

PART V

APPENDICES



*“There is something more hideous, more atrocious than war or than death; and that is to live in fear.”*

– *Eve Curie, French author*<sup>1</sup>

## APPENDIX I

# THE ADRENALINE-DOPAMINE RELATIONSHIP

Some of the subjects addressed in this appendix are redundant, and repeat concepts that were addressed in the main text. However, so many questions arise over the role of dopamine that I wanted to include this extra material, and repeat some of the basic ideas.

## ADRENALINE – MORE THAN JUST FIGHT OR FLIGHT

Certain physiological events have long been known to occur in response to an overwhelming surge of adrenaline. Whether the adrenaline tsunami comes from within the body or is administered via a needle, the main events are: increased heart rate, increased bronchodilation, increased urination, and opening the pores for increased sweating. Aside from these symptoms, known for nearly a century to doctors, we have the more general aspects of adrenaline, the ones that are better known to the man on the street. We all know that, under the influence of adrenaline, we all think and move differently than we do when we are relaxed.

The first section will describe behaviors that occur in various arenas when the adrenaline system is being used for that particular body function. I will include examples of adrenaline system behaviors at high, medium, low, and exhausted levels of adrenaline.

The second section will describe behaviors that occur in the same arenas when the dopamine system is dominant.

### **Adrenaline in the various arenas**

#### *Speed of thought*

Adrenaline-based thought is *fast*. Consider the example of a bicyclist who has just been hit by a car. While he hurtles through the air, his mind switches over to the adrenal neuropathway in the brain. His adrenaline levels surge, filling the thinking arena. This creates the following well-known change in his perceptions: time expands. He is able to distinctly process hundreds of thoughts. Sometimes, his “whole life passes before his eyes” before he hits the ground. He may be able to consider dozens of moves that might protect him. This tremendous rush of thoughts is able to be processed because, when the adrenaline neuropathways in the thinking arena are fully loaded, they do not dilly-dally around skipping from one side of the brain to the other, trying to balance logic and art, intuition and reason. Heck no.

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<sup>1</sup> From a speech to the American Booksellers Association, New York, April 9, 1940.

When one is about to crash head first into a windshield of a car, floods of adrenaline send the thoughts racing straight down the center of the brain to the frontal lobe allowing for a supreme amount of information to be directed to the center of will and focus. The maximum levels of adrenaline blast another group of brain neurons which dive directly to the midbrain areas, the areas that regulate primal survival instincts.

Even if the emergency is not purely physical, if the “danger” is coming from the competitors in an academic contest, the person who is using the adrenaline pathways for his thinking function and keeping high amounts of adrenaline gushing through this part of his system will be able to think faster and more brilliantly than the competition.

Now, if the adrenaline system is being used (as opposed to the dopamine system) but the adrenaline *levels* are low, a different scenario occurs. The mind, the guiding force of the adrenaline system, is still the director of the show, but the low levels of adrenaline allow the mind to scrabble around quickly from one thought to the next, often getting nowhere: the mind in a pointless whirl. This frame of mind can manifest as unfocused rambling, confusion, or even anxiety. These behaviors are mind-driven, but are not productive.

When the adrenaline system is dominant (the dopamine system is not in use) but adrenal *levels* are extremely low or exhausted, the mind simply doesn't know how to be effective. Depression or panic may ensue.

The intuition is not available in the thinking arena when the adrenaline system is dominant for that particular function. In all cases, whether the adrenaline levels are high or low, charging ahead, dithering in confusion, or moldering helplessly in depression, *dopamine and the intuition do not kick into the thought arena while the adrenal system is in use for that arena*. Instead, the negatively oriented, fear (adrenaline)-based mind controls the reins of the body chariot.

Again, when using the adrenaline system to perform certain thought tasks, the mind is in charge and the intuition is silent with regards to those thought tasks. Fear is the motivator that activates the adrenaline system. The mind-driven self-preservation instinct, whether raging at lightening speed in self-defense or just potheringly worried about everything in general, dominates when fear is present.

### ***Motor function***

When the adrenaline system is dominant (the dopamine system is turned off) and adrenaline levels are extremely high, the normal brakes on motor function are absent. We all know stories of a person who performed a superhuman feat, such as ripping the door off a burning car to rescue a child trapped inside. Such a powerful act of unnatural strength can occur when the adrenaline *pathway* to the midbrain is employed and the adrenaline *level* is set at maximum. At such very high levels of adrenaline, the self-evaluative, self-critical parts of the brain are bypassed; a person ceases to know that he cannot perform great feats of strength.

When the adrenal path is dominant for motor function but adrenaline levels are low, the pathways directing the body to keep moving are still in use. But without an overriding sense of adrenaline-induced purpose, a person may be merely restless instead of effectively dynamic.

When the adrenaline system is dominant for motor function but adrenal levels are exhausted, a person may feel internally restless but can barely stir himself to move. He

must almost create a pretend mental emergency to stir up enough adrenaline to get moving. His balance may be poor due to lack of a strong sense of direction and focus.

Note carefully: *just because adrenaline is exhausted, dopamine pathways will not automatically kick in.* The mental attitude determines which path is used. If fear is dominant with regard to motor function, the adrenaline path will be selected to govern movement even though adrenaline levels are set on empty.

### ***Sensory perception***

The adrenal pathway has neurons going to the incoming senses of sight, sound and smell. The neurons devoted to the rapid, fear-based processing of this information go more to the more primitive, self-defense areas of the brain than to the pondering, musing areas. Sensory information may be evaluated more in terms of what it means rather than just experiencing it.

When the adrenal pathway is dominant but adrenaline is at low levels, sights, sounds and smells are more likely to be perceived as annoying instead of provocative.

### ***Pain***

When the adrenaline neural pathways for monitoring pain are activated, pain can be ignored. Any of us might know of someone who has performed an impossible action such as fleeing a maniac by running a mile on a broken leg, or winning an eighteen mile bicycle race with a broken collarbone. One feels no pain as long as the adrenaline pain recognition pathway is in use and completely saturated. The neural circuits used when the adrenaline system is supremely dominant and topped up with adrenaline connect only tangentially with the pain centers.

