

## Neurovascular Coupling: A Unifying Theory for Post-Concussion Syndrome Treatment and Functional Neuroimaging

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### Abstract

Post-concussion syndrome (PCS) occurs in a significant percentage of concussion patients and is defined as having a history of traumatic brain injury with persistence of three or more symptoms. Standard structural clinical neuroimaging studies show no abnormal findings for the majority of PCS patients as opposed to functional MRI, which often reveals irregularities in the blood-oxygen level dependent (BOLD) signal. This suggests that dysregulation of neurovascular coupling (NVC), which causes abnormal BOLD signals, plays a significant role in PCS pathology. Compared to the pathophysiologic mechanisms occurring in acute concussion, the underlying neuropathophysiology of chronic concussive sequelae of PCS is less understood, though becoming clearer with emerging research. We present a treatment approach grounded in the physiological theory presented here called Enhanced Performance in Cognition (EPIC), which has shown strong clinical success.



### Biography:

Alina K. Fong received her PhD in Clinical Neuropsychology with an emphasis in neuroimaging from Brigham Young University. She received the national American Psychological Association Clinical Neuropsychology Division 40 Graduate Student Research Award in 2004. Her research focuses on clinical applications of fMRI. She has published numerous articles combining neuropsychology and neuroimaging, along with deriving normative data for brain injury. Dr. Fong is currently the Director of Cognitive FX, a concussion treatment center that utilizes functional Neuro Cognitive Imaging technology. She is a Clinical Neuropsychologist at Intermountain HealthCare, and has helped build the Sports Medicine and Concussion Clinic practices in Utah.



### Speaker Publications:

1. Cassidy JD, Carroll LJ, Peloso PM, Borg J, von Holst H, et al. (2004) "Incidence, risk factors and prevention of mild traumatic brain injury: Results of the WHO collaborating center task force on mild traumatic brain injury". *J Rehabil Med* 36: 28-60.
2. Faul MXL, Wald MM, Coronado V (2010) "Traumatic brain injury in the United States: Emergency department visits, hospitalizations and deaths, 2002-2006". Atlanta, GA.
3. McCrory P, Meeuwisse WH, Aubry M, Cantu B, Dvorak J, et al. (2013) "Consensus statement on concussion in sport: He 4th International Conference on Concussion in Sport held in Zurich, November 2012". *Br J Sports Med* 47: 250-258.
4. McCrea M, Guskiewicz KM, Marshall SW, Barr W, Randolph C, et al. (2003) "Acute effects and recovery time following concussion in collegiate football players: He NCAA concussion study". *JAMA* 290: 2556-2563.
5. Mittenberg W, Canyock EM, Condit D, Patton C (2001) "Treatment of post-concussion syndrome following mild head injury". *J Clin Exp Neuropsychol* 23: 829-836.

[30<sup>th</sup> International Conference on Neurology and Cognitive Neuroscience](#); February 24-25, 2020 London, UK.

### Abstract Citation:

Alina Fong, Neurovascular Coupling: A Unifying Theory for Post-Concussion Syndrome Treatment and Functional Neuroimaging, Cognitive Neuroscience 2020, 30<sup>th</sup> International Conference on Neurology and Cognitive Neuroscience; London, UK - February 24-25, 2020.

<https://neurocognitivedisorders.neurologyconference.com/abstract/2020/neurovascular-coupling-a-unifying-theory-for-post-concussion-syndrome-treatment-and-functional-neuroimaging>