

HYPERBARIC OXYGEN CHAMBERS



Baromedic Healthcare Pvt. Ltd

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About Us



- ❑ Baromedic Healthcare Pvt. Ltd; is a company established in 2012 with the sole objective of promoting Baromedic healthcare products and treatments in the world market.
- ❑ The company is promoted by professionals who have more than 20 years of experience in the field and has developed indigenously the technology for the manufacture of Hyperbaric chambers.
- ❑ In past 10 years time, we have done installations in the Defense Establishments and various Hospitals in Indian market
- ❑ Our HBOT chambers meet ASME-PVHO1-NFPA CODES & undergo a multi-stage inspection at the design, manufacturing, assembly, shipping and installation levels to ensure patient safety and maximum results.

Hyperbaric Oxygen Therapy : An Overview



What is HBOT ?

- Hyperbaric oxygen therapy (HBOT) is breathing 100% oxygen while under increased atmospheric pressure.

HBOT Application

- HBOT is an effective treatment for acute and chronic tissue damages of all types—any cause, any duration, any location.

The Therapy

- When a patient is given 100% oxygen under pressure, hemoglobin is saturated, but the blood can be hyper-oxygenated by dissolving oxygen within the plasma.
- The patient can be administered systemic oxygen in pressurized chambers
- The therapy can be used for routine wound care, treatment of most dive injuries, and treatment of patients who are ventilated or in critical care.

The role of Oxygen in our body...



- Oxygen floods areas that are oxygen starved to stimulate cell growth and regeneration.
- Hyperbaric oxygen acts as an anti-viral and anti-bacterial, as “bad” bacteria and viruses typically cannot tolerate oxygen.
- Hyperbaric oxygen is an immune modulator, supporting the immune system to bring T and B cells within normal function.
- Oxygen reduces tumor growth in cancer patients.
- Hyperbaric oxygen increases neural brain function due to oxygen saturation.
- Oxygen displaces toxins and other impurities to assist in detoxification of your system.
- Hyperbaric oxygen provides many other condition specific benefits.

Why HBOT ?



HBOT Benefits

- ❑ Greatly increases oxygen concentration in all body tissues, even with reduced or blocked blood flow;
- ❑ Stimulates the growth of new blood vessels to locations with reduced circulation, improving blood flow to areas with arterial blockage;
- ❑ Causes a rebound arterial dilation after HBOT, resulting in an increased blood vessel diameter greater than when therapy began, improving blood flow to compromised organs;
- ❑ Stimulates an adaptive increase in superoxide dismutase (SOD), one of the body's principal, internally produced antioxidants and free radical scavengers; and,
- ❑ Aids the treatment of infection by enhancing white blood cell action and potentiating germ-killing antibiotics.

Vasoconstriction =
Reduces Edema and
Swelling

Antibacterial on it's
own and Leukocytes
(WBC) kill bacteria
more efficiently

Enhancement of
some antibiotics.
WBC oxidative killing
synergism

Aniogenesis and
proliferation of
fibroblasts

Endothelial cell
proliferation,
resolves bruising and
reduces scarring

Collagen synthesis
and cross linking

Enhancement and
regulation of the
immune system

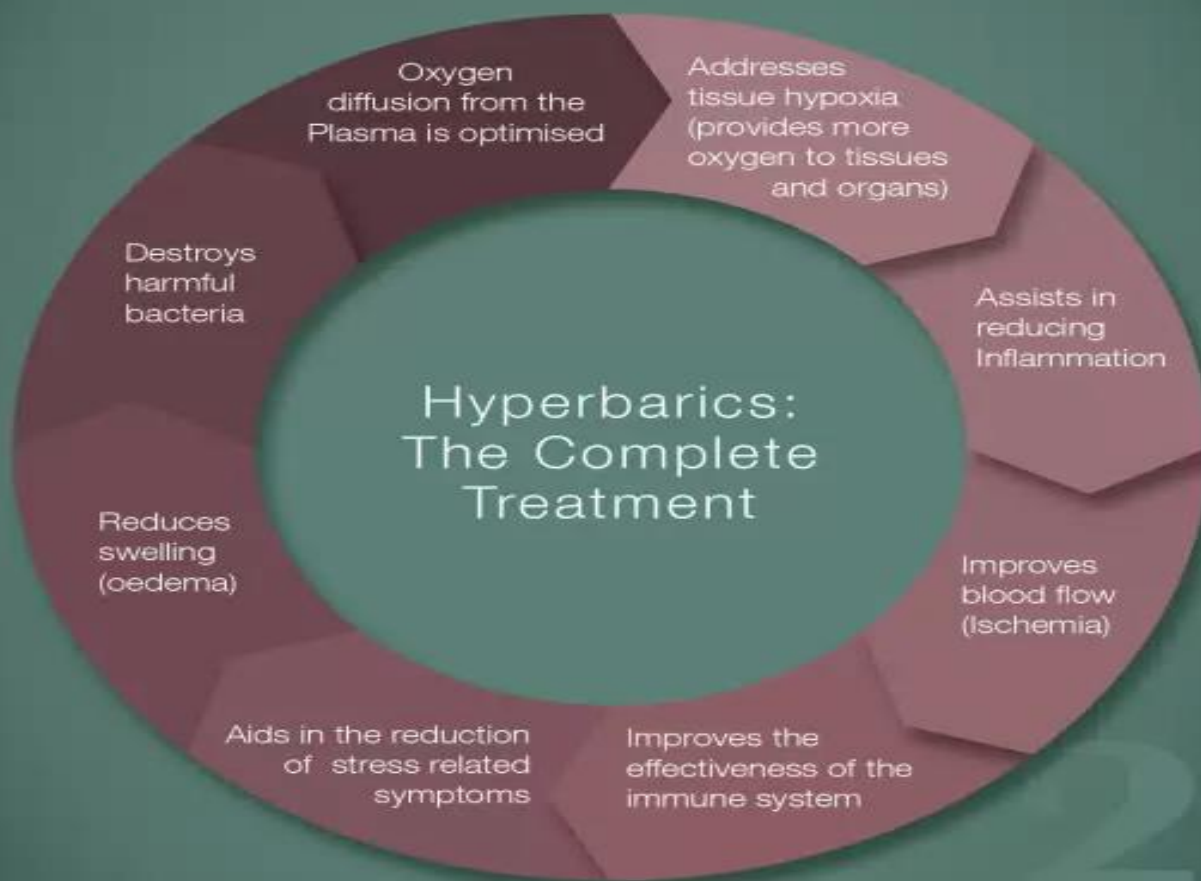
Slight Ph shift to
Alkaline, body
temperature
regulates

