

## Can Stress Make Me Fat?

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Britain in 2008 is a society that is wrapped up in triple 'epidemics' of stress, obesity and chronic disease. None of these issues were considered a problem in society 100 years ago; unfortunately, whilst we are regularly bombarded with the status quo recommendations – don't get stressed, don't get fat, with the threat of chronic disease as back up – but rarely are the links explored, let alone explained.

The physiology of stress generally relate to two classes of hormones, catecholemines and glucocorticoids. To keep things simple, I will refer to only to the main catecholamine in question, adrenaline, and the major glucocorticoid, cortisol. Whenever we activate our 'fight or flight' stress response, this causes both hormones to be released. These hormones are responsible for the familiar effects we might experience in a challenging situation; increased heart rate, an increase in energy, increased awareness/anxiety and a dry mouth to name a few. Non-essential processes like digestion are shut down, whilst the bloodstream is filled with glucose and fatty acids ready for fighting or running.

It is through this initial breakdown of fat and carbohydrate into smaller, usable products (fatty acids and glucose) that both the adrenal hormones are considered catabolic (breakdown) hormones. But if it were this simple, surely the more stressed an individual becomes, the more fat they will break down and the leaner they will become? Observation of the stressed people around us and official health figures both show this is definitely not the case.

Clearly, better understanding of the stress response is required. In particular, there seems to be little differentiation between the roles of adrenaline and cortisol. There is a propensity in stress culture to lump the effects of these two hormones together, when in reality they work in unison with one another in contrasting roles. The stress response actually comes in two waves; the first initiated by the release of adrenaline, which plunders the body's resources to prepare and prime the body for action. Adrenaline will normally stay in the bloodstream in high concentrations for several minutes. The second, cortisol-dominant phase is more of a compensation reaction to the plundering of resources that just occurred. Cortisol stays in the bloodstream for hours. So when this stress response becomes over-deployed, over-compensation occurs and this makes a stressed individual an stressed, overweight individual.

Cortisol causes fat cells and liver cells to activate more lipogenic (fat-producing) enzymes. The more cortisol you release, the more fat you will store. Why? Evolution has given us a perfect stress response to the dangers we have faced for the majority of the last 40 million years. These would have been threats to our physical safety, and running from a predator would have left us with emptier fat cells, but the compensation response (fuelled by cortisol) ensures that normality is resumed. However, the first stage of this stress response will be activated regardless of your activity levels and, as it was designed to

provide masses of glucose for working muscles quickly, this will cause an excessive build-up of glucose in your bloodstream when you sit raging in a traffic-jam, or sweat uncomfortably behind your desk. So what is the end result of this? The cortisol release, that nature intended to salvage something for the fat cells from what little remained in circulation, now has the resources to hold a festival of fat storage. There is more glucose left to shuttle into your fat cells to be converted to triglycerides (stored fat). There are more glucocorticoid receptors in the abdomen, hence the 'apple-shaped' fat distribution so often seen in stressed individuals and those on high doses of steroids.

It would be nice if your muscles were refueled in the same way as your fat cells. Unfortunately not the case. In order to help those muscles that have just become empty outrunning a lion, cortisol activates enzymes that cause produce insulin resistance. Thus, the non-working muscles are marginalised to give priority access to those that need it most. A clever system, but what happens when no muscles have been exercised? Insulin resistance, and therefore increased insulin production. Insulin resistance does not mean that insulin does not do its job, it simply means that it takes longer to do so and those cells with unlimited storage (fat cells) end up taking more than they otherwise would. More insulin means more fat storage. It also predisposes an individual to Type II diabetes.

So far we have got a system that spends a few minutes shuttling energy out of muscle and fat cells in the face of an apparent emergency then, when it turns out that this was simply an email that reminded you of another task you will not have time to do, spends the next few hours shuttling this excessive energy into fat cells, regardless of what you are eating.

