



The Pressure Point

Naval Medical Center

Va. hyperbaric chambers yet to treat patients



Portsmouth Naval Medical Center

The Associated Press
Monday Jun 25, 2007

PORTSMOUTH, Va. — Two hyperbaric chambers installed in 2000 at Portsmouth Naval Medical Center have yet to treat a single patient, because Congress did not provide funding to finish the project.

A 500-ton crane lowered the chambers into a specially designed center, and nearly \$4 million was invested, *The Virginian-Pilot* reported last week. An estimated \$9 million is needed to complete the job.

The hospital's top official said he isn't sure it's worth the investment.

"I think there's medical benefit in hyperbaric therapy for specific medical processes," Rear Adm. Thomas Cullison said. "I'm not sure there's \$9 million worth of economic benefit for using the chambers as designed to get there."

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Hyperbaric Military Medical Technology

Excerpt from an interview with Colonel Rocky Farr, Command Surgeon U.S. Special Operations Command



by MMT Editor Jeff McKaughan



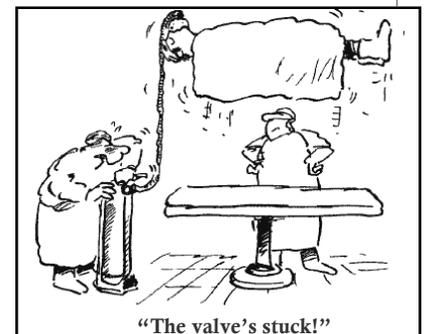
Colonel Rocky Farr
He received his M.D. in 1983 and has completed residencies and board certifications in aerospace medicine and anatomic and clinical pathology.

SOCOM Doc Dec 18, 2006

Q: On another mission-related physiology subject, in the Iraq and Afghanistan region SOF find themselves operating from basically sea level to very high altitudes. What training, conditioning, equipment or pharmaceuticals can be harnessed to lessen the physical drain at these heights?

A: Conditioning, acclimation and education are probably the three most important factors relevant to minimize the physical drain of operating in very high altitudes. There is nothing that can really replace the physiological conditioning of a body to operate in high al-

(Continued on page 2)



(Continued from page 1) Naval Med Ctr

The steel chambers sit idle at the Charette Health Care Center, a wing completed in 1999 and intended for the chambers.

“Without question, to go that far in the construction of a very, very unique facility and not complete it is just senseless,” said former U.S. Rep. Owen Pickett, who helped secure money for the chambers’ construction.

U.S. Sen. John Warner (R-VA) has asked the Navy to reassess the unfinished project.

“We’re just asking them to take another look at that, in light of the passage time and the best care for returning veterans,” John Ulyot, Warner’s spokesman, told *The Pilot*. “We’re willing to work with them, should this be a priority of theirs.”

The Portsmouth center would be one of the largest in the nation. It could treat patients in wheelchairs and on gurneys, and even allow doctors to operate on critically ill patients in the larger chamber, a 20-foot sphere.

Hyperbaric medicine is perhaps most commonly recognized as a treatment for divers with decompression sickness, also called the bends.

“...pressurized oxygen is used regularly to help them heal.”

For patients with chronic wounds and skin grafts, pressurized oxygen is used regularly to help them heal. Bones and tissue damaged from radiation in cancer treatment also benefit, and the treatment helps diabetic patients with wounds in their extremities avoid amputation.

tients with wounds in their extremities avoid amputation.

Cullison, who has been in command of the hospital since late 2005, said he is in favor of bringing in a contractor to provide hyperbaric treatment in one or two portable chambers on hospital grounds. From those results, doctors could gauge whether it makes sense to finish the existing chambers.

