Malcolm R. Hooper
OXYMED Australia

Workshop
The Final Frontier in Rehabilitation

The Final Frontier is focussed on repair and functional restoration
- ‘the Power within’
Who influenced you?

Mother Teresa (1910-1997)

“I wanted to become a Mother to the poorest of the world’s poor.”
Who influences you?
Feed you passion with influence

Preparing Global Leaders & Organizations for the Future
Explore the opportunities and implications of exponential technologies and connect to a global ecosystem that is shaping the future and solving the world’s most urgent problems.

What We Do
Our programs and events equip you with the mindset, tools, and resources to successfully navigate your transformational journey to the future. We are powered by our world class faculty, trailblazing practitioners, and global network of alumni, partners, and impact startups.
Global influencers

DR. PETER DIAMANDIS
Entrepreneurship, Space & Longevity
The Arc Podcast

SALIM ISMAIL
Founding Executive Director, Singularity University; Chairman, B4O Works
SingularityHub
@singularityhub
singularityhub.com
#SUsummit

EXponential Organizations
Why new organizations are ten times better, faster, and cheaper than yours (and what to do about it)

SALIM ISMAIL
Executive Director, Singularity University & Co-Author of "Exponential Organizations"
TheFutureOrganization.com

Will Elon Musk or NASA get humans to Mars first? 4:30

"The future will be far more surprising than most people realize, because few observers have truly internalized the implications of the fact that the rate of change itself is accelerating."

Ray Kurzweil, The Singularity Is Near
Humans adapting to Medical technology

- Taking blood sample
- Ultrasonography
- Liver elasticity measurement
- Liver biopsy
- Consultation with the doctor
Matrix-like small nanotechnology surgical robots?
• Only two years ago, Nasa teamed up with medical company Virtual Incision to develop a robot that can be placed inside a patient’s body and then controlled remotely by a surgeon.

Surgeons have to rethink their profession
• Surgeons are at the top of the medical food chain.
• Surgeons tend to alienate themselves from patients.

Virtual reality
• April 2016 Shafi Ahmed cancer surgeon performed an operation using a virtual reality camera at the Royal London hospital. It is a mind-blowingly huge step for surgery.
• Operations in real time through the Medical Realities website and App technology.

Augmented reality
• 3D medical visualization system – EchoPixel and HoloAnatomy using HoloLens allows doctors to interact with patient-specific organs and tissue in an open 3D space. It enables doctors to immediately identify, evaluate, and dissect clinically significant structures.

Surgical robotics
• By 2020, surgical robotics sales are expected to almost double to $6.4 billion.
• Surgical robots will have flexible components and tiny, worm-like arms.
Artificial Technology

3D Printing
• March 2016 in China, 3-D printed a full-sized model of the heart of a small baby born with a heart defect. Their aim was to pre-plan an extremely complicated surgery on the tiny heart.
• University of Rochester Medical Center (URMC) have developed 3D printing to create artificial organs. They look, feel, and even bleed like the real thing. Truly amazing!

App Technologies
• Touch Surgery developed a simulation system - App for practicing surgical procedures ranging from heart surgery to carpal tunnel operations.

Live diagnostics
• The intelligent surgical knife (iKnife) developed at the Imperial College London uses an electrical current and heats tissue to make incisions with minimal blood loss. The new iKnife, has a mass spectrometer that analyzes the vaporized smoke to detect the chemicals in the biological sample.
• This means it can identify whether the tissue is malignant real-time. The technology is especially useful in detecting cancer in its early stages with a focus towards prevention.

Artificial Intelligence - Teams up with surgical robotics
• The combination of surgical robotics and artificial intelligence.

• IBM Watson, Google Deepmind’s Alpha Go - machine learning algorithms.
• Enlitic - AI with “deep learning system” will be able to diagnose diseases and abnormalities. Enlitic AI technology will provide optimal surgical guidance and recommendation to surgeons.
Medical Robots

Articles in Medical Robotics

Could You Sue Diagnostic Algorithms or Medical Robots in the Future?