When adrenaline levels are low but the adrenaline pain recognition system is the dominant (the dopamine system is not in use), a person might perceive pain, but might still hide his pain from others. The extent to which the adrenaline system or dopamine system is dominant in the socializing part of his mind may determine whether or not the person in pain tells his friends, his co-workers, the world – or even himself – about his pain.

When the adrenaline pain recognition system is dominant and adrenal levels are exhausted, anything or everything might hurt. His response to the pain might range from being worried to being scared.

### ***Immune system***

The adrenaline pathway sends repression signals to the immune system. How many of us don't get sick as long as some crucial bit of work remains undone? And then, when the workload lightens or we get to take a vacation, the adrenaline levels drop and the suppressed illness surfaces.

When the adrenaline system is dominant but the levels of adrenaline are low, the result can be frequent illness, allergies, or malaise.

### ***Digestion***

The adrenaline pathways give short shrift to food metabolism and digestion. When we are keyed up with fear and rage, the adrenaline system pathways to the stomach say, "Shut down" and the signal to the large intestine is often, embarrassingly, "Abort!" It

is not so much that adrenaline itself causes the digestion system to stop functioning: the entire collection of adrenaline systems work together to prioritize body functions when adrenaline levels rise. Digestion is at the bottom of the priority list when one's life is on the line.

When most of the adrenaline pathways are dominant but adrenaline levels are low, one might feel a desire to stay busy via eating, but might not actually feel hunger. This can lead to pointless, incessant snacking, as the person tries to sedate with food the anxiety caused by choosing to use the adrenal system during times of low adrenaline.

### ***Temperature regulation***

When adrenaline levels are high, the adrenaline system for temperature regulation bypasses the conscious awareness of temperature. During an emergency, a person might work valiantly for hours in the blazing sun or bitter sleet, not affected in any way by the dangerous levels of heat or cold. Hours later, when the emergency ends and the adrenaline levels drop back down to normal, he may collapse from the heat or shiver violently as his body starts to assess his temperature imbalance.

When the adrenaline system is dominant but adrenaline levels are exhausted, temperature control of the body is compromised. One might suffer from a tendency towards extreme heat or extreme cold, or even go back and forth.

### ***Social interaction***

The adrenaline system for social interaction, when fully charged with adrenaline, does not integrate well with the nerve centers that govern nuances of socializing. Instead, they go directly to the danger assessment area. This pathway will interpret a stranger's behavior patterns in light of whether or not the stranger is a safety risk. It probably will not determine whether or not the stranger's feelings have recently been hurt.

The areas of the brain that process sophisticated emotions are not well traversed when the adrenaline levels are high. When the adrenaline system is dominant and adrenaline is surging, a person can be very aggressive and defensive, dangerously so, towards anyone whose bona fides are not certain.

When a person's adrenaline level is moderate, but the adrenaline system is turned on in this arena, he may act in a manner that is called "harm avoidance." Harm avoidance means that one is careful to not anger others and avoids situations that might lead to high drama. The underlying reason for the harm avoidance is not so much the obvious reason of avoiding bodily harm. The actual reason is this: if a person is locked into using the adrenaline system, when situations that are fraught with tension arise, the resulting increase in adrenaline can make him act out uncontrollably, in a primal manner, with unbridled fear or rage.

If a person is suppressing a tremendous amount of rage or fear from previous life events and is primarily adrenaline-system dominant, he may be very afraid of any social situation that will elevate adrenaline levels.<sup>1</sup> His fears may have two prongs: the profound

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<sup>1</sup> These fearful previous life events may include anything from a parent's epileptic seizures to violent beatings by an alcoholic step parent. They may have been events which, to an adult's mind, are not terrifying, but the events might have been terrifying to a child. The child's mind can be the one that determines neurotransmitter pathway choices, choices that may remain in place through adulthood. Even if the adult is able to consciously create less fear-driven pathways, it may be that certain events will

fear of provoking anger in the other person and the fear of evoking in himself an uncontrollable rage or terror in response to that person's anger.

Such a person may work furiously inside to harmonize his social surroundings. He may use his quick-working adrenaline system pathways to be always testing his surrounding emotional waters. He may use his rapid intelligence to manipulate social situations to minimize the level of stress. He may be a "people pleaser" or he may be a peacemaker. He might always be trying to anticipate and sedate any possible social tension.

On the other hand, to relieve himself of the moderate, but never ceasing level of adrenaline that courses through him, he may involve himself in intense sports. He may perform very well; using adrenaline, he may be able to move stronger, harder, and faster than his peers. He may even enjoy extremely dangerous sports: paradoxically, the relief he gets as he works off adrenaline can be calming.

If he is competitive, he may teach himself how to summon rage-level amounts of adrenaline during competitions, making himself into a primal, uninhibited competitor who is literally fighting for his life during his sports events.

Still others who are adrenaline dominant with moderate to low levels of adrenaline are merely suspicious and emotionally distant from most humans, especially people outside their immediate circle.

When the adrenaline system is dominant and adrenaline levels are exhausted, one usually avoids groups of people and may even avoid close contact, both emotional and physical, with loved ones.<sup>1</sup>

### ***Logic versus Intuition***

The adrenaline system pathways in the brain do not rely on intuitional hunches. The primitive brain centers of fear, rage, and hunger are the main connecting points along the adrenaline system neural pathways. Logic sometimes also plays a role, but it is not the sophisticated logic of higher thinking, but the primitive logic of "I did what I needed to do to save my life (or the life of my child)."<sup>2</sup>

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immediately throw him back into the fears learned in childhood. This is particularly the case if, through mental suppression and disassociation, he has ongoing unhealed injuries.

