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Care and management

Sentinel Monitoring Program: Quality Assurance in Laboratory animal facility

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Abstract

Sentinel animal testing plays a pivotal role in management of any modern vivarium. It is an extremely useful tool to assess the microbial status of the laboratory animals as part of the comprehensive animal care program. Sentinels pick up the early infection if any, in the micro and/or macro environment, as these animals are placed in a similar environment intentionally. Sentinels are representative animals, independent of the research colonies and are maintained only for the purpose of screening the pathogenic organisms at regular intervals. At times, as part of 3R's, we have on occasion used research animals to confirm our sentinel results. Sentinel program is concerned with prompt detection of pathogens and the measures to deal with them thereby ensuring the health status of the resident colony. With an effective sentinel monitoring program preventive measures can be taken to enact either, treat, contain or eradicate the pathogen. This review provides insights into the sentinel program with respect to disease surveillance of laboratory animals and conveys why it is necessary for effective in laboratory animal program management.

Key Words: agents, sentinel program, health monitoring, test methods, serology, culture, polymerase chain reaction (PCR), enzyme-linked immunosorbent assay (ELISA), immunofluoresence Assay (IFA)

Introduction

The use of laboratory rodents has become an indispensable tool in modern biomedical research and has shown a steady increase in various therapeutic areas of research. In recent years, many institutions import animals from a commercial vendor or breed them in their facility. Strains of genetically engineered, immunocompromised animals now play a vital role in research and various therapeutic diseases. Maintenance of clean facilities becomes an even more challenging process due to movement of animals between facilities on one hand and the relatively unknown health status of newly arrived animals on the other. Thus, though the animals may have originated from barrier maintained facilities, there might still be a risk of infection during transportation.

In any institution/organization, health monitoring is considered an integral part of the quality assurance system, e.g. Good Laboratory Practice (GLP), Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC), International Standards Organization (ISO) (Nicklas *et al.* 2002 and for other regulatory purposes (Weisbroth and Emily, 2000). Health monitoring is thus

an inescapable necessity and any institution which ignores conducting a sound health monitoring plan does so at the risk of losing all its valuable animals in the event of a disease outbreak.

The outcome of any infection depends on multiple factors relating to the characteristics of the pathogen, host susceptibility, infection rate and mode of transmission. However many a times before a pathogen elicits a response in infected animals by way of evincing clinical signs, it may harbour a low grade infection which may thus interfere with the intended aim of the research. Systematic and scheduled laboratory testing is the most effective way to determine colony status and to prevent or detect influences on experiments (Nicklas, 2008). Therefore, it has been our practice to deliberately subject certain susceptible strains of animals to a challenging environment such as soiled bedding, air or contact with animals of unknown health status. Such animals have been called as sentinel animals, a word derived from the French word "sentinelle" which means "watchtower". A sentinel animal is an animal known to be susceptible to an infectious agent that is placed in the area suspected of being contaminated (CCAC, 1993), and these animals are intentionally used and then tested to see if it became infected or developed antibodies to infectious agents.

The purpose of sentinel surveillance is to detect the adventitious infections early (virus, bacteria and parasites) among rodents/non rodents that could potentially interfere with research. The aim of the sentinel surveillance is to obtain timely information in a relatively inexpensive manner rather than to derive precise estimates of prevalence or incidence in the general population (CDCP, 2002).

General Considerations:

- A decision should be made for type of agents to be screened. Enlist the organisms of interest and may be comprehensive or partial list based on the facilities available.
- Compile the prevalence of agents and the past incidence of the facility if any.
- Evaluate the reliability of the testing method (e.g. ELISA, IFA, HAI and PCR etc.)
- Frequency of the testing interval and cost of the testing procedure.

Establishing a program:

Health monitoring program can be considered to comprise of two complementary components: routine screening and diagnostic evaluation. Routine screening involves periodical sampling of a population to detect organisms based on presumed morbidity and prevalence of the organisms screened in the past. In contrast, the diagnostic evaluation of the samples is retrospective and gives an idea for the cause of the clinical disease or death in the animals. The organisms may have invaded the population long before the initiation of clinical signs and death of the animal. Hence, clinical observation, complete morbidity and mortality records along with the postmortem reports are required during the diagnostic evaluation. The main goal for the health surveillance of the colony is to detect the introduction of any agent and to act quickly to control the spread within the colony, which will mitigate the impact that disease has on the science.

