

Biological Agent Reference Sheet (BARS)

The content of this document is for Emory University use only.

The information and contents of this Biological Agent Reference Sheet (including all text and graphics), whether available in print or electronic format (including any digital format, e-mail transmissions, or download from the website), shall be known hereinafter as "Reference Sheet Content". The Reference Sheet Content is provided as a courtesy and is not intended as a sole source of guidance in the evaluation of biological agents. The Reference Sheet Content is not intended to substitute for medical advice, medical care, diagnosis, or treatment obtained from a physician or health care provider. Please seek the advice of a physician or other qualified health provider with any questions you may have regarding a medical condition. Do not rely on the Reference Sheet Content for diagnosis, treatment, or medical advice. This Reference Sheet Content is for informational purposes and does not provide individualized medical care or treatment. No endorsement of any specific tests, products, or procedures is made by Reference Sheet Content or affiliated party, member, agent or employee of the Emory University Environmental Health and Safety Office.



BIOLOGICAL AGENT REFERENCE SHEET
Modified Vaccinia Virus Ankara (MVA)

BACKGROUND		MEDICAL PRECAUTIONS / TREATMENT					
<i>Development and Uses</i>	Modified Vaccinia Virus Ankara (MVA) was originally developed as an attenuated vaccinia virus strain for smallpox vaccination. It is now used as a vector for delivering recombinant constructs for numerous purposes and vaccines for other pathogens.	<i>Vaccines</i>	Individuals working in laboratories with only replication-deficient strains of vaccinia virus are not required to be vaccinated.				
CHARACTERISTICS & DEVELOPMENT		LABORATORY HAZARDS					
<i>Morphology and Genome</i>	Family <i>Poxviridae</i> ; genus <i>Orthopoxvirus</i> . MVA is enveloped with a highly asymmetric structure (ellipsoidal, brick shaped, or barrel shaped) measuring approximately 360 × 270 × 250 nm, with a single, linear dsDNA genome of 178 kb. MVA was generated from ancestor virus Chorioallantois Vaccinia virus Ankara (CVA; Turkish vaccine institute in Ankara) in 1968 by serial passage. Isolate F6, derived by 572 serial passages in chicken embryo fibroblasts (CEF), resulted in six major deletions. MVA is replication-deficient in most mammalian cells and does not produce many virulence factors. MVA has a large packaging capacity for heterologous DNA and is considered a vaccine virus of choice in preclinical and clinical research.	<i>Exposure</i>	Contact with mucous membranes (mouth or eyes), ingestion, inhalation of viral particles, and injection.				
<i>Growth Conditions</i>	BHK-21 [C-13] fibroblasts isolated from the kidney of an uninfected golden hamster are commonly used. The cells are incubated at 37°C with 5% CO ₂ in air atmosphere.	PERMIT REQUIREMENTS					
POTENTIAL HAZARDS		<i>USDA/State</i>	Importing MVA requires a VS 16-6A import permit. You should confirm import requirements with the USDA and your state's department of agriculture.				
<i>Host Range, Recombination, Transgene, and Strain Heterogeneity</i>	In avian species: MVA has an excellent safety profile in chicken hosts. In embryonic chicken tissues, the liver is the major target organ, macrophages and hematopoietic cells are the primary target cells, and chorioallantoic membrane is the major site of MVA replication. Nevertheless, in embryonic chicken tissues, increasing doses of MVA do not result in increased lesion severity or embryonic death. MVA-based vaccines are promising for protection of parrots against avian bornavirus.	CONTAINMENT					
