

HEALTH AND STRESS

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IS STRESS INHERITED?

A variety of neurotransmitters involved in the response to stress show altered levels and ratios in different mood disturbances, ranging from anxiety, to anger and depression. While all of these symptoms and states can be manifestations of stress, their persistence also produces stress. It is, therefore, not always clear whether associated neurotransmitter abnormalities represent cause or effect. However, anxiety, severe depression, and suicide, can result from low serotonin. The newer antidepressant drugs are more effective because of their ability to maintain higher levels of serotonin in the brain by inhibiting its reabsorption. Some patients do not respond to these as well as others. This may be due to inherited factors that influence serotonin production and metabolism, or affect other transmitter levels.

In certain individuals, the gene that suppresses serotonin removal is shorter than normal, and generates fewer of the molecules responsible for stimulating this process. The molecules that are produced are also less efficient. Therefore, one might suspect that short gene carriers would be more likely to be anxious or depressed, especially when under stress.

In one recent study, over 500 college students completed questionnaires designed to assess levels of anxiety and neuroticism, by answering questions such as "I am not a worrier", or "Frightening thoughts sometimes come into my head." Their responses were rated on a scale of 1 to 5 with respect to the degree of agreement or disagreement. Blood samples were also analyzed for the serotonin transport gene. Researchers found that those with the shorter version, scored much higher for anxiety and neuroticism, than those with the long form. Although only 5% of people have this particular defect, at least 10 other genes may contribute to anxiety. There may be additional heritable influences. Dopamine is another neurotransmitter that influences mood and responses to stress. Alterations in a gene responsible for certain dopamine activities, was recently reported to be associated with novelty and thrill seeking traits.

Both of these neurotransmitters also influence addictive and eating behaviors. Appetite suppressing drugs like Redux, fenfluramine and phentermine (fen/phen), act by influencing serotonin and dopamine concentrations. New studies in strains of mice who have been bred to become obese, reveal that their weight gain is largely due to still another brain chemical, called neuropeptide Y (NPY). These animals have a flawed "fat gene" (OB gene), and because of this, it is believed that they fail to produce leptin, an appetite suppressing protein.

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HEALTH AND STRESS

*The Newsletter of
The American Institute of Stress*

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As a result, they have persistent and voracious appetites, and become extremely fat, sterile, diabetic, and lethargic. However, when NPY is genetically removed, diabetes disappears, they slim down, become more energetic, and are able to reproduce.

OB gene, leptin, and NPY influences are probably responsible for most cases of morbid obesity. How important they are in people who are only moderately overweight people, is much more difficult to determine. There are other genes that can affect appetite and weight, and the urge to eat depends upon a complex interplay of psychophysiological and environmental factors. However, abnormal eating patterns in response to stress play such an important role in obesity, that stress reduction and behavioral modification are major components of all commercial weight reduction programs.

As Malvolio noted in *Twelfth Night*, "Some are born great, some achieve greatness, and some have greatness thrust upon them." Working backwards, it's obvious that many people are subjected to stresses that are beyond their control, while others create their own stress, because of inappropriate behaviors and faulty thinking styles. It now appears that some may also actually be born anxious and neurotic, because they have literally drawn a genetic short stick.

Serotonin, Depression, And Suicide

In addition to anxiety, several studies have shown that serotonin is significantly reduced in depression. This is especially true for patients with suicidal thoughts. Those with the lowest levels of serotonin, are four to six times more likely to take their own lives. Serotonin helps to control inhibitions, and lack of it may lessen the ability to suppress such urges. Obviously, not everyone who is depressed is suicidal, and low serotonin levels do not necessarily lead to self-destruction. There is compelling evidence that suicide is most likely to result if there is a serotonin deficit in a particular section of the optical cortex of the brain, which is located just above the eyes. This area is believed to be involved in controlling impulsiveness, and the desire to immediately act on some whim or idea. In one report, autopsy studies showed an almost complete absence of serotonin in this specific site in 95% of depressed individuals who had committed suicide. Other portions of the brain did not demonstrate deficits of either this degree or consistency.