Transmission routes

In many instances, the sentinel and the rest of the resident animal population is exposed to infection via the same route. Institutions that deal with frequent imports of animals and other biological materials should establish and implement an effective measure to reduce the risk of transmitting any infectious agents to the laboratory animals and the staff. For instance, *Staphylococcus aureus* is a common opportunistic inhabitant of the skin, which can profoundly affect host physiology (Baker, 1998a). Caging systems play an important role in maintaining the integrity of the health status of the animals and can minimize the exposure pattern of agents. Nowadays, many institutions have started using individually ventilated cages, biosafety cabinets for cage changes and isolators to prevent cross contamination. Although disease prevalence and outbreak management varied considerably among the facilities, these variabilities create an environment for possible cross contamination among the colonies (Carty, 2008). It is far better to prevent the introduction of pathogens than to have to account for their presence when interpreting experimental results (Baker, 1998b).

Animals

The transmission of any adventitious agent may occur from rodents shipped from vendors and/or other institutions. In order to avoid these transmissions, the packages for any kind of animal transport should be designed to prevent the animals escape, exclude the entry of microorganisms, allow visual inspection of the animals without compromising their microbiological status, and allow external disinfection of the package on arrival at the receiving facility (Mahabir *et al.* 2008). Animals may harbor any agent during transit and adequate care should be taken at the time of receiving. Improper disinfection of the exterior before unpacking can lead to contamination (Reuter and Dysko, 2003). So, the shipping crates needs to be decontaminated thoroughly before placing them into the quarantine. However, even with these extensive precautionary measures in place, there always exists a potential risk (White *et al.* 1998) for introducing any organism primarily of viral or bacterial origin.

Biological Materials

The use of biological materials such as cell lines, sera, embryonic stem cells, and sperm derived from other animals may result in the introduction of unwanted agents (Bhatt *et al.* 1986). If any of the afore mentioned materials are imported into the facility, they should be procured from institutions/vendors with necessary testing certificate ensuring that the biological materials are free from pathogens and/or need to be screened before use. A quality assurance program should confirm the status of these materials from time to time. Routine diagnostic tests like Mouse/Rat/Hamster antibody production test (MAP, RAP, and HAP) have been used extensively to identify the presence of infectious virus in biological specimens (Weisbroth *et al.* 1998). These traditional tests have now been effectively replaced by novel PCR diagnostic methods. Some of the murine viruses like lymphocytic choriomeningitis virus (LCMV) (Bhatt *et al.* 1986) minute virus of mice (MVM), mouse adeno virus, kilham rat virus (KRV), Toolan's H-1, mouse hepatitis virus (MHV), and reovirus3 have been detected in biological materials (Nicklas *et al.*1993). The most frequent contaminant is lactate dehydrogenase-elevating virus (LDV) (Nicklas *et al.* 1993) because this virus causes long lasting viremia in mice without any evidence of clinical signs. The use of parvovirus-infected rodents and contaminated cell lines can affect immunology, transplantation and oncology research (Besselsen *et al.* 2008).

Personnel

Personal hygiene and periodical monitoring of PPE's (personal protective equipment) for their quality and integrity of the materials are essential. Personnel may act as effective carriers of infection from contaminated to non-contaminated units (La Regina *et al.* 1992). Organisms may enter the facility if any breach in the PPE procedure and/or traffic pattern of the personnel occurs. Organisms of human origin like *Staphylococcus aureus* or *Klebsiella pneumoniae* are occasionally responsible for research complications, particularly in immunocompromised animals (Nicklas *et al.* 1993) because humans act as a mechanical or biological carrier for the transmission. An established traffic pattern and continuous education to the personnel can minimize the level of cross contamination into the facility. In addition, management should ensure the facility personnel coming into contact with laboratory animals have no access to other animals of unknown microbiological status.

Vermin Control

The great concerns of preventing major infections through adventitious agents are achieved by pest control program. Facilities should have rigorous monitoring procedure to prevent the entry of flying and crawling insects and wild rodents as they can carry unknown agents. Hence, the animal diets, bedding and waste materials may attract these external vermins. It is, therefore necessary to maintain the facility without any cracks, crevices and small holes especially in the walls, roofs and perimeter because these can allow entry of wild rodents into the facility.

Other Factors

The most important factors are equipment and materials used for animal experiments because these materials are considered as potential source of contamination as animals are often in contact with them. In many instances, the equipment may be shared with other laboratories within the facility increasing the possibility of contamination. An established system should be followed for transportation of materials within the facility and also for decontamination procedure by appropriate method. It is always necessary to use sterilized items (autoclaving/irradiation) in the facility and experimental materials can be disinfected with suitable agents. Drinking water is unlikely to be a source of infection, if it can be treated with a suitable method, such as (hyperchlorination/ozonization/ultra violet/reverse osmosis filtration) to eliminate the infectious microorganisms.

