GOVERNMENT AND SOCIETY

Prion research wish list

Although the sensitivity of current postmortem diagnostics for transmissible spongiform encephalopathies (TSEs), or prion diseases, could be improved, the most critical need is a live-animal, antemortem TSE blood test, according to a November report by the National Academies' Institute of Medicine (IOM). Various applications, such as screening blood bank samples and testing animal herds and military personnel, would all benefit from a live-animal TSE test, says Richard Johnson, chair of the IOM Committee on TSEs and professor of neurology at the Johns Hopkins University School of Medicine.

The number of TSE tests currently being conducted and slated to be conducted is overwhelming. According to an October 2003 Kalorama Information study about prion diagnostic technologies and markets worldwide, 12 million postmortem TSE tests are conducted annually on cows, deer, goats, and sheep. That number is likely to grow, particularly following the detection of the first case of bovine spongiform encephalopathy, or mad cow disease, in the United States in late December.

In addition, there are 75 million blood bank samples worldwide, many of which will need to be screened for TSEs. Johnson reports that there is currently a blood shortage in the United States, so knocking out donors who have merely lived in parts of Europe during the mad cow disease epidemic is a real problem. Johnson emphasizes that releasing the restrictive regulations will be difficult because of politics. "But, if a sensitive and specific test were available, then regulations could be relaxed."

"Blood bank screening, however, presents huge ethical problems," says Dean O. Cliver, another member of the IOM committee and professor of food safety at the University of California–Davis School of Veterinary Medicine. Cliver explains the caution: "Even a test that has a low probability of yielding false positive results, applied in a situation where the probability of a true positive result is infinitesimal, will yield mostly false positives." He continues, "It is one thing to take a suspect unit of blood out of the pool, but quite another thing to tell the donor that he or she is going to die."

Johnson expects that "something as novel as PCR, but for proteins," is needed to meet the accuracy and sensitivity demands of a live-animal test. He hypothesizes that an error rate of 1/100,000 is unacceptable, and a live-animal test needs to be 1000-fold more sensitive than any current postmortem assays.

According to the report, defining what is a single infectious unit of a prion will be critical for live-animal test development. Having TSE repositories that contain a collection of reference materials, genetically engineered animals, and reagents for diagnostic development and basic research is also important.

According to Cliver, the recommendations in the report are used as a guideline for funding the U.S. Department of Defense's National Prion Research Program. In 2002, Congress appropriated $42 million to be spent in 2003. Johnson comments that Europe spends ten times more money on prion research because of the mad cow disease epidemic. The Europeans think that the United States is "sitting on a chronic wasting disease [prion disease that affects deer and elk] time bomb." ■

—Laura Ruth

PEOPLE

Analytical chemist wins ISFG forensic award

John Butler, a research chemist at the National Institute of Standards and Technology (NIST), received an award from the International Society for Forensic Genetics (ISFG) for his work on the forensic analysis of DNA, in particular for improving the analysis of single-nucleotide polymorphisms. Although Butler was notified September 11, 2003, he has to wait until the ISFG meeting in 2005 to officially accept his award. He is only the fifth recipient of the prestigious award. Along with the kudos of winning, Butler will receive a cash award of €3000.

While a postdoc at NIST, Butler created the short tandem repeat (STR) Internet database that is now commonly used among forensic scientists worldwide. He is also the author of *Forensic DNA Typing: Biology and Technology behind STR Markers*, a leading text in the field. In addition, his group developed technology that was instrumental in the analysis of DNA samples from the World Trade Center terrorist attacks. The catalyst for this work, he says, stemmed from the need to improve methods for analyzing small pieces of damaged DNA and finding a better way to prevent signal loss from samples.

COURTESY OF JOHN BUTLER, NIST

Butler is funded by the National Institute of Justice and leads a six-member project team at NIST to improve forensic DNA typing methods. Now that he has won the ISFG award, what is next for the analytical chemist? Along with cataloging and mapping the exact positions of the 13 STR markers primarily used in the forensic community, he plans to tackle a new method for analyzing multiple DNA markers simultaneously.