(Continued on page 5)

(Continued from page 1) Hyperbaric Military Medical Technology



“Units will also sometimes deploy with portable recompression [hyperbaric] chambers and oxygen with rapid decent being the mainstay of treatment for HAPE/ HACE...”

titudes. Prior exposure and acclimation also allows individuals to learn their own limits and to experience the signs and symptoms associated with acute mountain sickness, high altitude pulmonary edema [HAPE] and high altitude cerebral edema [HACE]. Unfortunately, some individuals are at greater risk for suffering from exertion at altitudes.

As for treatment, again recognition of early signs and symptoms and removing the individual from further exposure to altitude is the primary goal. Dexamethasone and Acetazolamide are two of the main medication for prophylaxis. Both of those drugs hinder performance and do not replace acclimatization.

Units will also sometimes deploy with portable recompression [hyperbaric] chambers and oxygen with rapid decent being the mainstay of treatment for HAPE/HACE in addition to Dexamethasone as an adjunct therapy to HACE.

We have been looking at various acclimatization methodologies such as artificial high altitude before

deployment with various types of equipment and deployment regimes, which allow acclimatization attempts at home station or en route.

The Army Research Institute of Environmental Medicine provided us with an ascent profile that takes into account a stoppage period at 5,600 feet. This is the altitude of some American bases in Afghanistan.

It turns out that for every day one spends at this altitude, he or she can then make a direct ascent of 1,000 feet with minimal risk of altitude sickness, up to a maximum of 14,000 feet. Therefore, if you keep a unit at a 5,600-foot base camp for five days, you can expect combat performance at 10,600 feet after five days.

Nothing can take the place of adequate acclimatization.

[For complete interview, go to www.military-medical-technology.com]

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Evaluation of hyperbaric oxygen treatment of neuropsychiatric disorders following traumatic brain injury

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Introduction Psychiatric disorder often occurs after traumatic brain injury (TBI).¹ We noted the clinical effectiveness of hyperbaric oxygen (HBO) in treatment of neuropsychiatric disorders after TBI. Initially, the evaluation of its effects was only based on the improvement of clinical symptoms and there was no any other objective evidence to support the improvement.

To study the effects of HBO on cerebral blood flow (CBF) and the usefulness of single photon emission computed tomography (SPECT) images in the diagnosis and assessment of neuropsychiatric disorders after TBI, we compared the results of cerebral SPECT and cerebral computed tomography (CT) before and after HBO treatment.

Methods Three hundred and ten patients with neuropsychiatric disorders arising from traumatic brain injury were treated twice with hyperbaric oxygen. HBO therapy. All the patients had been diagnosed as head trauma based on (1) clear cut head trauma history; (2) headache, dizziness, poor memory, epilepsy, hysteria, poor concentration and attention deficit; (3) no history of intracranial space occupying lesion, hypertension or cardiovascular diseases.

Among the 310 patients, 212 had a disease course of 1 to 6 months, 79 had a course of 6 months to 1 year and 19 had a course longer than 1 year. Two hundred and twenty-five patients had headache, dizziness, poor memory, epilepsy, hysteria and poor concentration. Forty-seven patients had epilepsy and thirty-eight patients had post traumatic hydrocephalus.

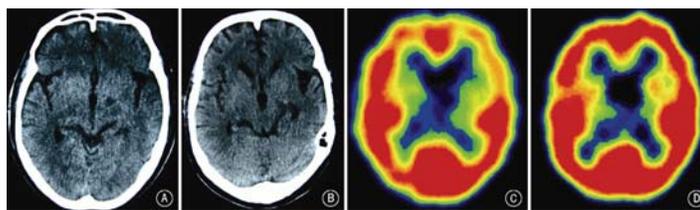


Fig. One typical case of a 41-year-old male patient suffered from brain trauma for 40 days induced by a traffic accident. He was conscious, dizzy, dysphoric, and poor in orientation. After treated with HBO for two courses, the patient recovered well.