Healing of nerve
Endings and
reduction in pain and
pain cycles



hyperbaric worx

HYPERBARIC OXYGEN TREATMENT





Maintaining high-energy phosphate bonds

- *HBOT can reduce lactic acid released from ischemic parts
- *HBOT increases ATP which is the energy factor used for nutrition and regeneration of tissues

Conditions Treated With Hyperbaric Therapy:



FDA Approved Conditions

Actinomycosis
Air or Gas Embolism
Carbon Monoxide
Poisoning and Smoke
Inhalation
Gas Gangrene
Cyanide poisoning
Crush Injury and other
Acute Traumatic Ischemias
Decompression Sickness

Diabetic Wounds
Necrotizing Soft Tissue
Infections
Osteomyelitis (Refractory)
Radiation Tissue Damage
Severe Anemia
Skin Grafts and Flaps
(Compromised)
Thermal Burns

Conditions Treated With Hyperbaric Therapy:



Off Label Conditions

ADD/ADHD
ALS
Alzheimer's
Anoxic Brain Injury
Autism
Bell's Palsy
Cancer
Cerebral Palsy
Chronic Fatigue
Chronic Inflammatory
Disease
Crohn's disease
Decreased Immune
Function
Diabetes
Fibromyalgia

General Wellness/
Prevention
Heart Disease
Infections
Immune Dysfunction
Lyme Disease
Macula Degeneration
Meniere's Disease
Migraines
Mitochondrial Disorders
Multiple Sclerosis
Near Drowning
Peripheral Neuropathy
Post Electrocution
Raynaud's Phenomenon

Reflex Sympathetic
Dystrophy Retinitis
Pigmentosa
Rheumatoid Arthritis
Severed Limbs
Sickle Cell Crisis
Spinal Cord Injury
Sports Injuries
Stroke
Surgery Pre and Post
Traumatic Brain Injury
Trigeminal Neuralgia
Vascular Disease
Venomous Bites
and other conditions

HBOT Treatments...CASE STUDIES



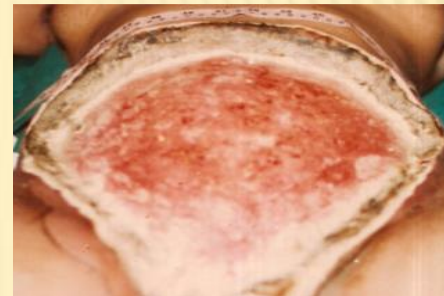
Crush Injury motorcycle accident



HBOT in Multiplace chamber



Post Surgery & HBOT



Fungal Infection following C- Section



Post 06 HBO sits



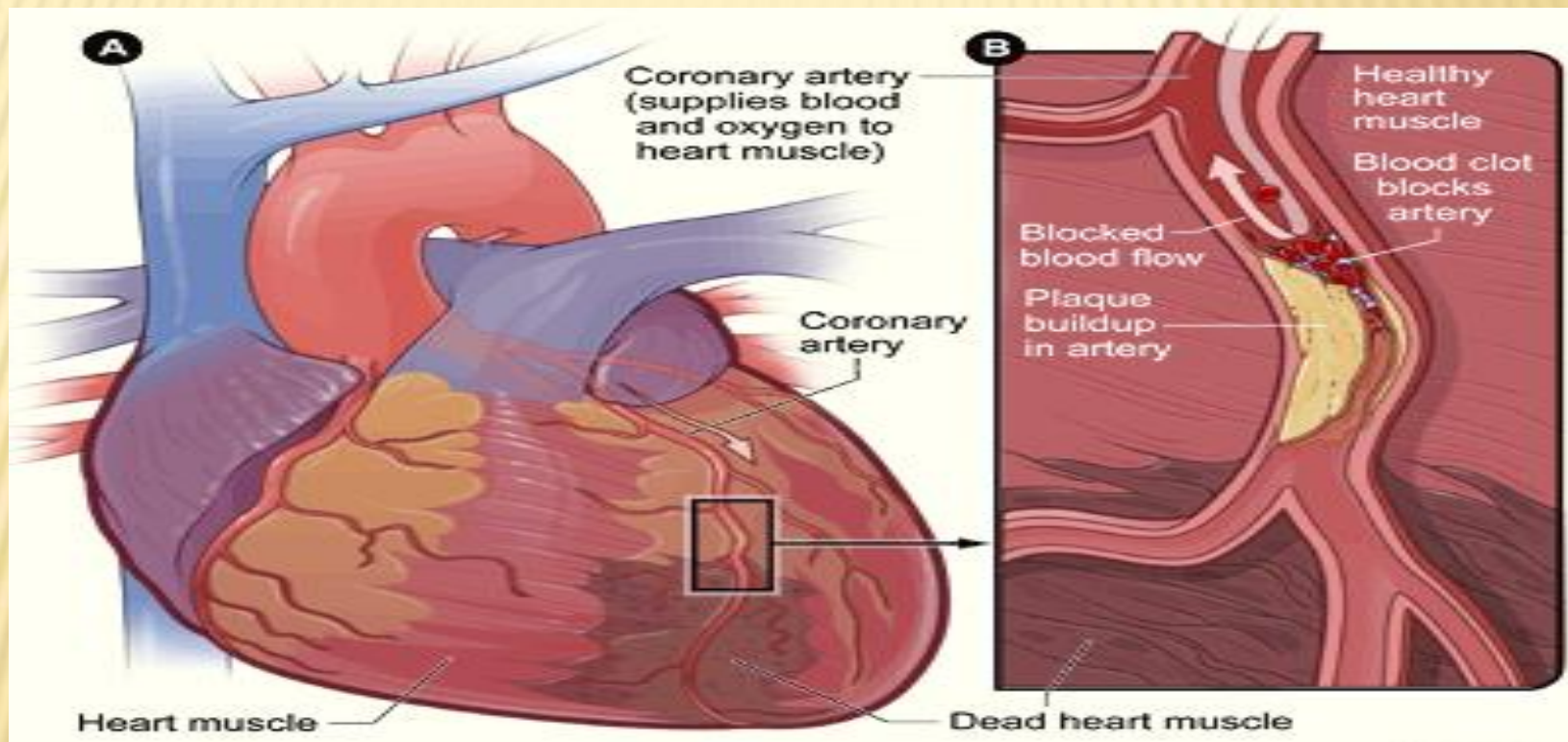
Post Graft

**HBOT
Healing
Power**



ISCHAEMIC HEART DISEASES

HBOT can do adequate oxygenation for heart muscle (myocardium) through plasma incase of blockage of involved coronary artery



