An Introduction to Stress

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What is Stress?

Stress is a part of life and is not inherently bad. All life forms have evolved mechanisms to cope with the stresses of their lives. In fact, we frequently seek stress, and we relish its biological effects as being exhilarating, even psychologically rewarding. This is why we ski, ride roller coasters and climb mountains. Yet no one denies that stress can have a damaging effect on the individual. We are only too aware of the human diseases associated with a stress-filled life, and we seem preoccupied about the toll that stress takes on us.

Because the term 'stress' has been used so broadly in biology and in the press, no clear definition has emerged. Unlike most diseases, stress has no defined aetiology(cause) or prognosis. For this reason, our intuitive feelings about stress often guide our use of the term.

Essential to any discussion of stress, or psycho-neuroendocrinology as it is referred to scientifically, is an appropriate definition of the terminology. Much confusion surrounds the meaning of such terms as: stress; stressor; the adaptive response; and the consequences of stress, with stress often being referred to as the consequence, the array of internal responses and even the activating stimulus.

Stress is defined as a state of threatened homeostasis, the dynamic condition in which the body's harmony, balance or equilibrium is disturbed. This state of disequilibrium is induced by a vast number of physical and psychological stressors, described as the threatening or disturbing stimuli. The adaptive response can be defined as the complex coordinated array of responses elicited to counteract and negate the effects of the stressor and re-establish homeostasis.

It is helpful to think of stress as the 'biological response' elicited when an individual perceives a threat to its homeostasis. The threat is the 'stressor'. When the stress response truly threatens our well-being, then the person experiences 'distress'.

To gain to a proper understanding of the concepts surrounding stress it is important that a person's biological response to a stressor be placed in perspective, viewed not as deleterious *per se*, but as an essential adaptive response which when activated inappropriately, or for a protracted period, may cause adverse affects. It should also be noted that not all stressors should be construed as noxious, as many challenges promote essential differentiation, growth and enhanced physiological and behavioural competence.

Physical stressors can include perturbations of the internal environment such as hypoglycaemia and extremes in the external environment (cold or heat), along with multifaceted stressors, for example, infection, intensive exercise or physical injury. Psychological stressors, by definition, affect emotion (eg, bereavement, loneliness and depression), resulting in frustration, fear and anxiety and are considered extremely effective in eliciting an adaptive response. It is important to be aware that although most stressors have a major physical or psychological component, they are more often than not a combination of different stimuli.

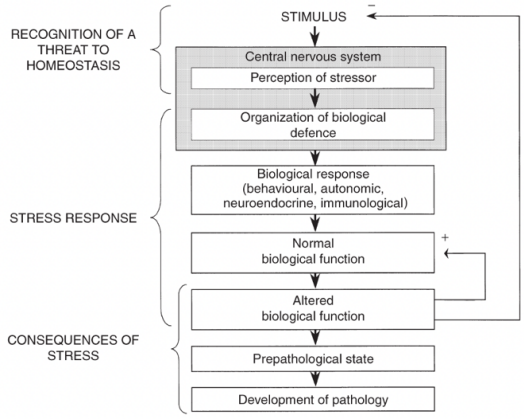

Fig. 1. A model of the biological response of animals following perception of a stressor.

Fight or Flight

When a person is exposed to a physical or psychological stressor the adaptive response elicits biochemical, physiological and behavioural changes aimed at the maintenance of homeostasis. Activation of the stress response results in secretion of glucocorticoids and catecholamines from the adrenal cortex into the bloodstream. The hypothalamic-pituitary-adrenal axis is activated resulting in the release of stress hormones; glucocorticoids (cortisol), catecholamines (epinephrine or adrenaline and norepinephrine or noradrenaline) which act to provide the necessary energy to overcome stressors by active redistribution of nutrients and energy. These changes in the availability of energy are paralleled by the stimulation of cardiovascular and pulmonary function, including increased heart rate, blood pressure and respiration rate. Simultaneously, anabolic processes such as digestion, growth, reproduction and immune function are suppressed.

The "fight or flight reflex" describes a link between the adaptive response and catecholamine secretion, manifesting in two ways: either the individual prepares to confront the threat (fight) or to flee from it (flight). The release of stress hormones results in an increased heart rate, altered cognitive and sensory thresholds, with heightened senses, increased arousal, alertness, vigilance and more focussed attention, and redirection of blood flow to essential muscles. The fight or flight reflex is an evolutionary adaptation designed to enhance survival in threatening situations.

Fig. 2. The fight or flight reflex: an essential response in certain situations

Stress and the Workplace

Sitting at our desk we are unlikely to be chased by a Wolf, or confronted by an angry Bear, but we remain susceptible to our fight or flight reflex; Perceiving someone or something, in a meeting, as a threat, can still elicit a profound hormonal response activating the fight or flight reflex. While it's not recommended to go toe-to-toe with a client or to jump up and run off mid-meeting, we can and should be prepared to acknowledge our physiology and as soon as possible, go outside for a brisk walk or do some exercise if we feel 'stressed' by a work situation.

The reason why this is so important is that the fight or flight reflex evolved as a powerful response designed to alleviate or deal with an acute threat; if the adaptive or stress response is activated chronically, the result can be persistent elevated levels of cortisol and adrenaline/noradrenaline which can lead to immune suppression and its associated pathologies. Chronic stress is also known to have significant impacts on cardiovascular health, contributing to various pathologies, such as:

- Hypertension (High Blood Pressure): chronic stress can lead to sustained high blood pressure, straining the heart and blood vessels, increasing the risk of heart disease and stroke.
- Coronary Artery Disease (CAD): chronic stress can exacerbate CAD which is characterised by the build-up of plaques in the coronary arteries constricting blood vessels, reducing blood flow to the heart.
- Arrhythmias: chronic stress can trigger abnormal heart rhythms, such as tachycardia (rapid heartbeat) leading to more serious cardiovascular events.
- Myocardial Infarction (Heart Attack): chronic stress can precipitate heart attacks by triggering the rupture of vulnerable plaques in the coronary arteries or by increasing blood pressure and heart rate.
- Stroke: chronic stress is associated with increased risk of stroke, particularly ischemic stroke, occurring when a blood clot blocks an artery supplying blood to the brain. Stress can contribute to hypertension and atherosclerosis, both of which are risk factors for stroke.

Managing stress through lifestyle modifications, relaxation techniques, and if necessary, seeking professional help can mitigate its impact on immune and cardiovascular health. Regular exercise, a balanced diet, adequate sleep, and maintaining strong social connections are also crucial for promoting heart health and resilience to stress.

Acknowledging that stress is an inherent aspect of life and recognising its potential to significantly impact our well-being underscores the importance of taking proactive measures to mitigate its effects and promote equilibrium. This awareness is key to fostering a healthy lifestyle.

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