<sup>1</sup> A fascinating study on brain function and susceptibility to addiction in male primates who become alpha males suggests that their brain switches from dopamine system -dominant to adrenaline system-dominant. They also switch from addictable to non-addictable. Even if the primate is supplied with dopamine-enhancing drugs, his behavior and brain patterns remain those of an adrenaline-dominant alpha male. See: *Nature Neuroscience* 5(2): 169-174, 2002, Mike Nader.

One significance of this study, for our purposes, is that it suggests that neurological preferences for the adrenaline system or dopamine system are not hard-wired in, based solely on genetics or innate personality. These neurological shifts from one system to the other occurred in these primates in response to a change in their external environment: a change in social status or in danger levels. In the study, a shift in social standing to an alpha position caused a neurological shift towards the adrenaline system. This shift helps maintain constant vigilance, wariness, and an increase in physical strength. This point is very important to keep in mind for our discussion of Parkinson's disease. Most PDers point with pride to their extreme focus and self-control. They are often displeased to learn that their quick mental faculty, their self-control and will power are, for the most part, the result of their constant mental immersion in fear or other negative thought patterns. Their "superiority" is, to a large extent, a result their unhealthy, abnormal habit of performing all body functions via the adrenaline system.

<sup>2</sup> Those who are adrenaline dominant often consider themselves to be supremely logical. However, in my experience, most self-proclaimed adherents of logic are actually quite illogical. Their main source of

When the adrenaline system is dominant but adrenaline levels are low, a person may be extremely, pedantically logical, maybe analytical, but not particularly insightful. Mere listings of facts and old knowledge are what some people call “bean counting:” not real wisdom. Insight requires intuition. The adrenaline pathway does not intersect significantly with the intuition-directed, dopamine system pathways for logic.

When the adrenaline system is dominant and the adrenaline levels are exhausted, a person might imagine himself to be determinedly logical, while, in fact, his memory may be flagging and his thoughts might not be particularly cogent.

### ***Breathing***

Adrenaline is closely associated with diaphragm function. From a western perspective, we might agree that breathing is fear-based: it is fear of suffocation that causes a person to inhale every few seconds, every moment of his life. The greater the level of adrenaline, the deeper and faster are the breaths.<sup>1</sup>

When the adrenaline system is dominant but adrenaline levels are low, the breathing may be slow and relaxed. However, if the adrenaline system for the mind is racing, however, or if one is anxious, angry, guilty, or fearful, the breathing may be rapid and shallow, or uneven. This is a case that shows how one adrenaline arena may be influenced by patterns occurring in another adrenaline arena.

When the adrenaline level is exhausted and one is emotionally depressed, with the mind stagnating, breathing may be slow and heavy, even difficult.

### ***Gravity***

When adrenaline levels are at their highest, they impart the power to jump higher, run faster, and last longer than most: defeating gravity, you might say. When the adrenaline system is dominant but adrenaline levels are low, movement may feel somewhat clumsy and uninspired, and only by summoning up extra mental will power, thus briefly increasing adrenaline levels, can one attain the focus needed to move easily. If the adrenaline system is dominant but adrenaline levels are exhausted, one feels greatly affected by gravity. If one is depressed, moving can be an effort. It can feel as if gravity has increased. The legs feel dense, heavy. Movement is slow and requires mental effort.

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“logic” is “That’s the way I learned it so it must be true.” They tend to be fairly closed to new ideas, and particularly distrustful of positive thinking. This distrust can be so severe as to be illogical.

An example of this illogic is the following example of a not uncommon attitude: “I admit that if I meditate for fifteen minutes on having a stomach ache, I can give myself a stomach ache. But that doesn’t mean that if I meditate on feeling good, or if I pretend to feel good, I could make myself actually feel better. Negative thinking does create a negative result, I admit, but positive thinking doesn’t do anything *real*. I don’t want to waste my time on pointless “feel-good” thinking – it can’t possibly work. And even if I did feel better, it wouldn’t be *real*, so I don’t want to try it.” Some people, including me, consider this attitude to border on illogical.

Many PDers feel a sense of pointlessness, or even shame, if they indulge in truly positive thinking. However, they are usually brilliant negative thinkers, especially when it comes to self-criticism.

<sup>1</sup> Interestingly, in Asian medicine, it is the water element (the element of the kidneys and more particularly the *adrenal* glands) that governs inhalation. The metal element (the element of the lungs) only controls exhalation.

## ***Shock***

Shock can occur as a response to a potentially fatal blow or emotional event. Head injuries in particular can set in motion a shock type of response. When a healthy person goes into shock, it causes an unaccustomed high level of adrenaline to course through the system, filling all pathways. When the first rush of adrenaline wears off, the body may still be on the adrenaline system, even though the adrenaline molecules themselves have gone back down to their normal level.

In a case like this, the person may behave just like the descriptions earlier in this chapter for the various arenas when “adrenaline system is turned on but adrenaline levels are low.” In other words, thinking may be stunned, not making coherent thoughts. Movement may be impaired, the person in shock may wish to just lie still and try to sort things out. The body may be sweating or shivering uncontrollably. There may be a sense of ineffectual panic, with trembling and holding the body in a fetal position.

## **DOPAMINE – JOY AND INTUITION**

Dopamine is the neurotransmitter of joy. The neural pathways of the dopamine system are the normal, default pathways of brain processing. The dopamine system is the one that humans automatically use when they are not performing a fear-based response.

In a healthy person, the level of dopamine present is simply this: enough to match how he feels. If a person feels mildly content, a small amount of dopamine is released. If he feels pretty good, more dopamine is released. If he lets himself feel great, even more dopamine will be released. Dopamine can also respond to expectation: just as adrenaline can be released in anticipation of a fearful situation, dopamine can be released in anticipation of pleasure. Loving, wise, grateful, and humble thought patterns trigger the dopamine systems.

Dopamine is an expectation-dependent neurotransmitter. Dopamine is discharged from its brain-vesicle holding tanks according to how good you feel or how good you think you are going to feel. Although most PDers do not realize this, a person does not have to work at feeling good. Dopamine and contentment are the default systems in humans; they occur automatically. Fear must be created. Joy is already present.

