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Thermography Test of Hyper-Oxy© Mild Portable Hyperbaric Chamber

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Oxygen and other dissolved gasses move from red blood corpuscles (RBC's) through plasma and interstitial fluid to supply the needs of metabolizing tissue cells following a concentration gradient. Under sea level conditions (1 atmosphere pressure; 760 mmHg; 14.7 lb/in2, 21% oxygen) the partial pressure of oxygen in the pulmonary veins and typical arterial vessels is between 90 and 100 mmHg, at which point hemoglobin, the oxygen carrying protein present in RBC's, is functionally saturated and cannot combine with any more oxygen. The partial pressure of oxygen in venous blood at rest is approximately 40 mm Hg. (The partial pressure of oxygen in the air in the lungs is not 21% because carbon dioxide contributes a greater proportion than it does in atmospheric air.)

Furthermore, the dissolved oxygen content in arterial blood is typically about 0.3 ml O2/ dl blood, and in venous blood it is 0.12 ml/dl; and the oxygen content of plasma increases by about 0.03 ml/dl per 10 mm Hg increase in partial pressure. Therefore, increasing the pulmonary vessels partial pressure of oxygen by 20% (1.2 atmospheres; 900 mmHg; 17.7 lb/in2) will increase the blood oxygen partial pressure from 90 mm Hg to approximately 110 mm Hg, and increases the arterial oxygen content from 0.3 ml/dl to 0.36ml/dl. The result is to temporarily increase the dissolved oxygen content and the concentration gradient of oxygen from the blood toward the tissue cells by 20%.

Due to the limited oxygen solubility in plasma, a greater increase in pressure or oxygen content of the air will not lead to significantly greater oxygen carrying capacity. However, the dissolved oxygen is immediately available to local tissues surrounding the various capillary beds due to the steeper concentration gradient, thus stimulating increased cellular metabolism. The result is better performance by the tissues, for routine cellular activities as well as improved growth and repair processes, and an incidental increase in heat production as a by-product of metabolism.

The increase in heat production can be detected and quantified using thermography. Thermography is the process of using the body's surface temperature to interpret

underlying physiology and pathology. The skin's temperature is a result of the amount of blood flowing through the region, along with the metabolism of the local tissues. Increasing oxygen availability, through increased blood flow or through increased dissolved oxygen content of the blood, will increase local metabolic heat production. The detectors are used to display different temperatures as different colors. The thermographer may then interpret the different colors and patterns for clinical significance.

After One Treatment In The Hyper-Oxy© Mild Portable Hyperbaric Chamber Thermography 2/15/99:

Experimental evidence has shown that a single exposure to the Hyper-Oxy chamber can increase local tissue temperature (Figure 1 palms of hands) by greater than 3-C. Additional experiments are needed to clarify whether this thermal increase is due to increased local metabolism or altered nervous control of blood flow through the region, and whether repeated treatments will produce sustained thermal increases. The thermograms demonstrate greater metabolic capacity in certain tissues following Hyper-Oxy© treatment and objectify the symptomatic relief experienced by some subjects.

*Review of Medical Physiology, 18th Ed. W.F. Ganong, Stamford, CT, Appleton & Lang, 1997.
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