What’s new, what’s hot, what’s timely? If you don’t have time to search the Internet for the latest developments that might impact your work environment, you just might find some of this information in this “Capsule” column. Please e-mail any comments or suggestions to felix.gmuender@bh.com.sg or to Co-Editor Barbara Johnson at barbara_johnson@verizon.net or Co-Editor Karen B. Byers at karen_byers@dffciharvard.edu.

Mystery Diseases, Staphylococcus aureus Infections, Low-cost Aerosol Exposure System, and Molecular Testing for Infectious Diseases

Infectious Disease: Blowing in the Wind

Kawasaki disease is a mysterious disease affecting small children (Frazer, 2012; Punnoose et al., 2012). The symptoms include inflammation of blood vessels and high fever. Although first identified in Japan in the 1960s, its cause is still unknown (Frazer, 2012). About 20 years later the first cases appeared in Hawaii and mainland North America. Medical doctors and epidemiologists believe it is an infectious disease, originating in mainland Asia, and speculate that it might have reached Japan, Hawaii, and North America by wind. The response of the immune system, symptoms, and epidemiology strongly suggest that an infectious agent is involved. If the wind-borne route is confirmed, this would be the first human pathogen that can cross oceans by wind. But for decades researchers have been unable to connect the disease with a virus, bacterium, or other categories of pathogens. High incidence in winter and early spring suggests that climate and weather patterns might play a role. The analysis of climate variables revealed that the peak incidence coincides with strong winds blowing from central Asia to Japan. Winds blowing from Asia towards Hawaii and mainland North America spiked cases there as well. Wind as a means of transmission has been proven for the foot-and-mouth disease virus (affects ungulate animals), Cryptosporidium and fungal spores, but because of the ultra-violet (UV) exposure, wind is not generally considered an efficient way of transmission over long distances. Microbiologists speculate whether the preserving nature of cryogenic temperatures together with protection by dust particles to which the agents might attach may enhance survival rates. Frazer (2012) summarizes that as long as the cause of Kawasaki disease is unknown, the airborne route of transmission remains speculation. Her article concludes with an observation by Taiwanese scientists who reported that outbreaks of avian influenza often happen in downwind areas of Asian dust storms (Chen et al., 2010).

Mystery Disease Haunts Region

Another mystery disease is reported from Uganda and South Sudan (Vogel, 2012). Head-nodding disease starts with lack of energy and enthusiasm, not eating well, a noticeable decline in intelligence, and finally seizures that escalate into full-blown epileptic seizures. The name of the disease comes from one of the symptoms: children and juveniles start head-nodding uncontrollably. Prospects for the affected children are not good because in this region epilepsy is considered contagious, and there may be a grain of truth in this case. The condition has become a relevant issue in the region and beyond as U.S. Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO) look for possible causes. Neurologists from CDC and WHO conducted neurological studies and confirmed that something is seriously wrong with the brains of these children, but the actual cause could not be identified (Vogel, 2012). The disease appears to have a geographic component because it is concentrated in relatively small areas. CDC scientists have also tested for many viruses, but all test results were negative. A leading hypothesis for the cause includes infection with Onchocerca volvulus, a parasitic worm transmitted by black flies and is the causative agent for onchocerciasis, better known as river blindness. The parasite is endemic to the regions that report nodding disease. However, a confounding discrepancy is that the parasite is widespread but nodding disease is not. Despite an eradication effort launched in 1974, the parasite still persists in 27 countries in Africa and South America. The evidence for a cause-effect relationship between the parasite and nodding disease originated from a 2008 study showing that 43 out of 51 patients either carried the parasite or tested positive for its DNA; however, the results could not be confirmed by larger follow-up studies. Some medical doctors, neurologists, and parasitologists active in the region still think onchocerciasis can trigger nodding disease. The most likely explanation according to some
scientists is a combination of factors including malnourishment (vitamin B-6 deficiency), heavy metal exposure, cyanide poisoning (inadequate preparation of the staple food cassava), and genetic predisposition.


**Long-term Outcome of Invasive Staphylococcus aureus Infections**

Jacobsson & Nasic (2012) report that short-term death rates for invasive *Staphylococcus aureus* infections (ISA) reported in the literature range from 20% to 60%. Typically, short-term studies utilize an end-point of 28 days. Until recently, no studies focused on long-term morbidity and mortality. The authors designed a long-term prospective study observing 157 patients after ISA until death or up to 3 years post infection. One hundred seventy three episodes and their recurrences were registered (16 of the 157 patients had a second episode). All *Staphylococcus* strains were methicillin-sensitive. Despite treatment, 30 patients (19.1%) died after 28 days. After 1 year the mortality had increased to 36.7% (59) and after 3 years to 45.5% (71). The authors found that short-term mortality is related to infection-related factors such as disease severity and blood pressure. The long-term outcome depended on age, co-morbidity (presence of other diseases such as diabetes, kidney disease, etc.), whether the infection was community- or hospital-acquired, with the latter being more risky, and the severity of sepsis. It was not always possible to identify *Staphylococcus* as the certain cause of death. Jacobsson & Nasic (2012) also noticed that even patients who were discharged from the hospital after full recovery had a high long-term mortality rate, which cannot be explained by co-morbidity and age alone. These patients may have had other complications that affected recovery and mortality. The survival curves for severe sepsis and complications fell quickly and leveled off after 100 days. After that period, patients with complicated bacteremia had the same low mortality as patients with non-severe sepsis. Jacobsson & Nasic (2102) conclude that doctors should care for septic patients at least for 3 months after discharge from the hospital.


