

CHRONIC VIRAL DISEASES BRANCH

Division of High Consequence Pathogens and Pathology



Innovation to Address Infection-Associated Chronic Disease

The Chronic Viral Diseases Branch (CVDB) works to understand and track the impact of chronic diseases associated with infections, whether the infectious causes and disease pathways are known or yet to be discovered. The innovative work of CVDB scientists supports monitoring, research, and education on:

- ▶ Human papillomaviruses (HPV), a known cause of cancer and other chronic diseases that can be prevented through vaccination.
- ▶ Myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS), a puzzling long-term illness that limits people's abilities to do daily tasks, work, go to school, and take part in family and social life.
- ▶ Prolonged illness following COVID-19 and other post-infectious syndromes.

What do CVDB's experts do?

Advancing HPV detection and monitoring HPV Vaccine's impact to control cervical cancer

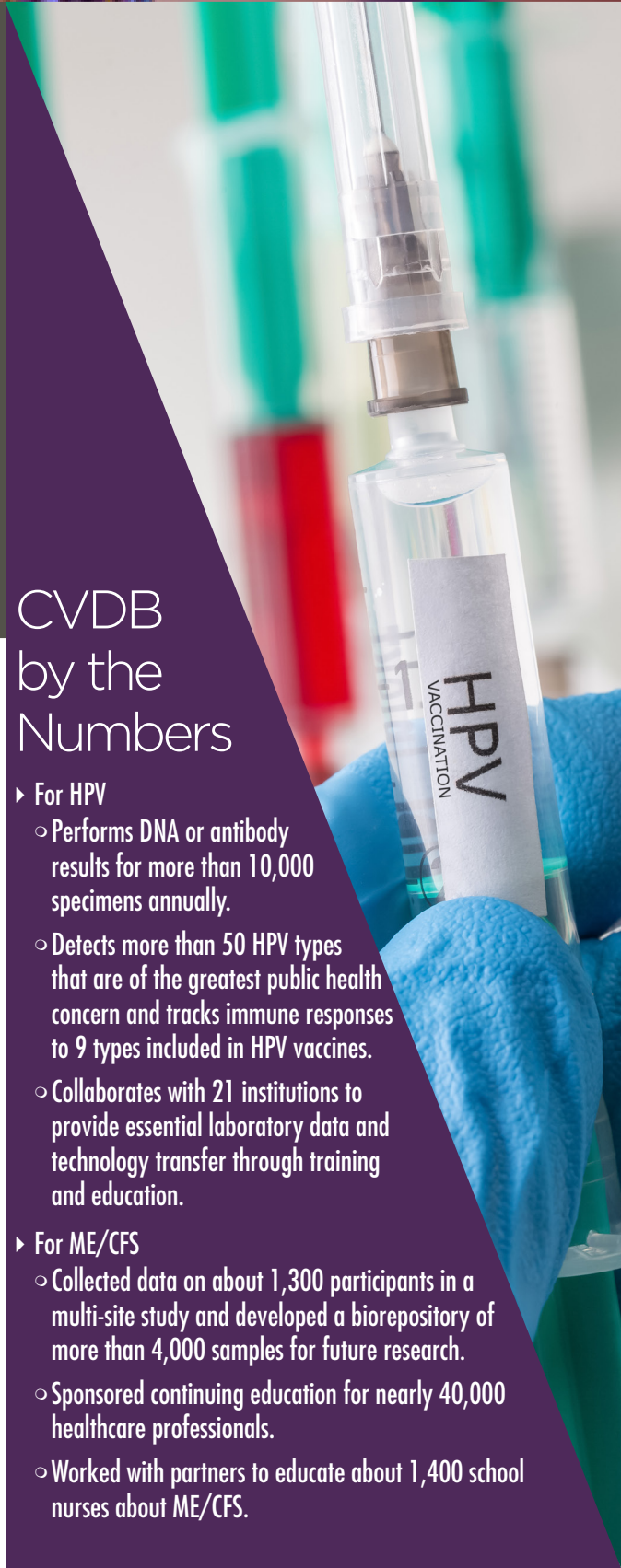
HPV is the most common sexually transmitted infection in the United States. Some HPV types can cause cervical and other cancers. Each year, HPV causes more than 33,000 new cancer cases in the United States and about 5% of cancers worldwide. Thankfully, HPV vaccines can prevent most of the harmful health effects caused by HPV.