Studies of people who have survived suicide attempts, show that serotonin deficiency becomes progressively more severe in the weeks just prior to the act. Since half of all suicide victims are under a physician's care in the month before their death, it has been suggested that testing procedures might be developed to identify those at the highest risk, so that preventive measures could be taken. In addition to direct measurements of serotonin, other methods are being investigated. For example, fenfluramine, which has long been used as an appetite suppressant, normally increases serotonin concentrations in the brain. However, this ability is markedly impaired in depression. Positive emission tomography (PET) is able to accurately track this reaction in the brain, and studies are now under way to determine whether this approach might be used to identify depressed patients who are at greatest risk for self-destruction, or other acts of violence.

Stress And Suicide

Suicide is the 8th leading cause of death in the United States. In addition to severe depression,

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emotional stress has also been shown to be a major contributor in children, unemployed individuals, and HIV infected patients, including those without evidence of clinical AIDS. In one long term study, over 1100 Johns Hopkins medical students were intensively evaluated for various psychological and personality characteristics using detailed questionnaires, interviews with them and family members, Rorschach testing, figure drawing tasks, etc. The purpose of this project was to determine whether certain psychological or personality characteristics might be associated with the development of specific diseases, such as hypertension, heart disease, cancer, arthritis, alcoholism, mental illness, etc. in later life. This seemed to be an ideal population to study, since these were young healthy individuals, who, as physicians, would presumably be more likely to pursue sensible lifestyles. In addition, they could readily be located and contacted in the future through alumni records, and the need for registration with state and federal agencies.

Over the next forty years, a considerable amount of data was obtained, confirming that certain personality traits and psychological characteristics did appear to predict a greater likelihood of developing different disorders. During this period of time, 13 men and 9 women committed suicide. Retrospective analysis revealed that these physicians were much more likely to have shown reduced resistance to stress while attending medical school. This was manifested by increased irritability, having to go to the bathroom more frequently, insomnia, loss of appetite, or a desire to seek solitude when the going got rough. Those scoring high on increased irritability were 6 times more likely to commit suicide, and difficulty in sleeping, and loss of appetite in response to stress, was associated with a 2.5 times greater risk for self-destruction.

The Low Cholesterol, Low Serotonin Connection

Numerous reports from around the world indicate that a low serum cholesterol is associated with an increased incidence of depression, suicide and violent behaviors. An Italian study of elderly men

and women showed that those with low cholesterol, were three times more likely to be depressed than those with elevated levels. Several years ago, Swedish investigators compared cholesterol levels with mortality statistics in almost 55,000 individuals who had undergone various health screening procedures two decades previously. Men with cholesterol readings in the lowest quartile, were almost three times more likely to have died in the interim, compared to those in the top quarter. The majority of deaths were due to suicides, and this was over four times more frequent in the low cholesterol group. A French study followed 7,000 men for 17 years, and during this period, 32 committed suicide. It was found that those with lower than average levels of blood cholesterol, were three times more likely to commit suicide. Depression is not uncommon following pregnancy, and low cholesterol may be responsible. Cholesterol levels tend to decline after delivery, and one recent report showed that post partum depression was most apt to occur when there was a very sharp drop in cholesterol.

Low cholesterol is also associated with an increased incidence of cancer. There has been considerable concern over increased mortality rates from cancer, suicide, and violent accidents reported in participants in some cholesterol lowering drug trials. Cholesterol is the building block for all steroid hormones, and many other crucial body chemicals. Interference with its synthesis could have unanticipated harmful effects on compounds that influence mood, behavior, and brain function. This is especially true for children. Whether certain components may be more important for their development than others, as low density lipoprotein (LDL) are for atherosclerosis, is not known. However, although cholesterol does not seem to play a role in the synthesis of serotonin, there is a correlation between cholesterol and serotonin levels that may be important. Dutch researchers studied 200 middle aged men, and confirmed that those with low serum cholesterol, also had lower serotonin levels. Cholesterol helps to transport serotonin to the brain. Therefore, when levels are low, it is believed that less serotonin reaches the brain, and more is cleared from the body. Finnish investiga-

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tors suggest that low cholesterol is associated with depression, because of its effects on interleukin-2, a cytokine known to be involved in lipid metabolism.

