulate System Prescriptions

The cingulate system of the brain allows us to shift our attention from thing to thing, idea to idea, issue to issue. When it is dysfunctional, we have a tendency to get locked into negative thoughts or behaviors; we have trouble seeing the options in situations. Healing this part of the mind involves training the mind to see options and new ideas.

Throughout this book I have written about the use of medications in healing the brain. I will do so in this chapter as well. It is important to remember, however, that your day-to-day thoughts and behaviors also have a powerful effect on your brain chemistry. UCLA psychiatrist Jeffrey Schwartz demonstrated, through award-winning research, a powerful mind-body lesson. He and other researchers at UCLA studied people who had obsessive-compulsive disorder with PET scans, reporting findings similar to those presented in this book. Interestingly, when these patients were treated with antiobsessive medication, the overactive parts of their brains slowed toward normal activity. This was a revolutionary finding: Medications help heal the dysfunctional patterns of the brain. What was more striking, however, was that those patients who were treated without medication, through the use of behavior therapy alone, also showed normalization of the abnormal activity in their brain when the treatment was effective. Changing behavior can also change brain patterns.

CG Prescription 1: Notice When You're Stuck, Distract Yourself, and Come Back to the Problem Later

The first step to overcoming cingulate dysfunction is to notice when you're stuck and distract yourself. Becoming aware of circular or looping thoughts is essential to gaining control over them. Whenever you find your thoughts cycling (going over and over), distract yourself from them. Get up and do something else. Distraction is often a very helpful technique. Here's an example.

Maurie

Maurie, age thirty-two, came to see me for chronic tension. He incessantly worried about his job. Despite getting good performance reviews, he felt that his boss didn't like him. The constant worry frequently upset him. He couldn't get these thoughts out of his head. Over and over they went. He complained of headaches, tension, and irritability at home. No amount of rational discussion helped. I gave him the task of writing down the times he was stuck on these negative thoughts about work. They occurred every several hours. The ANT-killing exercise was helpful for him, but it didn't completely prevent these thoughts from circling in his head. His homework became distraction. Every time one of these thoughts came into his mind, I told him he had to sing a song. He picked out several songs he liked and rotated through them whenever the thoughts started to bother him. This worked for him. He liked the music, and he felt that it gave him a measure of control over his bothersome thoughts.

Some of my cingulate patients find it helpful to make a list of all the things they can do to distract themselves when they get harassing thoughts. Here are some examples:

- *Sing a favorite song.*
- *Listen to music that makes you feel positive.*
- *Take a walk.*
- *Do a chore.*
- *Play with a pet.*
- *Do structured meditation.*
- *Focus on a word and do not allow any other thoughts to enter your mind (imagine a broom that sweeps out all other thoughts).*

If you actively distract yourself from repetitive thoughts or block them, over time they will lose their control over you.

CG Prescription 2: Think Through Answers Before Automatically Saying No

As mentioned, many cingulate people have an automatic tendency to say no. Fight the tendency. Before answering questions or responding to requests in a negative way, take a breath and think first whether or not it is best to say no. Often it is helpful to take a deep breath, hold it for three seconds, and then take five seconds to exhale, just to get extra time before responding. For example, if your spouse asks you to come to bed and make love, take a deep breath before responding that you're tired, sick, too busy, or not in the mood. Use the time during the deep breath to ask yourself whether you really want to deny your partner. Is it in your best interest to say no and continue doing what you're doing, or is it in your best interest to get close to your partner? The automatic no has ruined many relationships. Take enough time to ask yourself if saying no is really what you want to say.

CG Prescription 3: Write Out Options and Solutions When You Feel Stuck

When you are stuck on a thought, it is often helpful to write it down. Writing it down helps to get it out of your head. Seeing a thought on paper makes it easier to deal with in a rational way. When repetitive thoughts cause sleeping problems, keep a pen and paper near your bed to write them out. After you write out a thought that has "gotten stuck", generate a list of things you can do about it and things you can't do about it. For example, if you are worried about a situation at work, such as whether you'll get a promotion, do the following:

1. Write out the thought: "I'm worried about whether or not I'll get the promotion at work."

2. Make a list of the things you can do about the worry:

"I can do the best job I can at work."
"I will continue to be reliable, hardworking, and creative."
"I will make sure the boss knows I desire the promotion."
"In a confident (not bragging) way, I will make sure the boss knows about my contributions to the company."

3. Make a list of the things you cannot do about the worry:

"I cannot make the decision for the boss."
"I cannot want the promotion any more than I do."
"I cannot will the promotion to happen. Worrying will not help."
"I cannot make the promotion happen (although I do have lots of influence on the process by my attitude and performance)."

Use this simple exercise to unlock the thoughts that keep you up nights feeling tense.

CG Prescription 4: Seek the Counsel of Others When You Feel Stuck

When all of your efforts to get rid of repetitive thoughts are unsuccessful, it is often helpful to seek the counsel of others. Finding someone to discuss the worries, fears, or repetitive behaviors with can be very helpful. Often just talking about feeling stuck will open new options. Through the years, I have used mentors to help me through some of the problems I've had to face. Others can be a "sounding board", helping you to see options and offering reality checks.

Several years after I started performing SPECT studies on my patients, I was professionally attached by some of the researchers in the field. I had sent a letter to several of them, asking for their help and collaboration. No response. I was very excited about the clinical usefulness of SPECT in day-to-day clinical practice, and I wanted to share my excitement and newfound knowledge with others. The attack on my work caused me a lot of anxiety and sleepless nights. (Remember, I have right basal ganglia overactivity, and I have a strong tendency to avoid conflict and confrontation.)

I sought the advice of a closed friend who had seen the development of my work and who had referred to me many patients who had benefited from this technology. When I told him about the attack on my work, he smiled. He wondered why I had expected anything different. He said, "People who say things that differ from the norm used to get burned at the stake. The more controversial, the more of a nerve you're striking in the established community." When he said "What else would you expect?" it suggested a new way to interpret what had happened. I could look differently at the behavior of these other researchers. (In fact, one of the most vocal detractors of my work himself published research findings a year later confirming what I had seen clinically.) When you're stuck, allow others to help you with the unsticking process.

CG Prescription 5: Memorize and Recite the Serenity Prayer When Bothered by Repetitive Thoughts

The Serenity Prayer is repeated daily by millions of people around the world, especially those in twelve-step programs. It is a beautiful reminder that there are limits to what we can do in life and we need to respect that. Many people find it helpful to repeat this prayer every time they are bothered by repetitive negative thoughts. I recommend that you memorize at least the first four lines of the prayer (change it as needed to fit your own beliefs).

God, grant me the serenity
to accept the things I cannot change
the courage to change the things I can,
and the wisdom to know the difference.
Living one day at a time;
enjoying one moment at a time;
accepting hardship as a pathway to peace,
taking as Jesus did this sinful world as it is,
not as I would have it, trusting that your will make
all things right if I surrender to your will;
so that I may be reasonably happy in this life
and supremely happy with you in the next.
- Attributed to Reinhold Niebuhr.

CG Prescription 6: Don't Try to Convince Someone Else Who Is Stuck; Take a Break and Come Back Later

If you're locked in the middle of an argument with someone who's stuck, take a break! Take ten minutes, take ten hours, take ten days! If you distract yourself from a lose-lose situation, you're often able to come back later and work it out.

I learned long ago not to try to argue with people who have cingulate system problems. When another person is "stuck" on a thought or behavior, logical reasoning usually won't work. One of the best techniques I've found to deal with those who get stuck is as follows: I will briefly make the point I want to make. If I can tell the other person is getting locked into his or her position, I try to change the subject and distract him or her from the topic. Distraction allows time for the other person's subconscious mind to process what I said without having to lock in on it or fight it. Often, when we come back to the issue, the other person has a more open mind to the situation. Here's an example.

Jackie came to see me about marital problems. Her husband traveled and was unable to attend many of the sessions. In the individual sessions, I saw that Jackie frequently became locked into her position and left little room for alternative explanations of behavior. Her husband said that she would go on and on for hours and not listen to anything he said. As I realized this was her pattern, I used the brief "attack and retreat" model I described. When she complained about her husband not paying attention to her, I wondered aloud if it wasn't because he felt she didn't listen to his opinion. Immediately she said I was wrong. She said that she was a very good listener. I didn't argue with her, but went on to something else for

a while. The next session, Jackie talked about listening more to her husband. Her subconscious was able to hear what I said, as long as I didn't activate her getting locked into opposing me.

This is often a very helpful technique to use with teenagers. Many teens argue and oppose their parents as part of the natural individuation and separation process. I teach parents to get out of struggles with their teenagers by briefly making their points and moving on to other topics. For important issues, come back to them at later times.

One of the best marital suggestions I give couples, which I also mentioned in chapter 8, is "Go to the bathroom." When you can see that your partner is beginning to get into cingulate territory and is starting to go over the same point again and again, excuse yourself and say you have to go to the bathroom. Few people will argue with you when nature calls, and it is often helpful just to take a break. If the cingulate problem in the other person seems particularly strong, take a big book with you and settle in for a lengthier stay.

CG Prescription 7: Try Making Paradoxical Requests

Remember "reverse psychology"? It works with cingulate folks. But you need to be sly about it. In "reverse psychology", you basically ask for the opposite of what you want. When you want a kiss from a naturally oppositional two-year-old, say, "I don't want a kiss." The next moment the child is begging to give you a kiss. When you want someone to help you with a chore, say, "You probably wouldn't want to help me with this chore." Family therapists have developed whole paradoxical treatment prescriptions to deal with resistant couples. The therapists bet on the couple's resistance to suggestions. For example, if the couple is having problems spending time together and finding time for sex, the therapist would tell them not to spend any time together and definitely not to have sex. Many couples find that after the paradoxical suggestions they start to spend more time together and make love more regularly and passionately than they have in years.