Sample Size for sentinel testing

The necessary sample size entirely depends on the size of animal population, the prevalence rate of eventual infection and the frequency of the testing period. Ten animals should be monitored to detect at least one positive animal if the suspected prevalence rate of an infection is 30% (confidence level: 95%) (Nicklas *et al.* 2002; Shek, 2008). There is always a heightened potential risk of introducing agents into the facility. For instance, frequent introduction of animals from multiple sources and personnel movement all can lead increased chances of infectious outbreaks. Therefore, the frequency of screening should be optimized based on the practice, type of research and physical nature of the facility. Several reports revealed the statistical consideration for the size of the samples (Selwyn and Shek, 1994; Clifford, 2001).

Sampling techniques and frequency

Once the types of screening methods and kind of organisms have been determined, the number and frequency of the samples needs to be decided for consistency. The frequency of sampling is driven by the historical rate of contaminations with extraneous agents that compromise the microbial status of the colony (Selwyn and Shek, 1994). Many biological considerations that affect the sampling frequency, particularly for serologic estimation requires minimum 14 to 21 days necessary from the time of infection until the antibody titer raises in the serum of the infected animal. Depending upon the rate and method of transmission, additional time is required for the animal to show a detectable antibody titer and to reach

maximum morbidity. Considering all variables, at least three to six weeks may be required from the introduction of the agent and to develop sufficient enough serologic evidence of the organism in animals.

Sentinel Program

Sentinel animals are placed to monitor the population being surveyed and these animals are indirectly exposed to the infectious agents by using soiled bedding. These animals are independent of the research colonies and placed only for the testing purpose to evaluate the pathogens if any. The selection of strain, stock, age and sex are important. For instance, the C57BL/6 mice are not susceptible to MPV in comparison to white mice.

Generally female animals of the same species are preferred as sentinels because they fight less than males when group housed. Age and sex of the sentinels can be selected based on the type of research adopted by the institution. In general, outbred stocks have high vigor, robust immune response to a larger pool of antigens and involves relatively low cost. Institutions using immunocompromised animals such as Nude or SCID (severe combined immunodeficiency) mice may use heterozygotes as sentinels. In breeding facilities, retired breeders may also be screened because these animals were exposed to infectious agents for longer duration and presumed that these animals are likely to have seroconverted during their tenure. Hence, seroconversion occurs consistently in young mice exposed high doses of mouse parvo virus (MPV1) equivalent to those shed by acutely infected mice (Besselsen *et al.* 2008). Nevertheless, the duration of sentinel exposure can be decided based on the characteristics of the organisms.

The sentinels should be selected from any commercial vendor provided all the health reports and/or from the In-house breeding facilities of known pathogen free status. If the animals have been procured from an outside vendor, they should be quarantined and screened before releasing them into the facility for use to avoid introducing any infectious agents.

Sentinels used can be either contact sentinels, in which case they share housing with the animals being monitored, or as indirect sentinels, in this case animals are exposed through transfer of contaminated bedding and/or air from animals selected for monitoring. Contact sentinels are preferable when assessing the health status of small number of animals (e.g., import animals in quarantine), whereas indirect exposure methods are desirable when monitoring large colonies (Lipman and Homberger, 2003). Sufficient period of association is allowed for transmission of infectious agents and presumed increase in serologic titers or development of disease. It may be desirable to select a sentinel that has higher levels of exposure and which is therefore more likely to show evidence of a pathogen if it is present than to directly survey the population itself (Halliday Jo *et al.* 2007). In addition, any animal found sick, moribund or dead during the course of time are submitted for a detailed examination so that the occurring infections can be detected at a very early stage.

Generally, sentinel cages are placed on the lower tier of the rack to maximize the fomite transmission through air particulate movement. Transmission of infections by soiled bedding was shown experimentally for fecally excreted pathogens: sialodacryoadenitis virus (La Regina *et al.* 1992), mouse hepatitis virus (Smith *et al.* 2007), kilham rat virus (Ueno *et al.* 1996 and Smith *et al.* 2007) and *Helicobacter hepaticus* readily transmitted to sentinel mice via contaminated bedding (Livingston, 1998). Scheduled transfer of soiled bedding to the sentinel cage is mandated from rest of the housing cages of the population being monitored. The soiled bedding of adequate quantity can be transferred to the sentinel cages by using a cup to avoid any cross contamination during the practice. It is preferable to use equal amount of soiled and clean bedding mix together to provide comfort to the sentinels. Exposing sentinel animals to dirty bedding enhances the sentinels chances of becoming infected and could reduce the time required to detect some pathogenic agents (Thigpen *et al.*1989). The sentinel program can be practiced in quarantine, breeding and experimental unit and cages should be identified by using bright label with all the necessary information.