What if deep-learning algorithms misdiagnose a disease, the doctor accepts the judgment and the patient dies? What if the surgical robot misses a 1.1 cm organ?

Artificial Intelligence | Medicine | Science | Medical Robotics | Robotic Laws | Research

Top Healthcare Companies in Robotics

Robots are gaining traction in healthcare, reshaping the landscape. Both in hospitals and in homes, they are becoming more integral. This list ranks the top companies.

Future of Medicine | Medical Robots

The Technological Future of Surgery

The future of surgery offers an exciting combination between humans and technology, which could eliminate the physical strain of surgeons and allow for higher precision and efficiency.

Future of Medicine | Medical Augmented Reality | Medical Robotics | Virtual Reality | Medicine

Robots in Healthcare — Get Ready!

In the near future, robots will increasingly work alongside medical robots. Here are the necessary steps to gain a better understanding of how they function.

Future of Medicine | Future of Pharma | Medical Robotics

9 Exciting Facts About Medical Robots

Medical robots do not replace medical professionals, they are working alongside them. These are some interesting facts to consider.

Medical Robotics

8 Heart-Warming Stories of Digital Health Saving Lives

These are truly inspiring stories of how technology is saving lives or helping patients live better.

3D Printing in Medicine | Biotechnology | Future of Medicine | Medical Robotics

The Coolest Medical Robots in Sci-Fi Movies

Here are the top 10 medical robots that have made it to the screen.

Medical Robots | Medical Science Fiction

10 Exciting Medical Technologies That Will Make You Hopeful About Our Future

Here are some of the most exciting medical technologies that are shaping the future of medicine.

Diagnostics | Geriatrics | Health Centers & Trakks | Medical Robotics | Medical Science Fiction | Virtual Reality | Medicine

10 Promising Technologies Assisting the Future of Medicine

Many technologies are emerging, but some are more promising than others. These have the potential to greatly improve our healthcare system.

Medical Science Fiction | Virtual Reality | Medicine
Artificial Intelligence - machine learning algorithms
Unleash the Power within

Tony Robbins ‘Unleash the POWER within’
Ephesians 3 vs 20
Hyperbaric Brain Scans - Before and After

Case 3

Pre-HBOT

Post HBOT (40 Dives)

A picture is worth a 1000 words. These are side by side pre and post HBOT metabolic SPECT scans showing the improvement over time in the brain function of the individual with 40 hyperbaric therapy treatments. Dr. Ted Fogarty, MD IHMF President & Dr. Paul Harch, MD IHMA Executive Board.
Stem cell mobilization by hyperbaric oxygen.

Thom SR, Bhogale VM, Velazquez OC, Goldstein L, Thom LH, Rueck DG

Abstract

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 h. Over a course of 20 treatments, circulating CD34(+) cells increased eightfold, although the overall 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(+) subpopulation, but increased cell growth only occurred in samples obtained immediately posttreatment. 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 1,008 +/- 255 nM in association with HBO(2). Stem cell mobilization did not occur in knockout mice lacking genes for endothelial NO synthase. Moreover, pretreatment of wild-type mice with a 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.
Oxygen and Pressure Epigenetics

Professor Paul Harch April 2018

• Despite the “Decade of the Brain” from 1990-2000 and all the advances of modern medicine, treatment of the most common neurological diseases (traumatic brain injury, stroke, and dementia) has made minimal progress in the last 100 years.

• In 2017 Alzheimer’s Dementia alone accounts for 5.4 million cases in the USA. Total costs for dementia are estimated to be $259 million this year (1). The numbers will explode in the decades ahead as the Baby Boomers’ demographic emerges.

• Imagine for a moment, a treatment that generically addresses/treats the underlying pathophysiology of traumatic brain injury (TBI), concussion, stroke, dementia, and many other neurological and systemic diseases, a treatment that not only restores reserve capacity but stimulates repair and regrowth of tissue, a treatment that gives people back their lives.