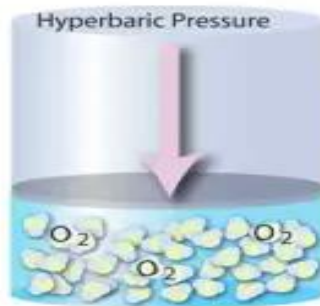
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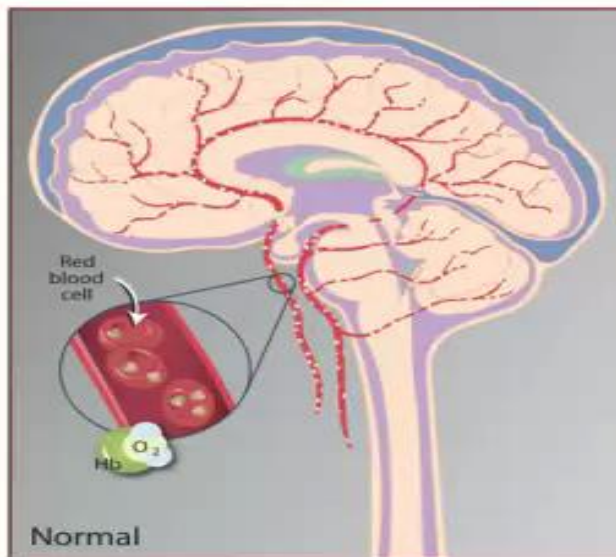
HYPERBARIC OXYGEN THERAPY IN GLOBAL ISCHEMIA, ANOXIA, AND COMA
TABLE 2
Human Studies

Category I: Hyper Acute Period (0 - 3 hours post cerebral injury)							
Author	Date	Diagnosis	Number of Patients	Length of Coma/Neuro Insult Pre-Hyperbaric Oxygen Therapy (HBOT)	Timing of HBOT	HBOT PROTOCOL	Results/ Conclusions
Hutchison	1963	Global Ischemia/anoxia. Asphyxiated neonates (apnea). No in chamber ventilator support available.	65	3-38 minutes	3-38 minutes	2-4 ATA/30 X 1, 14 patients treated more than 1	79% resuscitation rate (25% died later of other causes). Overall, 55% discharged from hospital "well". Most deaths due to Hyaline membrane disease or stillborn.
Ingvar	1965	Coma: progressive thrombotic CVA of the brainstem. Patient was pre-terminal	1	Not mentioned	"At signs of failing circulation"	"2.0-2.5 ATA. . . . for 1.5-2.5 hours"	Rapid awakening in chamber with increase in blood pressure and decrease in heart rate. Death shortly after the end of 1 HBOT.
Saltzman	1965	"Various forms of cerebral ischemia." Some in coma but only 5 of 25 is level of consciousness specifically identified.	25 (2 patients in coma in hyperacute or acute coma, 23 patients a few hours to 30 days after CVA)	1. 5 hours 61 year old patient with stupor and hemiplegia, suspected embolic clot. 2. 2.5 hours 58 year old with deep coma and hemiplegia, suspected air embolism	1. 5 hours 2. 2.5 hours	1. 2.02 ATA/ > 1 hour, 1 treatment. 2. 2.36 ATA/ 5 hours, 1 treatment	First patient dramatic awakening five minutes into HBO with improvement of hemiplegia. Discharged from hospital with mild residual deficit. Second patient dramatic awakening 10 minutes into HBO with improvement in hemiplegia. Discharged from hospital with only partial paralysis of the right leg. Remainder of patients probably described in Heyman study: 3 patients dramatic temporary improvement, 8 patients less dramatic temporary improvement, 12 patients no change during HBOT. 24 of 25 patients with only 1 treatment. One patient with 3 treatments
Viait	1969	Hepatic coma infants (2 viral, 1 toxic); HBOT plus exchange transfusions	3	Not mentioned	Not mentioned	Not mentioned, but extreme profile implied.	One died of pulmonary oxygen toxicity with "36 hours of HBOT", two survived. All three with normalization of consciousness.

Transportation of Oxygen in the Human Brain Under Hyperbaric Conditions



Oxygen (O_2) molecules become smaller under hyperbaric pressure and therefore more soluble. The smaller size allows oxygen to dissolve into all body fluids - plasma, cerebrospinal, interstitial, lymphatic, and synovial.



Normal
Under normal conditions, O_2 binds only to the hemoglobin (Hb) in red blood cells and is transported to the brain by blood supply.



Hyperbaric
Under hyperbaric conditions, the brain is saturated by oxygen, allowing O_2 to reach areas previously inaccessible by blood supply or blocked by damage.



- 1- HBO reduces chance of stroke recurrences
- 2- HBO relieves muscle spasticity and increases muscle strength
- 3- HBO improves mobility and fine motor function
- 4- HBO improves walking and balance
- 5- HBO increases exercise capacity
- 6- HBO improves sensitivity
- 7- HBO improves mental function including speech and memory
- 8 - HBO improves visual acuity
- 9- HBO improves bowel and bladder control and reduces sexual deficit

STROKE



Diabetic foot injury





A diabetic patient was referred for HBOT of his Wagner Grade III diabetic foot ulcer which was non-healing after one year, with amputation planned within 24 hours.



After three weeks (26 HBOT sessions) his wound showed considerable healing.



After 50 completed HBO sessions healing is evident.