CVDB's investigations are expanding what we know about HPV vaccines, under-investigated virus types, and diagnosis:

- ▶ CVDB's laboratory assesses whether HPV vaccines are working by verifying that HPV types targeted by the vaccine are decreasing and by investigating whether HPV types not covered by the vaccine are increasing.
- ▶ CVDB scientists have developed tests to find antibodies against HPV. These tests are needed to determine how well fewer vaccine doses, cheaper vaccine options, and new delivery methods (like microneedle patches) might work to prevent HPV.
- ▶ Innovative tests developed by CVDB use next generation sequencing to detect all known HPV types as well as new types. Previous testing methods identified only 40 of more than 200 known HPV types.
- ▶ In support of the World Health Organization's goal to screen 70% of women globally by 2030, CVDB is investigating how HPV and other tests can be used to improve cervical cancer screening.

CVDB by the Numbers

- ▶ For HPV
 - Performs DNA or antibody results for more than 10,000 specimens annually.
 - Detects more than 50 HPV types that are of the greatest public health concern and tracks immune responses to 9 types included in HPV vaccines.
 - Collaborates with 21 institutions to provide essential laboratory data and technology transfer through training and education.
- ▶ For ME/CFS
 - Collected data on about 1,300 participants in a multi-site study and developed a biorepository of more than 4,000 samples for future research.
 - Sponsored continuing education for nearly 40,000 healthcare professionals.
 - Worked with partners to educate about 1,400 school nurses about ME/CFS.





Advancing knowledge of ME/CFS and engaging partners

ME/CFS is a serious, long-term biological illness with symptoms that include severe fatigue, unrefreshing sleep, and worsening of symptoms following physical and mental exertion. Patients may also have dizziness and brain fog. ME/CFS affects as many as 2.5 million Americans, about 1 in 4 of whom are bedbound. ME/CFS accounts for \$18–51 billion in economic costs annually in the United States.

CVDB has worked for decades to develop a more complete picture of ME/CFS:

- ▶ CVDB scientists have helped standardize measures of illness that are now used in ME/CFS research nationwide. These standardized measures allow researchers to compare their results across multiple studies.
- ▶ Some of these standardized measures have been included in recent studies of persistent symptoms following infection with SARS-CoV-2. CVDB is working with academic partners to study people who previously had COVID-19 to determine what subset go on to develop ME/CFS-like symptoms (commonly referred to as long COVID). They aim to understand whether there are differences between ME/CFS and long COVID.
- ▶ Results from CVDB's study of ME/CFS, conducted in collaboration with national experts, are being used to make a difference. For example, they guided the formation of the Institute of Medicine's 2015 clinical case definition of ME/CFS and established measurements the FDA uses to evaluate whether ME/CFS treatments are effective in clinical trials.
- ▶ Through the California Emerging Infections Program, CVDB partners with Kaiser Permanente to describe the onset and early stages of ME/CFS, as well as to understand what leads some people with prolonged, unexplained fatigue to recover and some to progress to ME/CFS.
- ▶ CVDB also works with the National Association of School Nurses to learn more about ME/CFS in school children.
- ▶ In partnership with CDC's Behavioral Risk Factor Surveillance System and the National Health Interview Survey, CVDB is tracking ME/CFS at a population level.

Providing expert consultation

CVDB experts collaborate with the World Health Organization to improve the capacity of laboratories worldwide to conduct HPV testing through training, testing standardization, and technology transfer. With this enhanced testing capacity, other countries can establish HPV surveillance systems.

CVDB also provides guidance to the Advisory Committee on Immunization Practices and FDA advisory committees on U.S. HPV vaccine policy and approval of new HPV tests. CVDB scientists are setting standards for research, monitoring, and health education on ME/CFS at the domestic and international levels. They serve as content experts in collaboration with federal and state agencies and other partners.