A: Before HBO treatment, CT showed ill defined and flaky focal with low density in both sides of frontal lobe. **B:** After treated with HBO for two courses, CT showed ill defined and flaky focal with low density in both sides of frontal lobe. **C:** Before HBO treatment, SPECT showed massive radioactive rarefaction in the left frontal lobe and local rarefaction in the right indicating that rCBF reduced. **D:** After treatment with HBO for two courses, SPECT showed radioactive distribution normal indicating that rCBF returned to normal.

**“After HBO treatment,
70.3% of SPECT scans
showed no abnormalities
and these patients were
clinically improved.”**

HBOT Inside the NG 90 pure oxygen cabin, individual patients were treated under a pressure of 0.1 Mpa, inspired oxygen of 96% for 90 minutes daily for 20 days (2 courses).

Evaluation The obtaining time of SPECT and CT images of each patient was within 1-3 days before and after HBO treatment. Two experienced nuclear medicine physicians, independently of CT data, together analysed SPECT images. Each CT image was analysed, similarly independent, by two experienced radiologists.

Each image evaluation was: (1) cure: CT or SPECT showed the disappearance of foci; (2) improvement: CT or SPECT image showed that the foci were reduced by more than 1/3 in size; (3) inefficacy: CT or SPECT image showed foci were reduced by less than 1/3 or no change in size.

Cerebral single photon emissions computed tomography (SPECT)

images and computed tomography scans (CT) before and after hyperbaric oxygen treatment, were compared.

Results Before treatment, the proportion of abnormal cerebral changes detected by SPECT was 81.3% but only 15.2% by CT. After HBO treatment, 70.3% of SPECT scans showed no abnormalities and these patients were clinically improved. Treatment improved regional cerebral blood flow.

Conclusion SPECT was much more sensitive than CT in the diagnosis of neuropsychiatric disorders following hyperbaric oxygen treatment of neuropsychiatric disorders arising from traumatic brain injury.

Keywords: traumatic brain injury, hyperbaric oxygenation, computed tomography, single photon-emission computed tomography

SPECT images can demonstrate abnormal regional CBF (rCBF) and therefore provide an objective basis for clinical diagnosis and evaluation

1. Deb S, Lyons I, Koutzoukis C, Ali I, McCarthy G. Rate of psychiatric illness 1 year after traumatic brain injury. *Am J Psychiatry* 1999; 156: 374-378.



Natural History of Multiple Sclerosis with Childhood Onset

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ABSTRACT

Background The course and prognosis of childhood-onset multiple sclerosis have not been well described.

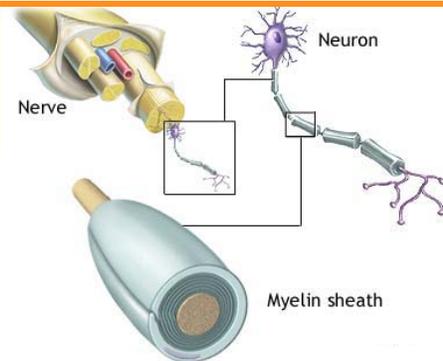
Methods We used data from 13 adult neurology departments affiliated with the European Database for Multiple Sclerosis (EDMUS) network to identify a cohort of 394 patients who had multiple sclerosis with an onset at 16 years of age or younger and a comparison group of 1775 patients who had multiple sclerosis with an onset after 16 years of age.

We determined the initial clinical features, the dates of disease onset, and the occurrence of outcomes, including relapse, conversion to secondary progression, and irreversible disability as measured by scores of 4 (limited walking ability but ability to walk more than 500 m without aid or rest), 6 (ability to walk with unilateral support no more than 100 m without rest), and 7 (ability to walk no more than 10 m without rest while using a wall or furniture for support) on the Kurtzke Disability Status Scale (range, 0 to 10; higher scores indicate more severe disability).