Paradoxical suggestions and interventions have been used as therapeutic prescriptions by psychotherapists for many years. These interventions have gone under many names, such as *antisuggestion, negative practice, paradoxical intention, confusion technique, declaring hopelessness, restraining change, prescribing a relapse,* and *therapeutic double blind.* Basically, they all involve suggesting the opposite of the desired response. A common paradoxical suggestion is given to people who have trouble sleeping: "Stay awake as long as possible when going to bed." In treating male patients who could not urinate in public rest rooms because of anxiety, psychologists L M Ascher and R M Turner told them they should go to public rest rooms and go through the entire procedure of urinating (stand in front of the urinal, unzip their pants, and take out their penis), but refrain from urinating. With repeated trials, the men were able to overcome their fear of urinating in public. It is my contention that these tactics probably work best on cingulate patients.

Whenever you want a cingulate person to do something for you, it is best to make it look as if it is his or her idea. If you ask for many things directly, you are likely to be disappointed. Ask for the person's input. Get his or her feedback. Here are some examples:

- If you want someone to meet you for dinner, it is often best to ask what time is good for him or her as opposed to telling him or her to meet you at a certain time.

- If you want a hug, it is often best to say something like "You probably wouldn't want to give me a hug."

- If you want him or her to go to the store with you, say something like "You probably wouldn't want to go with me."

- If you want someone to finish a report by next Thursday, say, "You probably can't finish the report by next Thursday."

- If you want a child to comply with a request without giving you a problem, say, "You probably wouldn't be able to do this without getting upset, would you?"

CG Prescription 8: Learn How to Deal With Oppositional Children

There are two prescriptions I find essential in dealing with oppositional children. Remember, oppositional children often become rigid or stuck in negative behavior patterns. Effectively intervening with them can make a significant difference in their lives. The first prescription is to know when to distract their attention in order to break the loops of thoughts or behaviors that cause them to be oppositional. Distraction, as mentioned above, is a very powerful technique in helping cingulate thinkers get unstuck. Distract the child away from the pattern by changing the subject, getting him or her to do something physical (such as taking a walk or playing a game), or working with a predetermined distraction prescription.

Josh

One prescription I use is having the parent read from a favorite book when the child begins to get stuck or locked into a negative thought or behavior. For example, eight-year-old Josh got stuck on being afraid of going to school. Before school he would complain of headaches, stomachaches, and anything else he thought his mother would accept to keep him home from school. When she caught on to his ploy, she would try to make him go to school anyway. When that happened, the little boy would scream, cry, throw tantrums, and threaten to run away from home. As the problem escalated, she brought Josh to see me. Not only was he anxious about school, his behavior was typically opposition. The first intervention was to tell Josh in no uncertain terms that he was going to school! It was the law. It was good for him. And if we allowed him to stay home from school, he would become more afraid of it and would actually become "frozen by his fears". To help him, on mornings when he felt as if he couldn't go to school or he was worried about school, his mom or dad would distract him from his bad thoughts. Josh was very interested in insects. He had many beloved books about insects. When Josh became upset, his parents would read to him about a new insect and try to make it as interesting as possible. If Josh still gave his parents a problem about going to school, then he had to spend the day sitting on his bed without watching television or being able to go out to play. If he was too sick to go to school, then he was too sick to do anything else. Before this intervention Josh had problems in the morning diminished to two mornings out of ten. By the third month, the problem was eliminated. Both parts of the intervention were crucial to its success. His parents had to let Josh know clearly that his fearful,

oppositional behavior would not get him anything positive. The parents would not be bullied. He was going to school, or he would have to sit on his bed all day long (no secondary gain by being sick). Second, the parents used distraction to help Josh shift his attention away from his fears that got stuck.

It is essential that parents assert their ultimate authority over cingulate children. Parents cannot allow oppositional behavior to prevail. If they do, it only reinforces the oppositional behavior, which could ruin a child's life. Permissive parents don't teach their children to deal with authority, and those kids have trouble socially and in school. Authoritative, firm parents tend to raise the most effective children. Just as when people who have OCD give in to their obsessive thoughts or compulsive behaviors those behaviors become stronger and harder to fight, when you give in to oppositional children and allow them to oppose you and disobey their oppositional behavior only becomes worse. The earlier you train oppositional children out of this behavior, the better off everyone will be. To that end, I have developed a set of parenting rules that is the first step in dealing with these children. It is important to clearly spell out the rules and make sure the child knows you are going to back them up. Here are two of the rules that deal with oppositional behavior:

Do what Mom and Dad say the first time.
No arguing with parents.

These rules speel out that you have authority as parents and will not allow your child to argue with you. If you make it a rule for children to comply the first time, then they know that is what is expected of them. You must also quickly intervene if they do not comply the first time. Do not tell a child to do something eight times. Your chance of abusing the child verbally or physically goes up dramatically if you repetitively tell him or her to do things and don't intervene early. For example, if you tell a child to do something and he or she refuses to do it or doesn't do it within a reasonable period of time, very quickly say, "You have a choice. You do it now, or you can take a time-out and then you can do it. I don't care, it's up to you." If the child doesn't move quickly to do what you asked, then put him or her in time-out. Repeat as necessary. Deal with misbehavior quickly, firmly, and unemotionally. The more emotional you get, the more these kids tend to misbehave. Consistency is essential here.

The second rule, "No arguing with parents," is very important for oppositional children. If you allow the child to argue with you, then you are only reinforcing and strengthening his or her cingulate resistance. Of course, you want to hear your child's opinion. But draw the line between stating one's opinion and arguing. You might want to tell your child, "As your parents, we want to hear your opinion, but arguing means you have made your point more than two times."

These parenting interventions are always more effective when you do them in the context of a good relationship with your child. Parents who become "limbically bonded" to their children by spending time and listening to them have fewer problems with oppositional behavior.

In summary, use distraction when necessary but also be firm and authoritative with oppositional children. Pick your battles with them, and do not fight over every issue.

Unfortunately, oppositional children often have one or two cingulate parents, which only feeds the negative family dynamics. Flexibility on the parents' part is often very helpful.

CG Prescription 9: Consider Cingulate Medications

Medications are often very helpful in the cingulate part of the brain, especially those medications that modulate the neurotransmitter serotonin.

Medications that increase serotonin in the brain are termed serotonergic. These include Prozac, Zoloft, Paxil, Anafranil, Effexor, Remeron, Serzone, Desyrel, and Luvox. Several research studies have shown that when these medications are effective, they normalize activity in the cingulate system. Clinically, I have seen these medications decrease patients' repetitive thoughts and compulsive behaviors, calm overfocus or worry, and relax people who have a tendency to be frozen by their inability to see options. When these medications work, they often have a dramatic effect on thoughts and behaviors.

Rob

Rob, a forty-eight-year-old married systems analyst, came to see me because he had problems with holding grudges, "getting stuck" in loops of negative thinking, obsessive thoughts, moodiness, irritability, periodic intense suicidal thoughts, and problems with anger control. "I am the anger broker of the Valley," he reported during the initial session. His wife also reported frequent episodes when Rob would become upset about something, be unable to shift away from the thoughts that were upsetting him, lose control, and exhibit aggressive behavior such as breaking furniture or punching holes in the walls. Rob had a childhood history of oppositional behavior. As part of his evaluation, a brain SPECT study was done that showed markedly increased uptake in his cingulate gyrus. I started him on Anafranil (clomipramine), which has been used in patients with obsessive thinking. Over two months of treatment, his dose of Anafranil was increased to 225 milligrams a day. Rob and his family noted a positive response. He was less irritable, markedly less aggressive, more flexible, and happier. He reported that he was more effective in interpersonal relationships, especially with his children.

After three years of continued clinical improvement on the same dose of Anafranil (two brief trials at lowering the dosage caused a resumption of symptoms) a follow-up brain SPECT study revealed a marked normalization of Rob's brain activity.

Medications don't work all of the time, and sometimes they have side effects that can be annoying and even disturbing. Yet serotonergic medications are some of the newest and most effective weapons in the arsenal against human emotional pain and suffering. They have helped millions of people live more normal lives.

In addition, Saint-John's-wort, a natural herbal treatment, in my experience can also be very helpful in raising serotonin levels and calming the cingulate part of the brain. Saint-John's-wort has been studied head to head with several antidepressants and found to be just as effective with fewer side effects. It has been used for many years in Germany, where it is prescribed seven times more often than Prozac. The usual dose of Saint-John's-wort is 300

milligrams (containing 0.3% hypericin) three times a day. I have used Saint-John's-wort in my clinic for several years and find it a very helpful treatment. Here's an example.

Linda

Linda was twenty-six years old when she first came to see me. She had been raped violently twice, had been in a physically abusive love relationship, and had experienced the death of a great many friends while still a teenager. Her symptoms were depression, anxiety, worrying, and drug use. Her baseline SPECT study showed marked overactivity in the cingulate (problems shifting attention), basal ganglia (anxiety), and limbic areas (depression and mood dyscontrol). After four psychotherapy sessions with EMDR (eye movement desensitization and reprocessing, a specific treatment technique for traumatic events) and one month of Saint-John's-wort (900 milligrams a day), Linda felt significantly better. When we repeated her SPECT study, there was marked normalization of activity in all three areas.

Even though Saint-John's-wort can be effective, it is not completely without side effects. One of my patients experienced a seriously slowed heart rate. Another patient who had gotten worse on Prozac found that Saint-John's-wort made her worse as well. If you have significant struggles with mood or behavior, I recommend you work closely with a psychiatrist and discuss any herbal treatments with him or her.