Further support for the serotonin link comes from a study comparing young monkeys who were fed either a high or low cholesterol diet for 8 months. Those on the low cholesterol regimen exhibited much more hostile and aggressive behaviors, as evidenced by increased biting, grabbing, hitting, and making threatening faces or gestures. They also had significantly lower spinal fluid concentrations of serotonin. In other research, male monkeys at the bottom levels of the social hierarchical scale, who were more apt to be submissive to others over access to food and females, had lower serotonin. They also tended to be much more violent and impulsive. From a teleological viewpoint, such a relationship could have evolved as an adaptive mechanism for primitive man. A reduction in fatty foods and cholesterol that lowered serotonin, might have triggered an increase in the willingness or ability to more actively engage in the difficult and dangerous task of hunting.

Serotonin, Self-Esteem, And Violence

Similar findings have been reported in humans, where there appears to be a direct correlation between levels of serotonin and self-esteem. Fraternity officers, elite athletes who are perceived as team leaders, and seniors, have higher serotonin levels than freshmen, or those with lower status living in the same college dormitory. One of the most impressive effects of Prozac and other antidepressants that boost serotonin, is that they raise self-esteem, even in individuals who are not significantly depressed. These drugs are increasingly being used for a variety of cosmetic purposes, both in humans and animals, since they often improve other behavioral problems, and promote a sense of well being. Having a good opinion about yourself allows you to be more self-assured and assertive, and less likely to use illegal or violent means to achieve your goals. This has important societal implications.

When you're at the low end of the totem pole, the system is obviously not working in your favor, so there may be more of a tendency to break the rules, especially if you think you can get away with it. Most people obey laws because of the risk of getting caught and incarcerated, but as in the Bob Dylan song, "When you ain't got nothin', you got nothin' to lose." We tend to think that competition is greatest in those who are battling to reach the top of the pecking order. However, it can be just as fierce at the lowest levels of the socioeconomic scale, especially for those who must constantly find ways just to eke out an existence. And, if there is little to lose, there is a much greater likelihood of throwing caution to the winds.

It is not surprising, therefore, that such individuals, or others with low self-esteem for other reasons, are much more likely to violate the law and commit crimes. The profile of those who are in jail, or are repeat offenders, is vivid proof of this. Psychologists showed several decades ago, that artificially lowering people's self-esteem by giving them false reports about their scores on achievement tests, would make them more likely to cheat in a subsequent card game. Similarly, inner city criminals, who are well aware of their low societal status, and the lack of legitimate routes for improving their situation, may be more inclined to engage in risky, illegal, and nefarious activities. This would likely further reinforce and contribute to their sense of worthlessness, thus setting up a vicious cycle.

Is It Nature, Nurture, Or Both?

As noted previously, heredity may influence serotonin levels, and individuals with the shorter version of the gene that protects against serotonin removal, are more anxious, and less resistant to stress. Why some patients with low serotonin are prone to anxiety, and others with the same level are more likely to be depressed or violent, is not clear. Other neurotransmitters like dopamine, or certain endorphins may play a role. Impulsiveness and thrill seeking have been reported to be linked to abnormalities in the gene that governs dopamine activities. Serotonin is manufactured from tryptophan, and the gene responsible for this conversion

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process is more active in some individuals than others. Heredity can also contribute in other complex ways. For example, self-esteem, and the perception of being attractive, is often influenced by attributes such as height, weight, physique, skin and eye color, and other inherited traits.