**Low-cost Aerosol Exposure System for Guinea Pigs**

Schroeder et al. (2012) have developed and tested a low-cost device to safely expose guinea pigs to hazardous aerosols. The device fits inside a regular biosafety cabinet (6 ft length is recommended) and can be easily decontaminated. Their paper includes design sketches, photographs, technical specifications of parts, and mode of operation. The equipment is comprised of four chambers, and the removable animal housing unit can hold up to four or up to eight animals. It fits into a box that is attached to the aerosol and nebulizer chambers. All units are sealed with gaskets and clamp fittings. The device has three threaded ports for pressure gauge (with an in-line HEPA filter), clean air vent (with a HEPA filter), and aerosol injection (with a HEPA-protected pump). The chambers are made of polycarbonate plastic and Goretex™ gaskets, which are resistant to the chemical decontaminants tested (bleach, peroxides, alcohols, and quaternary ammonium compounds). Parts and system components were chosen for resistance against mechanical and chemical degradation and are listed with suppliers’ names and part numbers. Schroeder et al. (2012) point out the system’s ease and safety of operation and minimal restraint stress for animals because it is a hybrid between a whole-body exposure system such as the Madison chamber (College of Engineering Shops, University of Wisconsin, Madison) and a nose-only exposure (e.g., CH Technologies, Westwood, NJ). The equipment can be built for less than U.S. $2,000.


**Molecular Testing for Infectious Diseases Should Be Done in the Clinical Microbiology Laboratory**

Molecular tests to diagnose and manage infectious diseases have evolved quickly and are used today in many laboratories. The simplicity of molecular diagnostic testing, combined with the accuracy and speed of obtaining test results, raises the question of whether it is necessary to conduct the testing in a clinical microbiology laboratory. The other options reviewed were central molecular pathology laboratories under the leadership of a clinical microbiologist, central molecular pathology laboratories under the leadership of an individual whose primary interest is in another area of molecular pathology, and reference laboratories (requires transport of samples).

Mosammaparast et al. (2012) have interviewed three experts about the advantages and disadvantages of the four settings. The summarized results of the interviews are shown in Table 1.

Mosammaparast et al. (2012) conclude that central laboratories with expertise and reference laboratories can be economical and useful alternatives to the clinical microbiology laboratory if sufficient resources are provided to assure short turnaround times, and transport time to reference laboratories is short.

Table 1
Comparison of settings for molecular testing of infectious diseases (adapted from Mosammaparast et al., 2012).

<table>
<thead>
<tr>
<th>Setting</th>
<th>Expert Oversight and Consultation</th>
<th>Turnaround Time</th>
<th>Cost</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical microbiology laboratory</td>
<td>Yes</td>
<td>Short</td>
<td>Reasonable</td>
<td>Best solution</td>
</tr>
<tr>
<td>Central laboratory with microbiologist oversight</td>
<td>Yes</td>
<td>Can be short depending on priority given</td>
<td>Reasonable</td>
<td>Acceptable if adequate resources are provided</td>
</tr>
<tr>
<td>Central laboratory with non-microbiologist oversight</td>
<td>No</td>
<td>Can be short depending on priority given</td>
<td>Reasonable</td>
<td>Unacceptable</td>
</tr>
<tr>
<td>Reference laboratory (commercial laboratory)</td>
<td>Likely</td>
<td>Typically slow</td>
<td>Variable</td>
<td>Useful for low volumes or very difficult tests. Unacceptable if turnaround times are slow.</td>
</tr>
</tbody>
</table>

Animal Bytes
Barbara Johnson1 and James Swearengen2

1Biosafety Biosecurity International, Herndon, Virginia and 2National Biodefense Analysis and Countermeasures Center, Fort Detrick, Maryland

Animal Bytes examines biosafety challenges posed when conducting work with animals and provides solutions that promote both safe and responsible research. Good safety and animal husbandry are essential for good science. Learn about best practices when working with animals and applied safety information that can be used every day. Please e-mail your comments, questions, and insights to barbara.johnson@verizon.net or to Co-Editor Karen B. Byers at karen_byers@dfci.harvard.edu.

Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC)
International Accreditation

AAALAC International accreditation is a voluntary undertaking and benchmark of an institution’s commitment to maintaining high-quality and standards in animal research programs. Institutions that achieve and maintain accreditation benefit from the process because healthy animals treated humanely with high-quality animal care are essential for valid and reliable research. Moreover, accreditation demonstrates a deep commitment to ethical and responsible animal use to the local community and to the broad scientific community. Accreditation is a holistic process where all aspects of an animal care and use program are evaluated including (but not limited to) institutional policies, practices, animal husbandry, veterinary care, and the facility, also referred to as the physical plant. While the evaluation process is a snapshot in time, achieving and maintaining accreditation is a continuous process requiring continuous improvements for the betterment of animal welfare and science. The eighth edition of the Guide for the Care and Use of Laboratory Animals (Guide) (NRC, 2011), the Guide for the Care and Use of Agricultural Animals in Research and Teaching (Ag Guide) (FASS, 2010), and the European Convention for the Protection of Vertebrate Animals Used for Experimental and Other Scientific Purposes, Council of Europe (ETS 123, 2006) serve as the three primary standards when applicable for the accreditation process and provide a means of ensuring best practices and maintaining regulatory compliance. As an example of the scope of applicability, ETS 123 is limited to the member countries of the Council of Europe that have voluntarily ratified the Convention, and it is not a prevailing standard in the United States. Nevertheless, ETS 123 may be of value to a program for its recommendations regarding housing environments for a variety of species. For example, while the Guide omits housing recommendations for ferrets, the guidance in ETS 123 would be useful for institutions using this species, regardless of its non-applicability as a regulatory mandate. Furthermore, ETS 123 may also be used to assess programs located outside of Europe that have established an institutional policy to follow this stand-