• Tissue growth requires replication of DNA. In 1997, Siddiqui et al argued that the oxygen component of HBOT was a DNA signaling agent (2)

• A single HBOT at the pressure used for diabetic foot wounds and radiation wounds up- or downregulated the expression of 8,101 (nearly 50%) of the known 19-20,000 protein-coding genes in the human genome. The largest clusters of upregulated genes were the anti-inflammatory genes and those that coded for growth and repair hormone, and the largest clusters of downregulated genes were the proinflammatory genes and apoptotic genes.

3. Ezkurdia L, et al. Multiple evidence strands suggest that there may be as few as 19,000 human protein-coding genes. Human Molecular Genetics. 2014;23(22):58665878
Oxygene – Epigenetic Therapy

• Further work showed the differential gene effects of pressure and oxygen (5) whereby different and similar clusters of neuronal genes are affected by different pressures and different amounts of hyperoxia (4).

• "In essence, during hyperbaric therapy physicians are playing a symphony with patients’ gene expression, the music of which is determined by the various pressures and amounts of hyperoxia to which the patient is exposed."

• HBOT appears to be an epigenetic therapy in the broad sense of the original definition of Waddington: “… the branch of biology which studies all molecular pathways modulating the expression of a genotype into a particular phenotype.” (6).

• The combination of hyperoxia and increased pressure are acting at the epigenetic level to differentially and temporarily alter gene expression and suppression of over 40% of all of our protein-coding genes.

• By mechanisms involving oxygen-sensitive gated membrane ion channels (7) and pressure induced strain on cell and mitochondrial membranes (8) hyperbaric pressure and hyperoxia are two organically, and naturally, manipulating, natural-occurring agents impacting changes in disease at the epigenetic level.

Oxygene Signaling – The Cellular Landscape

Understanding Hyperbaric Oxygen Therapy After 355 Years as the Oldest Gene Therapy Known to Man - Paul G. Harch, MD

• Almost 20 to 30 percent of the body’s consumption of oxygen occurs within 3 to 5 percent of the body mass – the brain and spinal cord structures. These structures are extremely sensitive to oxygen deficiency and benefits.

• Hyperbaric Oxygen Therapy at pressures greater than 2 ATA breathing 100% O2, increases Oxygen saturation into the blood plasma by 10-15 fold.

• HBO provides the necessary fuel to 'kick-start' cells in a dormant hypoxic state.

• As many as 8101 genes are directly influenced for over 24 hours after a single exposure to HBO.

• Upregulated genes are primarily growth and repair hormones and anti-inflammatory genes. Downregulated genes are the pro-inflammatory and apoptotic genes.

• HBO upregulates the patient's own target specific Stem Cells (with an 8-fold or 800 percent increase in circulating CD34+).

• HBO enhances Mitochondrial respiration.

• HBO proliferates Granulocyte Macrophage Colony Stimulating Factor (GM-CSF), Interleukin-3 (IL3), Interleukin-4 (IL4), Interleukin-10 (IL10), Interleukin-13 (IL13), Interleukin-21 (IL21), Brain Derived Neural Growth Factors (BDNF, GDNF), Vascular Growth Factors (VEGF), TGFβ Signalling, IGF1.

• HBO down regulates toxic intra and extra cellular inflammatory Cytokines (IL1, 2, 6, 7, 8, 17), Tumour Necrosis Factor Alpha (TNFo), GlycA, S100B.

• HBO inhibits opportunistic infections (viral, bacterial, parasitic), cell sepsis and more.
Oxygene Signaling – The Cellular Landscape

How Oxygen works - 5,769+* ways
(~# of cellular processes studied)

- Upregulates growth factors
- Reduces edema/swelling
- Promotes neural pathway growth
- Activates senescent neurons [“sleeping”, not dead]
- Increases neuronal energy [ATP]
- Downregulates inflammation
- Reduces reperfusion injury [not enough O2]

Inflammaging and Anti-inflammaging


The Role of Cytokines in Extreme Longevity.