CG Prescription 10: Try Nutritional Interventions

Low serotonin levels and increased cingulate activity are often associated with worrying, moodiness, emotional rigidity, and irritability. There are two ways that food can increase serotonin levels. Foods high in carbohydrate, such as pastas, potatoes, bread, pastries, pretzels, and popcorn, increase l-tryptophan levels (the natural amino acid building block for serotonin) in the blood, resulting in more l-tryptophan being available to enter the brain, where it is converted to serotonin. The calming effect of serotonin can often be felt in thirty minutes or less by eating these foods. Cerebral serotonin levels can also be raised by eating foods rich in tryptophan, such as chicken, turkey, salmon, beef, peanut butter, eggs, green peas, potatoes, and milk. Many people unknowingly trigger cognitive inflexibility or mood problems by eating diets that are low in l-tryptophan. For example, the high-protein, low carbohydrate diets that I recommend for low-dopamine states (related to prefrontal cortex underactivity) often make cingulate problems worse. L-tryptophan is a relatively small amino acid. When you eat a high-protein diet, the larger amino acids compete more successfully to get into the brain, causing lower levels of brain serotonin and more negative emotional reactiveness.

Nutritional supplementation with l-tryptophan can also be very helpful. L-tryptophan was taken off the market a number of years ago because one contaminated batch, from one manufacturer, cause a rare muscle disease and a number of deaths. The l-tryptophan actually had nothing to do with the deaths. L-tryptophan is a naturally occurring amino acid found in milk, meat, and eggs. Many of my patients have found it very helpful for improving sleep, decreasing aggressiveness, and improving mood control. In addition, it does not have side effects for most people, which is a real advantage over antidepressants. L-tryptophan was recently reapproved by the Food and Drug Administration and is now available. I recommend l-tryptophan in doses of 1.000-3.000 milligrams taken at bedtime. There have also been some

recent studies with inositol, from the B vitamin family, which you can get from a health food store. In odes of 12-20 milligrams a day it has been shown to decrease moodiness, depression, and problems of overfocus. Check with your doctor if you want to try these supplements.

CG Prescription 11: Exercise

Exercise can also be very helpful in calming worries and increasing cognitive flexibility. Exercise works by increasing brain levels of l-tryptophan. As mentioned above, l-tryptophan is a relatively small amino acid and has trouble competing against the larger amino acids to enter the brain. During exercise, more of the large amino acids are utilized to replenish muscle strength, which causes a decrease in the availability of these larger amino acids in the bloodstream. As such, l-tryptophan can compete more effectively to enter the brain and raise brain serotonin levels. In addition, exercise increases your energy levels and may distract you from the bad thoughts that tend to loop. I often recommend exercise for oppositional children as a way to improve their l-tryptophan levels and increase cooperation.

11

Looking Into Memory and Temper: The Temporal Lobes

> Ninety-four-year-old father to his sixty-eight-year-old son: "One day you wake up and realize that you're not eighty-one anymore. You begin to count the minutes, not the days, and you realize that you're not going to be around. All have left is the experiences. That's all there is."
>
> -*from* Grumpy Old Men

Functions of the Temporal Lobes

Dominant Side (usually the left)

- *understanding and processing language*
- *intermediate-term memory*
- *long-term memory*
- *auditory learning*
- *retrieval of words*
- *complex memories*
- *visual and auditory processing*
- *emotional stability.*

Nondominant Side (usually the right)

- *recognizing facial expressions*
- *decoding vocal intonation*
- *rhythm*
- *music*
- *visual learning.*

For too many years the temporal lobes have largely gone unnoticed in human psychology. They are rarely discussed in psychiatric circles, and few neurologists have been concerned with the rich contribution they make to who we are and how we experience life. Until we were able to map activity in the temporal lobes, their function remained mysterious. Many professionals basically thought of them as armrests for the brain. The brain-imaging work we have done at our clinic clearly shows that the temporal lobes play an integral part in memory, emotional stability, learning, and socialization.

The most precious treasures we have in life are the images we store in the memory banks of our brains. The sum of these stored experiences is responsible for our sense of personal identity and our sense of connectedness to those around us. Our experiences are enormously significant in making us who we are. The temporal lobes, on either side of the brain behind the eyes and underneath the temples, store the memories and images and help us define our sense of ourselves.

On the dominant side of the brain (the left side for most people), the temporal lobes are intimately involved with understanding and processing language, intermediate- and long-term memory, complex memories, the retrieval of language or words, emotional stability, and visual and auditory processing.

Language is one of the keys to being human. It allows us to communicate with other human beings and to leave a legacy of our thoughts and actions for future generations. Receptive language, being able to receive and understand speech and written words, requires temporal lobe stability. The ability to accurately hear your child say, "I love you," or to listen and be frightened by a scary story is housed in this part of the brain. The dominant temporal lobe helps to process sounds and written words into meaningful information. Being able to read in an efficient manner, remember what you read, and integrate the new information relies heavily on the dominant temporal lobe. Problems here contribute to language struggles, miscommunication, and reading disabilities.

I often tell my patients that it is their memories that give them both their greatest joys and their greatest sorrows. Memories can make us strong and self-confident (remember the times you felt most competent), or they can bring us to our knees (remember your biggest mistakes). Memories influence every action and pattern of action you undertake. Essential components of memory are integrated and stored in the temporal lobes. When this part of the brain is damaged or dysfunctional, memory is often impaired.

Memories can sabotage our changes for success and effectiveness. I once treated a couple with severe marital problems. The husband had problems with depression and attention deficit disorder. His wife tended to be rigid and unforgiving. Ultimately her memories destroyed the relationship. Shortly after they began therapy, the husband's problems were diagnosed and treated with medication. He got significant relief from his symptoms. Everyone except his wife noticed the improvement. Because his more positive behavior was inconsistent with her experience, she could not see his progress and remained in old patterns of behavior. She was stuck on blaming him. She was unwilling to get help for herself, and ultimately the marriage died. It was her memories, rather than the new reality, that killed it.

Through our research we have also found that emotional stability is heavily influenced by the dominant temporal lobe. The ability to consistently feel stable and positive, despite the ups and downs of everyday life, is important for the development and maintenance of consistent character and personality. Optimum activity in the temporal lobes enhances mood stability, while increased or decreased activity in this part of the brain leads to fluctuating, inconsistent, or unpredictable moods and behaviors.

The nondominant temporal lobe (usually the right) is involved with reading facial expressions, processing verbal tones and intonations from others, hearing rhythms, appreciating music, and visual learning.

Recognizing familiar faces and facial expressions and being able to accurately perceive voice tones and intonations and give them appropriate meaning are critical social skills. Being able to tell when someone is happy to see you, scared of you, bored, or in a hurry is essential for effectively interacting with others. Quaglino, an Italian ophthalmologist, reported on a patient in 1867 who, after a stroke, was unable to recognize familiar faces despite being able to read very small type. Since the 1940s, more than one hundred cases of prosoagnosia (the inability to recognize familiar faces) have been reported in the medical literature. Patients who have this disorder are often unaware of it (right-hemisphere problems are often associated with neglect or denial of illness), or they may be ashamed at being unable to recognize close family members or friends. Most commonly, these problems were associated with deficits of the right temporal lobe. Results of current research suggest that knowledge of emotional facial expressions is inborn, not learned (infants can recognize their mother's emotional faces). Yet when there are problems in this part of the brain, social skills can be impaired.

The temporal lobes help us process the world of sight and sound, and give us the language of life. This part of the brain allows us to be stimulated, relaxed, or brought to ecstasy by the experience of great music. The temporal lobes have been called the "interpretive cortex," as they interpret what we hear and integrate it with stored memories to give meaning to the incoming information. Strong feelings of conviction, great insight, and knowing the truth have also been attributed to the temporal lobes.

Problems with the Dominant (Usually Left) Temporal Lobe

- *aggression, internally or externally directed*
- *dark or violent thoughts*
- *sensitivity to slight; mild paranoia*
- *word-finding problems*
- *auditory processing problems*
- *reading difficulties*
- *emotional instability.*

Problems with the Nondominant (Usually Right) Temporal Lobe

- *difficulty recognizing facial expression*
- *difficulty decoding vocal intonation*
- *implicated in social skill struggles.*

Problems with Either or Both Temporal Lobes

- *memory problems, amnesia*
- *headaches or abdominal pain without a clear explanation*
- *anxiety or fear for no particular reason*
- *abnormal sensory perceptions, visual or auditory distortions*
- *feelings of déjà vu or jamais vu*
- *periods of spaciness or confusion*
- *religious or moral preoccupation*
- *hypergraphia, excessive writing*
- *seizures.*

Temporal lobe abnormalities occur much more frequently than previously recognized. You'll note that many of the above symptoms are often thought of as psychological when, in reality, for many they are biological. The temporal lobes sit in vulnerable area of the brain in the temporal fossa (or cavity), behind the eye sockets and underneath the temples. The front wall of the cavity includes a sharp bony ridge (the lesser wing of the sphenoid bone), which frequently damages the front part of the temporal lobes in even minor head injuries. (God would have done better to put bumper guards on that ridge.) Since the temporal lobes sit in a cavity surrounded by bone on five sides (front, back, right side, left side, and underside) they can be damaged by a blow to the head from almost any angle.

Temporal lobe problems can come from many different sources, the most common being genetics, head injuries, and toxic or infectious exposure. The temporal lobes, prefrontal cortex, and cingulate gyrus are the parts of the brain most vulnerable to damage by virtue of their placement within the skull. They are also the most heavily involved in thinking and behavior.

Blaine

Blaine, age sixty, came to see me because his wife heard me speak at a national conference and she was sure he had a temporal lobe problem. He had memory lapses. He was moody and he was often aggressive. He also frequently saw shadows out of the corner of his eyes and heard an annoying "buzzing" sound, for which his doctor could not find a cause. His temper flare-ups just seemed to come out of the blue. "The littlest things set me off. Then I feel terribly guilty," he said. When Blaine was five years old, he had fallen off a porch headfirst into a pile of bricks. As a schoolboy, he had had a terrible time learning to read and had frequently gotten into fights. His brain SPECT study showed significant abnormalities in his left temporal lobe: a decrease in activity in both the front and back and an area of increased activity deep within. Seeing these abnormalities, it was clear to me that many of Blaine's problems came from the instability of his left temporal lobe, likely a result of his childhood accident. I placed him on Depakote, an antiseizure medication known to stabilize activity in the temporal lobes. When I spoke to him three weeks later, he was elated. The buzzing and shadows had gone away, and he had not lost his temper since he had started the medication. He said, "That was the first time in my life I can remember going three weeks and not screaming at someone." Four years later his temper remains under control.