Diabetic foot and foot ulcers





Success of a graft after HBOT multiple sessions

Before



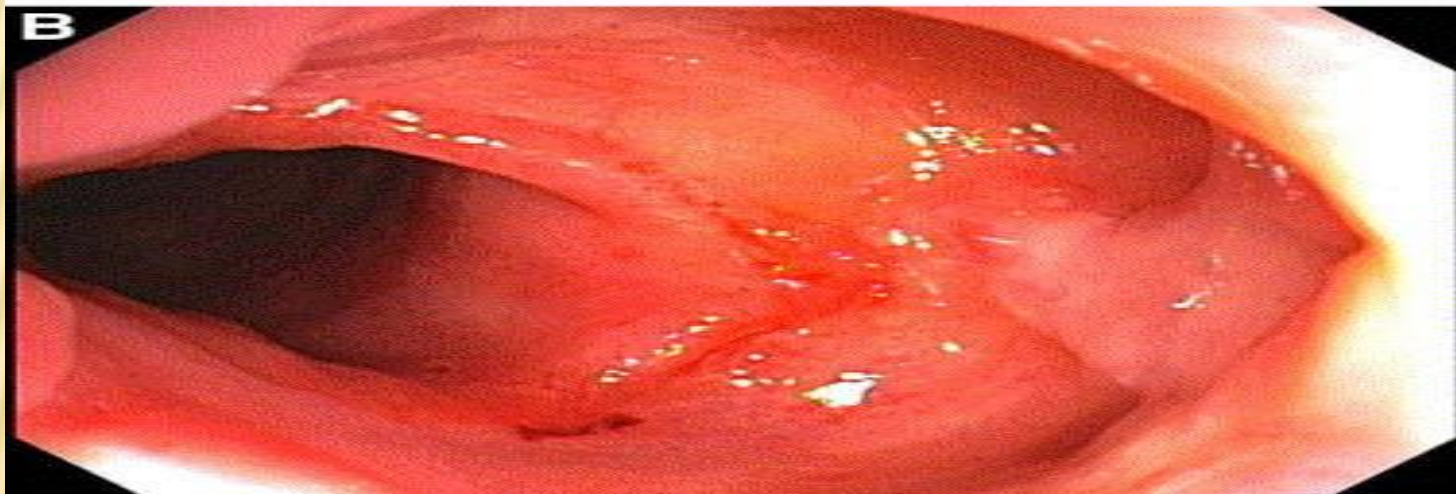
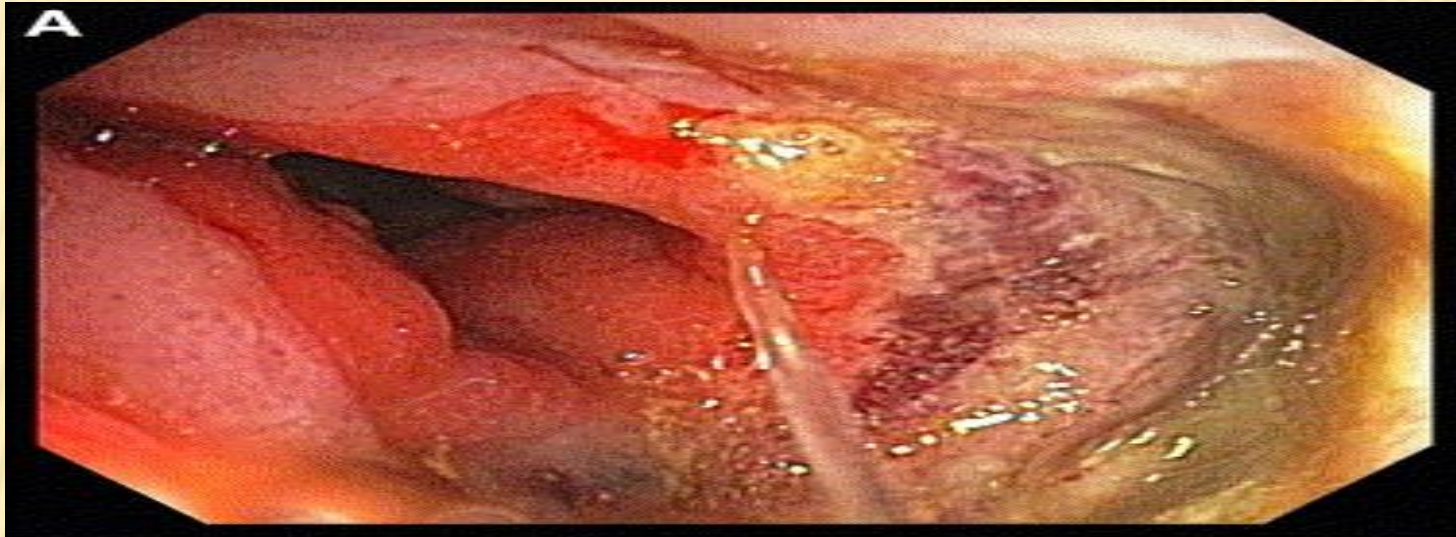
After



Radiation induced rectal ulcer treatment



Delayed Radiation Injury (Soft Tissue and Bony Necrosis)



Necrotizing Soft Tissue Infections





A non-healing Achilles tendon rupture following dehiscence of the suture line. After a second failed attempt at suturing the wound, HBO therapy was considered.

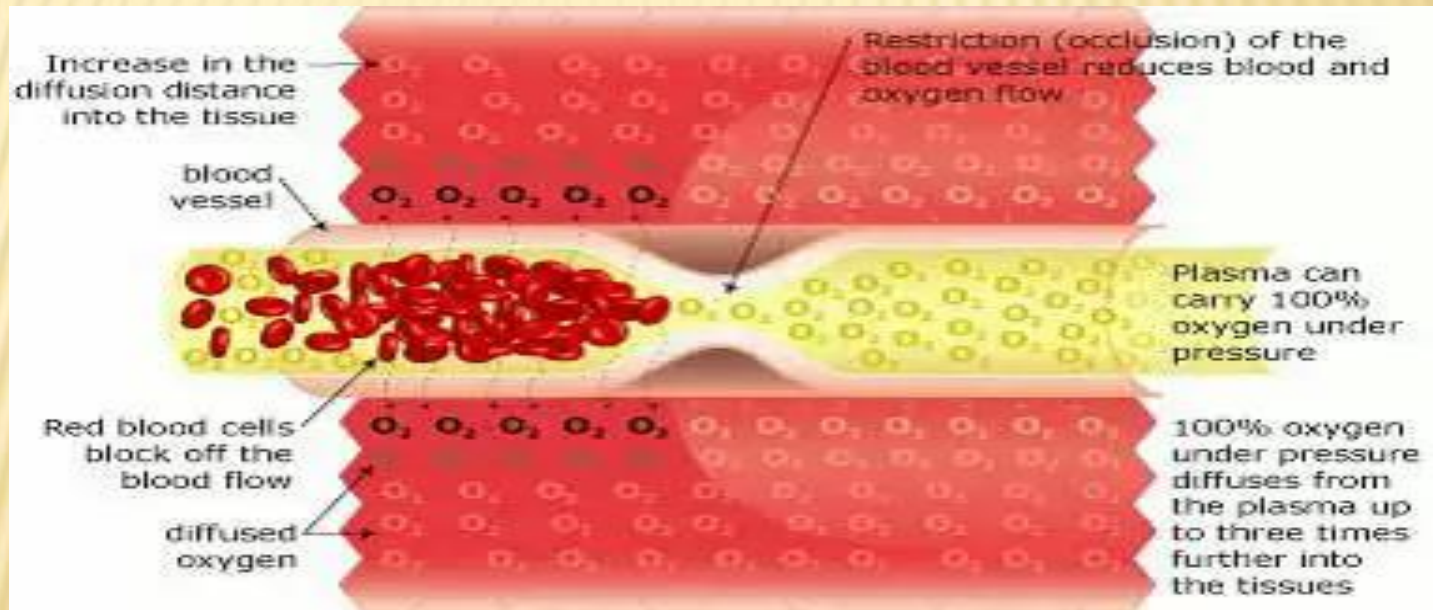


The wound completely healed after 20 HBO treatments at 2.0 atmospheres absolute for 90 minutes, each with routine wound care and supplemental oral antibiotic therapy.



