Why stress is bad for you?

In this society many people live in a permanent state of fight or flight. We inherited those modes of living from our ancestors, back when our survival could depend on it.

When someone experiences a stressful or threatening event, the **amygdala**, an area of the brain that contributes to emotional processing, sends a distress signal to the hypothalamus. The hypothalamus communicates with the rest of the body through the **autonomic** nervous system, which controls such involuntary body functions as breathing, blood pressure, heartbeat, and the dilation or constriction of key blood vessels and small airways in the lungs.

The autonomic nervous system has two components, the sympathetic nervous system and the parasympathetic nervous system. The sympathetic nervous system functions like a gas pedal in a car. It triggers the fight-or-flight response, providing the body with a burst of energy so that it can respond to perceived dangers. The parasympathetic nervous system acts like a brake. It promotes the "rest and digest" response that calms the body down after the danger has passed.

The sympathetic nervous system sends signals to the adrenal glands. These glands respond by pumping the hormone **epinephrine** (also known as **adrenaline**) into the bloodstream. As epinephrine circulates through the body, it brings on a number of physiological changes. The heart beats faster than normal, pushing blood to the muscles, heart, and other vital organs. Pulse rate and blood pressure go up. The person undergoing these changes also starts to breathe more rapidly. In the extreme, a panic attack can cause panting. Small airways in the lungs open wide. This way, the lungs can take in as much oxygen as possible with each breath. Extra oxygen is sent to the brain, increasing alertness. Sight, hearing, and other senses become sharper. Meanwhile, epinephrine triggers the release of blood sugar (glucose) and fats from temporary storage sites in the body. These nutrients flood into the bloodstream, supplying energy to all parts of the body.

As the initial surge of epinephrine subsides, the hypothalamus activates the HPA axis. This network consists of the hypothalamus, the pituitary gland, and the adrenal glands. The HPA axis relies on a series of hormonal signals to keep the 'gas pedal' pressed down. If the brain continues to perceive something as dangerous, the hypothalamus releases CRH, which travels to the pituitary gland, triggering the release of ACTH. This hormone travels to the adrenal glands, prompting them to release **cortisol.** The body thus stays revved up and on high alert.

Cortisol suppresses the immune system, increases blood pressure, increases blood sugar, decreases libido, produces acne, causes osteoporosis, poor sleep, digestive problems, diabetes, increases appetite, stores unused energy as fat and contributes to obesity. The human body takes between 1/2 an hour to 2 days to recover from adrenaline and longer to recover from cortisol.

But it gets worse.

DNA makes up all the cells of our body. In the nucleus of each cell, the DNA molecule is packaged into thread-like structures called **chromosomes**. Each chromosome is made up of DNA tightly coiled many times around proteins, called histones, that support its structure. The chromosomes are protected by 'end caps' (called **telomeres**) much like a shoelace has a

protecting end cap. Our cells replenish by dividing; however, each time they divide they lose some telomeres. Eventually the telomeres become insufficient to protect the chromosome, the cell ages and cell division becomes faulty, leading to aging and disease. One can think of telomeres acting as the 'aging clock' in every cell.

Apart from age, what else damages telomeres? Cortisol! Hence stress brings on premature aging and a host of ailments.

How do we overcome the effect of stress?

We can do this by reducing the effects of cortisol.

Dopamine, serotonin, oxytocin and endorphins reduce cortisol and are the quartet responsible for your happiness. Endorphins reduce the feeling of pain and trigger a positive feeling in the body, similar to that from morphine and codeine.

Your body will produce the quartet whenever you:
* see something beautiful; such as a sunset, a painting or a flower,
* hear beautiful music or see someone move gracefully,
* touch the one you love, or stroke your pet
* achieve a target - such as making a good golf shot or finishing a jigsaw puzzle,
* exercise and breath slowly and deeply
* meditate

Tai Chi incorporates several of these: It's always performed to relaxing music, we learn to move gracefully, we breath slowly and deeply, it's a form of exercise and we achieve targets (such as refining a movement or finishing a level). In effect, Tai Chi is often described as 'moving meditation'.

Why is deep breathing, that is associated with meditation, good for you?

To explain that we need to examine the source of our body's energy. Obviously we need food and oxygen. These are used by the mitochondria in every cell of your body (except blood cells). You inherit your mitochondria from your mother. Originally, mitochondria were bacteria that were enveloped by eukaryotes and were kept as organelles. An adult body contains about 10 million billion of them! The average cell has 300 to 400, liver cells have 1000 to 2000 and heart muscle cells have about 5000.
Mitochondria take in Oxygen and sugars from the blood. Their output is CO2, water, heat (they 'run' at 51 degrees C) and ATP (adenosine tri phosphate). ATP is what powers your muscles, brain and body functions. So, better breathing equals more oxygen which equates to more ATP. Muscle cells and nerve cells have especially high energy needs. Common features of mitochondrial disease are: muscle weakness, exercise intolerance, hearing loss, trouble with balance and coordination, seizures and learning deficits. Other frequent complications include impaired vision, heart defects, diabetes and stunted growth.

Most people find that it's difficult to stay focussed on straight meditation. Our minds get bored and our thoughts start to wander. Chi Kung can help. It consists of sets of movements designed to improve your internal strength. Chi Kung practitioners believe that routines provide the best benefit if each move is performed only four times.

To enable continued focus on relaxation and breathing, Tai Chi presents an opportunity to maintain the meditative state. A good teacher can keep the class so focussed that at the end of the class many students say "I can't believe an hour has passed." In that time they haven't thought about the things in their life that cause them stress.

Why is muscle tension bad and how can we ease it?

It's common knowledge that muscle tension causes pain, headaches and difficulty moving. Tension-type headaches and migraine headaches are associated with chronic muscle tension in the area of the shoulders, neck and head.
Pharmacies are full of tablets to relieve the symptoms! Wouldn't it be better to examine the causes of muscle tension and learn to minimise the end result?
Some people believe that each muscle relates to a certain issue. (See the separate article on causes.) We need to become so relaxed that we can feel a single muscle becoming tense. When you feel a muscle tense up then ask yourself WHY? then do something about it. Is it your subconscious 'talking' to you? Kinesiology uses this to diagnose long-standing trauma.

Of particular interest is the 'Cinderella' muscle AKA the 'Silly muscle'. This muscle is the first to tense (via the fast twitch fibres) and the last to relax.
Fast twitch is for speed, slow twitch is for strength. This muscle (on the right side of your neck) tenses up for the silliest of reasons: Shall I have tea or coffee? Read a book or watch TV? Ring someone now or later?

The Cinderella muscle can also be triggered by an ongoing 'decision avoidance' situation, such as playing on the internet (or reading a novel) instead of working. In this case it is the slow twitch muscles that are brought into play.

We can counter the stress response by using a combination of approaches that elicit the relaxation response. These include deep abdominal breathing, focus on a soothing word (such as peace or calm), visualization of tranquil scenes, repetitive prayer, yoga, or Tai Chi.
The Chinese art of Push Hands is a sure-fire method to release muscle tension.