	In mammalian species: MVA is replication-deficient in most mammalian cells. However, some mammalian cell lines support limited MVA replication (e.g., human embryonic kidney (HEK) 293 cells, HeLa cells, human Caco-2 cells, Chinese hamster ovary (CHO) cells, and BHK-21 cells). It is important to note that 1) "MVA productively infects human Caco-2 cells after multiple serial passages in Caco-2 cells" (Viruses. 2017 Nov; 9(11): 318). 2) Recombination can occur in vitro between MVA vectored vaccine and wild type cowpox virus (CPXV) in cell lines that are semi-permissive to MVA (Viruses. 2017 Nov; 9(11): 318). 3) Nonreplicating MVA still enters target cells where recombinant constructs are translated. Risk associated with recombinant constructs must be evaluated on a case-by-case basis. In addition, strains should be evaluated for homogeneity by PCR, sequencing, or infection studies to ensure there are no variants present that can replicate in mammalian cells.	<i>BSL2/ABSL2/ABSL1</i>	Containment Level 2: Work in a biological safety cabinet (BSC). Use aerosol-tight centrifuge rotors, load/unload centrifuge inside a BSC, and decontaminate centrifuges after use. Inoculated animals shed MVA during the first few hours and should remain at ABSL-2 for 72h, then moved to ABSL1.				
<i>Modes of Transmission</i>	The risk of MVA transmission apart from vaccination or inoculation of cells in the laboratory is very low, but accidental exposure could occur (e.g., by needlesticks).	SPILL PROCEDURES					
<i>Signs and Symptoms</i>	In rare cases, exposure to MVA may cause serious allergic reaction including difficulty breathing, dizziness, or swelling of the face and neck.	<i>Small</i>	Notify others in the area and allow 30 minutes for aerosols to settle. Don appropriate PPE. Cover the spill with paper towels and apply disinfectant effective against MVA, working from the perimeter towards the center. Allow 30 minutes of contact time before disposal and cleanup of spill materials.				
		<i>Large</i>	Contact Emory's Biosafety Officer (404-357-1821) or The Spill Response Team (404-727-2888).				
		EXPOSURE PROCEDURES					
		<i>Mucous membrane</i>	Flush eyes, mouth, or nose for 15 minutes at an eyewash station.				
		<i>Other Exposures</i>	Wash area with soap and water for 15 minutes.				
		<i>Seek Medical Attention</i>	<table border="1"> <tr> <td>7:30 am - 4:00 pm (OHS): 404-686-8578</td> <td>After Hours: OIM NP On Call 404-686-5500, PIC# 50464</td> </tr> <tr> <td>Needle Stick: EUH (404-686-8587) EUHM (404-686-2352)</td> <td>ENPRC: Maureen Thompson Office (404-727-8012) Cell (404-275-0963)</td> </tr> </table>	7:30 am - 4:00 pm (OHS): 404-686-8578	After Hours: OIM NP On Call 404-686-5500, PIC# 50464	Needle Stick: EUH (404-686-8587) EUHM (404-686-2352)	ENPRC: Maureen Thompson Office (404-727-8012) Cell (404-275-0963)
7:30 am - 4:00 pm (OHS): 404-686-8578	After Hours: OIM NP On Call 404-686-5500, PIC# 50464						
Needle Stick: EUH (404-686-8587) EUHM (404-686-2352)	ENPRC: Maureen Thompson Office (404-727-8012) Cell (404-275-0963)						
		<i>Reporting</i>	Report incident to supervisor and complete an employee incident report in PeopleSoft.				
		DISINFECTION					
		<i>Disinfectants</i>	1) 1:10 dilution of bleach (5.25% sodium hypochlorite) for 30 minutes or overnight. 2) quaternary ammonium compounds (QACs) 3) povidone-iodine hand wash and hand rub products [MVA was introduced in 2014 as a reference virus for evaluating the virucidal activity of hygienic hand rub and hand wash for enveloped viruses (European Standard EN14476:2013/FprA1:2015)].				
		PERSONAL PROTECTIVE EQUIPMENT (PPE)					
		<i>Minimum PPE Requirements</i>	Wear gloves, closed toed shoes, a lab coat, and appropriate face and eye protection.				
		<i>Additional Precautions</i>	Use respiratory protection if work will be performed outside a biosafety cabinet.				