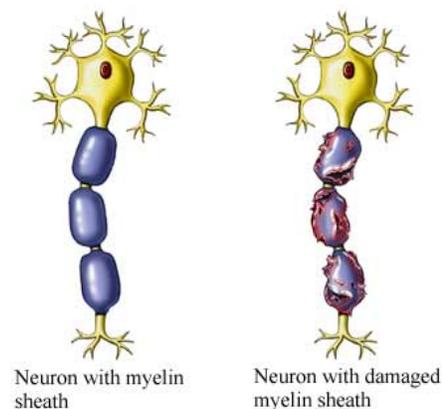
Results For patients with childhood-onset multiple sclerosis, the estimated median time from onset to secondary progression was 28 years, and the median age at conversion to secondary progression was 41 years. The median times

Right: The symptoms, severity, and course of MS vary widely depending partly on the sites of the plaques and the extent of the demyelination. Experts generally group multiple sclerosis into two major symptom categories, Relapsing-remitting and Chronic-progressive.

Recent evidence suggests that the disease process starts long before symptoms begin. By the time symptoms appear, there are often already signs of brain and spinal cord atrophy. MS' cause is unknown, and it cannot be prevented or cured. It is not fatal, however, and great progress is being made in treating it and identifying underlying mechanisms that trigger this disease



Myelin is the layer that forms around nerves. Its purpose is to speed the transmission of impulses along nerve cells.



from onset to disability scores of 4, 6, and 7 were 20.0, 28.9, and 37.0 years, respectively, and the corresponding median ages were 34.6, 42.2, and 50.5 years.

In comparison with patients with adult-onset disease, those with childhood-onset disease were more likely to be female than male (female:male ratio, 2.8 vs. 1.8), were more likely to have an exacerbating-remitting initial course (98% vs. 84%), took approximately 10 years longer to reach secondary progression and irreversible disability, and reached these landmarks at an age approximately 10 years younger ($P < 0.001$ for all comparisons).

Source Information

From Hôpital Neurologique Pierre Wertheimer, Hospices Civils de Lyon; INSERM Unité 842; and Université Lyon 1 — all in Lyon (C.R., S.V., C.C.); Hôpital de Bicêtre, Paris Kremlin-Bicêtre, Paris (Y.M., M.T.); Hôpital Pontchaillou, Rennes (G.E.); Hôpital Purpan, Toulouse (M.C.); Hôpital Saint Julien, Nancy (M.D.); Hôpital Pellegrin, Bordeaux (B.B.); Hôpital Pasteur, Nice (C.L.-F.); Hôpital de la Timone, Marseille (J.P.); Hôpital Général, Dijon (T.M.); Hôpital de la Pitié-Salpêtrière, Paris (C.L.); Hôpital Roger Salengro, Centre Hospitalier Régional Universitaire, Lille (P.V.); Hôpital Tenon, Paris (E.R.); and Centre Hospitalier Universitaire Dupuytren, Limoges (L.M.) — all in France; University Hospital Gasthuisberg, Leuven, Belgium (B.D.); and Royal Victoria Hospital, McGill University, Montreal (C.R., S.S.).

Conclusion

Patients with childhood-onset multiple sclerosis take longer to reach states of irreversible disability but do so at a younger age than patients with adult-onset multiple sclerosis.



(Continued from page 2) *Naval Chambers*

"We've had them there for seven years now already," Cullison said. "A couple, three more years of trying to figure this out in a more rational way is going to cost us less than taking them out and realizing it was a bad decision and trying to put them back.

"It would make more sense to me to just leave them there for now and work around them."

NORFOLK

U.S. Rep. Thelma Drake (R-VA) on Friday asked the Navy's top official for answers about the unused hyperbaric chambers installed at Portsmouth Naval Medical Center seven years ago.

"I hope you can understand my concerns, as well as the concerns of my constituents, regarding what would appear to be a misuse of taxpayer dollars," Drake wrote to Navy Secretary Donald Winter.