In order to perceive joy and experience the release of dopamine, one has to stop thinking fear-based thoughts: one must stop anticipating that one is going to feel bad. Even more than that: a person must feel safe.

- In a healthy person, when dopamine is released, it automatically floods the dopamine systems. The dopamine systems are always potentially available, always turned on. Dopamine itself is not released into the various systems, however, when their parallel adrenaline systems have been activated.
- The amount of dopamine available to stimulate the dopamine systems is good-mood and expectation dependent. To the extent that one feels safe or, following that, anticipates joy or a good result, appropriate levels of dopamine will be automatically released. If an adrenaline system is activated, dopamine will not be released for that system.

- In Parkinson's disease, dopamine cannot be released – even during positive thinking – because of incorrect signals in the brain that suppress dopamine release.

As an aside, the fact that the dopamine system neuro pathways are always potentially available explains why a stressed (fearful, adrenaline-dominant) person can take dopamine-enhancing drugs such as nicotine, methamphetamine, opiates, cocaine, or alcohol and soon feel the flow of false (due to drug-induced distortions) intuition and temporary joy: the pathways are always switched to the On position, just waiting for some dopamine to come along and activate them.

The activation of the adrenaline system, as well as the release of adrenaline into the adrenaline systems, on the other hand, is activated by choice. The choosing of fear instead of joy is sometimes a conscious choice and sometimes an unconscious choice. Sometimes the “choice” is choosing to follow an established habit.

### ***Habit***

A person can develop the habit of using the adrenaline system for some activities, and turning the adrenaline system off during others. For example, some people can relax deeply the moment they get home from work. Others only feel really joyful, turning off their fear, when they are singing or being creative. Others, including people with Parkinson's, tend to have a very narrow range of circumstances in which they dare to turn off the adrenaline systems.

Of course, this description is grossly oversimplified. When both systems are running, which is the norm, adrenaline is being released for some activities and dopamine is being released for others. For example, in a normal person, there is always some amount of adrenaline being released into the breathing system. If this adrenaline pathway is shut down, a person will stop breathing. Therefore, if a person is feeling deeply relaxed in other aspects, he will still have some adrenaline in the breathing system.

Adrenaline above and beyond the levels necessary to maintain certain life-sustaining fear-based activities such as breathing can cause adrenaline prioritization of the flow of blood and energy throughout the body.

For example, a person who is eating but whose thoughts are worried will have excess adrenaline in his system. Even though this person may think that he is physically relaxed, adrenaline in the thinking pathways causes a diminution of activity in the digestive tract. Digestion is a lowest priority function when excess levels of adrenaline are in place. Therefore, because the adrenaline levels in the total system are causing a decrease in blood to the stomach and an increase in blood to the skeletal muscles, the dopamine levels in his digestive tract may not be optimal.

### *Summary of the one-or-the-other relationship between adrenaline and dopamine*

Again, activation of the adrenaline system, regardless of the level of adrenaline, turns off the release of dopamine. Even when a person is in a condition of adrenaline exhaustion, if he is fearful, if he is choosing the adrenaline system, he will not be able to access the dopamine system. As long as an adrenaline system is the system of choice *or* if

there is excess adrenaline floating around in the area, dopamine will not be released: the dopamine system will just sit there, unused.

However, in the opposite situation, excess dopamine in the system, from drugs, for example, does *not* turn off the release of adrenaline.

The dopamine system is the default system; it potentially can run all the time. The dopamine system runs when everything is normal and healthy, and there is no fear. The onset of fear triggers the adrenaline system and an appropriate level of adrenaline for the situation. The release of dopamine into the dopamine system is then turned off. The dopamine system is stymied to the extent that the adrenaline system is turned on. One does not need to turn the dopamine system on; it is on automatically to the extent that one is fearless.

### ***Adrenaline-blocking and dopamine-enhancing drugs***

When the adrenaline system is turned on, as it is in Parkinson's, flooding the body with dopamine-enhancing drugs does not turn the adrenaline system off; the drugs cause both systems to run simultaneously. This is what happens when PDer's take dopamine-enhancing drugs; dopaminergic drugs *mask* some of the symptoms of adrenaline exhaustion. The adrenaline system is still turned on full blast.

However, there are certain drugs that can sedate the adrenaline system. Anticholinergic and antihistamines somewhat sedate certain parts of the adrenaline system: the muscle and immune sections, respectively. However, in a PDer, this turning down of adrenaline does not turn the dopamine system on; the dopamine system in PDer's has been electrically turned off at the source.

Marijuana turns off parts of the adrenaline system: the digestion, pain, and mental processing arenas of the adrenaline system are turned off in response to this herb. In healthy people (non-PDer's,) this allows dopamine to flow in these areas. This accounts for the surge in appetite, decrease in pain, and a somewhat realistic sense of joy while under the influence of marijuana.<sup>1</sup>

The effects of the drugs and herbs that turn off the adrenaline system in various arenas are slightly different from the effects of the dopaminergic drugs. Dopaminergic drugs include cocaine, alcohol, nicotine, methamphetamine, the opiates, and of course, the current antiparkinson's medications. The dopaminergic drugs do not turn off the adrenaline system, they simply mask the adrenaline symptoms with symptoms of excess joy. Also, the dopaminergic drugs induce dopamine at unnaturally high levels.

Since these latter drugs only mask adrenaline, an appetite suppressant, they cannot increase the appetite. Appetite is suppressed if the adrenaline system is employed. Because the levels of dopamine are unnaturally high, the illusions of joy under the

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<sup>1</sup> Because marijuana very possibly turns off adrenaline rather than supplying dopamine directly, marijuana may be less neurologically addictive than the drugs that directly enhance dopamine. Addictive in this sense means that the amount needed to produce an effect increases with usage. Marijuana is not neurologically addictive in this sense. However, marijuana may still be emotionally addictive even though the need for ever-increasing dosage does not occur.

influence of dopaminergic drugs are even more distorted than they are under the influence of the drugs and herbs that reduce adrenaline.<sup>1</sup>

### **Dopamine in the various arenas**

What happens when the adrenaline systems are turned off in various arenas and the dopamine pathway is allowed to dominate? The following section will list these changes. I will only describe what happens when dopamine is flowing at the higher levels. I will not list the ways in which dopamine functions at low, medium and high levels. By describing how dopamine works at the highest levels, the reader can extrapolate what happens when the dopamine system in any given arena is only partly topped up.