Common problems associated with left temporal lobe abnormalities include aggression (internally or externally directed), dark or violent thoughts, sensitivity to slights, mild paranoia, word-finding problems, auditory processing problems, reading difficulties, and emotional instability. Let's look at each of these in detail.

The aggressiveness often seen with left temporal lobe abnormalities can be expressed either externally toward others or internally in aggressive thoughts about oneself. Aggressive behavior is complex, but in a large study performed in my clinic on people who had assaulted another person or damaged property, more than 70 percent had left temporal lobe abnormalities. It seems that temporal lobe damage or dysfunction makes a person more prone to irritable, angry, or violent thoughts (much more on this will be discussed in the chapter on violence). One patient of mine with temporal lobe dysfunction (probably inherited, as his father was a "rageholic") complains of frequent, intense violent thoughts. He feels shame over having these thoughts. "I can be walking down the street," he told me, "and someone accidentally brushes against me, and I get the thought of wanting to shoot him or club him to death. These thoughts frighten me." Thankfully, even though his SPECT study confirmed left temporal lobe dysfunction, he had good prefrontal cortex function, so he is able to supervise his behavior and maintain impulse control over his terrible thoughts. In a similar case, Misty, a forty-five-year-old woman, came to see me about her angry outbursts. One day, someone had accidentally bumped into her in the grocery store and she had started screaming at the woman. "I just don't understand where my anger comes from," she said. "I've had sixteen years of therapy, and it is still there. Out of the blue, I'll got off. I get the most horrid thoughts. You'd hate me if you knew." She had fallen off the top of a bunk bed when she was four years old and had been unconscious for only a minute or two. The front and back parts of her left temporal lobe were clearly damaged. A small daily dose of Depakote was very helpful in calming the "monster" within.

I often see internal aggressiveness with left temporal lobe abnormalities, expressed in suicidal behavior. In a study from our clinic we saw left temporal lobe abnormalities in 62 percent of our patients who had serious suicidal thoughts or actions. After I gave a lecture about the brain in Oakland, a woman cam up to me in tears: "Oh, Dr Amen," she said, "I know my whole family has temporal lobe problems. My paternal great-grandfather killed himself. My father's mother and father killed themselves. My father and two of my three uncles killed themselves, and last year my son tried to kill himself. Is there help for us?" I had the opportunity to evaluate and scan three members of her family. Two had left temporal lobe abnormalities, and Depakote was helpful in their treatment.

In terms of suicidal behavior, one very sad case highlights the involvement of the left temporal lobes. For years I wrote a column in my local newspaper about the brain and behavior. One column was about temporal lobe dysfunction and suicidal behavior. A week or so after it appeared a mother came to see me. She told me that her twenty-year-old daughter had killed herself several months earlier and she was grief stricken over the unbelievable turn of events in their life. "She was the most ideal child a mother could have," she said. "She did great in school. She was polite, cooperative, and a joy to have around. Then it all changed. Two years ago she had a bicycle accident. She accidentally hit a branch in the street and was flipped over the handlebars, landing on the left side of her face. She was unconscious when an onlooker got to her, but shortly thereafter she came to. Nothing was the same after that. She was moody, angry, easily set off. She started to complain of 'bad

thoughts' in her head. I took her to see a therapist, but it didn't seem to help. One evening, I heard a loud noise out front. She had shot and killed herself on our front lawn."

Her tears made me cry. I knew that her daughter might well have been helped if someone had recognized her "minor head injury," which had likely caused temporal lobe damage; anticonvulsant medication might well have prevented her suicide. Of interest, in the past twenty years psychiatrists have been using anticonvulsants to treat many psychiatric problems. My suspicion is that we are frequently treating underlying physiological brain problems that we label as psychiatric.

People with left temporal lobe abnormalities are often more sensitive to slights and even appear mildly paranoid. Unlike people with schizophrenia, who can become frankly paranoid, people with temporal lobe dysfunction often think others are talking or laughing about them when there is no evidence for it. This sensitivity can cause serious relational and work problems.

Reading and language-processing problems are also common when there is dysfunction in the left temporal lobe. Being able to read in an efficient manner, remember what you read, and integrate the new information relies heavily on the dominant temporal lobe. It is currently estimated that nearly 20 percent of the US population has difficulty reading. Our studies of people with dyslexia (underachievement in reading) often show underactivity in the back half of the left temporal lobe. Dyslexia can be inherited, or it can be brought about after a head injury damaging this part of the brain. Here are two illustrative cases.

Denise

Thirteen-year-old Denise came to see me because she was having problems with her temper. She had pulled a knife on her mother, which had precipitated the referral. She also had school problems, especially in the area of reading, for which she was in special classes. Due to the seriousness of her aggression and learning problems I decided to order a SPECT study at rest and during concentration. At rest her brain showed mild decreased activity in the back half of her left temporal lobe. When she tried to concentrate, the activity in her left temporal lobe completely shut down. As I showed Denise and her mother the scans, I told Denise that it was clear that the more she tried to read, the harder reading would become. As I said this Denise burst into tears. She cried, "When I read i am so mean to myself. I tell myself, 'Try harder. If you try harder then you won't be so stupid.' But trying harder doesn't seem to help." I told her it was essential for her to talk nicely to herself and that she would do better reading in an interesting, fun, and relaxed setting. I sent Denise to see the educational therapist who works in my office. She taught her a specialized reading program that showed her how to visualize words and use a different part of the brain to process reading.

Carrie

Carrie, a forty-year-old psychologist, came to see me two years after she sustained a head injury in a car accident. Before the accident she had had a remarkable memory and had been a fast, efficient reader. She said reading had been one of her academic strengths. After the accident, she had memory problems and struggled with irritability, and reading became

difficult. She said that she had to read passages over and over to retain any information and that she had trouble remembering what she read for more than a few moments. Again, her SPECT study showed damaged to the front and back of her left temporal lobe (the pattern typically seen in trauma). I had her see my biofeedback technician to enhance activity in her left temporal lobe. Over the course of four months she was able to regain her reading skills and improve her memory and her control over her temper.

In our experience, left temporal lobe abnormalities are more frequently associated with externally directed discomfort (such as anger, irritability, aggressiveness), while right temporal lobe abnormalities are more often associated with internal discomfort (anxiety and fearfulness). The left-right dichotomy has been particularly striking in our clinical population. One possible explanation is that the left hemisphere of the brain is involved with understanding and expressing language, and perhaps when the left hemisphere is dysfunctional, people express their discomfort inappropriately. When the nondominant hemisphere is involved, the discomfort is more likely to be expressed nonverbally.

Mike

Nondominant (usually right) temporal lobe problems more often involve social skills problems, especially in the area of recognizing facial expressions and voice intonations. Mike, age thirty, illustrates the difficulties we have seen when there is dysfunction in this part of the brain. Mike came to see me because he wanted a date. He had never had a date in his life and was very frustrated by his inability to successfully ask a woman out on a date. During the evaluation Mike said he was at a loss as to what his problem was. His mother, who accompanied him to the session, had her own ides. "Mike", she said, "misreads situations. He has always done that. Sometimes he comes on too strong, sometimes he is withdrawn when another person is interested. He doesn't read the sound of my voice right either. I can be really mad at him, and he doesn't take me seriously. Or he can think I'm mad, when I'm nowhere near mad. When he was a little boy Mike tried to play with other children, but he could never hold on to friends. It was so painful to see him get discouraged." Mike's SPECT study showed marked decreased activity in his right temporal lobe. His left temporal lobe was fine. The intervention that was most effective for Mike was intensive social skills training. He worked with a psychologist who coached him on facial expressions, voice tones, and proper social etiquette. He had his first date six months after coming to the clinic.

Abnormal activity in either or both temporal lobes can cause a wide variety of other symptoms, including abnormal perceptions (sensory illusions), memory problems, feelings of déjà vu (that you have previously experienced something even though you haven't), jamais vu (not recognizing familiar places or people), periods of panic or fear for no particular reason, periods of spaciness or confusion, and preoccupation with religious or moral issues. Illusions are very common temporal lobe symptoms. Common illusions include:

- *seeing shadows or bugs out of the corner of the eyes*
- *seeing objects change size or shape (one patient would see lampposts turn into animals and run away; another would see figures in a painting move)*
- *hearing bees buzzing or static from a radio not there*
- *smelling odors or getting odd tastes in the mouth*
- *feeling bugs crawling on the skin or other skin sensations.*

Unexplained headaches and stomachaches are also common in temporal lobe dysfunction. Recently, the anticonvulsant Depakote received a clinical indication for migraine headaches. Often when headaches or stomachaches are due to temporal lobe problems, anticonvulsants seem to be helpful. Many of the patients who experience sudden feelings of anxiety, nervousness, or panic make secondary associations to the panic and develop fears or phobias. For example, if you are in a park the first time you experience a feeling of panic or dread, you may then develop anxiety every time you go into a park.

Moral or religious preoccupation is a common symptom with temporal lobe dysfunction. I have a little boy in my practice who, at age six, made himself physically sick by worrying about all of the people who were going to hell. Another patient spent seven days a week in church, praying for the souls of his family. He came to see me because of his temper problems, frequently directed at his family, which were often seen in response to some perceived moral misgiving or outrage. Another patient came to see me because he spent so many hours focused on the "mysteries of life" that he could not get any work done and was about to lose his job.

