

HOW STRESS FRIES BRAIN CELLS?

Dr. PARMJIT SINGH

We no longer live in an ideal world. The social structure has evolved to the extent that we have to wrestle with stress and anxiety to fight for our survival in the changing socio-economic conditions, pay mortgage for a large house, buy a better car than our neighbor and worry ourself sick for not being able to get a coveted promotion or accumulate wealth. The list is endless and so are its consequences.

In the earlier days, things were simpler: people lived in a modest environment, there were less broken families, people helped each other in the times of need and above all, there was not so much commercialism in the world. Inhabitants were not worried about having to buy a powerful satellite dish to watch that mindless soap opera stuff or brand name clothes to cover their deep rooted inferiority complex (some psychologists speculate that a lot of people in North America are suffering from low self-esteem). Above all, the ghost of individualism, as it is pervasive in North American and Western continent, was not so pronounced yet.

But things have changed. In the last three or four decades, North America has become an impressive success story: income has doubled, housing is better, medical care is more efficient (unless you are on a waitlist for a major medical procedure), food is surplus, social security is ensured and the average longevity of people has risen. Nevertheless, there is a dark streak to these glamorous statistics. Since 1960, divorce rates have also doubled, teen suicide has tripled, recorded violent crime has quadrupled, prison population has quintupled, and babies born to unmarried parents have sextupled.

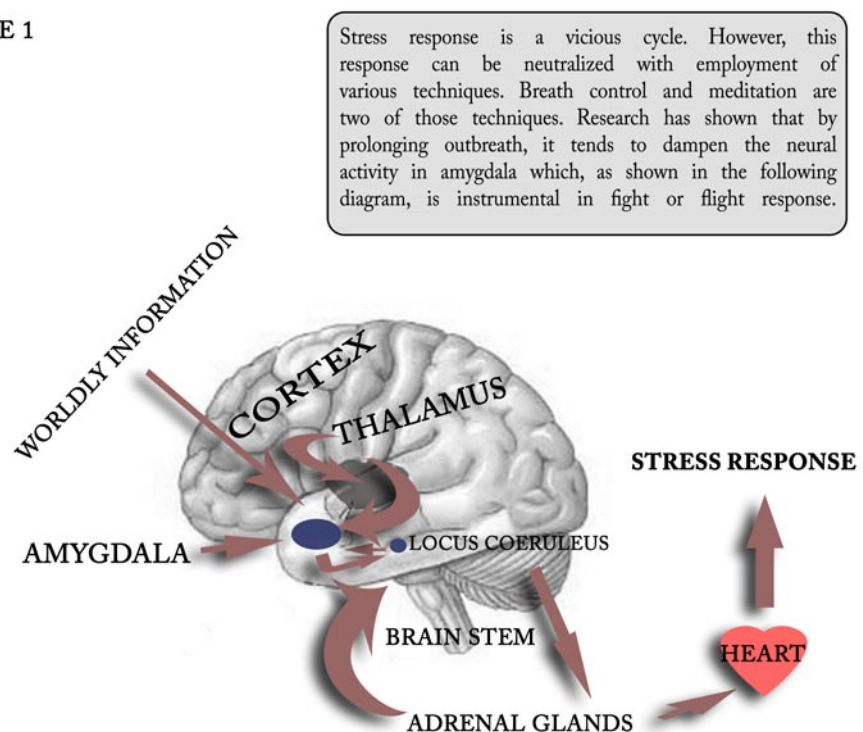
People are more stressed and depressed than ever. In a study published in Canadian Chronic Diseases, the number of people suffering from depression has gone up sharply (71% increase over previous years and authors say that their estimate is conservative). These two faces of same reality do not make sense. Proverbially, we are living in the best and worst of the times in the same epoch. Rapidly changing family, economic and social conditions are generating a lot of stress making it as one among the major killers in the modern world.

Stress Response-Devil's Pharmacy

Stress is an alarm system that goes off in our body every time we are faced with unfamiliar situations or threatening circumstances. It is part of the 'fight or flight system' our ancestors developed as a defense mechanism while living in precarious

FIGURE 1

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conditions of jungles and ravines when food and housing was not as predictable and stable as it is today. Then they had to run for their lives when chased by an ill-intentioned tiger bent upon making them their next meal or sprint for miles to get their next bite of eat. Then this stress response was healthy, for it ensured their survival.

The whole sequence of stress response kicks in with the receipt of actual or perceived potentially alarming information in cortex which is then faxed to amygdala. It initiates the whole to and fro mechanism culminating into stress reaction, as it is illustrated in the Figure 1.

With each instance of stress response setting off in the body, it triggers off an important physiological system into a top gear. Hormones start flowing into the bloodstream, heart pumps faster trying to match up to the demands of an emergency situation, and so on and so forth, a typical situation if a wild animal would be chasing us down the lane.

