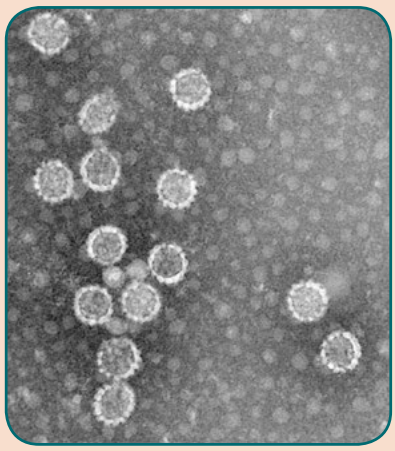
Chronic Viral Diseases Branch (CVDB)

The laboratory scientists, epidemiologists, and other public health professionals in CVDB conduct research on chronic fatigue syndrome (CFS) and human papillomavirus (HPV) with the goal of reducing the health burden of these conditions.

Disease Burden

CFS is a debilitating and complex disorder that involves profound fatigue that is not improved by bed rest. It may also be worsened by physical or mental activity. More than 1 million Americans are believed to suffer from CFS, yet only about half have consulted a physician for their illness. Based on population samples, the total annual economic costs for CFS in the U.S. is approximately $19-51 billion.

HPV is the most common sexually transmitted infection in the U.S., but most people who become infected go undetected. Most HPV infections (90%) go away on their own within two years. Sometimes, HPV infections persist and can cause serious health problems. HPV causes nearly all cases of cervical cancer and a subset of cancers of the vagina, vulva, anus, penis, and oropharynx.



Electron micrograph of HPV viral-like particles (VLP).

Our Work
Epidemiologic & Laboratory Research

CVDB conducts multidisciplinary, population-based studies to investigate the clinical and molecular epidemiology of both CFS and HPV.

- The CFS program studies the prevalence, gene structure and expression, and characteristics of patients with CFS or myalgic encephalomyelitis (ME) identified from clinical practices. The CFS program also studies the economic burden associated with CFS including lost productivity and healthcare expenditures, (See story below.)
- The HPV program includes the development and implementation of state-of-the-art assays to assess the impact of HPV vaccination in the U.S. and to evaluate altered dosing schedules and vaccine effectiveness in special populations. HPV program also conducts studies to identify epidemiological, viral and host genetic factors that could be used to improve cervical cancer screening.

Expert Consultation

CVDB provides subject matter experts in ME/CFS and HPV to national and international organizations. The branch provides input on ME/CFS issues to the Secretary of Health and Human Services (HHS) through Chronic Fatigue Syndrome Advisory Committee (CFSAC) meetings with the Assistant Secretary for Health. CVDB consults and collaborates with WHO and PAHO to improve laboratory capacity for HPV testing through training and standardization of assays, participates in the Advisory Committee for Immunization Practices (ACIP) workgroup on HPV and has served on FDA advisory committees on HPV vaccine and testing issues.

Clinical & Public Education (CFS)

Kick-off meeting for the Multi-Site Clinical Assessment of CFS study.

The branch develops and evaluates clinical and public education programs to decrease morbidity associated with CFS. It incorporates behavioral translational research to study, design and evaluate CFS education activities and applies communication and education theories to outreach activities., CVDB strives to maintain a two-way relationship with stakeholders. Based on feedback from advocates and the research community, CVDB hosts a CFS Patient-Centered Outreach and Communication Activity (PCOCA) conference call providing program updates, presentations by CFS experts, and a communications platform for the CFS community. The branch develops continuing education (CME, CNE, or CEU) through web-based, self-study courses available on the CDC website. CVDB also works with the Center for Advanced Professional Education (CAPE) to develop educational CFS patient curricula for medical schools.

CVDB in Action: Multi-site clinical assessment of CFS

In 2012, CVDB began a multi-site clinical assessment of CFS to characterize patients with CFS or ME in clinical practices with expertise in those conditions. The study initially enrolled more than 450 patients aged 18-70 years with managed or diagnosed CFS, post-infective fatigue (PIF), or ME, at any of seven participating clinical sites. The study further expanded to study samples such as pediatric CFS patients, healthy controls and patients ill with conditions that may resemble CFS (such as fibromyalgia, chronic Lyme disease, chronic hepatitis, or congestive heart failure). Additionally, it includes two sub-studies: 1) Cognition and Exercise Testing; 2) NK Cell Pilot Testing.

CVDB in Action: Demonstration of HPV Vaccine impact in US

Since 2003, the CVDB laboratory has determined the HPV types in more than 10,000 specimens from U.S. women in the National Health and Nutrition Evaluation Survey. This precise longitudinal assessment of HPV prevalence demonstrated a reduction in HPV types targeted by vaccines in the youngest age groups in the post-vaccine (21006-2010) compared with pre-vaccine time periods (2003-2006).

Select Publications:

Panicker G, Rajbhandari I, Gurbaxani BM, Querec TD, Unger ER. Development and evaluation of multiplexed immunoassay for detection of antibodies to HPV vaccine types. *J Immunol Methods* 417: 107-114, 2015 doi: 10.1016/j.jim.2014.12.013 2015 Nakano Citation, Nominated for 2014 Charles C. Shepard award in Laboratory Science

Miller AH, Jones JF, Drake DF, Tian H, Unger ER, Pagnoni G. Decreased basal ganglia activation in subjects with chronic fatigue syndrome: association with symptoms of fatigue. *PLoS One* 9: e98156, 2014 doi:10.1371/journal.pone.0098156

Steinau M, Saraiya M, Goodman MT, Peters ES, Watson M, Cleveland JL, Lynch CF, Wilkinson EJ, Hernandez BY, Copeland G, Saber MS, Hopenhayn C, Huang Y, Cozen W, Lyu C, Unger ER. Human papillomavirus prevalence in oropharyngeal cancer cells before vaccine introduction, United States. *Emerg Infect Dis* 20: 822-8, 2014 doi: 10.3201/eid2005.131311

Brimmer DJ, Maloney E, Devlin R, Jones JF, Boneva R, Nagler C, LeRoy L, Royal S, Tian H, Lin JS, Kasten J, Unger ER. A pilot registry of unexplained fatiguing illnesses and chronic fatigue syndrome. *BMC Res Notes* 6:309, 2013 doi: 10.1186/1756-0500-6-309

Brimmer DJ, Campbell C, Bonner K, Lin JM. News from the CDC: chronic fatigue syndrome (CFS) and standardized patient videos - a novel approach to educating medical students about CFS. *Transl Behav Med.* 2013 Dec;3(4):338-9. doi: 10.1007/s13142-013-0229-9.