Counting design costs, the tab for the project was about \$3.75 million, according to a Navy report recently obtained by *The Virginian-Pilot*. The chambers were never finished and no patients have been treated there. Instead, the medical center sends patients to local hospitals for hyperbaric therapy and picks up the tab.

Drake's letter to Winter came in response to an article about the chambers in *The Virginian-Pilot* on Thursday.

The massive steel chambers - a 20-foot sphere that could fit 16 patients, and a cylinder with room for 10 patients - were hoisted into a specially designed wing of the medical center in 2000.

But the Navy never completed the so-called "piping and instrumentation" needed to make the chambers operable. That is estimated to cost at least \$6.2 million.

Some retired Navy doctors contend that hyperbaric therapy could help heal injuries sustained by military members in Iraq and Afghanistan. Chambers deliver pressurized oxygen to patients to promote healing of certain kinds of wounds, infections, tissue damage and skin grafts.

In an interview this week, Rear Adm. Thomas Cullison, commanding officer of the medical center, said Portsmouth treats few war casualties.

Marines injured in Iraq and Afghanistan are typically cared for at naval hospitals in Bethesda, Md., or San Diego. Neither facility

(Continued on page 8)

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Effectiveness of Hyperbaric Oxygen Therapy for Hearing Loss After Cardiac Surgery

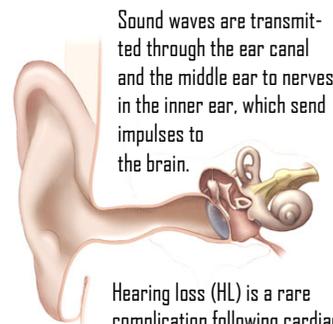
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Sound waves are transmitted through the ear canal and the middle ear to nerves in the inner ear, which send impulses to the brain.

Hearing loss (HL) is a rare complication following cardiac surgery with extracorporeal circulation (CSWEC) or other non-otologic surgery under general anesthesia, as is HL caused by loss of cerebrospinal fluid during neurosurgery or spinal anesthesia. The incidence of HL after CSWEC is not known since preoperative hearing testing is not commonly done and a perioperative HL may occur unnoticed.

A Case Report

Sudden sensorineural hearing loss is a rare complication after cardiac surgery with extracorporeal circulation. We report a case of a 60-year-old man who experienced severe sensorineural hearing loss after Bentall procedure and recovery of normal hearing after 20 days of hyperbaric oxygen therapy.

Upcoming Event

USAAA 2007 International Autism and Asperger Conference

Denver, Colorado - August 8-11
 Hyatt Regency Tech Center

Treating Autism as a Medical Disorder; Bringing Biomedical Treatments and Behavioral & Developmental Therapies Together

Thirty-three of the world's most renowned leading autism experts will present new interventions and new research in both education and medicine. The conference is co-hosted by Autism Society of Boulder County (ASBC).

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Archives

Journal of Cerebral Blood Flow & Metabolism (2006) 26, 666–674.
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Hyperbaric oxygen preconditioning

induces tolerance against spinal cord ischemia by upregulation of antioxidant enzymes in rabbits

This work was supported in part by the National Natural Science Foundation of China (Grant 30471664 to Lize Xiong).

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Abstract

The present study examined the hypothesis that spinal cord ischemic tolerance induced by hyperbaric oxygen (HBO) preconditioning is triggered by an initial oxidative stress and is associated with an increase of antioxidant enzyme activities as one effector of the neuroprotection.

New Zealand White rabbits were subjected to HBO preconditioning, hyperbaric air (HBA) preconditioning, or sham pretreatment once daily for five consecutive days before spinal cord ischemia. Activities of catalase (CAT) and superoxide dismutase were increased in spinal cord tissue in the HBO group 24 h after the last pretreatment and reached a higher level after spinal cord ischemia for 20 mins followed by reperfusion for 24 or 48 h, in comparison with those in control and HBA groups.

The spinal cord ischemic



The Human Spinal Cord.