Abstract

• **Longevity and aging are two sides of the same coin**, as they both derive from the interaction between genetic and environmental factors. Aging is a complex, dynamic biological process characterized by continuous remodeling. One of the most recent theories on aging focuses on immune response, and takes into consideration the activation of subclinical, chronic low-grade inflammation which occurs with aging, named "inflammaging".

• Long-lived people, especially centenarians, seem to cope with chronic subclinical inflammation through an anti-inflammatory response, called therefore "anti-inflammaging".

• In the present review, we have focused our attention on the contrast between inflammaging and anti-inflammaging systems, by evaluating the role of cytokines and their impact on extreme longevity.

• **Cytokines are the expression of a network involving genes, polymorphisms and environment**, and are involved both in inflammation and anti-inflammation.

• We have described the role of IL-1, IL-2, IL-6, IL-12, IL-15, IL-18, IL-22, IL-23, TNF-α, IFN-γ as pro-inflammatory cytokines, of IL-1Ra, IL-4, IL-10, TGF-β1 as anti-inflammatory cytokines, and of lipoxin A4 and heat shock proteins as mediators of cytokines.

• We believe that “inflammaging is a key to understand aging”.
• “Anti-inflammaging may be one of the secrets of longevity”.
Hypoxic Mitochondrial Dysregulation

Cancer as a metabolic disease: implications for novel therapeutics

Thomas N. Seyfried, Roberto E. Flores, Angela M. Poff, Dominic P. D'Agostino

Mitochondrial Dysregulation

- Diabetes
- Muscular Dystrophy
- Alzheimer's Disease
- Autism
- Epilepsy
- Parkinson's Disease
- Huntington's Disease
- Lou Gehrig's
- Fibromyalgia
- Cardiomyopathy
- Cancer
NfKB – Master Regulator of Inflammation

**HEMATOLOGICAL MALIGNANCIES**
- Multiple Myeloma
- Mantle Cell Lymphoma
- MALT Lymphoma
- Diffuse Large B-cell Lymphoma
- Hodgkin’s Lymphoma
- Myelodysplastic Syndrome
- Adult T-cell Leukemia (HTLV-1)
- Acute Lymphocytic Leukemia
- Acute Myeloid Leukemia
- Chronic Lymphocytic Leukemia
- Chronic Myeloid Leukemia

**SOLID TUMORS**
- Breast Cancer
- Cervical Cancer
- Prostate Cancer
- Renal Cancer
- Lung Cancer
- Colon Cancer
- Liver Cancer
- Pancreatic Cancer
- Esophageal Cancer
- Gastric Cancer
- Laryngeal Cancer
- Thyroid Cancer
- Parathyroid Cancer
- Melanoma
- Bladder Cancer
- Cylindroma
- Squamous Cell Carcinoma (and Neck)
- Oral Carcinoma
- Endometrial Carcinoma
- Ovarian Cancer
- Retinoblastoma
- Astrocytoma/Glioblastoma

**NF-κB**

**Inflammation**
- Ischemia/Reperfusion
- Cardiac hypertrophy
- Atherosclerosis
- Multiple sclerosis
- Muscular dystrophy
- Alzheimer’s disease
- Bone resorption
- Renal disease
- Incontinentia pigmenti
- Ectodermal dysplasia
- Crohn’s disease
- Neuropathological disease
- Helicobacter pylori-associated gastritis
- Systemic inflammatory response syndrome

**Stress**
- Diet
- Chemotherapy
- Infection
- Obesity
- Addiction

**Cytokines**
- IL-1
- IL-2
- IL-6
- TNF-α
- MCP-1

**Symptoms**
- Cachexia
- Anxiety
- Cognitive impairment
- Depression
- Neuropathic pain
Cytokine Storm

Role of Cytokines and Cytokine Inhibitors in Chronic Inflammation

- TNFα
- IL-1
- IFNγ
- GM-CSF
- IL-8 and other chemokines
- IL-15
- IL-16
- IL-17
- IL-18
- TGFβ
- IL-6
- IL-1RA
- sIL-1R1
- sTNF-R Monoclonal antibody to TNF
- IL-4
- IL-10
- IL-11
- IL-13
- IL-18BP