In this situation, other important operations of the body are placed into suspension until the situation abates. The repair mechanism, digestive process and reproduction are shut down. Of course, we cannot afford to be worried about reproducing or making love if our life is on the line (unless we are crazy). Imagine what would happen to a car if it was running continuously without any rest for a few years. That is exactly what happens to the human body— it wears out under constant exposure to stress.

At present, however, we do not live in jungles any more and we do not have to dodge wild animals. Then why does our 'fight or flight' response keep us strung up? It is because we have forgotten the way to turn it off. In the present world, where productivity and efficiency are the hallmark of success, we are always strung up for one reason or the other. A high-performance job, an approaching deadline or a tyrant and demanding boss, an impending loss of job or mortgage payment will do the same thing as a tiger pursuing our ancestors in the jungle did millennia ago.

According to Dr Robert Sapolsky of Stanford University, "Stress per se does not make us sick, but it creates a fertile ground for the germination of various diseases". The list is endless. From heart problems, depression, cancer to diabetes— stress is considered a culprit in almost all the dreaded illnesses we face today. Depression, which stalks countless people, is also one unsavory side-effects of chronic stress.

It leads to depletion of important neurotransmitters and hormones necessary for joyful living as is illustrated in Figure 2. Interestingly, the origin of these diseases does not lie outside us. To this date, science does not consider these diseases caused by any outside germ or bacteria and are mostly called the 'diseases of civilization' or more apt still 'diseases of our reckless lifestyle'. In a true sense, any given stressful reaction or situation triggers a devil's pharmacy in our body with an enduring damage. In certain circumstances this response serves a healthy purpose for it ensures your survival by acting out appropriately under threatening conditions. However, it could become a double-edged sword if you forget to shut it off once the situation has blown over.

As the effects of stress work in an insidious manner and without our conscious knowledge, so by the time we are kind enough to acknowledge them, the damage has already been done. It would not be too much to say that chronic stress can damage our heart by precipitating cardiovascular ailments and fry the hippocampal cells of brain. No wonder we start losing memory as we age. It is

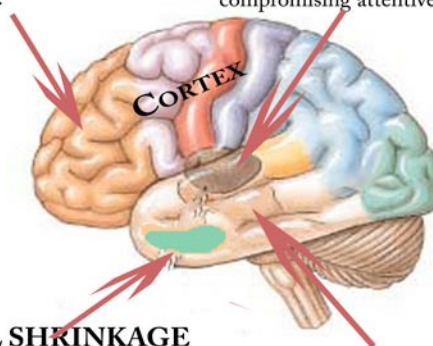
EFFECTS OF DEPRESSION ON BRAIN FUNCTIONING

DOPAMINE DEPLETION

Chronic stress can increase the risk of depression by exhausting dopamine level. This neurotransmitter is essential for pleasure.

NOREPINEPHRINE DEPLETION

Prolonged stress depletes norepinephrine level thus compromising attentiveness.



HIPPOCAMPAL SHRINKAGE

Chronic stress initiates cellular death in hippocampal area which affects the memory in long run.

SEROTONIN DEPLETION

Chronic stress reduces the release of serotonin neurotransmitter thus affecting sleep.

FIGURE 2

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because stress can kill cells in hippocampus which is heavily involved in memory process. In this context, growing old should not stress us much. Instead, not getting stressed out for fear of growing old might help us stay young.

STRATEGIES TO REDUCE STRESS

Two types of strategies work very well in combination:

1. Mental and/or spiritual
2. Physical

Mental and/or Spiritual:

1. Ask yourself a few questions related to your life, work, relationships etc.:
 - a. What is the source of my stress? E.g. work, marriage, relationship etc.
 - b. What is the underlying conflict?
 - c. Am I attaching too much importance to work or money?
 - d. Why do I work?
 - e. Do I work for money or for love of the work itself?
 - f. How are my relationships with family or spouse?
 - g. Do I have sufficient social or family support?
 - h. Is my love for family or friends based on my personal interests or does it have some deeper meaning?
 - i. For each action in my life, I should ask myself why I am doing this.

Even though the above list is not an exhaustive source, however, it will help us start a self-reflection and introspection process. After you have honestly answered the above questions, you will find an underlying pattern in your life and it will give you some handle on the sore spots. As the saying goes: knowing is essential to the solution. We will engage in more comprehensive introspection and self-analysis while working through this program.

2. For happy and stress free life, three things are very important:
 - a. Harmonious job/work,
 - b. Good family life/marriage and
 - c. Selfless service.

Physical:

1. Regular moderate physical exercises
2. Yoga, Tai Chi, jogging, aerobics
3. Meditation and other awareness practice

Freedom from stress requires some deep and honest soul searching. In the long run, symptomatic treatment will not do any good. If you want to spare yourself from the deadly effects of stressful lifestyle driven by money, power, greed, prestige, it is better to engage in some self-introspection.

Remember: *you will be retiring to your grave earlier than usual, if you are constantly under stress. Then what good is a Mercedes parked in your garage or a million dollars in your account? To enjoy that, you need to live longer.*

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