Hypergraphia, a tendency toward compulsive and extensive writing, has also been reported in temporal lobe disorders. One wonders whether Ted Kaczynski, the Unabomber, didn't have temporal lobe problems, given the lengthy, rambling manifesto he wrote, his proclivity toward violent behavior, and his social withdrawal. (His loathing of high technology would make submitting to a SPECT scan out of the question for him.) Some of my temporal lobe patients spend hours and hours writing. One patient used to write me twenty- and thirty-page letters, detailing all the aspects of her life. As I learned about temporal lobe hypergraphia and had her treated with anticonvulsant medication, her letters became more coherent and were shortened to two or three pages giving the same information. Of note, many people with temporal lobe problems have the opposite of hypergraphia; they are unable to get words out of their heads and onto the page. I know a therapist who's a wonderful public speaker but cannot get the thoughts out of his head to write his book. On his scan there was decreased activity in both temporal lobes. On a very small daily dose of Depakote, his ideas were unlocked and he could write for hours at a time.

Harriet

Memory problems have long been one of the hallmarks of temporal lobe dysfunction. Amnesia after a head injury is frequently due to damage to the inside aspect of the temporal lobes. Brain infections can also cause severe memory problems. Harriet was a very gracious eighty-three-year-old woman who had lost her memory fifteen years earlier during a bout of encephalitis. Even though she remembered events before the infection, she could remember only small bits and pieces afterward. An hour after she ate, she would feel full but couldn't remember what she had eater. Harriet said, "I left my brain to the local medical school, hoping my problems would help someone else, but I don't think they'll do anything with my brain except give it to medical students to cut up. Plus I want to know what the problem is. And write it down. I won't remember what you tell me!" Harriet's brain showed marked damage in both temporal lobes, especially on the left side, as if the virus had gone to that part of her brain and chewed it away.

Alzheimer's disease, a devastating progressive form of senile dementia, is the cause of one of the most common memory problems in the elderly. Unfortunately, it robs many people of their retirement years and can leave families physically, emotionally, and financially exhausted. SPECT is an important tool in diagnosing this disorder. Before functional studies were available, the only way to diagnose Alzheimer's was through autopsy. SPECT studies show a typical Alzheimer's pattern of decreased perfusion in both temporal lobes and decreased activity in the parietal lobes. Sometimes this pattern is seen three to six years before the onset of symptoms. Some of the new anti-Alzheimer's drugs are showing promise in arresting the progression of this disorder and have been shown on SPECT to actually improve perfusion in the parts of the brain, mostly involved in memory and thinking, such as the temporal lobes. Here is a scan of a man with Alzheimer's disease who had become forgetful, got frequently lost away from home, forgot how to do simple things such as dress, himself, and was increasingly aggressive toward his wife.

Fyodor Dostoyevsky was reported to have had bouts of "temporal lobe seizures." He felt his affliction was a "holy experience." One of his biographers, René Fueloep-Miller, quotes Dostoyevsky as saying that his epilepsy "rouses in me hitherto unsuspected emotions, gives me feelings of magnificence, abundance and aeternity." In *The Idiot,* Dostoyevsky writes:

> There was always one instant just before the epileptic fit ... when suddenly in the midst of sadness, spiritual darkness and oppression, his brain seemed momentarily to catch fire, and in an extraordinary rush, all his vital forces were at their highest tension. The sense of life, the consciousness of self, were multiplied almost ten times at these moments which lasted no longer than a flash of lightning. His mind and his heart were flooded with extraordinarily light; all his uneasiness, all his doubts, all his anxieties were relieved at one; they were all resolved in a lofty calm, full of serene, harmonious joy and hope, full of reason and ultimate meaning. But these moments, these flashes, were only a premonition of that final second (it was never more than a second) with which the fit began. That second was, of course, unendurable. Thinking of that moment later, when he was well again, he often said to himself that all these gleams and flashes of supreme sensation and consciousness of self, and therefore, also of the highest form of being, were nothing but disease, the violation of the normal state; and if so, it was not at all the highest form of being, but on the contrary must be reckoned the lowest. Yet he came at last to an extreme paradoxical conclusion: "What if it is disease?" he decided at last. "What does it matter that it is an abnormal intensity, if the result, if the sensation, remembered and analyzed afterwards in health, turns out to be the acme of harmony and beauty, and gives a feeling, unknown and undivined till then, of completeness, of proportion, of reconciliation, and of startled prayerful merging with the highest synthesis of life?

Bryce

Lewis Carroll is reported to have had "temporal lobe experiences," which were described in the visual distortions of Alice in *Alice's Adventures in Wonderland.* Seven-year-old Bryce became very upset when his mother read *Alice's Adventures in Wonderland* to him.

He said that he felt like Alice. "I have weird things happen to me," he told her. "I see things." During the day he saw objects change shapes, often getting smaller. He also saw green, shadowy ghosts at night. Bryce also had a lot of anxiety symptoms. Frightened that Bryce was losing his mind (a cousin had been diagnosed with a "schizophrenic-like" illness), his mother brought him to see me. On hearing of these symptoms, I suspected that one or both of his temporal lobes were acting up. His brain SPECT study confirmed abnormalities in his right temporal lobe and increased basal ganglia activity. I prescribed Depakote (an antiseizure medication effective in the temporal lobes), and he was also placed in psychotherapy to decrease his anxiety. Within two weeks, Bryce's strange experiences disappeared, and over the next six months his anxiety lessened.

Ellen and Jack

Ellen and Jack had similar histories: both had been somewhat reclusive; both had periods of spaciness; and both had periods of panic for no particular reason. Both had religious experiences that occupied a good deal of their lives. Ellen, age thirty-two, was nearly paralyzed by her deep religious feelings, unable to work and socially isolated. Jack took great interest in her periods of "deep spiritual awakening", but was never able to make out what they meant. Ellen was brought to my office by her parents, who were concerned about her social isolation. Jack wanted an evaluation for the panic attacks. The couple's SPECT studies revealed marked increased activity in the deep aspects of their temporal lobes. The majority of their symptoms went away on Depakote. Even taking Depakote, both remained deeply religious people, but they were no longer constantly preoccupied with their thoughts.

Jim

Like Ellen and Jack, Jim was bothered by periods of spaciness and panic. He also had periods of "religious thoughts", in which he felt the "presence of the devil" and was unsure and afraid. His fear of the devil haunted him, made him reclusive, and made him seem paranoid to his family. There was an interesting difference between Jim's SPECT studies and Ellen's and Jack's studies: Jim's study revealed abnormal activity in the left temporal lobe, not the right. In my experience, left temporal lobe problems are often associated with very negative or "dark" thoughts. After Jim was placed on Depakote, the "presence of the devil" was gone.

Temporal Lobe Checklist

Here is the temporal lobe 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 temporal lobe problems.

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

1. Short fuse or periods of extreme irritability.
2. Periods of rage with little provocation.
3. Frequent misinterpretation of comments as negative when they are not.
4. Irritability that tends to build, then explodes, then recedes; person often feels tired after a rage.
5. Periods of spaciness or confusion.
6. Periods of panic and/or fear for no specific reason.
7. Visual or auditory changes, such as seeing shadows or hearing muffled sounds.
8. Frequent periods of déjà vu (feelings of being somewhere you have never been) or jamais vu (not recalling a familiar place or person).
9. Sensitivity or mild paranoia.
10. Headaches or abdominal pain of uncertain origin.
11. History of a head injury or family history of violence or explosiveness.
12. Dark thoughts, such as suicidal or homicidal thoughts.
13. Periods of forgetfulness.
14. Memory problems.
15. Reading comprehension problems.
16. Preoccupation with moral or religious ideas.

12

Enhancing Experience: Temporal Lobe Prescriptions

The following prescriptions are geared toward optimizing and healing the temporal lobes. They are based on what we have learned about the temporal lobes, as well as clinical experience with my patients. Remember that the temporal lobes are involved with mood stability, understanding and processing language, memory, reading social cues (facial expression and voice intonation), rhythm, and music.

TL Prescription 1: Create a Library of Wonderful Experiences

Strive for a series of experiences that keep you motivated, healthy, and excited about your life. As the temporal lobes store the experiences of your life, keeping them stimulated with positive ones will help keep you healthy. Celebrate your life on a regular basis; make your experiences count.

Record the memorable experiences of your life with pictures, videos, diary entries, and so on. Develop a library of wonderful experiences. Reexperience them whenever you can. Experiences are your link to life itself. Can it be possible that home movies really are therapeutic? Perhaps not for family and friends, but they certainly are for you.

TL Prescription 2: Sing Whenever/Wherever You Can

Singing in the shower may be healing to your temporal lobes. Song has long been known to have healing qualities. You can often tell that a person is in a good mood if he or she is humming or singing. Song is a true joy of life, no matter how you sing.

Song is often associated with spiritual experience. When I was in college, I attended Calvary Chapel, a large church in southern California. The must was magical. Listening to the choir was not just a pleasant experience, it was a wondrous experience that resonated through every cell in my body. The music uplifted both the soul and mood of the congregation. The pastor said the music was "blessed by God Himself." Several of my friends were choir members. They were often transformed when they started to sign. Shy people would become more extroverted, more alive. People in the congregation became more involved in the service during congregational singing. The church community glistened with the contagious joy of the music.

Preschool and kindergarten teachers have known for a long time that children learn best through songs. They remember the material better, and it is easier to keep them engaged in the activity. So why do we stop singing in the second or third grade? Perhaps we should continue the singing into later grades.

Interestingly, when I was in basic training in the military, we often sang when we marched. I still have those songs in my head. When we sang as a group, morale went up, and the tasks that we were doing (like twenty-mile road marches) didn't seem quite as bad.

Sing whenever and wherever you can. You may have to sing softly if your voice is like mine (my sixteen-year-old daughter is often embarrassed when I sing in church). It will have a healing effect on your temporal lobes, and probably your limbic system as well.