Arterial Insufficiencies: Central Retinal Artery Occlusion

Visual improvement has been reported even with delay of
HBOT.



HBOC Treatments : CASE STUDIES –

Venous Stasis Ulcers



Mrs. J has been having problems with her legs for about 10 years. She had Varicose veins and developed chronic venous stasis ulcers . Her skin had formed open sites that didn't bleed and didn't hurt. But a foul-smelling odor and constant drainage had kept her from leaving her house.

Through a strict regimen of debriding and customized dressings and Hyperbaric Oxygen, her wound healed completely in a matter of weeks. Efforts were then made to improve her diet, start her on a walking program, and lace her in customized stockings. Today, she's not only wound-free for the first time in a decade, she also has better circulation in her legs.



HBOC Treatments : CASE STUDIES –

Diabetic Cellulites



This is the foot of a 48 years old, diabetic and smoker . He had been feeling extremely sick and started complaining of his feet bothering him. Thinking that it would just get better with time and rest he stayed at home and in bed. When the problem started becoming unbearable, he decided to have a doctor look at his feet who diagnosed he had cellulites of the feet. He was then admitted for IV antibiotics and further wound care. He continued this treatment including debridments for the next week. Ten days later, he was able to leave the hospital walking on both feet.



HBOC TREATMENTS : CASE STUDIES –

Diabetic Wound Infections



64 year old female insulin dependent diabetic, 18 days post femoral anterior tibial bypass. Post op wound infection grew out pseudomonas and failed to heal. Completely healed with 40 HBO treatments and skin grafting

HBOC TREATMENTS : CASE STUDIES –

Non Healing Wounds



55 year old female post transmetatarsal amputation secondary to gangrene of the hallux. Wound healing impaired by chronic steroid therapy for arthritis. Complete healing after 37 adjunctive hyperbaric treatments

HBOC TREATMENTS : CASE STUDIES – OsteoRadionecrosis



52 year old male post surgical excision of cancer of the floor of the mouth followed by radiation therapy. Presented with osteoradionecrosis of the mandible and oral cutaneous fistula which failed to heal with conventional therapy. Complete resolution with a total of 91 Hyperbaric treatments and two flap procedures.

Our Product: Hyperbaric Oxygen Chamber



MODEL M - 8

Our products conform to ASME-PVHO I-NFPA codes and standards

Our Product: Hyperbaric Oxygen Chamber M 3



MODEL : M -3

Our products conform to ASME-PVHO I-NFPA codes and standards

Our Product: Capacity & Specifications (M – 8)



Main Chamber Capacity

- Two Beds and Four Seats OR
- One Bed and Six Seats OR
- Eight Seats OR
- Customized - Combination to be specified while ordering

Air Lock Chamber Capacity

- One Seat

Chamber Specifications

- Length (overall) : 7000 mm
- Inside diameter : 2400 mm
- Length (Main chamber) : 5500 mm
- Length (airlock chamber) : 1500 mm
- Access door opening : 800 mm W x 1800 mm H (Rectangular)
- Penetrations Additional 4 nozzles, 50mm dia will be provided at suitable location..
- Working pressure : 3 ATA
- Pressurization rate : 0.1 kg/cm²/minute to 0.25 kg/cm²/min adjustable

Our Product: Capacity & Specifications (M-3)



Main Chamber Capacity

- One Bed OR
- One Bed and Two Seats OR
- Four Seats

Chamber Specifications

- Length (overall) : 3400 mm
- Inside diameter : 1500 mm
- Length (Main chamber) : 2800 mm
- Access door opening :800 mm W x 1100 mm H (Rectangular)
- Penetrations Additional 2 nozzles,50mm dia will be provided at suitable location..
- Working pressure : 3 ATA
- Pressurization rate : 0.1 kg/cm²/minute to 0.25 kg/cm²/min adjustable

PRODUCT UTILITIES FOR M-8 & M-3



UTILITIES

- Medical lock for main chamber
- Intercom /Sound powered communication system
- Oxygen & Carbon di oxide monitors with alarm
- CO2 Scrubber
- Fresh air ventilation
- Oxygen masks with dump facility for exiled CO2. with built in microphone.
- Entertainment facility
- Air conditioning of chamber for comfort
- Optional patient monitoring system for ECG, EEG, Pulse oxymetry etc.
- Optional PC-PLC based controls with HMI interface & data logging and Patient history spread sheet
- 100% Redundancy with auto and manual controls.
- Breathing quality air supply
- Detailed documentation with hard & soft copies and on line support through Team viewer software.

HYPERBARIC OXYGEN CHAMBERS : SYSTEMS



- Air Supply System with Ventilation
- Inter Communication System
- Oxygen Supply System with masks
- Temperature & Humidity System
- Closed Circuit TV
- O₂ and CO₂ Analyzers
- Fire Fighting System
- PLC based SCADA system



HYPERBARIC OXYGEN CHAMBERS : SYSTEMs

- ▣ Manufactured as per ASME- PVHO 1-NFPA
- ▣ 3rd Party design certification
- ▣ Material Selection
- ▣ Q.A.P. of process
- ▣ Certified Welders
- ▣ Radiography of Joints
- ▣ FEA for safe stress levels as per standards
- ▣ View Port manufacturing facility

ASME International





HYPERBARIC OXYGEN CHAMBERS : SYSTEMS

BREATHING QUALITY COMPRESSED AIR SYSTEM

- ▣ Breathing Quality Air
- ▣ Oil Free compressors
- ▣ 3 Stage Ultra Filters
- ▣ All valves with class 6 leakage standards
- ▣ Certified SS pipeline welding (Argon Arc welding)
- ▣ Zero Failure rate
- ▣ Redundancy in system