On the other hand, we have seen that environmental factors, such as stress and low socioeconomic status also play a role. In some instances, a combination of the two may be crucial. Individuals who attempt suicide have a very high incidence of child abuse, and studies have shown that parental deprivation at critical points in childhood can result in a lowering of serotonin that persists. If you already have low levels because of genetic factors, childhood abuse will further aggravate this, and would be more likely to trigger suicide in later life. As indicated, serotonin is manufactured from tryptophan, an essential amino acid found in high protein foods like turkey, chicken, milk, and cheeses, so dietary influences could play a role. In addition to serotonin, other neurotransmitters also modulate mood and behavior, and since these all interact, their relative ratios may also be important.

Current aggressive attempts to achieve the lowest cholesterol level possible with powerful drugs and stringent diets might not be a prudent pursuit for everyone, particularly children. There are concerns about cancer, suicide, and violent behaviors, and those with evidence of significant anxiety, depression, or lack of self-esteem might be at particular risk. Can anything be done to correct hereditary influences that contribute to such problems? Genetic engineering enhancements have already made it possible to prevent or treat certain disorders. Intense investigations are currently in progress to determine whether the *limone* gene, which protects against atherosclerosis, can be cloned for use in high risk patients. Further advances may make it feasible in the future, to also protect against inheriting an abnormally low cholesterol, or an increased susceptibility to stress. Stay tuned.

Paul J. Rosch, M.D., F.A.C.P.

Editor

Heredity sets limits, environment decides the exact position of those limits. Edwin C. MacDowell

Working Moms More Stress, But Worth It

The consistent increase in job stress complaints continues. A recent survey confirms that almost four out of five working mothers feel that their jobs have become much more stressful over the past two years. The major reason cited was an increased workload. Despite this, most believe they are happier than their mothers were, and enjoy their dual roles and responsibilities. In fact, even if they won a million dollar lottery, only 11% said they would stop working! Some of the other major findings were that:

- Most felt they were under a great deal of stress. On a scale of 1-5, with 5 being the highest, almost half gave themselves a four. Forty-five percent of respondents reported feeling "stressed out" at least once or twice a week, and for 38%, it was more than three times a week.
- Jobs are becoming more demanding. Sixty-eight percent described their work load as either "too heavy to do a good job" or "uneven and unpredictable". One out of three listed increased responsibility without commensurate authority as a growing problem.
- Increased stress levels have had a damaging effect on personal relationships. Seventy percent say they most frequently take their stress out on their spouses, and that a strained relationship with spouses or children represents the biggest intangible toll of job stress. More than one in three state that their sex drive has diminished as a result of job stress.
- Most wouldn't change things if they could. Almost 70 percent feel they are happier than their mothers were. Being busy and productive through work activities seems to provide other rewards, although these were difficult to define.

When asked about how stress affected them physically, more than two thirds cited fatigue, followed by headaches (46%), muscle tension (45%), overeating (32%), insomnia (30%), digestive prob-

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lems (20%), rashes and other skin complaints (14%), smoking (8%), and drinking and high blood pressure (7%). Psychological reactions included increased irritability in three out of four, depression (48%), anger (42%), and nervousness (20%).

The two most common causes of stress in working women were lack of time and money. When specifically asked what they thought would most likely reduce their stress, 62% said more money, while 61% opted for additional personal time. It would seem that those with enough money, don't have time to spend it, while others who have adequate free time, can't afford to enjoy it. Concerns related to child care, and catching up with housework and shopping are common stresses encountered outside of the workplace. However, these usually result from having to work, and greater flexibility might be the most effective remedy for these problems. When asked what they would do if they were the CEO of the company, almost half said that the very first thing would be to offer flex-time to their employees. Only 28% indicated they would raise salaries. If they suddenly won a million dollar lottery, more than one in four said they would start their own business to find some type of work arrangement that gave them more control and flexibility.

Other stress busting suggestions include:

- Discussing your problems with a good friend rather than a family member. Often, you will be able to blow off more steam, without disrupting your home life. Only 11% of those surveyed indicated that they tended to seek such help when dealing with stressful situations. In many instances, others can be of great assistance or offer valuable suggestions, if you share your problems with them.
- When things really pile up, do take ten minutes out to get things off your chest to your husband, and encourage him do the same with you. However, it's important for both to understand, and agree in advance, that neither is responsible for the other's work problems.
- Don't be afraid to ask for help when unexpected problems arise. Create a back-up system of family members, co-workers, or friends,

who might be able to run errands, do shopping, pick up children, or pitch in if an emergency arises. And make yourself available to do the same for them.