Small start systemic spread

**But Cytokine Storm Masks the Injury Site**

Cytokine Storm makes the entire body looks inflamed, injured and infected
Cytokine Storm Also Causes “Immune Confusion”

An injury or infection usually leads to the local production of cytokines. Normally, these cytokines allow white blood cells to home in on the infection and migrate from the blood stream into the affected area.
Cytokine Storm

Cytokines

- Clotting
- Shock
- Lung Injury
- Cell Death
- Intestinal Injury
- Immune Paralysis

Inflammation, Organ Failure and Infection

Skull icon
The typical candidate for Hyperbaric Oxygen Therapy

"Nurse, get on the internet, go to SURGERY.COM, scroll down and click on the 'Are you totally lost?' icon."
MORE THAN HALF OF CANCER DRUGS MAY NOT WORK, STUDY SUGGESTS
More than half of cancer drugs may be ineffective

Researchers found certain drugs on the market don't have proven benefits

London: According to a recent study half of the cancer drugs that have recently arrived on the market have come with little evidence that they boost the survival or wellbeing of patients. The researchers found that of cancer drugs approved by the European Medicines Agency (EMA) between 2009 and 2013, 57 per cent (59 out of 68) had no supporting evidence of better survival or quality of life when they entered the market.

After an average of five years of follow up, only half of the drugs had shown a survival or quality of life gain in patients over existing treatments or placebo. For the remaining 33 (49 per cent), uncertainty remains over whether the drugs extend survival or improve quality of life, according to the authors of the study from King's College London and the London School of Economics and Political Science (LSE).

DRUGS OR SCAMS?

- Of drugs approved by the EMA between 2009 and 2013, 57 per cent had no supporting evidence of better survival.
- With 49 per cent of the drugs, uncertainty remains over their benefits.
- Of the 23 drugs with a survival benefit, only 48 per cent were judged to offer a clinically meaningful benefit.

Of the 23 drugs with a survival benefit that could be scored with a validated tool, only 11 (48 per cent) were judged to offer a clinically meaningful benefit, they added.

Author Huseyin Naci, assistant professor in LSE’s Department of Health Policy, said, “It is remarkable that so few cancer drugs entered the European market without any clear data on outcomes that matter to patients and their doctors: longer survival and better quality of life. There is a clear need to raise the bar for approving new cancer drugs.”

Dr Courtney Davis, a medical and political sociologist in the Department of Global Health and Social Medicine at King’s, added, “We evaluated the evidence base for all new drugs entering the market over a five year period and found that the majority came onto the market without clear evidence that they improved patients’ survival or quality of life.”

The study was published in The British Medical Journal.

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BMJ 2009-2013: 57% no evidence
The Contribution of Cytotoxic Chemotherapy to 5-year Survival in Adult Malignancies

The overall contribution of curative and adjuvant cytotoxic chemotherapy to 5-year survival in adults was estimated to be 2.3% in Australia and 2.1% in the USA.

"As the 5-year relative survival rate for cancer in Australia is now over 60%, it is clear that cytotoxic chemotherapy only makes a minor contribution to cancer survival. To justify the continued funding and availability of drugs used in cytotoxic chemotherapy, a rigorous evaluation of the cost-effectiveness and impact on quality of life is urgently required."
Cancer as a metabolic disease: implications

Thomas N. Seyfried*, Roberto E. Flores, Angela M. Poff† and Dominic P.D. Agostino‡

Biology Department, Boston College, Chestnut Hill, MA 02467, USA and
‡Department of Molecular Pharmacology and Physiology, University of South Florida, Tampa, FL 33612, USA