Testing Methodologies

It is necessary to evaluate the testing strategy for sensitive and specific diagnostic approaches to accurately identify the pathogen in the infected colonies. The most common method to assess the presence of viral agents is to examine serum for the presence of specific antibody. Most of the viral antibodies are detected using ELISA method. Exceptions would include mouse thymic virus, for which the test recommended is indirect immunofluorescence assay (IFA), and lactate dehydrogenase-elevating virus which can be detected by supplementing a test to detect elevation of LDH in the serum. Haemagglutination Inhibition (HAI) test also be used for viral screening, however ELISA and IFA are more sensitive than HAI and are commonly used as primary tests for most of the viral agents and mycoplasma.

Nowadays, polymerase chain reaction (PCR) technique is used to detect many of the pathogens and this test doesn't require the host to have a completely functional immune system to enable detection. The PCR technique is the reliable method for the detection of *Helicobacter spp.* (Fox *et al.* 1994; Pritchettt-Corning *et al.* 2009) *CAR bacillus* (Baker, 2003) and *Pneumocystis spp.* (Pritchettt-Corning *et al.* 2009) in laboratory animals. In addition, novel multiplex diagnostic system that employs fluorescent microbeads coated with purified antigens is useful or simultaneous serodetection of

Table 1 : List of infective organisms screened in laboratory animals					
Agents	***Rat***	***Mouse***	***Hamster***	***Guinea Pig***	***Rabbit***
Mouse corona virus / Mouse hepatitis virus (MHV)		√			
Sendai virus	√	√	√	√	
Rat corona virus / Sialodacryoadenitis virus (RCV/SDAV)	√				
Kilham rat virus (KRV)	√				
Minute virus of mouse / Mouse parvo virus (MVM/MPV)		√			
Theilers murine encephalomyelitis virus (GDVII)		√			
Rota Virus (EDIM/MRV)		√			√
Pneumonia Virus of Mice (PVM)	√	√			
Rat parvo virus (RPV)	√				
Reovirus 3	√	√			
Lymphocytic choriomeningities Virus /Arena virus (LCMV)		√	√		
Lactate dehydrogenase-elevating virus (LDV)		√			
Ectromelia virus/Mouse pox		√			
Adenovirus (MAV 1 & MAV 2)	√	√		√	
Polyoma virus		√			
Hantaan virus	√	√			
Toolan's virus (H1)	√				
Mouse thymic virus (MTLV)		√			
Cytomegalovirus (CMV)		√		√	
Hemorrhagic disease virus					√
Myxoma Virus					√
Mycoplasma pulmonis	√	√			
Corynebacterium kutscheri	√	√	√	√	
Streptococcus pneumoniae	√	√		√	
Klebsiella pneumonia	√	√			
Cilia-associated respiratory bacillus (CARB)	√	√			√
Pasteurella pneumotropica	√	√			
Pasteurella multocida					√
Pasteurellaceae			√	√	
Bordetella bronchoseptica	√			√	√
Pseudomonas sp	√	√			
Staphylococcus sp	√	√			
β hemolytic Streptococci sp (group B)	√	√		√	
Clostridium piliforme	√	√	√	√	√
Chlamydia psittaci				√	
Streptococcus moniliformis	√	√		√	
Salmonella sp	√	√	√	√	√
Citrobacter rodentium		√			
Yersinia pseudotuberculosis				√	
Helicobacter sp	√	√	√		
Encephalitozoon cuniculi	√	√	√	√	√
Pneumocystis carinii	√	√			
Syphacia muris	√				
Syphacia obvelata		√			
Aspiculuris tetraptera		√			
Other endoparasites	√	√		√	√
Dermatophytes				√	√
Ectoparasites	√	√	√	√	√

