

2018 Archived Research Grantees



Dr. Raffaele Piumelli, MD, is a specialist in neonatology and preventive and social pediatrics and head of the Center for Sleep Disordered Breathing and SIDS at the Meyer University Children's Hospital, Florence, Italy.

Dr. Piumelli and his team are studying oxidative stress in CCHS. The major aim of the study is to assess the possible involvement of the PHOX2B gene in the homeostasis of oxidative defense mechanisms. In response to stress the body makes harmful substances called Reactive Oxygen Species (ROS). High ROS concentrations can damage the cells of our body. Anti-oxidants are protective against ROS compounds. Therefore there has to be a balance between the production of ROS and the production of antioxidant agents capable of blocking their destructive effects. The term "oxidative stress" refers to a condition of *imbalance* between the production of ROS and their elimination by anti-oxidants. Patients suffering from sleep disordered breathing, e.g. those affected by CCHS, have previously been documented by Dr. Piumelli's group to show consistently high oxidative stress in blood cells. The aim of this study is to confirm that CCHS patients have elevated oxidative stress indicators, identify oxidative stress markers in the urine of CCHS patients, and test the effectiveness of antioxidant therapies (such as vitamin supplements, adequate diet, and the promotion of mild physical exercise) on relieving oxidative stress.



Dr. Patrice G. Guyenet was trained at Ecole Normale Supérieure (Paris), College de France (PhD in Neurochemistry) and Yale University (Postdoc). He is currently Professor of Pharmacology at the University of Virginia.

Dr. Guyenet's proposed study is pre-clinical and discovery-based. Dr. Guyenet and his team seek to identify the neural pathways that cause *arousal in response to asphyxia*, a life-saving reflex that is defective in CCHS. Normally, asphyxia, a condition arising when the body is deprived of oxygen, produces arousal from sleep. But this normal reflex does not occur in CCHS and the failure of this reflex in CCHS has life-threatening consequences. The goal of the present project is to clarify how an increase in blood CO₂ or a reduction in blood oxygen produces arousal. The hope is that a better understanding of how asphyxia produces arousal will eventually provide the means to activate breathing and prevent the damaging effects of repeated hypoxic insults in CCHS patients.