TL Prescription 3: Use Humming and Toning to Tune up Your Brain

In *The Mozart Effect,* Don Campbell, founder of the Institute of Music, Health, and Education, lists the benefits of using your voice to enhance mood and memory. He says that all forms of vocalization, including singing, chanting, yodeling, humming, reciting poetry, and simply talk can be therapeutic. "Nothing rivals toning," he concludes. The word *toning* goes back to the fourteenth century and means to make sounds with elongated vowels for extended periods of time. *Ah, ou* (as in *soup*), *ee, ay, oh,* and *om* are examples of toning sounds. Campbell writes that when people tone on a regular basis for five minutes a day, "I have witnessed thousands of people relax into their voices, become more centered in their bodies, release fear and other emotions, and free themselves from physical pain... I have seen many people apply toning in practical ways, from relaxing before a dreaded test to eliminating symptoms of tinnitus or migraine headaches... Toning has been effective in relieving insomnia and other sleep disorders... Toning balances brain waves, deepens the breath, reduces the heart rate, and imparts a general sense of well-being." Campbell reports that in his experience certain sounds tend to have certain effects on the body and emotions:

Ahhh - immediately evokes a relaxation response

Ee or *ay* - is the most stimulating of vowel sounds, helps with concentration, releasing pain and anger

Oh or *om* - considered the richest of sounds; can warm skin temperature and relax muscle tension.

Try toning for 5 minutes a day for 2 weeks to see if it will help you.

In a similar way, humming can also make a positive difference in mood and memory. Mozart hummed as he composed. Children hum when they are happy. Adults often hum tunes that go through their minds, lifting their spirits and tuning their mind. Consciously focus on humming during the day. As the sound activates your brain, you will feel more alive and your brain will feel more tuned in to the moment.

TL Prescription 4: Listen to Classical Music

Listen to a lot of great music. Music, from country to jazz, from rock to classical, is one of the true joys of life. Music has many healing properties. Listening to it can activate and stimulate the temporal lobes and bring peace or excitement to your mind.

Music therapy has been a part of psychiatric treatments for decades. Certain music has a calming effect on patients. Fast-tempo, upbeat music can stimulate depressed patients in a positive way.

In highly publicized work, researchers at the University of California at Irvine (UCI) demonstrated that listening to Mozart's *Sonata for Two Pianos* (K448) enhanced visual-spatial learning skills. Frances H Rauscher, PhD, and her colleagues conducted a study with thirty-six undergraduates from the department of psychology who scored eight to nine points higher on the spatial IQ test (part of the Stanford-Binet Intelligence scale) after listening to ten minutes of Mozart. Gordon Shaw, one of the researchers, suggested that Mozart's music may "warm up" the brain: "We suspect that complex music facilitates certain complex neuronal patterns involved in high brain activities like math and chess. By contrast, simple and repetitive music could have the opposite effect." In a follow-up study, the researchers tested spatial skill by projecting sixteen abstract figures similar to folded pieces of paper on an overhead screen for one minute each. The test looked at ability of participants to tell how
the items would look unfolded. Over a 5-day period, one group listened to Mozart's *Sonata for Two Pianos,* another to silence, and a third to mixed sounds, including music by Philip Glass, an audio-taped story, and a dance piece. The researchers reported that all three groups improved their scores from day one to day two, but the group that listened to Mozart improved their pattern recognition scores 62 percent compared to 14 percent for the silence group and 11 percent for the mixed group. On subsequent days the Mozart group achieved yet higher scores but the other groups did not show continued improvement. The researchers proposed that Mozart's music strengthened the creative right-brain processing center associated with spatial reasoning. "Listening to music," they concluded, "acts as an exercise for facilitating symmetry operations associated with higher brain function." Don Campbell gives a nice summary of this work in *The Mozart Effect,* along with many other examples of music enhancing learning and healing the body. Campbell writes that in his experience Mozart's violin concertos, especially numbers 3 and 4, produce even stronger positive effects on learning.

In the context of the temporal lobes, this research makes perfect sense since the temporal lobes are involved in processing music and memory. Certain types of music may activate the temporal lobes and help them learn, process and remember information more efficiently. It is likely that certain types of music open new pathways into the mind.

Certain music can also be very destructive. It is no coincidence that the majority of teenagers who end up being sent to residential treatment facilities or group homes listen to more heavy metal music than do other teens. Music that is filled with lyrics of hate and despair encourage those same mind states in developing teens. What your children listen to may hurt them. Teach them to love classical music when they are young.

Music is influential from a very early age. Dr Thomas Verny in his book *The Secret Life of the Unborn Child* cites scientific experiments showing that fetuses preferred Mozart and Vivaldi to other composers in early as well as later stages of pregnancy. He reported that fetal heart rates steadied and kicking lessened, while other music, especially rock, "drove most fetuses to distraction," and they "kicked violently" when it was played to their mothers.

Classical music and other beautiful, soothing music can positively stimulate your brain.

TL Prescription 5: Learn to Play a Musical Instrument

In a follow up study by Rauscher and Shaw at UCI, thirty-four preschoolers were given piano keyboard training. After six months, all the children could play basic melodies from Mozart and Beethoven. They exhibited significant increases in visual-spatial skill - up to 36 percent improvement compared to other preschoolers who received computer lessons or other types of stimulation. Campbell cites the following studies: the College Entrance Examination Board in 1996 reported that students with experience in musical performance scored 51 points higher on the verbal part of the SAT and 39 points higher on the math section than the national average. In a study of approximately 7,500 students at a university, music majors had the highest reading scores of any students on campus. Learning a musical instrument, at any age can be helpful in the development and activation of temporal lobe neurons. As the temporal lobes are activated in an effective way, they are more likely to have improved function overall.

TL Prescription 6: Move In Rhythms

The temporal lobes are involved with processing and producing rhythms. Chanting, dancing and other forms of rhythmic movement can be healing. Many Americans never learn about the concept of rhythm and how important it can be to healing and health.

Chanting is commonly used in Eastern religions and orthodox Western religions as a way to focus and open one's mind. Chanting has a special rhythm that produces an almost trancelike state, bringing peace and tranquility and opening the mind to new experiences and learning.

Even for people with two left feet like myself, dancing and body movement can be very therapeutic. When I worked on a psychiatric hospital unit, the patients had dance therapy three to four times a week. I found that my patients were often more open and more insightful in psychotherapy after a dance therapy session. Dancing, like song and music, can change a person's mood and provide positive experiences to treasure throughout the day, week, or even longer.

Look for opportunities to move in rhythms.

TL Prescription 7: Consider Temporal Lobe Medications

Abnormalities in the temporal lobes can cause serious problems, including seizures, visual changes, abnormal sensory experiences, and serious behavior changes. Medications can often be very helpful in temporal lobe dysfunction. Depakote (divalproex), Neurontin (gabapentin), Lamictal (lamotrigine), and Tegretol (carbamazepine) are antiseizure medications that are very effective in stabilizing abnormal activity in the temporal lobes. They have been shown to be helpful for a wide variety of "psychiatric" problems, such as aggressiveness, intractable depression, manic-depressive disorder, migraine headaches, pain syndromes, and even learning disabilities. Dilantin, a classic antiseizure medication, has also been shown to help some patients with temporal lobe abnormalities. If you suspect you have temporal lobe problems, obtain an evaluation by a neurologist or neuropsychiatrist.

TL Prescription 8: Get Enough Sleep

Current research underscores the importance of sleep. A recent SPECT study demonstrated marked decreased perfusion in the temporal lobes in people who get less than six hours of sleep a night. Decreased sleep is also associated with mood instability, decreased cognitive ability, irritability, and periods of spaciness - all temporal lobe problems. When I was the chief psychiatrist at Fort Irwin in the Mojave Desert, I treated several people with severe sleep deprivation from military manoeuvers. They often presented with symptoms of cognitive impairment, paranoia, and hallucinations. Sleep is essential to optimal brain function, especially temporal lobe function. Make sure you get at least six to eight hours every night.

TL Prescription 9: Eliminate Caffeine and Nicotine

In our experience and the experience of other brain researchers, caffeine and nicotine are powerful vasoconstrictors that decrease blood flow to the brain, especially to the temporal lobes. Eliminate these substances from your body, or at least cut down on the amount you consume. You will feel sharper and more in focus overall. Even though caffeine and nicotine may help in the short run, they will make things much worse in the long run. The overall decreased activity caused by the caffeine and nicotine makes people use more and more to get the same effect. They end up chasing a self-induced problem.

TL Prescription 10: Watch Your Nutrition

Nutritional support can be very helpful in temporal lobe problems. Many people with aggressive behavior become much worse after a high sugar load. If aggressiveness is present without features of depression or obsessive thoughts (more the explosive or short-fuse form of aggressiveness), then a higher-protein/lower-simple-carbohydrate diet is likely to be very helpful. If the aggressiveness is associated with ruminations, moodiness, and depression, then a balanced diet of equal amounts of carbohydrates and protein is likely to be best.

TL Prescription 11: Try EEG Biofeedback

Given what we have learned from SPECT, my clinic often uses EEG biofeedback to enhance temporal lobe functioning. When we see over- or underactive areas on SPECT, we

put electrodes over those areas, measure the activity, and train healthier brain-wave rhythms in that part of the brain. This can be very helpful for brain injury patients. One woman who was involved in a head-on collision had memory problems, irritability, and trouble reading after her accident. Her cognitive state prevented her from returning to work, which fed a growing depression. On SPECT she had decreased activity in the left temporal lobe. After twenty-five EEG biofeedback sessions over her left temporal lobe, she reported marked improvement in memory, was less irritable, and enjoyed reading once again. Her mood also improved, and she was able to return to work.

13

The Dark Side

Violence: A Combination of Problems

Violence is a complex human behavior. There has long been a passionate debate over whether violent behavior is the result of psychological, social, or biological factors. Current research indicates that violence in fact results from a combination of all three.

Because of the lack of specific biological studies to evaluate violent behavior, clinicians have had to rely on family history to look for genetic factors, along with a history of head trauma, seizures, or drug abuse to evaluate possible medical causes. One of the reasons underlying the lack of clear biological diagnostic tools in violence may be the diversity and variability of the reported findings in the scientific literature. Nonspecific and conflicting EEG findings have been reported. A wide variety of neurotransmitter abnormalities have been reported, including disturbances of norepinephrine, dopamine, serotonin, acetylcholine, and gamma-aminobutyric acid (GABA). Numerous neuroanatomical sites have also been implicated in violence, including the limbic system, temporal lobes, frontal lobe lesions, and prefrontal cortex.

