



David W. Smith, M.D.

Founder & CEO

Visiting Scientist Chicago North Shore University
Department of Neurosurgery

Former Consultant to
Human Performance Laboratory Cincinnati
Children's Hospital and Medical Center

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Biography

David W. Smith MD, ACP, BS (Chemistry), Board Certified (Internal Medicine Specialist) with recognition as a visiting scientist for both The Human Performance Laboratory for the Division of Sports Medicine at Cincinnati Children's Hospital Medical Center and for the North Shores Division of Neurosurgery and North Shore Neurological Institute, Chicago Illinois. Over his 30-year medical career he has served as Chief of Medicine at Reid Hospital and Healthcare Services, and has founded both Xennovate Medical LLC and TBI Innovations LLC (both established to further Dr. Smith's inventions, discoveries and intellectual property). As Chief Science officer, he has served as lead design and medical education consultant to GlaxoSmithKline (GSK is \$90B+ Pharmaceutical and Healthcare company), GENTEX Corp (largest manufacturer of USAF helmets), and Materials Modification Inc. (nanomaterials and coating pioneer to the military complex). Consistent with his Internal Medicine background and experiences Dr. Smith has Intellectual Property and peer-reviewed publications in many diverse fields of science, giving him a unique perspective in already overcoming a broad spectrum of significant medical paradigms. Specifically, his firm background in analytical chemistry (with an added emphasis in physics), affixed to his medical degree and internal medical career, have allowed him to bring a better understanding of energy interactions and impartations to the human body (particularly useful in Traumatic Brain Injury).

Dr. Smith discovered and then pioneered "SLOSH Theory," which is the basis of his compression collar invention for humans designed specifically to mitigate SLOSH energy absorption, thereby seeking to reduce the risk of brain damage from traumatic events. Further, he recently co-authored (with Julian Bailes MD, a world-renowned neurosurgeon) a presentation on "The Physics of Traumatic Brain Injury-Revisited," Congress of Neurological Surgeons, Annual Meeting, San Diego, CA, Sept 2016. This venue represents the largest gathering of Neurosurgeons and Brain Injury Specialists in the world, and that event provided the backdrop for Dr. Smith's disclosure of his latest thinking on how "cavitation" can explain how the physics of a concussive wave can produce

the chemistry of a TBI. In his scientific role with Xennovate Medical, he has also presented several novel battlefield dressings to the Department of the Army Research Lab (DARPA) at the Aberdeen Proving Grounds, Aberdeen, MD.

Dr. Smith has assisted Gentex Corp in successfully being awarded a \$90M contract in the arena of mitigating the forces involved in human ejections from supersonic aircraft. He was the lead scientist in Xennovate's two-year funding effort with DARPA's Joint Improvised Explosive Device Defeat Organization (JEIDDO).

Education & Certifications

BS University of Cincinnati (Honors) Chemistry with emphasis in Mathematical Sciences	1986-1989
Internal Medicine Specialty Case Western Reserve University Hospitals, Cleveland	1986-1989
MD University of Cincinnati	1982-1986
Wayne/Union County Medical Society Richmond, IN	1989-2016
American Board of Internal Medicine	1990-2016
Indiana State Medical Society	
American Medical Association	

Patents & Patents Pending

- ❖ DEVICE TO REDUCE SLOSH ENERGY ABSORPTION AND ITS DAMAGING EFFECTS THROUGH REDUCING THE FLOW OF ONE OR MORE OUTFLOW VESSELS OF THE CRANIUM BY COMPRESSING SAID VESSELS. APP# 12/931,415, PUBLICATION NUMBER: US 2012/0197290 A1
- ❖ Methods and Devices to reduce damaging effects of concussive forces or blasts on a subject, App# 13/489,536
- ❖ METHOD TO REDUCE SLOSH ENERGY ABSORPTION AND ITS DAMAGING EFFECTS THROUGH THE REDUCTION OF INELASTIC COLLISIONS IN AN ORGANISM, APP# 20110065637
- ❖ Devices and Systems to Mitigate Traumatic Brain and Other Injuries Caused by Concussive or Blast Forces | US20140343599A1
- ❖ Methods and Devices to Reduce the Likelihood of Injury from Concussive or Blast Forces | US20160157870A1