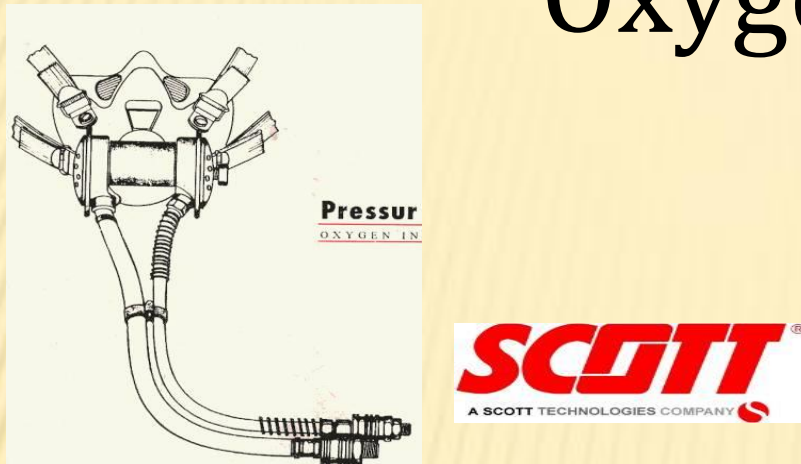
Ingersoll-Rand





HYPERBARIC OXYGEN CHAMBERS : SYSTEMS

Oxygen System

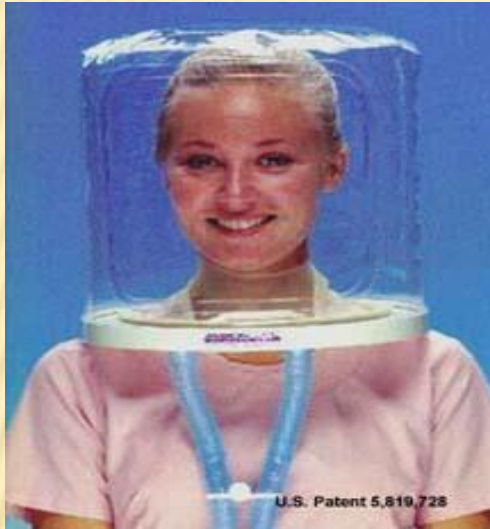


- Oxygen Manifold
- Oxygen Masks designed for patient comfort
- Ensures 100 % delivery of Oxygen
- Needs a positive pressure during inspiration , amount of pressure is patient dependent
- Exhaled gases are released outside the treatment area





Oxygen System



Oxygen Hoods

- Useful for patients who experience difficulty with mask
- Patient friendly , maintains eye contact
- Used in children

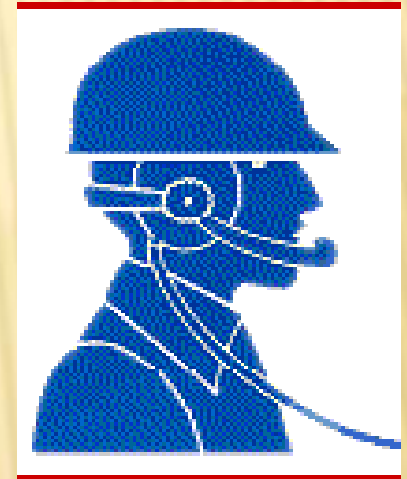
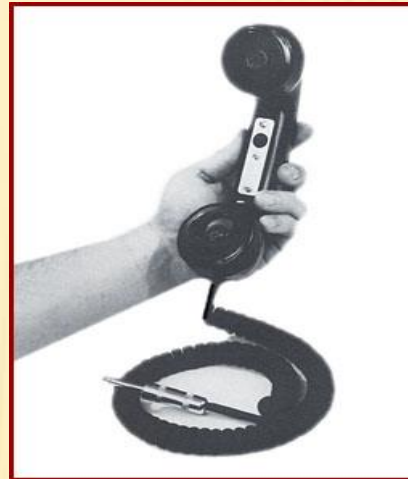




HYPERBARIC OXYGEN CHAMBERS : SYSTEMS

COMMUNICATION SYSTEM

- ▣ Sound Powered Two-way Handset
- ▣ Two-way microphone unit
- ▣ One to many Broadcasting
- ▣ Closed Circuit Cameras with remote pan and tilt functions.
(Wireless option available)





HYPERBARIC OXYGEN CHAMBERS : SYSTEMS

CLIMATIC SYSTEM

- Maintains comfort conditions inside the chamber during treatment
- Uses Pneumatically operated Motors
- Parameters controlled by means of Controller with calibrated sensors

22 °C

% RH

55





PATIENT MONITORING SYSTEM

- Gathers on-line information of Patients condition
- Datalogging facility of different parameters
- Patient history can be viewed
- Infrared system For Data Transmission



SENSORMEDICS
a subsidiary of VIASYS Healthcare



HYPERBARIC OXYGEN CHAMBERS : SYSTEMS

SAFETY SYSTEM

ANALOX

- Real time O₂ and CO₂ monitoring system
- Self Programmable Hi-Low limits & Audio/ Visual Alarms
- Fire fighting system as per NFPA standards for quick response
- Flameproof wiring
- Flameproof paints & fabric for upholstery.

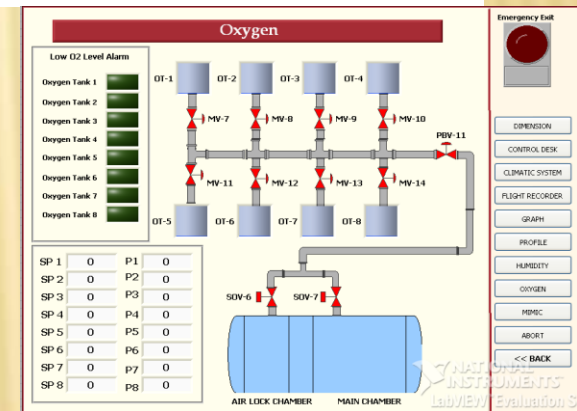
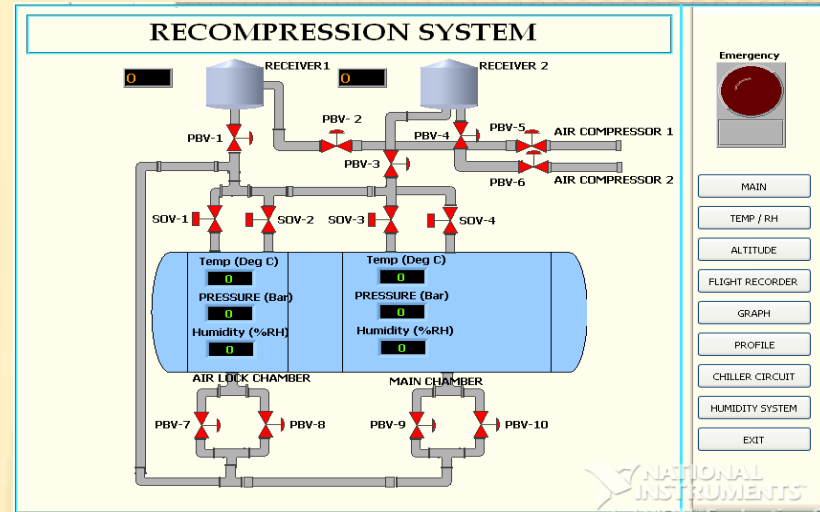




HYPERBARIC OXYGEN CHAMBERS : SYSTEMS

PLC & SCADA SYSTEM

- SCADA based command and control.
- Auto/Manual option
- Centralized control
- Data logging
- Report generation





HYPERBARIC OXYGEN CHAMBERS : SYSTEMS

MULTI UTILITY CONTROL PANEL



Centralized Control of all Parameters. Ergonomically Designed

HYPERBARIC OXYGEN CHAMBERS : INSTALLATIONS



We have successfully Manufactured, Installed and commissioned Hyperbaric Chambers at following locations :

