The Air You Breathe

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Bo-Tau

The air you breathe comprises three main gases.

The largest proportion (79%) comprises the inert gas nitrogen, with oxygen making up 21 percent and carbon dioxide just 0.03 percent.

Once it has found its way into the capillaries, oxygen can be transported through the body by two basic mechanisms, either bound to the haemoglobin or dissolved directly into the blood plasma.

Approximately 99 percent of the oxygen transported in the blood is bound chemically to haemoglobin, a protein contained within the red blood cells (erythrocytes). Each molecule of haemoglobin is capable of transporting four molecules of oxygen.

The amount of oxygen that can be transported per unit volume of blood depends, therefore, on the concentration of haemoglobin.

Normal haemoglobin concentration for a healthy male and female is approximately 150 grams and 130 grams, respectively, per litre of blood.

Haemoglobin can also carry carbon dioxide, a waste product from cells, which it picks up from the return trip to the heart and lungs. Oxygen and carbon dioxide should be the only molecules, which bind to haemoglobin. However, other gases also often present in our environment can also bind to red blood cells, so reducing or even preventing oxygen from attaching to haemoglobin. One gas that does so is carbon monoxide, present in high concentrations in both cigarette smoke and car exhaust fumes. Because this has an affinity for haemoglobin 240 greater than oxygen smokers may have between 5 and 15 percent of all their haemoglobin taken up by this gas at any given time, even if they are not smoking at that particular moment. As a result they transport oxygen far less efficiently than do non-smokers.

Once haemoglobin becomes oxyhaemoglobin (oxygen rich) it still has to travel throughout the body in order to supply the needs of individual cells, and the pumping force, which circulates the blood throughout the body, is, of course, the heart.

The right side of this pump takes in deoxygenated blood from the veins (carbon dioxide-rich) pumps it into the capillaries surrounding the alveoli in the lungs where carbon dioxide passes out of the blood and oxygen is taken up by the red blood cells.

This oxygen-rich blood is then redistributed to every cell in the body, its journey starting from the left side of the heart and passing via large arteries and then smaller and smaller blood vessels to all the 75 trillion cells making up our body.

When this oxygen rich blood arrives at the cells it flows through increasingly tiny blood vessels to the point where the red blood cells must squeeze single file through capillaries in which an exchange of gases similar to that within the lungs occurs. This time however the red blood cells drop off their molecules or oxygen and replace them with molecules of carbon dioxide (a by-product of cellular activity).

This blood then returns to the heart through succession of increasingly large veins, eventually going through the right side of the heart and returning back to the lungs to complete the cycle.

The balance of these gases in the blood is extremely critical, since it is constantly being monitored by the brain and has a significant, and moment- by-moment, effect on the functioning of our nervous system. Increasing the rate at which you breathe by even a small amount, for instance, reduces the amount of carbon dioxide in the blood.

This in turn raises the level of mental and physical arousal to such an extent that in some cases even such mild hyperventilation can trigger a full-blown panic attack.

This whole intricate and delicately balanced process, on which life depends, requires not only that our heart and major blood vessels are all in good working order but also that sufficient fresh air is available within the lungs and that carbon dioxide is efficiently expelled by the lungs. Unfortunately this is by no means always the case.

Indeed research suggests that less than a third of us breaths in such a way as to safeguard health and maximise mental and physical potential.

A study of 153 heart patients in a coronary unit found that every single one of them breathed poorly, using the muscles of their chest rather than their diaphragm take and release a breath. Other studies have shown that breathe therapy, either on its own of in conjunction with biofeedback and meditation can have a beneficial effect in medical conditions including chronic pain, migraine headaches, high blood pressure (hypertension) asthma and panic attacks.

To the ancients this would come as no surprised, to modern men conditioned as we are to regarding breathing purely in terms of an exchange of gasses, the power of the breathe often comes as a surprise.

Yet there is not the slightest doubt that improving the way we breathe is the simplest, fastest and most effective way of enhancing well-being.

Each breath we take and, especially, how we take them, exerts a powerful influence over everything from the health of our heart to the efficiency with which we digest dinner.

My research and clinical experience has also led me to conclude breathing plays an equally crucial role in the way we perform – especially when facing difficult or unfamiliar challenges. Indeed it can make the difference between success and failure, determining whether we achieve our true potential or unable to accomplish those goals that should be well within our powers to attain.

For a detailed description of practical breathing procedures to help enhance health and wellbeing, see the ***Bo-Tau*** *Home Training Programme DVDs*