Study suggests neuroprotective effect by HBO.

tolerance induced by HBO preconditioning was attenuated when a CAT inhibitor, 3-amino-1,2,4-triazole, 1 g/kg, was administered intraperitoneally 1 h before ischemia. In addition, administration of a free radical scavenger, dimethylthiourea, 500 mg/kg, intravenous, 1 h before each day's preconditioning, reversed the increase of the activities of both enzymes in spinal cord tissue.

The results indicate that an initial oxidative stress, as a trigger to upregulate the antioxidant enzyme activities, plays an important role in the formation of the tolerance against spinal cord ischemia by HBO preconditioning.

Keywords:

antioxidant enzymes, hyperbaric oxygen, ischemic tolerance, reactive oxygen species

“..an initial oxidative stress, as a trigger to upregulate the antioxidant enzyme activities, plays an important role in the formation of the tolerance against spinal cord ischemia by HBO preconditioning.”

Archives

Journal of Bone and Joint Surgery - British Volume, Vol 85-B, Issue 3, 371-375. doi: 10.1302/0301-620X.85B3.13237

Hyperbaric oxygen therapy

as a treatment for stage-I avascular necrosis of the femoral head

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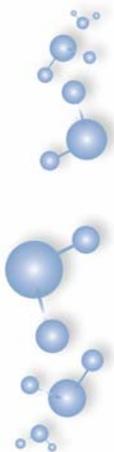
A vascular necrosis (AVN) of the head of the femur is a potentially crippling disease which mainly affects young adults. Although treatment by exposure to hyperbaric oxygen (HBO) is reported as being beneficial, there has been no study of its use in treated compared with untreated patients. We selected 12 patients who suffered from Steinberg stage-I AVN of the head of the femur (four bilateral) whose lesions were 4 mm or more thick and/or 12.5 mm or more long on MRI.

Daily HBO therapy was given for 100 days to each patient. All smaller stage-I lesions and more advanced stages of AVN were excluded. These size criteria were chosen in order to compare outcomes with an identical size of lesion in an untreated group described earlier.

Overall, 81% of patients who received HBO therapy showed a

return to normal on MRI as compared with 17% in the untreated group. We therefore conclude that hyperbaric oxygen is effective in the treatment of stage-I AVN of the head of the femur.

“...81% of patients who received HBO therapy showed a return to normal on MRI as compared with 17% in the untreated group.”





from Pretoria

Oxygen magic allows bodies to heal

By Cornelia du Plooy

“Success rates are about 95 percent when combined with appropriate surgery”

Dr Frans Cronjé, head of the Hyperbaric Oxygen Therapy Unit at Eugene Marais Hospital in Pretoria, assures his patients there is no hocus pocus involved in the treatment, but at first glance it does seem too good to be true.

But once Cronjé explains the inner workings of hyperbaric oxygen therapy (HBOT), the simple dynamics behind the treatment start making sense.

"It involves the use of 100 percent oxygen, breathed within an environment of increased pressure. It is then delivered to the tissues by means of circulation to achieve a therapeutic effect. HBOT increases the blood oxygen content and improves oxygen delivery to tissues."

The oxygen works like a medicine.

"Conditions that are often treated with HBOT include decompression illnesses related to diving, carbon monoxide poisoning, gas gangrene, soft-tissue infections that struggle to heal, acute burns, failing plastic surgery reconstruction, diabetic wounds, chronic bone or bone marrow inflammation, chronic wound-healing problems following radiation therapy for cancer, brain abscesses and acute blood loss anaemia," said Cronjé.

But the most common indications for HBOT treatment are diabetic wounds, radiation damage and crush injuries.

Cronjé said diabetic foot problems were caused by inadequate blood supply, neuropathy and infection. "HBOT benefits include primary healing, reduction in the number of amputations, improved long-term viability of the limb and reduced hospital stay," he said.