Again, in order for the dopamine system to be on, it is *not* necessary to create a background of love or joy. That background already exists. The dopamine system, and dopamine itself (in a healthy person), is already up and ready to go at all times; it is only *inhibited* to the extent that adrenaline systems are being used instead.

A spiritual analogy is that one doesn't need to find joy; one only needs to stop being scared. More to the point, one doesn't need to find God: one only needs to stop avoiding Him. God, like the dopamine system, has always been there right along.

### ***Speed of thought***

Along the dopamine neural pathways, the speed of thought processing can be leisurely, integrating both sides of the brain. The thoughts find themselves pondering, daydreaming, and creatively combining information from both its logic and aesthetic sides. Thoughts developed using primarily dopamine may include information from memory and feelings of the heart. The thoughts may be directed by the feelings of gratitude, joy, humility, loyalty, or devotion.

During deep meditation, when the adrenal pathways are shut down and the dopamine pathways maintain homeostasis of the body through quieting all the body processes, one can hold the mind still on one thought at a time for as long as is desired. It is as if time ceases to exist – just the opposite of adrenaline, when time seems to expand.

But quick knowledge is possible via the dopamine system: when using dopamine, the intuition, no longer shrouded by the adrenaline system, is exposed. Wisdom, the knowing of what is right via the intuition, is instantaneous. The process of creatively processing thoughts with dopamine may be languorous.

At the highest levels of dopamine flow, thoughts are not directed towards self-preservation: when intuition is supremely dominant and no fear is present, there is no self-preservation instinct. A person in this state intuitively perceives himself as one with everything: there is no “self” to preserve.

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<sup>1</sup> This section on drugs is extremely superficial. For more details on the mechanisms of the various dopaminergic and anti-adrenaline medications and supplements, please read Walton-Hadlock, JL, *Medications of Parkinson's Disease or Once Upon A Pill: patient experiences with dopamine-enhancing drugs and supplements*. Parkinson's Recovery Project, 2003. This book is available for free download at [www.pdrecovery.org](http://www.pdrecovery.org).

## ***Motor function***

Motor function using dopamine is pleasant. The body moves, not so much because the mind commands it to do so, but because of the sheer joy that comes from having a body, from being alive in every vibrating cell. Motor function using dopamine feels very different from motor function from adrenaline. Some recovering PDers have described the novel – to them – sensation of moving via the dopamine system, with naturally occurring dopamine, in this way: “It was like a miracle. It was like brain waves taking form as movement.” Or more straightforwardly, “I was sitting on the sofa and I thought about getting up, and suddenly, I found that I was standing up! I didn’t have to actually think about what I was going to do, I just thought about the *idea* of doing it, and it happened.”

Motor function from dopamine feels as if brain waves are manifesting themselves as movement, with no middleman of grim determination or stern resolve required, and no self-critic watching from a distance making sure that it is done correctly. Dopamine movement is manifested in the way that a cat stretches, or the unselfconscious movements of a child, or the brilliantly fast reflexes of a joy-filled athlete.

### *“Dancing with Glen” – an aside*

If you will forgive me a short aside, I will share with you a quick story that makes the point. A member of our PD Treatment Team shared this story with us. She had been a dancing instructor for years and years before she became an acupuncturist. She has an expression she uses for describing how our recovering patients move. When they suddenly start moving with dopamine, she says they are “dancing with Glen.”

“When I was a ballroom dancing instructor, I had, for several years, an instruction partner who was the best dancer I’ve ever known. Everyone loved to dance with Glen, both men and women; he was ambiguous in his sexual preferences and had many gay friends. But gender had nothing to do with it; it was all about the music.

“When Glen danced with you, it was as if there was no gravity. There was no labored thinking, no analyzing. If you just surrendered to the music and trusted Glen to lead you, you could dance forever, floating on air. It was pure joy, directed by music, expressing itself as movement.

“But Glen would only dance with you as long as you trusted his lead and followed him. If you started thinking consciously about what you were doing, if you started trying to remember logically which foot should come next, which direction you should spin in, Glen would immediately sense the change in the dynamic and would promptly walk you to the side of the room and pick up another partner.

“As long as you were willing to trust him and fly in time with the music and the spirit of the dance, he would keep dancing. The moment you started to have logic or doubt enter into it, he would know it, and stop dancing with you. He always said he simply couldn’t dance, really dance, if the partner was distracting him with mental stuff.

“I loved dancing with Glen, of course, so I worked at training my thoughts. But the more I tried to discipline them so that they wouldn’t show up, the more they intruded, and Glen always knew. So I had to train myself the other way, by training myself to choose trust. Not so much choosing trust, but *being* trust. When I surrendered my logic and just flew with my heart, time ceased. I could have kept dancing forever.”

Moving with uninhibited dopamine, with the adrenaline system turned completely off, is like Dancing with Glen.

### ***Sensory perception***

Dopamine system pathways to and from the senses connect more with the memories and creative processes than they do with the emergency warning systems. They go more to the sides of the brain and not so much to the primitive centers at the core. When using the dopamine system's neural pathways, smoke from the barbeque might evoke memories of long summer evenings and cooking outdoors. If the adrenaline system pathways are in use, the smell of smoke might evoke the response, "Did I remember to recharge the fire extinguishers?"

### ***Pain***

The dopamine system's network of nerves perceives pain not necessarily as a horrible thing, but as something to be dealt with. When a person is most fully engaged with the dopamine system rather than the adrenaline system, pain is perceived as a helpful signal. The pain signal is acknowledged and removal of the pain source is initiated. This might mean taking one's thumb off a hot stove or it might lead to gently stretching and bending a foot with a cramp in it.