Our SPECT studies provide a useful window into the brain of violent or aggressive patients and help bring together the diversity of biological findings. I have studied hundreds of children, teenagers, and adults who exhibited violent or aggressive behavior and compared them to people who have never been violent. The brain of the violent patient is clearly different from that of the nonviolent person. I have found clinically and statistically significant differences between aggressive groups and nonaggressive groups clustered around three major findings: decreased activity in the prefrontal cortex, increased cingulate activity, and increased or decreased activity in the left temporal lobe. Other significant findings included increased focal activity in the left basal ganglia and on the left side of the limbic system.

The brain SPECT profile of the violent or aggressive patient suggested by these findings is:

- *decreased activity in the prefrontal cortices (trouble thinking)*
- *increased cingulate activity (getting stuck on thoughts)*
- *focal increased or decreased activity in the left temporal lobe (short fuse)*
- *focal increased activity in the basal ganglia and/or limbic system (anxiety and moodiness).*

Case Histories

Paul

Paul, a twenty-eight-year-old gardener, came to my clinic for work-related problems. He had increasingly intense feelings of rage toward his boss. Paul said that his boss was prejudiced against him because he was Hispanic. He frequently thought about killing his boss, and he reported that only the thought of his wife and small daughter prevented him from doing so. He needed to maintain his job in order to support his family. Paul could not get the anger toward his boss out of his head.

He said that since childhood he had had many explosive outbursts. He imagined himself someday shooting down at people from the top of a tower. He described himself as having an extremely short fuse, especially while driving. At the age of seven, he had ridden his bike full speed into a brick wall and had been unconscious for several minutes.

Paul had no evidence of psychotic disorder or significant depression, although he did complain of short periods of confusion, fear for no reason, and episodes of déjà vu. His EEG was within normal limits. A brain SPECT study was obtained in order to evaluate any underlying brain abnormalities that might have been contributing to his difficulties.

Paul's brain SPECT study was significantly abnormal. It revealed normal activity in the prefrontal cortex at rest that worsened when he tried to concentrate (problems with impulsivity). There was also moderate marked increased uptake in the deep aspects of the left temporal lobe (short fuse) and the cingulate gyrus (stuck on thoughts).

Because of the clinical picture and information from the brain SPECT study, Paul was placed on the anticonvulsant Tegretol at therapeutic levels, along with Prozac several weeks later. After six weeks, he reported that he noted a sense of increased inner control and inner peace. His periods of confusion, déjà vu, and fearfulness diminished. His angry outbursts decreased, and he was able to go to work at a new job.

Steven

Steven, a thirty-nine-year-old radio station engineer, was admitted to the hospital for suicidal thoughts. He had recently separated from his wife of eight years. During their relationship there had been mutual physical spousal abuse for which he had spent some time in jail. Steven also complained of having a very short fuse. He found himself frequently yelling at other drivers on the road and was easily upset at work. On admission he was depressed and tearful, and had problems sleeping and poor concentration. He reported short periods of confusion, feelings of intense rage with little provocation, and times when he would see shadows out of the corners of his eyes. His EEG was within normal limits. Steven's brain SPECT study revealed marked increased uptake in the deeper aspects of the left temporal lobe and marked increased activity in the cingulate gyrus.

With the clinical picture and information from the brain SPECT, it was decided to start Steven on an anticonvulsant in addition to an antidepressant. He was placed on Tegretol at therapeutic levels along with Prozac. Even though he continued to feel sad about the breakup

of his marriage, he felt calmer and in better self-control, and his suicidal thoughts abated. He did report that he wished he had known about the dysfunction in his temporal lobe years earlier. He felt it might have changed the outcome of his marriage.

Mark

Mark, a thirty-four-year-old corporate employee, was referred by his counselor after he was discharged prematurely from a drug treatment program for psychotic thinking. Mark had gone into drug treatment voluntarily, trying to break a ten-year amphetamine addiction. Initially it seemed that Mark had an amphetamine psychosis, but after four months free from any drugs, his paranoia and aggressive behavior escalated. On three separate occasions he stormed out of my office, cursing me as he left. He began to display dangerous behavior, expressing homicidal and suicidal ideas along with grandiose thinking. He had gone through several similar episodes in the past. Mark refused medication, suspecting that I was trying to control him or poison him. He did consent to having a brain SPECT study after much encouragement from his family.

The first time Mark went for his SPECT study, he ripped the IV out of his arm and ran from the clinic. He called me an hour later and cursed me out, saying again that I was trying to poison him. I called his mother, who calmed him down and sat with him through the test. His brain SPECT study revealed significant decreased uptake in his left temporal lobe.

With the clinical picture and the SPECT information, Mark was started on the anticonvulsant Tegretol at therapeutic levels. Within ten days, he felt calmer and was obviously less paranoid. Within a month, he returned to work at full function and felt more in control of his temper than even before he had started using drugs. He was relieved to know about the temporal lobe dysfunction and felt it explained many of the problems he had had in the past. He continued his medication without incident.

Peter

Peter was a twelve-year-old boy with a history of oppositional behavior, emotional outbursts, increased activity level, short attention span, impulsiveness, school problems, frequent lying, and aggressive behavior. At age six, Peter had been placed on Ritalin for hyperactivity, but it had made him more aggressive and had been stopped. He was admitted to a psychiatric hospital at age eight for aggressiveness, where he was diagnosed with depression and started on an antidepressant, which had little effect. By the age of twelve, a psychiatrist in the Napa Valley had seen him for several years of psychotherapy, and his parents were seen in collateral sessions as well.

The psychiatrist frequently blamed the mother as the "biggest part of Peter's problem." He told her that if only she would get into psychotherapy and deal with her childhood issues, Peter's problems would lessen. Peter's behavior escalated to the point where he was frequently aggressive and uncontrollable at home. He was rehospitalized on the day he attacked a classmate with a knife.

I was on call the weekend Peter was hospitalized. To bond with the kids, sometimes I play football with them. Peter was on my team. On every single play, he tried to cheat. When we were on defense, he would move the ball back several feet and then turn around to look at me, as if he were trying to get me angry. I refused to play his conflict-seeking game, but I decided it was time to get a brain SPECT study to help me understand Peter's need for turmoil.

Peter's SPECT study was abnormal. There was significant left temporal lobe underactivity; in addition, when he tried to concentrate, his prefrontal cortex shut down. Peter was placed on Tegretol at a therapeutic level. Within three weeks, he was a dramatically different child. He was more compliant, better with the other children on the hospital ward, and less conflict-seeking with the hospital staff. On the weekend he was being discharged from the hospital, I was again on call. As I had the month before, I gathered the kids on the ward and we played football. Peter was on my team. On every single play, he talked to me about what we were going to do. There was no evidence of the prior conflict-seeking behavior. Peter was exhibiting socially effective behavior.

After Peter's discharge from the hospital, his mother no longer looked like "the problem." Even though Peter was emotionally more stable, he still had symptoms of attention deficit disorder, having trouble concentrating and following through on his schoolwork. Knowing about the drop-off in prefrontal cortex activity, I added Cylert (a brain stimulant) to the Tegretol, which helped him perform much better in school. Eight years after his hospitalization, Peter is stable and doing well at school and at home. When Peter was sixteen, I gave a lecture to the faculty at his school. Peter saw me in the parking lot. He ran over to me and gave me a big hug (in front of his friends)!

Profile of Violence

These findings point to a brain SPECT profile of the aggressive patient that involves several specific areas of the brain, especially the left hemisphere. When these findings are taken together, they suggest that aggression is a complex process mediated by several different areas of the brain.

Decreased activity in the prefrontal cortex is a finding often cited in people who are having cognitive difficulty, such as in schizophrenia or major depression. The prefrontal cortex is involved in mediating concentration, impulse control, and critical thinking. Aggressive people often misinterpret situations and react in an impulsive manner.

As mentioned above, increased activity in the cingulate is frequently noted in people who become "stuck" on certain thoughts or behaviors. Aggressive people often become "stuck" on real or imagined injustices and think about them over and over. For example, in several of the case histories, the men often became enraged while driving. They reported that if someone accidentally cut them off on the road, they would think and think about it to the point where they would have to do something, such as honk, gesture, or even chase the other driver, in order to get the thoughts out of their minds. Studies have shown that medications that increase serotonin in the brain (such as Prozac or Anafranil) normalize activity in the cingulate.

Increased activity in the basal ganglia is often found in patients who have anxiety or panic disorders. People who are aggressive often report a baseline level of tension or anxiety, and many clinicians have seen a pattern with these patients where they become increasingly more anxious before they strike out.

Abnormalities in the limbic system have been associated with aggressiveness. Some researchers believe that affected people have limbic seizures. Studies consistently find that when the amygdala, a structure in the deep temporal lobes often considered part of the limbic system, is stimulated, a person becomes more agitated and aggressive. The limbic system is often cited as the part of the brain that sets the mood, and abnormal activity in this area may be associated with significant moodiness.

Aggression and abnormalities in the temporal lobes have been described in numerous studies. They are perhaps the most striking finding of our work. Medications such as Neurontin, Tegretol, and Depakote have been found helpful in decreasing abnormal activity in this portion of the brain.

In my experience with brain SPECT imaging, left-side brain abnormalities are associated with patients who are more irritable and aggressive. In addition, right-side brain abnormalities often correlate with patients who are more withdrawn, socially conscious, and fearful, and much less aggressive.