Annexure - 1. List of organisms and type of samples used for laboratory animals

Agents	*Sample type*	*Assays*	*Samples for PCR assays*	*PCR Assay type*	*Rat*	*Mouse*	*Hamster*	*Guinea Pig*	*Rabbit*	*Remarks**
Viral agents										
Mouse corona virus / Mouse hepatitis virus (MHV)	Serum	ELISA IFA	Mescentric Lymph nodes, fecal pellet, liver, lung, spleen	RNA		P,C,F				√
Sendaivirus			Trachea, Lung	RNA	P,C,F	P,C,F	P,C,F	P,C,F		√
Rat corona virus / Sialodacryoadenitis virus (RCV/SDAV)			Hardarian gland, salivary gland	RNA	P,C,F					√
Minute virus of mouse / Mouse parvo virus (MVM/MPV)			Mescentric Lymph nodes, fecal pellet,	DNA		P,C,F				√
Theilers murine encephalomyelitis virus (GDVII)			Intestine, brain , fecal pellet	RNA	F	P,C,F				
Rota virus (EDIM/MRV)			Caecum, colon, fecal pellet	RNA	C,F	P,C,F			P,C,F	
Pneumonia virus of Mice (PVM)			Trachea, lung	RNA	C,F	P,C,F				√
Rat parvo virus	Serum	ELISA IFA	Mescentric Lymph nodes, fecal pellet	DNA	P,C,F					√
Kilham rat virus (KRV)				DNA	P,C,F					√
Toolan's virus (H1)				DNA	C,F					√
Reovirus Type 3	Serum	ELISA IFA	Liver, lung, fecal pellet	RNA		C,F				
Lymphocytic choriomeningities virus /Arena virus (LCMV)			Kidney, urine	RNA	P,C,F	P,C,F	P,C,F			
Lactate dehydrogenase-elevating virus (LDV)			Liver, spleen, Lymph nodes	RNA		C,F				
Ectromelia virus/Mouse pox			Spleen, skin, liver, fecal pellet	DNA		F				
Adenovirus (MAV 1)	Serum	ELISA IFA	Urine, kidney, spleen, adrenal gland	DNA	P,C,F	P,C,F		P,C,F		√
Adenovirus (MAV 2)			Intestine, fecal pellet	DNA	C,F	C,F		C,F		√
Polyoma virus			Mammary gland, skin, fecal pellet	DNA		C,F				
Hantaan virus			Kidney, lung, fecal pellet	RNA	F	F				
Mouse thymic virus (MTLV)			Salivary gland	DNA	F	F				
Cytomegalovirus			Salivary gland, urine, kidney	DNA	C,F	C,F		P,C,F		
Hemorrhagic disease virus	Serum	ELISA IFA	Liver	RNA					P,C,F	√
Myxoma virus				DNA					P,C,F	

Bacteria, mycoplasma and protozoal agents										
Mycoplasma pulmonis	Serum	ELISA	Trachea, Nasal aspirate, mouth swab	DNA	P,C,F	P,C,F				√
Corynebacterium kutscheri	Respiratory tract	culture	mouth swab	DNA	C,F	P,C,F	P,C,F	P,C,F		
Streptococcus pneumoniae			Nasal swab	DNA	P,C,F	P,C,F		P,C,F		
Klebsiella pneumonia			Nasal swab	DNA	P,C,F	P,C,F				
Cilia-associated respiratory bacillus (CARB)			Trachea, lung, lung wash	DNA	P,C,F	P,C,F				
Pasteurella pneumotropica	Respiratory tract	culture	Naso pharyngeal swab	DNA	P,C,F	P,C,F	P,C,F			√
Pasteurella multocida			Nasal aspirate	DNA					P,C,F	√
Bordetella bronchoseptica	Respiratory tract	Culture	Trachea	DNA	C,F	C,F		P,C,F	P,C,F	
Pseudomonas sp			Trachea, Intestine	DNA	P,C,F	P,C,F				√
β hemolytic Streptococci sp (group B)			Trachea	DNA	C,F	C,F		C,F		
Clostridium piliforme	Intestine	ELISA	Intestine	DNA	P,C,F	P,C,F	P,C,F	P,C,F	P,C,F	
Streptobacillus moniliformis	Nasopharynx		Nasal aspirate	DNA	C,F	C,F		P,C,F		
Helicobacter sp	Descending colon	PCR	Fecal pellet, caecum, colon	DNA	C,F	C,F	P,C,F			
Citrobacter rodentium		culture	Spleen, colon	DNA		C,F				
Salmonella sp	Colon	culture	Liver, Caecum, colon	DNA	P,C,F	P,C,F		P,C,F	P,C,F	
Yersinia pseudotuberculosis	Urine Lymph node	culture	Liver, Lung Lymph node	DNA				F		
Chlamydia psittaci	Conjunctiva genital	culture	Eye wash, mucosal swab	DNA				F		
Encephalitozoon cuniculi	Urine, Brain section	culture, HP	Kidney, brain, fecal pellet		F	F	F	F	P,C,F	
Pneumocystis carinii	Naso pharynx	culture	Lung, lung wash, nasal aspirate	DNA	F	F	F	F	F	
Syphacia muris	Tape test	Microscopy			P,C,F	P,C,F				√
Syphacia obvelata	Fecal pellet	Flotation			P,C,F	P,C,F				√
Aspiculuris tetraptera					P,C,F	P,C,F				√
Other endoparasites		Wet mount			P,C,F	P,C,F	P,C,F	P,C,F	P,C,F	
Dermatophytes		Microscopy			P,C,F	P,C,F	P,C,F	P,C,F	P,C,F	
Ectoparasites		Microscopy			P,C,F	P,C,F	P,C,F	P,C,F	P,C,F	