- ❖ Method to reduce SLOSH energy absorption and its damaging effects through the reduction of inelastic collisions in an organism | US20189987020
- ❖ Device to Reduce SLOSH Energy Absorption and its Damaging Effects Through the Reduction of the Flow of One or More Outflow Vessels of the Cranium | US20160008004A1
- ❖ Methods and Devices to Reduce Damaging Effects of Concussive or Blast Forces on a Subject | US20160317159A1
- ❖ Method to reduce SLOSH energy absorption and its damaging effects through the reduction of inelastic collisions in an organism | US8985120B2
- ❖ Methods and devices to reduce the likelihood of injury from concussive or blast forces | US20148900169
- ❖ ADHESIVE ATTACHMENT AND REMOVAL DEVICE US 7,309,809 B2
- ❖ SELF-CLEANSING BLADDER DRAINAGE CATHETER US 2008/0172040 A1
- ❖ METHOD OF IMPARTING A FLEXURAL MODULUS TO MATERIALS, AND PRODUCTS RESULTING THEREFROM US20080058858
- ❖ NASAL DILATOR DESIGN PATENT WITH GLAXO SMITH KLINE US D662,203S

Publications

- ◆ Red Blood Cell Response to Blast Levels of Force Impartations Into Freely Moveable Fluid Surfaces Inside a Closed Container | *Frontiers in Physics* | 21 August 2018 | Smith, et al.
- ◆ Cranial Venous Blood Cavitation: A Possible Mechanism of Traumatic Brain Injury Associated with Blast Wave exposure and Head Impacts | *Military Medicine* | September 2017.
- ◆ A jugular vein compression collar prevents alterations of endogenous electrocortical dynamics following blast exposure during special weapons and tactical (SWAT) breacher training |
- ◆ Mild jugular compression collar ameliorated changes in brain activation of working memory after one soccer season in female high school athletes | *Journal of Neurotrauma* | 2017.
- ◆ Neck collar with mild jugular vein compression ameliorates brain activation changes during a working memory task after a season of high school football, *Journal of Neurotrauma* · February 2017 DOI: 10.1089/neu.2016.4834
- ◆ Internal Jugular Vein Compression: A Novel Approach to Mitigate Blast Induced Hearing Injury, *Otology & Neurotology*: · January 2017

- ◆ Effect of Internal Jugular Vein Compression on Intracranial Hemorrhage in a Porcine Controlled Cortical Impact Model, *Journal of Neurotrauma* 34(8) · August 2016, DOI: 10.1089/neu.2016.4648
- ◆ Analysis of head impact exposure and brain microstructure response in a season-long application of a jugular vein compression collar: A prospective, neuroimaging investigation in American football, *British Journal of Sports Medicine* 50(20): bjsports-2016-096134 · June 2016, DOI: 10.1136/bjsports-2016-096134
- ◆ The Effects of External Jugular Compression Applied during Head Impact Exposure on Longitudinal Changes in Brain Neuroanatomical and Neurophysiological Biomarkers: A Preliminary Investigation, *Frontiers in Neurology* 7(24) · June 2016, DOI: 10.3389/fneur.2016.00074
- ◆ LETTERS TO THE EDITOR-IN-CHIEF RESPONSE, *Journal of Orthopaedic and Sports Physical Therapy* 44(6):459-460 · June 2014
- ◆ Altitude Does Not Reduce Concussion Incidence: Response, *The Orthopaedic Journal of Sports Medicine* 2(3) · March 2014, DOI: 10.1177/2325967114527235
- ◆ Rates of Concussion Are Lower in National Football League Games Played at Higher Altitudes, January 2014, DOI: 10.2519/jospt.2014.5298
- ◆ Altitude Modulates Concussion Incidence: Implications for Optimizing Brain Compliance to Prevent Brain Injury in Athletes, *The Orthopedic Journal of Sports Medicine* 1(6) · November 2013, DOI: 10.1177/2325967113511588
- ◆ Effect of slosh mitigation on histologic markers of traumatic brain injury Laboratory investigation, *Journal of Neurosurgery* 117(6):1110-1118 · December 2012, DOI: 10.3171/2012.8. JNS12358
- ◆ Internal Jugular Vein Compression Mitigates Traumatic Axonal Injury in a Rat Model by Reducing the Intracranial Slosh Effect, *Neurosurgery* 70(3):740-6 · September 2011, DOI: 10.1227/NEU.0b013e318235b991
- ◆ The Impact of Blast Exposure and the Ameliorating Effect of a Collar Device: An fMRI study | The 24th Annual Meeting of the Organization for Human Brain Mapping, Singapore, June 17-21, 2018 | Yuan W, Barber Foss KD, Thomas S, Galloway R, DiCesare C, Dudley J, Leach J, Scheifele P, Smith D, Altaye M., Rhea CK, Thomas Talavage, Myer GD.