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 Emerging evidence indicates that cancer is primarily a metabolic disease involving disturbances in energy production through respiration and fermentation. The genomic instability observed in tumor cells and all other recognized hallmarks of cancer are considered downstream epiphenomena of the initial disturbance of cellular energy metabolism. The disturbances in tumor cell energy metabolism can be linked to abnormalities in the structure and function of the mitochondria. When viewed as a mitochondrial metabolic disease, the evolutionary theory of Lamarck can better explain cancer progression than can the evolutionary theory of Darwin. Cancer growth and progression can be managed following a whole body transition from fermentable metabolites, primarily glucose and glutamine, to respiratory metabolites, primarily ketone bodies. As each individual is a unique metabolic entity, personalization of metabolic therapy as a broad-based cancer treatment strategy will require fine-tuning to match the therapy to an individual's unique physiology.
Hypoxia drives Cancer mutations
Hypoxia – Feldmeier 2003

Hyperbaric Oxygen: Does it promote growth or recurrence of malignancy?


1Radiation Oncology Department, Medical College of Ohio, Toledo, OH; 2Department of Radiation Oncology and Nuclear Medicine, Deutsches Krebsforschungszentrum, Germany; 3Department of Radiation Oncology, Heinrich Heine University, Dusseldorf, Germany; 4Department of Radiation Oncology, U. University Medical Center, The Netherlands

iii. Interleukin-8 release is increased by hypoxia. This has been demonstrated in human glioblastoma cells in culture. IL-8 has been shown to have angiogenic properties in this model. The work of Shi and associates confirms an increase in IL-8 by hypoxia and acidosis and suggest this contributes significantly to the aggressive biology of pancreatic cancer.

![Diagram showing the relationship between hypoxia and tumor progression]
Chronic inflammatory disease

Inflammation
- Cytokines
  - NF-κB

Chronic inflammatory disease
- Smads
- TGFβ
- HIF
- Hydroxylase

Fibrosis

Hypoxia
Cytokine balance

**Inflammatory MEDIATORS**

**Chronic Inflammation**

**Tumor Promotion**: Cell proliferation, Cell Survival, Angiogenesis, Genomic Instability, Metastasis

The overall balance of inflammatory signals determines if conditions are favorable for oncogenesis

**Tumor Suppression**: Apoptosis, Cellular senescence, Lysis, Immuno-surveillance
Case Study – Glioblastoma Multiforme, age 7
Surgical resection, Radiotherapy
Cytokine Profile – Before HBOT

<table>
<thead>
<tr>
<th>INTEGRATIVE MEDICINE</th>
<th>BLOOD - SERUM</th>
<th>CYTOKINES, Extensive Panel</th>
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<td>Result</td>
<td>Range</td>
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<td>INFγ</td>
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<td></td>
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Brain Derived Neurotrophic Factor (BDNF) 33.2  20.0 - 50.0  ng/mL
HBOT 84 hours
Cytokine Profile – 106 hours HBOT

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<th>INTEGRATIVE MEDICINE</th>
<th>BLOOD - SERUM</th>
<th>Hyperbaric Oxygen Therapy (HBO)</th>
<th>Cytokines: Extensive Panel</th>
<th>ProInflammatory Cytokines (TH1)</th>
<th>AntiInflammatory Cytokines (TH2)</th>
<th>GM-CSF</th>
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<th>Interleukin 3</th>
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Note: *H indicates a high value compared to normal ranges.
HBOT & Glioblastoma Multiforme

Med Gas Res.

Hyperbaric Oxygen Therapy as adjunctive strategy in treatment of glioblastoma multiforme.

• Glioblastoma multiforme (GBM) is the most common type of malignant intracranial tumor in adults. Tumor tissue hypoxia, high mitotic rate, and rapid tumor spread account for its poor prognosis. Hyperbaric oxygen therapy (HBOT) may improve the sensitivity of radio-chemotherapy by increasing oxygen tension within the hypoxic regions of the neoplastic tissue. This review summarizes the research of HBOT applications within the context of experimental and clinical GBM.

• Limited clinical trials and preclinical studies suggest that radiotherapy immediately after HBOT enhances the effects of radiotherapy in some aspects.

