MUSC Guidelines for Pox Virus Use & Vaccination of Research Personnel

Recombinant vaccinia and other pox viruses have become common tools to investigate the expression of exogenous genes in a variety of cultured cell types as well as vehicles to deliver novel antigens for vaccination and cancer therapy. However, pox viruses when present on surfaces, in culture, used as inocula or to infect laboratory animals are potential sources of infection to research personnel. The following guidelines are intended to ensure a safe work environment for research personnel and will facilitate compliance with the guidance set forth by the NIH endorsed CDC publication Biosafety in Microbiological and Biomedical Laboratories as well as the CDC’s Vaccinia (Smallpox) Vaccine Recommendations of the Advisory Committee on Immunization Practices. All research involving poxviruses MUST therefore comply with the following.

- All research involving recombinant DNA, microorganisms or biological toxins MUST be registered with MUSC’s Institutional Biosafety Committee.
- All manipulations involving poxviruses must utilize, at a minimum, Biosafety Level 2 containment with safety practices commensurate with the level of risk associated with the protocol.
- Whenever possible, all manipulations of pox viruses should be conducted in a biosafety cabinet. When experimental procedures preclude use of a biosafety cabinet added personal protective equipment MUST be utilized to provide protection to the eyes, nose and mouth.

Vaccination

Multiple strains of vaccinia virus are available for use. The level of virulence and thus risk from their manipulation vary for humans and animals. Depending on the strain used, vaccinia virus presents varying levels of health risk to laboratory personnel. Highly attenuated strains are typically unable to replicate or replicate poorly in human cells and tissues and thus, vaccination of research personnel is not recommended as vaccination against this virus also carries a risk.

Vaccination is not recommended for individuals working with the following highly attenuated strains:

<table>
<thead>
<tr>
<th>Highly Attenuated Strain</th>
<th>Derived from</th>
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<tbody>
<tr>
<td>MVA</td>
<td>Vaccinia virus (Ankara)</td>
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<tr>
<td>NYVAC</td>
<td>Vaccinia virus (Copenhagen)</td>
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<tr>
<td>TROVAC</td>
<td>Fowlpox virus</td>
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<tr>
<td>ALVAC</td>
<td>Canarypox virus</td>
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Non-highly attenuated strains possess the ability to replicate in human cells and tissues and pose a sufficient level of risk to merit recommending vaccination.
**Vaccination is recommended** for researchers who directly handle cultures, inoculum or animals infected with:

- Non-highly attenuated vaccinia virus strains
- Recombinant vaccinia viruses derived from non-highly attenuated strains
- Other Orthopoxviruses capable of infecting humans (such as: cowpox, monkey pox, etc.)

The CDC recommends revaccination every ten years for personnel working with non-highly attenuated vaccinia virus and recombinant viruses derived from non-highly attenuated vaccinia viruses.

Principal Investigators submitting IBC applications for research involving non-highly attenuated vaccinia or other Orthopoxviruses must offer vaccinations to their research personnel who may come in contact with the viruses. Research personnel may elect to be vaccinated or sign a vaccination declination form. Research personnel must undergo medical evaluation prior to receiving inoculations. The Principal Investigator is responsible for arranging for the vaccination of personnel requesting immunizations and must contact the Biosafety Officer for assistance obtaining the vaccine and coordinating with Employee Health Services to perform medical evaluations and inoculations.

Several laboratory acquired infections caused by vaccinia viruses have been documented, some of which resulted in significant hospitalization. Vaccination against vaccinia results in high seroconversion rates and only infrequent adverse events; however, there are classes of individuals who have health conditions that in and of themselves predispose them to adverse consequences. As such any individual requiring vaccination MUST CONSULT with his/her primary care physician and MUSC employee or student health prior to receiving a vaccination against this agent. Should the healthcare team deem the risk of an adverse consequences to be of sufficient concern the potential vaccinee will not be vaccinated nor allowed to work with or be present when the agent is in use.

The resulting immunity from a successful course of vaccination by scarification should provide sufficient protection in recipients from developing a substantial infections resulting from uncontrolled, inadvertent exposure by unusual routes (e.g., the eye) with a substantial dose of virus of higher or unknown pathogenicity.

The following CDC links address vaccine efficacy, side effects and contra-indications.

- Smallpox Vaccine: Information for the General Public
- Vaccinia (Smallpox) Vaccine Recommendations of the Advisory Committee on Immunization Practices
- Smallpox Vaccination: Information for Health Professionals
- Smallpox Vaccination: Adverse Events
Vaccinia is a live virus vaccine which may be shed from the inoculation site. The CDC has documented several cases of vaccinia virus transmission via physical contact with vaccinees.

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5305a3.htm (2002-2004)

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5619a4.htm (2007)

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5925a2.htm (2010)

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6208a2.htm (2012)