- Take time out. If possible, find some "get-away" spot in your attic, garage, garden, or some other convenient place, where you can spend some quiet time alone to think or relax. This helps to avoid taking your feelings out on others. The survey showed that those women who seemed to be most resistant to stress, took an average of 72 minutes a day to attend to personal needs, compared to only 40 minutes for those less able to cope.
- Exercise also helped to reduce stress. Regular exercise was engaged in by 54% of the low stress group, compared to only 38% for others. Exercisers were also less likely to eat to relieve their stress (14%), in contrast to almost twice as many (27%) for the rest of those surveyed.
- Try to keep in touch with your family during the day. Just a short phone call to the kids after they finish school can help keep stress levels down. If your supervisor objects to personal calls, explain that you would be much more productive if you knew things were all right at home, by spending a minute or two on the phone. It will also help reassure your children that they come first.
- Work at improving your office relationships. Having good rapport with superiors and co-workers can make things easier if you need to leave work early or possibly bring your child to the office for an hour or two.

Working mothers seem to be committed to the lives they've chosen. Although almost four out of five considered themselves to be more stressed than their mothers, the vast majority believe that they are also happier. They would much rather be subjected to stress, than suffer from the depression that their mothers seemed to experience more frequently.

Respondents were far more likely to feel irritable (75%), than depressed (40%), as a result of their job stress. However, all things considered, they enjoyed working, and believed they would be worse off, with confinement at home. Some even

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seem to thrive on stress. As one manufacturing engineer and mother of two explained, "If there were no stresses in my life, there would be no challenge either." Support for this comes from the author of a recent book on working women, who noted, "All evidence is that employed women, regardless of the work they do, experience higher levels of psychological well-being and lower levels of stress than women who stay home."

Working Mother-July/August, 1996

Sewing Up Stress

Strung out working moms might want to consider taking up sewing, since it could prove to be a productive way to relieve their particular problems. While this may sound screwy to some, sewing can provide significant stress reduction benefits. Readers old enough to remember, may recall that Edward, the Duke of Windsor, resorted to knitting, to relieve the stress associated with giving up the crown for the woman he loved. During the French Revolution, Madame LaFarge apparently also found this to be a pleasant pastime, while watching the heads of guillotine victims being lopped off. Sewing, knitting, needlepoint, macramé, quilting, and similar diversions, make it possible to temporarily forget the cares of the day. Years ago, women would get together with neighbors or church members, just to sit, sew and chat for an hour or two, and such sewing bees promoted strong social support. In addition, they were often organized to produce products that would help the needy, or raise funds for a worthy cause. A solid support network of friends and family, creating things you can take pride in, and especially doing something you enjoy that benefits others, have all been shown not only to reduce stress, but also provide other health benefits.

At first glance, advising working mothers to take up sewing might seem stupid. After all, most can't find enough hours in the day to finish their existing work and family obligations, and adding another assignment, would be more likely to cause additional stress. This may undoubtedly be true in some instances. In addition, no stress reduction strategy works for everyone. Jogging, meditation,

and yoga, are great for some, but when arbitrarily imposed on others, are dull, boring, and even stressful. This also applies to sewing, as well as every other stress management technique.

On the other hand, everyone needs some leisure time to unwind, and escape from daily pressures. For some, this is often provided by passive activities, like watching TV, or taking a nap. But there are active escapes such as engaging in enjoyable hobbies, that also provide diversion. Many of these involve elements of creativity, or making things that are disorganized more orderly, and attractive. Such accomplishments contribute to one's character, and promote feelings of pride, confidence and self-esteem. As indicated earlier, these attributes improve social status and integration, and the achievement of goals in a responsible fashion.