In extreme dopamine mode, pain is perceived impersonally, with no negative connotation at all. Fire walkers and people in ecstatic trance often experience events that should, in a normal person, result in pain. However, if the dopamine system is fully operational, the body might not respond to the pain, and the mind may transcend it.

### ***Transcendence versus denial***

Note carefully here the difference between transcendence and denial. A person with Parkinson's might have been in denial about receiving an injury, and therefore registered no pain in response. His adrenaline system's neural pathways will support him in this: by cleverly keeping the neural paths on the "Emergency" circuit, the normal pain recognition process is bypassed and the pain is put in a holding tank, to be dealt with later.

A person of even-tempered mental control and wisdom, on the other hand, experiencing a situation that would ordinarily be considered painful, might be able to understand the universal electromagnetic forces at work in both his body and in the pain-inducing action, and even the greater dynamic of ultimate cause and effect.

By focusing on the light and electricity behind the atoms and molecules of the body, one might see the painful action as occurring, not to the ego-identified body, but to the body that is a physical manifestation of one's thought waves. A person of supreme presence of mind can simply restore the thought waves that constitute body awareness back to the correct pattern, so that the interaction of the body and the pain-inducing event is not a harmful one. This is the opposite of denial of pain, this is transcendence of pain.

True transcendence is not an activity that we see frequently, but it is one that the great saints and sages can employ when performing healings on themselves and others.

### ***Suppression of pain does not equal spiritual superiority***

Some PDers imagine that they are somehow emotionally, mentally, or even spiritually superior when they deny and suppress their pain. The true man of wisdom, however, acknowledges all events and intuits the wisdom behind them, or at least that there is a wisdom, however unfathomable.<sup>1</sup> He stands unmoved amidst the crash of breaking worlds, not because he pretends it's not happening, but because he perceives the perfect love and trusts in the ultimate perfection that hides behind the movements of the swirling cosmos.

On the other hand, if a truly wise man does feel pain, he expresses it. An example of a great soul expressing his pain is found in the gospels of the New Testament. In response to the sisters' sorrowful mourning of their beloved, recently deceased Lazarus, "Jesus wept."

I am reminded of another example of this principle. The close disciples of Saint Francis observed that sometimes Francis would go for long periods of time without eating. They tried imitating what they thought was his tremendous self-discipline. After the disciples went a few weeks, suffering pangs of hunger, Francis asked them what they were doing. When he was told that they were trying to imitate him, he laughed at them good-naturedly, saying, "If I was hungry, I would eat. Go, feed Brother donkey (the body)."

### ***Immune system***

Under the influence of dopamine, illness is less likely to occur. When one is feeling peaceful, or radiant with joy, he is much less likely to become ill than one who is feeling out of sorts and disgruntled. In the case of illness, both high levels of dopamine and high levels of adrenaline keep an illness at bay, and low levels of both make a person susceptible.

But unlike the situation with adrenaline, in which the body holds off fighting an illness until such time as the adrenaline winds down, a person who is flush with dopamine is not postponing the illness until a later date. Instead, his well-tuned immune system can work with an exquisite accuracy so that pathogens are killed off with few obvious signs of ongoing illness.

### ***Digestion***

In high schools, students are taught that adrenaline regulates the sympathetic, "fight or flight" system. They are also taught that the opposite of this system is called the parasympathetic, or "cud chewing" system. When the parasympathetic (dopamine

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<sup>1</sup> I heard an unsubstantiated report that India has the world's lowest incidence of Parkinson's disease. A national characteristic of the people of this great county, home of the world's most sophisticated and profound philosophies, is their expressiveness of their emotions. Though I generalize here, the people of India are known to readily laugh, cry, and openly express their joys and sorrows. Some westerners regard their behavior as "childlike," even while crediting them with an advanced degree of compassion and spiritual depth.

It is curious to note that the British, known for their stiff upper lip, have a high rate of Parkinson's disease. This is particularly significant because, for over a century, many British and native Indians lived in the same Indian environment, sharing many of the same external influences. If this report of low incidence of Parkinson's in Indians can be proven, it suggests an interesting direction for future epidemiological studies of historical data on PD.

system) is turned on, the neural signals in the eating arena instruct the stomach and digestive tract to report for duty. The best digestion occurs when the dopamine system is dominant in a maximum number of systems.

When the adrenaline system is turned off, the appetite increases. Many PDers lose weight when they begin taking dopaminergic drugs. Despite the dopamine, their appetite does not increase. This is because their adrenaline system is still turned on. The drugs merely mask the situation in the adrenaline system, they do not turn it off.

### ***Temperature regulation***

Under the influence of high dopamine, one does not notice temperatures. Like with the pain and the immune system arenas, high levels of either dopamine or adrenaline render one oblivious to temperatures. However, when the dopamine system is working well, one does not notice the temperature because the body is automatically doing whatever it takes to maintain homeostasis. Temperature regulation with dopamine is done with elegant use of the body's resources so that a person does not get too hot or too cold, nor does he notice the temperature.

Examples of this are young children at play, who never seem to notice the weather as long as they are laughing. Another example is the way in which a person might not notice the cold wind strafing him when his clothes fit like the paper on the wall, his haircut turned out just right, he got the new job he was hoping for and the woman who owns his heart has just agreed to marry him. In a case like this, he might be singing in the rain, but he won't get a chill. His dopamine-saturated dopamine system will see to it that his internal body temperature is regulated properly, making automatic adjustments to compensate for the weather.

### ***Social Interaction***

The dopamine system's neural pathways for social activities connect the dots between social cues, memories, and logic. This integration makes possible the correct interpretation of a smile, or remembering – and caring – about someone's birthday, and knowing what sort of gift would be perfect. Even public speaking to a room full of critical strangers, when performed fearlessly by the dopamine system, is a joy rather than a trial.