- ▣ 4 Bed +4 Seats Chamber at Leh
- ▣ 2 Bed + 4 Seats Chamber at Indraprasth Apollo Hospital, New Delhi
- ▣ 1 Bed Chamber installed at Sikkim
- ▣ 2 Bed Chamber at Apollo Hospital, Ahmedabad
- ▣ 2 Bed Chamber at Kargil
- ▣ 2 Bed + 4 Seating Chamber at IAM, Bangalore
- ▣ 2 Bed+4 Seating Chamber at OxyMed Hospital, Chennai
- ▣ 2 Bed+4 Seats Chamber at Godrej Memorial Hospital, Mumbai
- ▣ 2 Bed+4 Seats Chamber at Yashwantrao Chavan Hospital Pune
- ▣ 1 Bed+6 Seats Chamber at Amruta Hospital Kochi
- ▣ 1 Bed+2 Seats Chamber at S.P.Fort Hospital Trivendrum

MINISTRY OF DEFENCE GOVT.OF INDIA
R&D ENGINEERS DEFENCE RESEARCH & DEVELOPMENT LAB.
CERTIFICATION



BAROMEDIC HEALTHCRE PVT.LTD. Has technology transfer agreement with Kasco Industries who have MOU with DRDO Lab. For manufacturing Hyperbaric & Hypobaric chambers as per ASME-PVHO I-NFPA


कोड
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भारत सरकार, रक्षा मंत्रालय
 Government of India, Ministry of Defence
 रक्षा विकास संगठन
 Research & Development Organisation
 रक्षा विकास संगठन (इंजीनियर्स)
 Research & Development Establishment (Engrs)
 दिग्घि, पुणे 411 015
 Dighi, Pune 411 015 (INDIA)
 दिनांक
 Dated : 10 Mar 1997

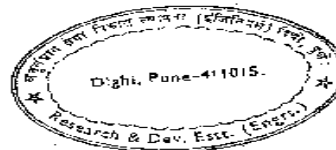
TO WHOMSOEVER IT MAY CONCERN

M/s KASCO INDUSTRIES, PUNE-411 037, have manufactured and supplied Boy Pressure as well as High Pressure Chambers of size 7.5 m long & 2.2 m dia, as per the ASME & PVHO Codes for the Army in Ministry of Defence, based on the specification formulated by the R&DE (Engrs), Dighi, PUNE - 411 015 under Defence Research & Development Organisation.

We have also entered into a 'Memorandum of Understanding' with M/s KASCO INDUSTRIES, PUNE - 411 037 for the fabrication of Recompression Chambers for Hyperbaric Oxygen Therapy.



(NM NANIPRASAD)
Sc 'E'



HYPERBARIC OXYGEN CHAMBERS : CERTIFICATIONS



Certificate of
Compliance
From ABS
Conforming to
ASME-PVHO I
& NFPA
Standards



Core Competence

- ▣ Experienced Design team with expertise in Finite Element Analysis as per ASME - PVHO I
- ▣ Well established manufacturing facility
- ▣ Third party approved and certified designs
- ▣ Implementations of latest NFPA safety standards
- ▣ State of the art View Port manufacturing as per ASME-PVHO I



Core Competence *contd ..*

- Certified compressed air and oxygen pipeline
- State of the art Control Panel and monitoring systems
- Experience in setting up total Hyperbaric facilities as per Standards
- Back up provided by Panel of experts in Implementing HBOT



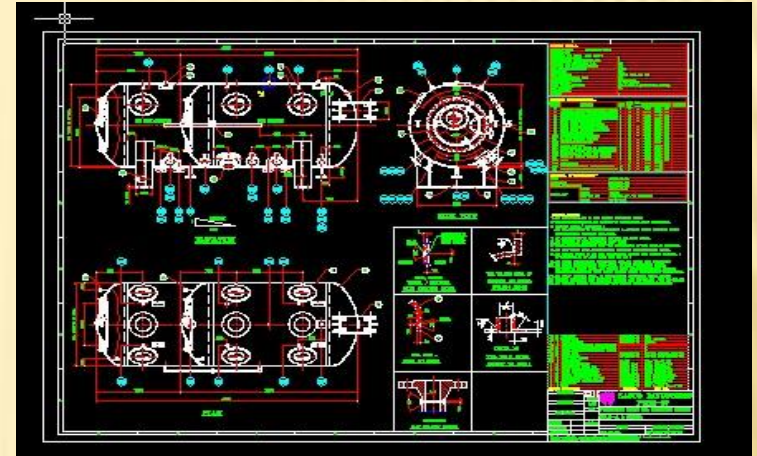
Conclusions

Our patients need the best that medical science can offer to alleviate suffering .

We as physicians must do all we can to ensure early recovery and minimal morbidity.

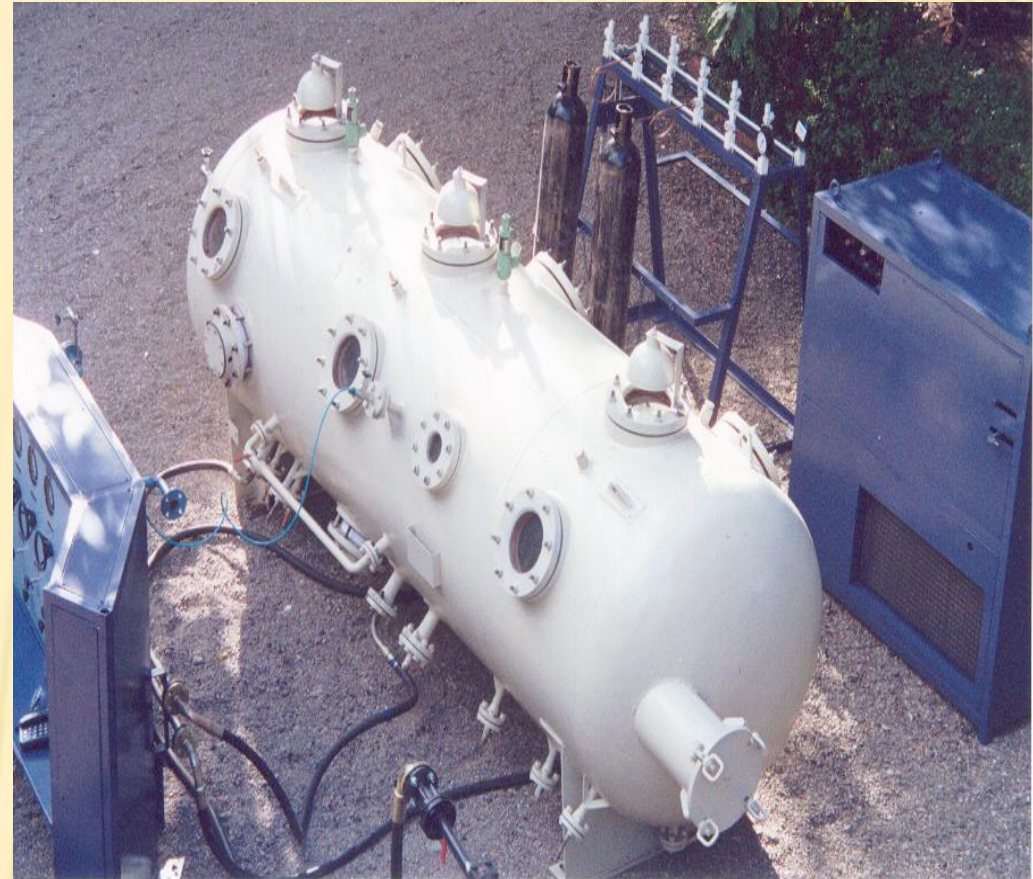
- *We are poised at an exciting era of the revival of Hyperbaric Medicine .*
- *Must familiarize referring Physicians with recent research and remove skepticism of the sixties*
- *Strict scientific and ethical practices must be followed.*