All of the above also help to foster an improved sense of control over one's life. Stress is difficult to define, because it is different for each of us. Situations that are distressful for some individuals are pleasurable for others, or may have little impact, as illustrated by observing the reactions of passengers on a steep roller coaster ride. However, all of our clinical and laboratory studies confirm that the feeling of having little control is always distressful. Employees today are under more stress, because they have less and less control over the finished product, cannot utilize the full potential of their talents, rarely have enough time to get the job done to their satisfaction, and frequently find scant social support from superiors, co-workers and customers. Many working moms may find that sewing and similar activities are able to provide these rewards.

There may be other health benefits. A New York University Medical Center study also confirms that sewing can quiet the heart. Researchers report that in experienced needleworkers, heart rates dropped by about 11 beats per minute while they were sewing. For those who were less skilled, it is lowered around 7 beats per minute. However, some hobbies may be more stimulating than relaxing. Heart rates were found to increase in people who paint at an easel, read a newspaper, play cards or rely on a handheld video game for diversion.

Univ. of TX Health Letter-January 1996

Book Reviews • Meetings and Items of Interest

Book Review

Life At The Edge Of Science, by Beverly Rubik, Institute for Frontier Sciences, Philadelphia, PA, 1996, 185 pgs. \$19.00

This meaty little volume is an anthology of articles previously published by the author, who founded and directed the Center for Frontier Sciences at Temple University in 1988. These reflect her abiding interest in alternative medicine, and eclectic curiosity about the origins and nature of consciousness, and cutting-edge controversies that question the conventional paradigms of mainstream medicine. Included are discussions of the well recognized biological effects of subtle energies that are not consonant with Newtonian physics, how the benefits of traditional Chinese practices can be explained in terms of western medicine, and attempts to reconcile the rifts between spirituality and science.

The fifteen chapters are divided into three sections titled Anomalistics, Consciousness Studies, and Biology and Medicine. Of particular interest is the last section which includes papers dealing with the volitional effects of healers on bacterial growth, a discussion of "energy medicine", and Gurwitsch's demonstration over fifty years ago, that when onions were kept close together, they stimulated the growth of each other's roots, and that separation by a thin piece of glass, but not quartz, abolished this effect. Kaznacheev has similarly shown that when tissue culture cells are destroyed by adding carbolic acid to the medium, adjacent healthy cells that are separated by quartz, start to die at the same rate, but that this does not occur when glass of the same thickness is substituted. These observations suggest that these weak energies that have powerful affects on cell growth are in the ultraviolet range. The chapter entitled, "An Emerging Paradigm for Biology and Medicine"

emphasizes the importance of the rapidly emerging field of bioelectromagnetics, and another proposes a model for how meaningful alternative medicine research can best be conducted.

The writer's strong background in biochemistry and biophysics is quite evident throughout, as is her compelling ability to make complicated issues quite comprehensible. The book is highly recommended for those who want to see how knowledge from different cultures and disciplines can be meaningfully integrated, or obtain a glimpse into what 21st century medicine may offer.

Meetings and Items of Interest

Feb. 21-23 Stress, Immune Disorders, sponsored by East Synthesis West, Dana Point, CA, call (310) 420-6090

Mar. 3-8 Art and Science of Health Promotion Conference, "Health Promotion: What's the Impact and What Works?", Hyatt Regency, Hilton Head Island, SC, call (810) 682-0707

Mar 12-18 Association For Applied Psychophysiology And Biofeedback Annual Meeting, Better Living Through Applied Psychophysiology: Surfing the Wave of Technology, for info: AAPB, 10200 W. 44th Avenue, Suite 304, Wheat Ridge, CO 80033-2840

Mar. 20-22 American Psychosomatic Society 55th Annual Scientific Meeting, Hilton of Santa Fe, Santa Fe, NM, call (703) 556-9222

April 13-15 2nd International Symposium on Functional Gastrointestinal Disorders, The Pfister Hotel, Milwaukee, WI, call Cathy Means for info (608) 263-6637

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