I was raised in a strong Catholic family. I was taught to believe that if you live a clean life and work hard, you will be successful. I believed that there was something the matter with the character of people who were drug addicts, murderers, child abusers, and even those who took their own lives. After being involved with about five thousand brain SPECT studies my mind has changed completely. I now believe that it is essential to evaluate the brain when behavior is out of bounds. The brain is an organ that dramatically influences behavior, thoughts, and feelings. These cases and many like them are yet further examples to me to press on studying the brains of people with abnormal behavior. What we need is more knowledge, more understanding, and less judgment.

Sometimes I want to cry when I think of all the children and teenagers who are in group homes, residential treatment facilities, and juvenile halls, or who have run away from home because their families could not deal with them any longer. I know that many, many of them have brain problems that have never been properly evaluated. Perhaps they have seen a local counselor or physician who looked at the abnormal behavior and told the parents that the child could behave if only he or she really wanted to. In today's "enlightened" society, that attitude is as prevalent as ever. No amount of trying would have changed Peter's behavior.

Here is an example of the impact that brain problems can have on a family.

Father-and-Son Study

Nine-year-old Phillip was frightened when the police came to his school to talk to him. His teacher had noticed bruises on his arms and legs and had called Child Protective Services. Phillip wasn't sure if he should tell them the truth - that his father, Dennis, had beaten him up - or if he should say that he had fallen down a flight of stairs or something like that.

Phillip did not want to get his dad into trouble, and he felt responsible for the beating he had received. After all, he reasoned, his father had told him ten times to clean his room, but for some reason unknown to Phillip, he hadn't done it. Phillip and his father often fought, but it had never been apparent to people outside the home. Phillip decided to tell the truth, hoping that it would help his family get some help.

Indeed, Phillip's family did get help. The court ordered counseling for the family and a psychiatric evaluation for the father. The father was found to be impulsive and explosive in many different situations. He had begun to have problems with aggressiveness after sustaining a head injury in a car accident six years earlier. His wife reported that when Phillip had first been born, his father had been loving, patient, and attentive. After the accident, he had become irritable, distant, and angry.

In family counseling sessions, Phillip was very difficult - restless, overactive, impulsive, and defiant. He ignored his parents' request to stop his annoying behaviors. I soon discovered that the interaction between Phillip and his father was the problem and counseling alone would not be helpful. I believed there was some underlying biological or physical "brain problem" that contributed to the abusive interactions. In an effort to further understand the biology of this family's problems, I ordered brain SPECT studies on Phillip and his father.

The studies for both were abnormal. The father's clearly showed an area of increased activity in his left temporal lobe, probably a result of the car accident. Phillip's revealed decreased activity in the front part of his brain when he tried to concentrate. As we have seen, this finding is often found in children who have ADD and are impulsive and overly active.

After taking a history, watching the family interact, and reviewing the SPECT studies, it was clear to me that Phillip's and his father's problems were, in part, biological. I placed both of them on medication. The father was put on an antiseizure medication to calm his left temporal lobe, and Phillip was placed on a stimulant medication to increase activity in the front part of his brain.

Once the underlying biological problems were treated, the family was able to benefit from psychotherapy and begin to heal the wounds of abuse. In counseling sessions, Phillip was calmer and more attentive, and his father was better able to learn how to deal with Phillip's difficult behavior in a constructive way.

Whenever abuse of a child occurs, it is a severe tragedy. The tragedy is compounded when the underlying brain problems that may be contributing to the abuse are ignored.

Suicide

Suicide is the eighth leading cause of death in the USA. It is often attempted when a person feels as though he or she has not other option. Suicide devastates a family, often leaving parents, spouses, and children feeling abandoned, guilt stricken, and depressed.

Brain SPECT studies have been useful in helping to understand suicidal behavior. I have scanned several hundred people who have attempted suicide. They frequently show the violent pattern described above. The majority of these patients had increased cingulate activity

(tendency to get stuck on negative thoughts); increased or decreased activity in the temporal lobes, most commonly on the left side (short fuse and irritability); and decreased activity in the prefrontal cortex during a concentration task (impulsivity and poor judgment).

Most suicidal thoughts are brief in duration. Yet when someone who gets locked into negative thoughts also has a short fuse and problems with impulsivity - watch out! Here are several examples.

Danny

Danny was eight years old when his mother brought him to my clinic after he had twice tried suicide. He had attempted to jump out of a moving car on the freeway, and he had put a rope around his neck and tied it to the closet rod. Both time his mother had stopped him. She said that Danny had an obsession with death. He often complained that he hated his life and felt he'd be better off dead. At the age of three, Danny had fallen out of a motor home that was moving about thirty miles per hour and sustained a head injury with a brief loss of consciousness. Over the next year, he had changed from a happy, fun-loving child to a surly, negative, unhappy child who was subject to monumental temper tantrums. A neurologist had ordered an EEG on Danny when the parents complained he was having periods of spaciness. The EEG was normal. As part of my evaluation, I ordered a brain SPECT study to evaluate why a child so young would exhibit suicidal behavior (which is very unusual in children under ten).

Danny's SPECT study showed markedly increased activity in the deep aspects of his temporal lobes, markedly increased activity in the cingulate gyrus, and decreased activity in his prefrontal cortex during a concentration task. No wonder Danny was having so much trouble. Traditionally play therapy or psychotherapy is the first line of treatment for depressed or suicidal children. Given the seriousness of this case, I placed Danny on Depakote, an antiseizure medication, to stabilize his abnormal temporal lobe activity. Three weeks later, I added Zoloft to help with his obsessive thinking. Within six weeks, Danny lost his anger, his suicidal thoughts had disappeared, and he was able to interact with his family in a more positive way. Danny was also seen twice weekly in psychotherapy for a few months. Three years later, Danny remains on lowered doses of his medication without any suicidal thoughts.

Mary

Sixteen-year-old Mary was admitted to the hospital for recurrent suicide attempts. This was her fifth psychiatric hospitalization, and she was going to be transferred to a long-term residential treatment facility. Mary also had problems with obsessive thoughts about unusual sexual behaviors, and she compulsively took eight to ten showers a day and changed her clothes that many times during a day as well. Her mother could barely keep up with the laundry. On the day Mary was admitted to the hospital, she had cut her wrists with broken glass. Mary had a paternal uncle who had multiple incarcerations for assaultive behavior. Her father's father was an alcoholic.

Mary's brain SPECT study revealed markedly increased cingulate activity, along with increased activity in the left side of her basal ganglia and the left side of her limbic system. The increased activity also spread into the deep aspects of her left temporal lobe. No wonder

she was in so much pain! She had tried Prozac in the past, but it had made her more aggressive. Given her symptoms and SPECT findings, I put her on Depakote and Anafranil (an antiobsessive antidepressant). Over the course of the next month, Mary became more relaxed, and she was able to talk about her obsessive thoughts. Her suicidal thoughts diminished, and it was decided that she could return home rather than go to long-term treatment. She remained in therapy for several years and made no more suicide attempts. Her SPECT study was repeated eight months later to make sure we were on the right track. There was an 80 percent decrease in activity in the areas of her brain that had been overly active.

Randle

Randle has been hospitalized for two serious suicide attempts before he came to see me. He was the chief executive officer of a computer software company, and on the outside it appeared he was a man who had everything. He had a beautiful wife, three children, and a successful business. On the inside, however, he was tormented. He often went into rages at home over minor things. He drank too much, and he was obsessively jealous whenever any man looked his wife's way. Randle began having a repeat of his suicidal thoughts when he came to see me. Randle's father had killed himself when Randle was seventeen years old (suicide is often a modeled behavior). His father had been diagnosed as manic-depressive. Randle had an uncle who was an alcoholic, an aunt who was being treated for depression, and a nephew who was on Ritalin for ADD.

On close questioning, Randle said he had "really dark days" even when he wasn't drinking. He also complained of seeing shadows and of frequent spacy periods. I ordered a brain SPECT study to help understand the patterns in Randle's brain. It showed left temporal lobe abnormalities, increased cingulate activity, and decreased activity in his prefrontal cortex when he tried to concentrate. Again, these findings are consistent with a short fuse, obsessive thoughts, and impulsivity. This symptom triad often leads to aggressive behavior, toward either oneself or others. Randle had a very positive response to a combination of Tegretol and Prozac.

Stalking

In my clinical practice I have studied four people who have been arrested for stalking. All four had the brain pattern I have described for violence with left temporal lobe problems, heavily increased cingulate activity, and decreased activity in the prefrontal cortex in response to a concentration task. These people would get stuck on negative thoughts, such as "I must have her," and they were unable to let go of those thoughts. In three of the four cases, medication helped these patients give up their obsessions. The fourth person went to jail. Cheryl was an example of successful treatment.

Cheryl

After seeing an interview on television, Cheryl, twenty-eight, became obsessed with a player on a professional baseball team. She started attending every home game. She wrote to him weekly. She couldn't stop thinking about him. She had a responsible job in a bank during the day, but at night and weekends she focused mostly on this one celebrity. When she didn't get any response to her letters, she began trying to contact him by telephone and in

person. When this was unsuccessful the tone of her letters changed from admiration to irritation and then to subtle threats. After she sent a particularly hostile letter, the team reported her to the police. The police warned her to stop trying to contact the ballplayer.

Her brother Peter had been seeing me at the time for obsessive-compulsive disorder. He had had a nice response to the combination of Prozac and psychotherapy. When he heard what was going on with his sister, he insisted that she come to see me. Reluctantly she came to my office.

Cheryl was frightened by her own behavior. She had never before had any contact with the police. "I just couldn't get him out my head," she said, referring to the ballplayer. Cheryl had for a long time had trouble getting certain thoughts out of her head. As a teenager, she had had problems with anorexia. As an adult she had gone through many relationships. Her boyfriends had complained that she worried too much and was too jealous. As part of my evaluation, I ordered a brain SPECT study. It revealed a significantly overactive cingulate, left temporal lobe changes, and decreased prefrontal cortical activity. Cheryl responded nicely to a combination of an antiobsessive antidepressant (Prozac), an anticonvulsant (Depakote), and psychotherapy. She said that the medication allowed her to be more flexible and not get locked into repetitive thoughts.