HYPERBARIC OXYGEN CHAMBERS : INSTALLATIONS



Two Bed Chamber at Apollo Hospital

HYPERBARIC OXYGEN CHAMBERS : INSTALLATIONS



**Monoplace Chamber with Air Lock Chamber
at North Sikkim**

HYPERBARIC OXYGEN CHAMBERS : INSTALLATIONS



2 Lying+4 Seating Chamber for IAM, Bangalore

HYPERBARIC OXYGEN CHAMBERS : INSTALLATIONS



HBO CHAMBER AT GODREJ HOSPITAL , MUMBAI

MODEL M3 INTERIOR

ONE BED & TWO SITTING PATIENTS



**MODEL M8 : 2 BEDS & 4 SEATS OR 1 BED & 6 SEATS
OR 8 SEATS COMBINATION AVAILABLE**



Our Support – *Installation and Training...*



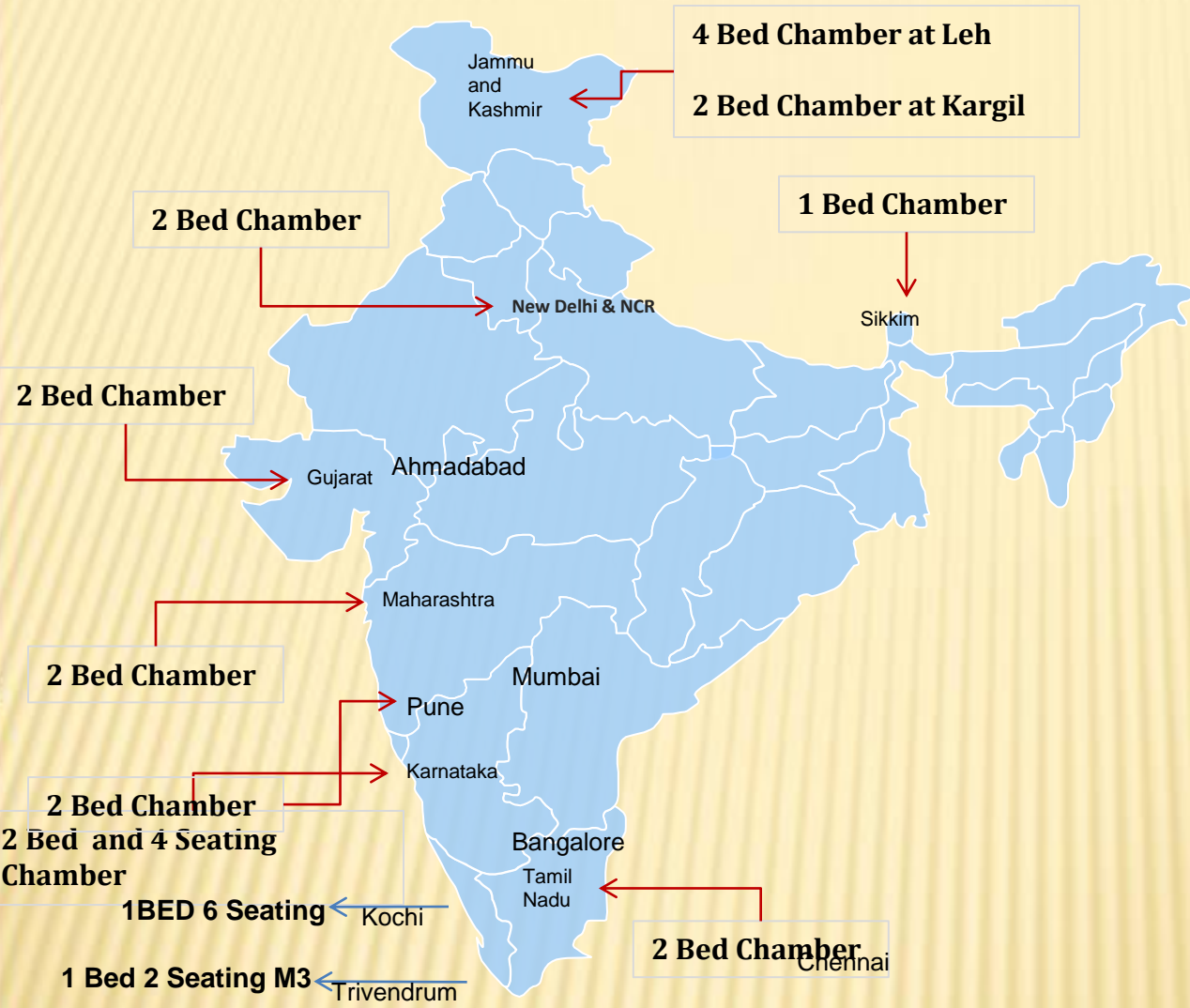
Installation

- **Installation and Commissioning is done by an Expert team of BHPL**
- **Installation is offered for certification and Certificate obtained by BHPL**
- **Periodic visits undertaken by BHPL team to Supervise and verify the Performance**
- **On line support by our expert team is offered for operations of the system**

Training

- **Documented Operating Procedures are provided for the operations of the HBOT Centre**
- **On site Training for Doctors and Nurses are Provided by BHPL Team**
- **Periodic visits for up gradation of training and discussions on case Histories is arranged**
- **On line access to Expert Doctors is provided for support and help**

Our Installations and Key Customers...



Our Support – *Installation and Training...*



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Thank You

For further information & details please contact

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