P - Partial Profile (6-12 weeks), C - Comprehensive Profile (18-24 weeks), F - Full profile (Annually),
Full profile includes agent of all the partial and comprehensive profiles.
Remarks* - Required screening of the agents in animal facilities in India.
Note - Histopathology and immunohistochemistry may be performed based on the diagnostic results

various infectious agents (Khan *et al.* 2005).

Samples preferred to be collected for screening of bacteria are taken from upper respiratory tract (nasopharynx/trachea) and intestinal tract (caecal contents or feces). Selective media should be used to distinguish the pathogenic bacteria from the non-pathogenic. There are some bacteria including mycoplasma which can be detected by using ELISA and PCR method. Regardless of the method adopted by the institution, an established standard operating procedure should be implemented to obtain consistent testing results.

In addition, pelt examination from the animals often provides the evidence for the presence of any ectoparasites. Skin scrapings can be taken from lesions if any and the same can be screened for mite infestation. Tape test or direct fecal floatation techniques are used to detect the presence of pinworms of *Syphacia spp.* because they deposit their ova in the perineum of the host. In contrast, *Aspiculuris tetraptera* pinworms deposit their egg within the large intestine of the host and caecal examination is most commonly used to detect the ova and adult worms. Similarly, caecal examination is used for other endoparasites (e.g. tape worms).

A detailed list of orgonisms and type of samples used for assays are given in **Annexure-1.**

Documentation of results

Detailed results pertaining to sentinels should be reviewed and filed based on functional area. Besides, the data can be incorporated as part of the experimental data. The test results should include all the relevant information's like test method, source of the samples (isolator, barrier and conventional), profile of organisms (partial/ comprehensive/full). Test results should be archived annually for further traceability and this can be served as historical data for the facility. A list of organisms provided (Table 1) and one can decide the profile of the organisms to be screened based on their nature of work.

Response to the positive resultsIt is always advisable to confirm the positive results by another laboratory and/or by repeated testing by using other reliable methods such as IFA, PCR, culture or histopathology exists for the pathogen. Serology provides an indirect measure of exposure to an agent, whereas PCR directly detects the presence of the agent and histopathology detects pathological changes induced by the microbe (Livingston and Riley, 2003). Generally, the eradication involves standard approaches (e.g. depopulation, rederivation, antimicrobial therapy, stop breeding, test and cull) (Clifford and Watson, 2008; Shek, 2008). An action plan pertaining to any emerging infectious agents should be in place to guide during confirmed positive result of any agent. For any contamination, animal care personnel and research staff work together and discuss about the impact on the research of the positives and discuss the possible action plans for elimination of the pathogen, decontamination of the facilities and evaluation of the colony.

Conclusion

The objective of this review is to provide an insight into the role of sentinel animals in detecting the adventitious microbial infections early among rodents and non rodents used in biomedical research. The effective health monitoring systems rely on early detection of unwanted organisms (Clarke and Perdue, 2004). The use of sentinel animals for disease monitoring is relatively inexpensive when no animal from hygienic unit to be examined are available for microbiological examination (e.g. immunocompromised and transgenic animals). Animal health and welfare, not to mention protection of scientists from the adverse effects of infectious disease on their research animals, are unequivocally institutional and governmental responsibilities (Barthold, 1998). The biomedical research community and laboratory animal professionals should take a proactive role in understanding the need of animal health surveillance and implementation of sentinels programs in their facility with the available resources. Further more, disease free animals can provide clean status of the facility, animal health assurance to the researchers and in turn ensure meaningful research data.

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