Pentagon Inadvertently Shipped Live Anthrax to Labs in Nine States.[i]

Not a headline you want to see in the news about your company……but if you are shipping "inactivated" biological samples or transferring them to work areas that require less vigorous laboratory practices and containment than a live sample would, you run the risk of this happening to you if you do not have robust practices in place. The impact of transfer/shipment of improperly inactivated samples can be severe: medical and disability or death expenses for infected person(s), medical expenses of those who fear they may have been infected, remediation costs, negative publicity, increased regulatory scrutiny, loss of contracts/business and third-party liability claims.

Inactivation means to render a material "free of infectious agent" or "non-viable" so that the material is no longer capable of growing, replicating, infecting, or causing disease. Inactivation procedures include physical methods such as irradiation, heat and steam sterilization (heat/pressure) and chemical methods involving the use of a chemical to inactivate the material. The inactivation method chosen must not only be effective at inactivating the infectious agent in the sample but must also allow downstream sample processing. It is important to note that inactivation to render a sample free of infectious virus may not destroy the nucleic acids of those viruses and some of these nucleic acids may still be regulated by the Select Agent Program.[ii]

If your company is inactivating samples containing infectious materials and these materials will be subsequently handled with less restrictive practices, you should follow all applicable regulations (CDC/APHIS select agent and importing, shipping, exporting; OSHA blood borne pathogens; state/local) and guidelines (Biosafety in Microbiological and Biomedical Research (BMBL); NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules). In addition, the following practices should be considered:

Written Policy to outline the company requirements and process for inactivation of samples and transfer or shipment of these materials, including requirements for documentation. The policy should include approval processes for inactivation procedures, validation plans, and transfer or shipment of materials. Persons with the appropriate expertise (i.e. microbiology, virology, infectious disease) should be consulted and be part of the review and approval processes.

Validation of Inactivation Procedures. An infectious agent or sample should not be considered inactivated until it has been subjected to an inactivation method that has been validated to be effective for that particular agent or particular sample type. Validation of inactivation procedures can include: 1) use of exact conditions of commonly accepted, previously validated method (i.e. autoclaving); 2) use of exact conditions of a published, validated method; or, 3) development and validation testing of in-house methods.[iii] Validation testing may include cell viability assays, growth analysis, in vivo exposure, and/or molecular detection assays and should always include appropriate control samples. If there is any deviation or modification from the validated method, a revalidation should be done using the new conditions before the method is used to inactivate materials. Documentation of all validation methods and testing results should be maintained.

Written Inactivation Procedures should be developed with step-by-step instructions of the exact inactivation procedures that were validated. These should be easy to follow to reduce the chance of human error. These should be specific to address what infectious agent or samples for which the method is validated, chemical concentrations and volumes required, temperature, pressure, contact time and preparation of samples prior to inactivation. Any persons performing the procedures should be trained and able to demonstrate that they understand and can perform the procedures.

Safety Testing of Samples Prior to Release and confirmation of inactivation demonstrates due diligence and provides some level of assurance that the inactivation procedures were completed properly. While it is not possible to test the entire sample, testing a percentage of each sample may be done. Safety tests to verify inactivation may include, but are not limited to, cell viability assays, growth analysis, in vivo exposure, and/or molecular detection assays. Safety testing should always include appropriate controls and all results should be thoroughly documented and maintained.

Sample Labeling Following Inactivation and Inventory Prior to Transfer or Shipment. Labeling samples as "inactivated" and the method of inactivation used provides information about the sample to laboratory personnel and others handling the material and can help to prevent samples that are not inactivated from inadvertently being transferred or shipped. Samples should be inventoried prior to transfer or shipment to insure that only properly labeled and inactivated samples are included. Quality control checks of the inventory and labeling is recommended. A copy of the sample inventory and chain of custody form should be included with all shipments and transfers.

Receipt of Inactivated Samples. Some form of inactivation documentation, along with an inventory of samples and chain of custody form, should be requested from the source institution when receiving inactivated samples. Performing some safety testing of received samples as described above, prior to handling them with limited controls and protective equipment, is good practice for protection of your employees.

Handling of Improperly Inactivated Samples. If live infectious agent is identified in inactivated samples, the samples should be secured and safety personnel and management should be notified immediately to assess the risk. Decontamination of work areas, medical surveillance or post-exposure prophylaxis for potentially exposed individuals and regulatory reporting may be required.

Many organizations have already considered these practices if they have biosafety level 3 or biosafety level 4 laboratories, but infectious agents typically handled at biosafety level 2 can also put persons at risk if they are thought to be inactivated and handled as such. Having multiple check points throughout the process protects your company by providing more oversight and increasing the opportunities for problems to be found and addressed prior to transfer/shipment.

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[i] ABC News May 27, 2015 http://abcnews.go.com/Politics/pentagon-inadvertently-shipped-live-anthrax-labs-states/story?id=31346018

[ii] Guidance on the Regulation of Select Agent and Toxin Nucleic Acids http://www.selectagents.gov/guidance-regulation.html

[iii] Non-viable Select Agents and Nonfunctional Select Toxins and Rendering Samples Free of Select Agents and Toxins http://www.selectagents.gov/guidance-nonviable.html

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