### ***Logic versus intuition***

Great scientific insight, poetry, and art, all work of heart-expanding beauty, is inspired through a high level of attunement with intuition. Intuition is at its most perceptible when dopamine levels are highest. In combination with intuition, which contributes joy, gratitude, humility and devotion, the dopamine system's neural pathways for logic meander through the brain, making connections between analytic thought, creativity, art, and memories. These connections and combinations can trigger the sensation of the chest swelling with joy, a sensation that we associate with love, and which expresses itself as art.

### ***Breathing***

When the dopamine pathways are in full dominance and all the adrenaline pathways are completely turned off, one can consciously stop breathing. Great yogis, Zen

masters, Sufis, and Christian mystics all practice devotion and/or practical techniques to still the restless, adrenaline-driven mind. Only in this way can the intuition, speaking through the language of the heart, answer the deepest questions of the soul.

As the adrenaline system's pathways to the lungs (diaphragm) and fear centers are shut off completely, the body reverts to its default state, using only the dopamine neural pathways. These pathways, when followed without any fear-based mental distraction, allow the cells of the body to remain quiet, alive but not metabolizing, and the breathing stops for as long as one desires. Verified accounts exist of yogis being observed in the breathless state.<sup>1</sup>

Weeks or months later, they resume breathing. They suffer no physical damage during their deep stillness.

### **Gravity**

Probably most interesting of all is the relationship between gravity and dopamine. I have already mentioned that, via adrenaline, one can combat the forces of gravity with super strength. But when the dopamine system for movement is completely saturated with dopamine at the highest levels, one no longer needs to combat the forces of gravity: one can fly.

Saints and sages of every faith have found that, when their thoughts are too saturated with love to be borne, they cannot keep their feet on the ground: they levitate.

If this example is too spiritual for you, let me get a little earthier. Michael "Air" Jordan, a supreme basketball player, earned his nickname because of his ability to soar into the air and hover there, even fly towards the basket, radiant with joy, while he lined up his shots. Magic Johnson got his name the same way. Other athletes have been known to perform "antigravity" feats. In athletics, this is called "being in the Zone."

One of my Olympic athlete patients (not a PDer) describes being in the Zone as what happens when the laws of physics disappear, the sun is on your back, and all things are possible. "That's why I swim," she says. "I swim for those moments when reality shifts, when there are no limits."

When one's wings are filled with such pure joy, one can perform feats that defy physics. At these times, breathing is minimal, coordination is effortless, and one can

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<sup>1</sup> A study designed by French scientific researchers in the 19<sup>th</sup> century recorded the underground burial of Sadhu Haridas, a yogi who had agreed to put himself in a breathless state for two months. Two months later he was exhumed and his inert body was immediately pronounced dead. A few minutes later, his eyelids fluttered and he began breathing. He quickly resumed normal activities.

Zen master Shunryu Suzuki said, "Concentrate on your breathing and it will go away," alluding to this phenomenon. *To Shine One Corner of the World: Moments with Shunryu Suzuki, Stories of a Zen master told by his students.*

The great Christian mystic Paul attested "By the rejoicing that I have in Christ Jesus, I die daily."<sup>1</sup> Corinthians, 15:31. This mystic "death," during which the body becomes motionless and breathing ceases, is the result of the supreme peacefulness and joy that is felt when, during God-attunement, all fear-related thoughts, even the fear of death, are turned off.

Mystics of every faith speak of this breathless state, the deathlike stillness of blissful union with God. An Islamic mystic, the poet Rumi, wrote in this conversation with God (in my source book God's voice is italicized): "I would love to kiss you. *The price of kissing is your life.*" (*The Essential Rumi, Translation by Coleman Barks.* Castle Books. 1997. p. 37.

In the Jewish faith this relationship between utter cessation of body function and attunement with the Divine is simply stated in Psalm 46:10, "Be still, and know that I am God."

almost hear the sound of the universe singing. Such a person can feel in his heart the answers to his questions, and he knows that he is love, that is he is loved.

Watching athletes when they are in the Zone confers an almost breathless joy onto the fans. The same applies when truly great singers fearlessly soar up to the high note, or sing from their wide-open soul – the audience feels “uplifted” on the shared wings of the singer.

#### *Swimming lessons – a story*

Writing here about the swimmer reminds me of a wonderful example she gave me of how to separate the adrenaline/fear people from the dopamine/joy people.

“I used to teach swimming for little kids,” she said. “On the first day of lessons, the kids hang on the side of the pool and practice blowing bubbles in the water or kicking. All the kids can do that. The next day is when they separate themselves out. I tell the kids that they are going to float. I tell them that the water will hold them up. They won’t need to do any work. I tell them that they just need to lay back, spread their arms and legs, and float on the water.

“Some of the kids get sparkly eyed and happy, saying, ‘The water will carry us? Oh boy!’

“Other kids grit their teeth and I can just see that they are thinking, ‘The water is going to hold me up? What? No way will the water hold me up. Maybe the other kids, but not me. I’m going to have to work like a beaver to keep from going down!’

“So then I get them started floating. The kids with the faith and wonder lie back on the water and float, their faces beaming. The scared ones start pumping their arms and legs. Thrashing, kicking, beating at the water, they do everything they know to force themselves to stay on the top. And they go right to the bottom like a stone.”

This reminds me of another story, a story of the great ballet master, Nijinsky. He could take leaps that defied all the laws of physics. Like Michael “Air” Jordan, he could simply fly through the air. The orchestra director had to hold the note, watching him, and only resume the flow of the music when Nijinsky came down.

He could not perform those leaps, however, if he was dancing with a partner. The partners’ negative thoughts always pulled him down. There was only one person he could dance with: his wife, a skilled ballerina. However, even she would keep him bound by gravity unless he first hypnotized her. Only after she was hypnotized into a state where she was unable to doubt his magic could he then perform his flying, lighter-than-air leaps with her by his side.