“HBOT benefits include primary healing, reduction in the number of amputations, improved long-term viability of the limb and reduced hospital stay”

HBOT plays a valuable role in the prevention and management of damage to soft tissue and bone following therapeutic radiation.

"Radiation therapy renders tissue vulnerable to trauma that is unable to heal due to an imbalance between oxygen supply and demand. HBOT restores the tissue's ability to heal and affords surgical and reconstructive options not otherwise available or reliable," said Cronjé.

Success rates are about 95 percent when combined with appropriate surgery.

HBOT, if introduced early, improves the outcome by reducing the effects of poor blood circulation, oxygen deficiency and excess fluid in the tissues and death of cell tissue.

The first hyperbaric chamber unit Cronjé worked with was a multiplace (more than one occupant) facility at the Institute for Aviation Medicine. It was a South African Navy recompression chamber and was painted in traditional yellow.

Because Cronje felt this colour intimidated patients, he decided to make their new facility - inaugurated in April 1996 - an apricot/peach colour and to call it "Miss Piggy".

This started a tradition of naming all hyperbaric chambers across the country after animation characters - there are now Pooh and Piglet at Eugene Marais Hospital where Cronjé is in private practice.

"After Miss Piggy and Piglet we ran out of pork cartoon characters and decided to move to AA Milne," Cronjé laughed. There is Tigger in Welwitchia Hospital in Walvis Bay, and Eeyore in Welkom Medi-Clinic. More recently, Shrek and Fiona were added at Pretoria Academic Hospital.

There are additional centres at St Augustines Hospital and Claremont Hospital in Cape Town.

For many patients the idea of being sealed in a pressure vessel for 90 minutes or more can be a frightening thought.

But Cronjé said even the worst claustrophobics among his patients understood that the benefits overrode their phobia. Sedatives were given as needed.

Being a non-invasive treatment, patients tired of being poked and prodded by people in white coats can rest assured that they spend their treatment time relaxing, just breathing and watching television or listening to music. The oxygen works its own "magic" - by allowing the body to heal.

The hyperbaric unit at Eugene Marais Hospital opened in 1998 with one oxygen chamber and a two-bed room on the sixth floor. It rapidly expanded to a four-bed ward and later it was agreed to build a 200m² area as an exclusive hyperbaric centre.

Today the unit accommodates between six and thirteen patients a day.

For more information call 012 335 1577.

[This article was originally published on page 6 of Pretoria News on September 12, 2006]



"Mundo vitam dare"



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The International Hyperbarics Association, Inc., is a coalition of doctors, parents, patients, corporate chamber-industry professionals, hyperbaric center owners, and above all members who are committed to the cause of medical hyperbarics.

Our members come to us from all geographical areas with one common goal—to share their knowledge and information regarding the latest hyperbaric news. Our driving force is our members, who are committed to do all we can "to give life to the world."

— "Mundo vitam dare"



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(Continued from page 5) Naval Medical Ctr

has an on-site hyperbaric chamber.

Drake asked Winter whether the Navy officially supports the use of oxygen therapy in treating wounded service members, as well as how much the Navy has spent on hyperbaric treatment since 2000.

Cullison said the hospital spent a little more than \$100,000 for hyperbaric treatments in the past two years. He said he wasn't convinced, without further study, that it was worth spending millions to complete the chambers.

Drake also asked how much it would cost to get the chambers functioning and what the

Navy would do with the chambers if it decides not to use them.

She is the second official to demand answers about the chambers. Earlier this week, in response to inquiries from a newspaper, U.S. Sen. John Warner, R-Va., asked the Navy to reassess the project.

Warner's spokesman, John Uilyot, said Friday he expects to get updated statistics about the potential patient load early next week.

Jessica Smith, a spokeswoman for U.S. Sen. Jim Webb, D-Va., said Friday that Webb supports Warner's request for an updated assessment on the project.

See left for more information regarding the Portsmouth Naval Medical Center's Chambers