It doesn't stop there, though. As mentioned above, stressful situations throughout the course of evolution would inevitably have left an individual with less energy stores, with those valuable fat stores depleted. The 2nd-wave of the stress response (the compensation phase) deals with this very cleverly, inhibiting a hormone called leptin (an appetite suppressant) in the brain, which signals for an individual to replenish themselves with foods that the body can convert easily to stored fat; sugar. Often my clients tell me they lack the willpower to eat the foods they know they should – normally, this is simply a physiological response to uncontrolled blood sugar levels and uncontrolled stress.

Beyond these direct mechanisms that stress hormones cause increased fat storage, there are many other effects that are likely to trouble the determined dieter. Digestion is shut down from the moment you face a situation you interpret as stressful (your dry mouth is caused by the salivary glands shutting down). Compromised digestion is at the basis of almost every health concern, but inefficient digestion means the inefficient conversion of food to energy, which causes more fat storage. It will also increase the likelihood of vitamin/mineral deficiency to near certain; this will compromise the body from cellular level up, with vitality and metabolic rate the likely losers. For various complex mechanisms, primarily regarding the disruption of healthy digestive and immune function, food allergies are more likely to develop.

Cortisol also binds to steroid receptors all over the body, resulting in less receptor sites available for other steroid hormones such as estrogen and testosterone. Testosterone, especially, is involved heavily with muscle metabolism. Both have potent effects on mood, mental aptitude and libido. Both adrenaline and cortisol will respectively stop you from going to sleep and ensure you can never reach deeper levels of sleep required for

sufficient repair. Without reaching the deeper levels of sleep, you will be unable to release optimal levels of growth hormone, a powerful fat-burning hormone.

So clearly, the message is simple: Don't Get Stressed. But are there any practical steps one can take to making this more of a reality?

Although stress causes bad sleep, one of the easiest way to spike your own release of hormones is to compromise on the time you spend asleep. Breaking this catch-22 situation is clearly of paramount importance. Areas to look at here are what time you go to sleep, whether you keep a television in your room (watching late at night easily disrupts the sleep/wake cycles) or if you do work in your bedroom before going to bed. Valerian Root, a herb is very useful if you have trouble going to sleep, and hydroxytryptophan, an amino acid, is useful if you would like to get into a deeper, more relaxed sleep. One of the best investments you could ever make in establishing better sleeping patterns is a black-out blind; this really does make a difference, even to those who do not feel they have a problem sleeping.

Controlling your blood sugar levels with regular meals is another very easy way to break the cycle of overworked adrenal glands. This means smaller meals, 4-6 times per day, with good levels of quality protein and fat (mirroring the type of diet we evolved upon). Avoiding alcohol, tobacco, sugar and especially caffeine are also steps that can be achieved with more ease than one might think. An individual that consumes 3 cups of coffee at work at 2 cups of tea at home may be shocked to realise that they are consuming a daily total of over 600mg of caffeine (thats the equivalent of 10 cans of red bull!). Beyond these two changes there is the more complex matter of altering the way you respond to the world around you – analysing who/what pushes your buttons and whether you should allow this to happen, analysing if you are trying to get too much done in too little time and whether your work/life balance is as optimal as it could be. These matters are often easily identified, but not as easily rectified.

The stress response is a great example of a system that has evolved perfectly for the world in which we evolved in. Unfortunately, this is a very different world from the one that we are surrounded by today. Frequent activation of our stress response, together with lack of physical exertion that our bodies clearly expect in this situation, are doing untold damage. This applies to our immune and cardiovascular systems as much as it does to our figure.

Moreover, it serves as yet another example of how diet and lifestyle habits have an enormous impact on the hormonal conditions (and therefore body composition) in an individual. It also demonstrates numerous factors that have an impact on stress levels, and thus what impact stress levels has on even basic processes such as the metabolism of food, mood and sleep. Once more, getting back in sync with evolution on all fronts is your best guarantee to achieve your goals.

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