#### **Parallel pathways: a summary**

The brain has two neural systems that regulate thought, metabolism, and perception. These two systems, the adrenaline and the dopamine, are somewhat parallel. They regulate all the same functions, but they do it with different motivations, different neural connections, different fields of emphasis.

They both regulate speed of thought, pain awareness, temperature regulation, hunger and digestion, the immune system, time perception, and breathing. All of these body functions are necessary for the maintenance of life. The manner in which life is maintained, one might say the quality of life, depends on which pathway is used.

### ***The trite old freeway metaphor***

If these two pathways were roads, they would start and end in the same place (“being alive”) but one would be a superfreeway with no speed limits and only a few specific exits. The other would be a rambling road that had different scenery every time you traveled it. The freeway route would get you there faster, and when you arrived, you’d be keyed up with fear and pride. The slow route would fill you with joy and gratitude. As for how long the slow route might take, it wouldn’t matter: with the beautiful slow route, there is no sense of time.

If we wanted to get poetic about it, we might say that the dopamine route is that Road Not Taken, the road less traveled by, that we read about in high school.

As you can deduce from the above, a happy and healthy person uses primarily the dopamine systems. He only shifts over to the adrenaline pathway and lets loose with elevated adrenaline levels, with a concomitant closing off of the dopamine pathways, when a condition of high stress or emergency is occurring. As soon as the emergency is over, the adrenaline levels, in a healthy person, climb back down and dopamine goes back up.

Ideally, as the dopamine and adrenaline system usage fluctuates back and forth, their respective neurotransmitter levels adjust automatically up and down as well.

And don’t forget: a person can be using both of these systems simultaneously. Most people simply use the system that corresponds to whichever activity and mood is dominant at the moment for a given arena. Someone might use the adrenaline system for his eyes, ears, hands and feet while driving, even while he is laughing merrily, using the dopamine system to choose his words and move his lips as he converses with his best friend in the passenger seat.

Only people with extraordinary mind control, such as saints and PDers, can will themselves to use primarily one system or the other.

### ***Wrapping up the adrenaline/dopamine section***

The mind-body relationship is altered when adrenaline is dominant: under the influence of high adrenaline, the ego- or fear-laden mind is the unquestioned master of the slavishly obedient body. Under the influence of very high dopamine, a unity of body and joyful intuition is maximized, while the mind serves as the obedient switchboard, monitoring and controlling the flow of incoming and/or outgoing sensations to and from the consciousness.

In normal people, dopamine is dominant during eating, enjoying pleasant company, dancing, and doing sports while in “the Zone.” Adrenaline is dominant during driving, interfacing with testy strangers, combat, or performing extreme sports.

#### *How does this relate to Parkinson’s disease?*

Most people with Parkinson’s, especially those who develop Parkinson’s in their early years, prior to their mid-seventies, have an extraordinary level of mind control from an early age. Due to fear, they use this mental control to choose the adrenaline system as their perpetual system of choice.

In people with Parkinson’s, the adrenaline system always dominates a majority of activities. Until energy begins to flag due to aging or adrenal exhaustion, the adrenaline

levels are kept as high as possible. This high level of adrenaline and reliance on the adrenaline system corresponds to, “I’m injured and I can’t deal with my emotional and physical insults and injuries right now; I’m in danger.” The brain’s dopamine system, for the most part, is in perpetual hibernation.

Even if this pre-PDer consciously tries to turn off his fearful thoughts and relax, it is very difficult to do: his lack of dopamine availability (an electrical, physiological pathology discussed in chapter three) prevents the normal feelings of joy from rising up even though fear is absent. The normal reversion to joy simply doesn’t happen. Instead, the pre-PDer finds, over time, that to keep his blood stirring and his mind focused, physical and mental restlessness is a more likely source of reliable stimulation than the deep inner joy that eludes him more and more.

Let’s look once again at the PD development sequence. First, a person’s fear-based will power, self control, and personality determined his ability to ignore his injury and ignore his fear, and maybe even ignore his whole body. Over time, when the dopamine signals in the brain got shut down via the electrical resistance/backwards flow, the physiological deficiency in dopamine began to direct his behavior, his personality: since dopamine was not available, he chose more and more to create a sense of urgency and restlessness to keep himself going. This in turn triggered the release of more adrenaline, the neurotransmitter that is associated with danger and fear. His fearfulness increased, ultimately, because of the injury, which in turn had been retained because of fear.

In the PDer, the interconnectedness of mind and body has congealed perfectly, as it always does, to create a body and behaviors that reflect his thought patterns. In his case, those thought patterns are usually powerfully focused, desirous of helping others, negative with regard to his own worth, and based on fear rather than joy. Over decades, despite his best efforts to hide his emotions behind his actions, his body will proclaim them: his body will begin to resemble the shrinking, trembling body of a person who is, deep inside, too frightened to move. If his trauma was profound enough and he lives long enough for the PD symptoms to become advanced, his trembling rigid body may begin to resemble that of a person in shock.

## SUMMARY

The adrenaline-dopamine relationship is a cornerstone upon which Parkinson’s, a neurotransmitter-related illness, is built. One might want to say that in the absence of dopamine, a person must use adrenaline. However, we think it is more apropos to say that, when one chooses to use a fear-based model for living one’s life, making adrenaline dominant, dopamine levels must necessarily decrease. When, through electrical confusion set in motion by a foot injury, the dopamine unavailability eventually transmutes into cellular change and dopamine availability is no longer a matter of choice, this transition is merely solidifying a choice that was already made, long before. I propose that the sum of the fear-based attitude, the injury, and the sequelae of both, constitutes the energetic blockage that causes Parkinson’s disease.

Our in-depth meetings with hundreds of PDer, in which we discussed personality, responses in all the various arenas, and attitude, provided thousands of clues that suggest that an incorrect adrenaline-dopamine relationship is at the bottom of the

Parkinson's disease problem. We will need to meet with thousands of PDers before we can be certain.

But until that time, we can say this: all of the PDers that we've asked have all laughingly admitted that, when they tried to learn to float, they sank like a stone.