• HBOT also is able to strengthen the anti-tumor effect of chemotherapy when applied together.

• Overall, HBOT is well tolerated in the GBM patients and does not significantly increase toxicity. However, HBOT applied by itself as curative strategy against GBM is controversial in preclinical studies and has not been evaluated rigorously in GBM patients. In addition to HBOT favorably managing the therapeutic resistance of GBM, future research needs to focus on the multimodal or cocktail approaches to treatment, as well as molecular strategies targeting GBM stem cells.
Cerebrolysin – Brain Derived Neurotrophic Factor

WELCOME TO CEREBROLYSIN®

Cerebrolysin® is a multi-modal neuropeptide drug which improves the brain's ability for self-repair by stimulating neurorecovery.

Cerebrolysin® is used for treatment of ischemic and hemorrhagic stroke, traumatic brain injuries (TBI), different forms of dementia (vascular dementia, Alzheimer's disease) and cognitive disorders and to prevent cognitive decline after brain injuries.

READ MORE
Cerebrolysin – Brain Derived Neurotrophic Factor


- **Brain derived peptide** with neurotrophic factors - brain-derived neurotrophic factor (BDNF), glial cell line derived neurotrophic factor (GDNF), nerve growth factor (NGF), ciliary neurotrophic factor (CNTF) and other peptide fragments.

- CL neurotrophic shown to **improve cognitive performance and global function** in numerous neurodegenerative disorders and mental illness with increased daily quality living.

- CL potentiates **brain alpha activity**, reduces slow EEG delta frequencies; improved **memory performance** in healthy elderly humans, suggesting CL activates cerebral mechanisms related to attention and memory processes.

- CL improves cognitive deficits and global function in patients with mild to **moderate progressive neurodegenerative disease** including Multiple Sclerosis, Parkinson’s Disease, Alzheimer’s Disease, Dementia, Acute and Chronic Stroke victims.

- CL improves **post-acute traumatic brain injury**; childhood autism (89%) and cerebral palsy.

- CL attenuates **motor neuron damage in spinal cord** and **nerve root damage** – with significant motor recovery. **Neuro-immunotrophic** reducing **chronic nerve cell inflammation** in both acute traumatic and chronic progressive neurodegenerative diseases (progressive arthritis).

- **Neuroprotective and neurorestorative** properties, demonstrates ‘anti-aging’ with benefits ‘improving cognition, memory function, brain metabolism with capacity.’
Cerebrolysin – Brain Derived Neurotrophic Factor

In pharmacodynamic studies it has been demonstrated that Cerebrolysin:

- Reduces brain Aβ deposition, tau phosphorylation and Aβ- and tau-related neuropathology by regulating GSK-3β and CDK-5 activity
- Modulates neuroinflammation, attenuating microglia activation and IL-1β release in vitro and in vivo, and reducing the elevated serum levels of TNF-α and TNF receptor-1 in AD patients
- Displays neurotrophic-like actions on neuronal survival and neurite outgrowth and increases circulating IGF-1 and BDNF levels in humans
- Protects against oxidative and excitotoxic damage, at least in part by inhibiting lipid peroxidation and calpain activation
- Enhances the supply of glucose to the brain and ameliorates the slowing of brain bioelectrical activity
- Promotes neural plasticity and prevents dendritic and synaptic loss
- Promotes neuronal survival protecting neurons from apoptosis and degeneration
- Stimulates neurogenesis, probably through Akt activation
- Improves learning and memory.
Cerebrolysin Publications

• Cerebrolysin attenuates hyperalgesia, photophobia, and neuroinflammation in a nitroglycerin-induced migraine model in rats. Brain Res Bull. 2018 May 9;140:197-204.
• Cerebrolysin and aquaporin 4 inhibition improve pathological and motor recovery after ischemic stroke. CNS Neurol Disord Drug Targets. 2018
• Effectiveness of arginase inhibitors against experimentally induced stroke. Naunyn Schmiedebergs Arch Pharmacol. 2018
• The efficacy of prevention of postoperative cognitive dysfunction in cardiac surgeries with the use of the Cerebrolysin. Zh Nevrol Psikhiatr Im S S Korsakova. 2017;117(12):37-45. Russian.
Cerebrolysin Publications


