Hyperbaric Oxygenation Increases Patients own Stem Cells By Eight-Fold

... 2 hours HBOT at 2 ATA; doubles the patients own circulating stem cells

... 40-60 hours HBOT increases circulating stem cells by 8-fold (800%) !!

A scientific study completed at the University of Pennsylvania School of Medicine reports that **Hyperbaric Oxygen Therapy (HBOT) are a safe and effective way to mobilize the patients own stem cells providing immediate benefit and further preparing the patient for future stem cell implantation related therapies.**

In fact the population of CD34+ cells in the peripheral circulation of humans doubled in response to a single exposure to 2.0 atmospheres absolute (ATA) HBOT for 2 hours. Over a course of twenty treatments, circulating CD34+ cells increased eight-fold!
cells from bone marrow are capable of providing specialized functions in many different organs and tissues throughout the body. This movement, or mobilization, of stem cells can be triggered by a variety of stimuli—including Hyperbaric Oxygenation.

While drugs are associated with a host of side effects, Hyperbaric Oxygenation treatments carry a significantly lower risk of such effects.

"This is the safest way clinically to increase stem cell circulation, far safer than any of the pharmaceutical options," said Stephen Thom, MD, Ph.D., Professor at the University of Pennsylvania School of Medicine and lead author of the study.

"This study provides information on the fundamental mechanisms for hyperbaric oxygen therapy and offers a new therapeutic option for mobilizing stem cells."

"We reproduced the observations from humans in animals in order to identify the mechanism for the hyperbaric oxygen effect," added Thom. "We found that hyperbaric oxygen mobilizes stem/progenitor cells because it increases synthesis of a molecule called nitric oxide in the bone marrow. This synthesis is thought to trigger enzymes that mediate stem/progenitor cell release."

Hyperbaric Oxygenation not only causes the release of the patients circulating stem cells but greatly facilitates future endeavors using stem cell related therapies which is costly and not an automatic guarantee in every patient.

It is hoped that future study of hyperbaric oxygen's role in mobilizing stem cells will provide a wide array of treatments for combating injury and chronic progressive disease.

The completed study is scheduled for publication in the April 2006 edition of the *American Journal of Physiology – Heart and Circulatory Physiology*.

Submitted on August 19, 2005; Accepted on November 7, 2005

Stem cell mobilization by hyperbaric oxygenation

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We hypothesized that exposure to hyperbaric oxygen (HBO^2) would mobilize stem/progenitor cells from the bone marrow by a nitric oxide (·NO) dependent mechanism.

The population of CD34+ cells in the peripheral circulation of humans doubled in response to a single exposure to 2.0 atmospheres absolute (ATA) O_2 for 2 hours. Over a course of twenty treatments, circulating CD34+ cells increased eight-fold, although the over-all circulating white cell count was not significantly increased.

The number of colony-forming cells (CFCs) increased from 16 ± 2 to 26 ± 3 CFCs/100,000 monocytes plated. Elevations in CFCs were entirely due to the CD34+ sub-population, but increased cell growth only occurred in samples obtained immediately post-treatment. A high proportion of progeny cells express receptors for vascular endothelial growth factor-2 and for stromal derived growth factor.

In mice, HBO_2 increased circulating stem cell factor by 50%, increased the number of circulating cells expressing stem cell antigen-1 and CD34 by 3.4-fold, and doubled the number of CFCs. Bone marrow ·NO concentration increased by 1008 ± 255 nM in association with HBO_2. Stem cell mobilization did not occur in knock out mice lacking genes for endothelial .NO synthase. Moreover, pre-treatment of wild type mice with a nitric oxide (·NO) synthase inhibitor prevented the HBO_2-induced elevation in stem cell factor and circulating stem cells.

We conclude that HBO_2 mobilizes stem/progenitor cells by stimulating .NO synthesis.