Rapid Detection of Herpes Viruses for Clinical Applications
Lyndon B. Johnson Space Center, Houston, Texas

There are eight herpes viruses that infect humans, causing a wide range of diseases resulting in considerable morbidity and associated costs. Varicella zoster virus (VZV) is a human herpes virus that causes chickenpox in children and shingles in adults. Approximately 1,000,000 new cases of shingles occur each year; post-herpetic neuralgia (PHN) follows shingles in 100,000 to 200,000 people annually. PHN is characterized by debilitating, nearly unbearable pain for weeks, months, and even years. The onset of shingles is characterized by pain, followed by the zoster rash, leading to blisters and severe pain. The problem is that in the early stages, shingles can be difficult to diagnose; chickenpox in adults can be equally difficult to diagnose. As a result, both diseases can be misdiagnosed (false positive/negative).

A molecular assay has been adapted for use in diagnosing VZV diseases. The polymerase chain reaction (PCR) assay is a non-invasive, rapid, sensitive, and highly specific method for VZV DNA detection. It provides unequivocal results and can effectively end misdiagnoses. This is an approximately two-hour assay that allows unequivocal diagnosis and rapid antiviral drug intervention. It has been demonstrated that rapid intervention can prevent full development of the disease, resulting in reduced likelihood of PHN. The technology was extended to shingles patients and demonstrated that VZV is shed in saliva and blood of all shingles patients. The amount of VZV in saliva parallels the medical outcome.

This work was done by Duane Pierson of Johnson Space Center, and Satish Mehta of Enterprise Advisory Services, Inc. For further information, contact the JSC Innovation Partnerships Office at (281) 483-3809. MSC-25009-1

High-Speed Data Recorder for Space, Geodesy, and Other High-Speed Recording Applications
Goddard Space Flight Center, Greenbelt, Maryland

A high-speed data recorder and replay equipment has been developed for reliable high-data-rate recording to disk media. It solves problems with slow or faulty disks, multiple disk insertions, high-altitude operation, reliable performance using COTS hardware, and long-term maintenance and upgrade path challenges.

The current generation data recorders used within the VLBI community are aging, special-purpose machines that are both slow (do not meet today’s requirements) and are very expensive to maintain and operate. Furthermore, they are not easily upgraded to take advantage of commercial technology development, and are not scalable to multiple 10s of Gbit/s data rates required by new applications.

The innovation provides a software-defined, high-speed data recorder that is scalable with technology advances in the commercial space. It maximally utilizes current technologies without being locked to a particular hardware platform. The innovation also provides a cost-effective way of streaming large amounts of data from sensors to disk, enabling many applications to store raw sensor data and perform post and signal processing offline.

This recording system will be applicable to many applications needing real-world, high-speed data collection, including electronic warfare, software-defined radar, signal history storage of multispectral sensors, development of autonomous vehicles, and more.