• Efficacy and safety of Cerebrolysin treatment in early recovery after acute ischemic stroke: a randomized, placebo-controlled, double-blinded, multicenter clinical trial. J Med Life. 2017

Starving Cancer with Dr. Dominic D'Agostino
The Ketogenic Diet and Hyperbaric Oxygen Therapy Prolong Survival in Mice with Systemic Metastatic Cancer

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Abstract

Introduction: Abnormal cancer metabolism creates a glycolytic-dependency which can be exploited by lowering glucose availability to the tumor. The ketogenic diet (KD) is a low carbohydrate, high fat diet which decreases blood glucose and elevates blood ketones and has been shown to slow cancer progression in animals and humans. Abnormal tumor vasculature creates hypoxic pockets which promote cancer progression and further increase the glycolytic-dependency of cancers. Hyperbaric oxygen therapy (HBO₂) saturates tumors with oxygen, reversing the cancer-promoting effects of tumor hypoxia. Since these non-toxic therapies exploit overlapping metabolic deficiencies of cancer, we tested their combined effects on cancer progression in a natural model of metastatic disease.

Methods: We used the firefly luciferase-tagged VM-M3 mouse model of metastatic cancer to compare tumor progression and survival in mice fed standard or KD ad libitum with or without HBO₂T (2.5 ATM absolute, 90 min, 3x/week). Tumor growth was monitored by in vivo bioluminescent imaging.

Results: KD alone significantly decreased blood glucose, slowed tumor growth, and increased mean survival time by 56.7% in mice with systemic metastatic cancer. While HBO₂T alone did not influence cancer progression, combining the KD with HBO₂T elicited a significant decrease in blood glucose, tumor growth rate, and 77.9% increase in mean survival time compared to controls.

Conclusions: KD and HBO₂T produce significant anti-cancer effects when combined in a natural model of systemic metastatic cancer. Our evidence suggests that these therapies should be further investigated as potential non-toxic treatments or adjuvant therapies to standard care for patients with systemic metastatic disease.


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Ketogenic Diet & HBOT
Do wheel chairs inhibit recovery?

**National Neurotrauma Society Symposium in Orlando, Florida**

NewScientist Aug 2008 - INJURED rats strapped to tiny "wheelchairs" that restrict their movements recovered less limb function and coordination than those left to fend for themselves. This might mean that people with a spinal cord injury would recover better if they were encouraged to use their limbs sooner after injury and relied less on wheelchairs.
Neural Priming
Neural Priming

Neuropriming is the process of using electrical stimulation during movement-based training to build stronger, more optimized connections between your brain and muscles.

This process induces a temporary state of hyper-learning or "hyperplasticity" in the brain, which refines the brain's ability to learn and adapt to training. This allows you to see better results, faster.
A Real-World Investigation into the Benefits of Transcranial Direct Current Stimulation to the Primary Motor Cortex on Muscular Performance in Elite Athletes

Halo Neuroscience

February 10, 2016

ABSTRACT: As interest in non-invasive brain stimulation grows, many potential users are seeking applications for the heightened learning state associated with this technology. One possible application is in sports, where stimulation has shown promising results in the form of increased training efficiency, improving both motor skills and raw power. In this study, athletes training for strength- and power-intensive sports received neurostimulation treatment in the form of transcranial direct current stimulation (tDCS) from the Halo Neurostimulation System during their normal training routine. Athletes who received stimulation showed significantly greater improvement in their jumping ability compared to non-stimulation athletes. The current study demonstrates the ability of non-invasive brain stimulation to improve athletic performance; however, further testing with larger populations and sham controls is needed in the future.
Exoskeleton Neural Priming
Exoskeleton Neural Priming
The cost of pioneers