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CFS Computational Challenge Leads to Bounty of Papers and Findings

CDC's Large-Scale Study of Chronic Fatigue Syndrome Points to Underlying Factors, Illness Subtypes

The April issue of the journal *Pharmacogenomics* includes a special section on chronic fatigue syndrome (CFS), 14 papers authored by experts in diverse fields of medicine, molecular chemistry, epidemiology, genomics, math, engineering and physics. Four multidisciplinary teams led by researchers at the U.S. Centers for Disease Control and Prevention (CDC) analyzed a large data set from clinical and laboratory experiments involving 227 subjects.

This intense effort, called the "CFS Computational Challenge" or C³, set out to identify factors that potentially cause or are related to CFS. The CDC provided the four teams with information that included extensive clinical evaluations, formal sleep laboratory analysis, tests on the blood, and data from the activity of 20,000 genes. They reported their preliminary findings in September 2005 and have continued working to refine them and publish this set of papers.

One of the teams linked CFS with high allostatic load, a term used to describe cumulative wear on the body resulting from chronic or inadequate adaptation to change. "The outcomes of this study demonstrate that the physiology of people with CFS is not able to adapt to the many challenges and stressors encountered throughout life, such as infection, injury and other adverse childhood events." said Dr. William C. Reeves, who heads CDC's CFS research program. "This study also suggests that the pathophysiology of CFS involves hypothalamic pituitary adrenal axis dysfunction."

The scientists also showed that CFS is quite heterogeneous and encompasses a number of clinically distinct illnesses, each including disabling fatigue. The mechanisms that cause the fatigue in the different CFS groups appear to involve the brain, hormones and the immune system. Data show genetic changes in the glucocorticoid receptor gene and genes related to sympathetic nervous system activity. Research also suggests that the blood cells in people with CFS behave differently, for example, by having a different immune response. According to Dr. Reeves, "These are important findings because they will help to focus our research efforts to identify more effective treatments which ultimately could help alleviate a lot pain and suffering."

(more)

CDC's Dr. Suzanne Vernon developed the concept for C³. "We challenged the teams to develop ways to integrate and analyze a wide range of medical data so as to identify those things that could improve the diagnosis, treatment or understanding of CFS," Dr. Vernon said. "There is a clear biologic basis for CFS and knowing these 'molecular lesions' will help us devise effective therapeutic intervention and control strategies." Dr. Vernon oversees the CDC's CFS Molecular Epidemiology Program.

More than a million people in the U.S. have chronic fatigue syndrome (CFS), a debilitating disease that has no cure, can last for many years, and packs a tremendous personal, social and economic toll -- \$9 billion a year to the nation and \$20,000 per family. It is characterized by severe exhaustion, widespread musculoskeletal pain, cognitive impairments, sleep disturbances and post-exertional relapse of symptoms. CFS occurs most frequently in women ages 40-60 and is as disabling as multiple sclerosis and chronic obstructive pulmonary disease. After nearly 20 years of research, the cause of CFS is not known and treatment is still focused on symptom relief to improve function and quality of life.

The team-driven data analysis was modeled after Duke University's Critical Assessment of Microarray Data Analysis (CAMDA), an annual challenge that employs cutting-edge data mining techniques to examine multivariate data sets. The 2006 CAMDA Challenge will also use the CDC's CFS data set. Teams will meet at Duke on June 7-8, 2006 to share their findings.

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The CFIDS Association of America is the nation's largest and most active organization dedicated to conquering CFS, also known as chronic fatigue and immune dysfunction syndrome or CFIDS. The CFIDS Association of America co-sponsored the September 2005 meeting at Cold Spring Harbor Laboratory where the teams first presented their analyses.

The Centers for Disease Control and Prevention (CDC) is the principal agency in the United States government for protecting the health and safety of all Americans and for providing essential human services, especially for those people who are least able to help themselves. CDC began studying CFS in the late 1980s.

The journal *Pharmacogenomics* is a peer-reviewed journal presenting reviews and reports by the researchers and decision-makers closely involved in this rapidly developing area of science. Key objectives are to provide the community with an essential resource for keeping abreast of the latest developments in all areas of this exciting field.

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For more information about chronic fatigue syndrome, visit www.cfids.org.

For additional information about the CFS Computational Challenge, including a list of participants, visit http://www.cdc.gov/ncidod/diseases/cfs/meetings/2005_09.htm

For a list of articles in the April issue of *Pharmacogenomics* visit http://www.futuremedicine.com/toc/pgs/7/3;jsessionid=oUGJNe_WWei8nGQQPQ

For more information about CAMDA, visit <http://www.camda.duke.edu/camda06>