RESEARCH WITH YELLOW FEVER VIRUS (YFV)

Laboratory-acquired Yellow Fever Virus infections have been reported in the literature. These Guidelines were designed to establish a system of information and safeguards that must be followed at the University of Pittsburgh when using Yellow Fever Virus.

1. SCOPE

1.1. **Agent -** Yellow Fever Virus (YFV) is an Arbovirus of the family Flaviviridae.

1.2. **Incidence -** Endemic in equatorial Africa and South America. Estimated 200,000 cases per year, and 40,000 deaths per year. YFV is not endemic in the U.S.

1.3. **Sequelae -** Causes a range of disease from mild febrile illness to jaundice and hemorrhage. The case fatality rate is approximately 20%.

1.4. **Vaccine -** 17D-204 strain YF-VAX is an attenuated live vaccine licensed for use in the U.S. Primary vaccination is a single subcutaneous injection. Evidence from multiple studies demonstrate that yellow fever vaccine immunity persists for 30-35 years. Precautions and contraindications to this vaccine are noted for infants <9 months, pregnant women, nursing mothers, individuals with altered immune status or persons hypersensitive to eggs. More information regarding side effects of vaccination and contraindications are found in this vaccine's information sheet.

1.5. **Laboratory Hazards and Communicability**

1.5.1. Use of YFV is restricted to Biosafety Level 3 or Animal Biosafety Level 3 (BSL-3/ABSL-3) facilities with strict adherence to BSL-3/ABSL-3 practices.

1.5.2. YFV can be transmitted in a laboratory setting through needlesticks and inhalational accidental exposures. Vaccine-induced immunity presumably protects against exposure through a percutaneous or inhalation route. Exposure to aerosolized YFV, and particularly to high concentrations of virus that might occur during viral purification, potentially could lead to infection through mucous membranes.

1.5.3. YFV infections are not transmitted person to person, or via contact or common vehicles.

1.5.4. Instances of mother-to-child transmission of the vaccine strain of YFV via breastfeeding[1] and mother-to-fetus transmission of YFV infection[2] have been documented.

1.6. **Employees at Risk-** Handling of the YFV agent and/or research animals experimentally infected with YFV creates the highest risk of exposure and potential infection. Due to the presence of BSL-3 engineering controls and work practices and the use of proper respiratory protection, employees entering areas where YFV is utilized are at less risk of infection.

2. GUIDELINES

2.1. All Principal Investigators (PI's) using YFV must be registered with the Biosafety Officer/EH&S. A registration document may be obtained from the web site www.ehs.pitt.edu.

2.2. Biosafety Level 3 practices, containment equipment and EH&S-approved BSL3/ABSL3 facilities are required for all activities involving the use or manipulation of YFV and infected animals. A protocol-specific Biosafety Level 3 Manual is required for all YFV research, and must be approved by EH&S and the University Biohazards Committee prior to initiating YFV research.

2.3. Laboratories shall be inspected by EH&S at least annually to verify appropriate BSL-3 containment, practices and restricted access.

2.4. All individuals who directly handle a) cultures or b) animals contaminated or infected with non-attenuated YFV strains that infect humans must be medically screened by Employee Health Services for contraindications to YFV exposure and/or YFV vaccine. Vaccination is required for individuals seeking to handle YFV or infected animals at the University of Pittsburgh.

2.5. Occupational Health Requirements

2.5.1. All personnel entering any BSL-3/ABSL-3 facility at the University of Pittsburgh must be enrolled in the University's Respiratory Protection Program, and have been successfully fit-tested for respiratory protection in the previous twelve months.

2.5.2. All personnel entering BSL-3/ABSL-3 facilities must have undergone a BSL-3 Worker Health Screening from Employee Health Services (*My*Health@Work), Medical Arts Building, Suite 500.59, Pittsburgh, PA 15213, 412-647-4949, 7 AM – 3:30 PM, in the previous three years.

2.5.3. Evidence of vaccination for YFV (or physician documented evidence of prior infection) is required for all individuals before handling YFV cultures or YFV infected animals at the University of Pittsburgh. This requirement shall be stated in respective job descriptions for University personnel.

2.5.4 For persons entering research facilities using YFV at the University of Pittsburgh but are not directly handling YFV agents or animals, the YFV vaccine is available at no cost by contacting Employee Health Services.

2.5.5 Women of childbearing age or women who plan to or become pregnant while performing research that requires direct handling of YFV or YFV-infected animals should consult with Employee Health Services to discuss potential risks to mother and child.

2.6. Individuals refusing or having a medical contraindication to the YFV vaccine as determined by the Employee Health Services will be prohibited from handling YFV or infected animals at the University of Pittsburgh. The determination of all prohibited tasks will be made by the employee's supervisor in consultation with the Department of Environmental Health and Safety.

2.6.1. Staff members refusing or having a medical contraindication to the YFV vaccine shall be referred to their supervisor. The supervisor in consultation with the Office of Human Resources (and if necessary EH&S and Employee Health) will examine the feasibility of other duties for the employee that do not involve handling of YFV.

2.6.2. Faculty members refusing or having a medical contraindication to the YFV vaccine shall be referred to the respective department chair or dean. The supervisor in consultation with the Office of Human Resources and the Office of the Provost (and as necessary EH&S and Employee Health Services) shall determine other duties for the faculty member that do not involve handling of YFV.

2.7. Visitors are not to handle YFV or infected animals at the University of Pittsburgh unless they have demonstrated proficiency at BSL-3 practices and have documented evidence of vaccination.

2.8. It shall be the responsibility of the Principal Investigator and/or individuals responsible for control of access to a YFV facility to assure that individuals with potential YFV exposure are enrolled in the occupational health requirements of this Procedure and are vaccinated prior to initial handling of YFV.

2.9. Laboratory personnel must wear personal protective equipment when handling these agents to include at a minimum a lab coat, liquid barrier gloves and respiratory protection. All personnel entering BSL3 containment facilities must abide by the garbing requirements for the specific facility as established by EH&S. Refer to the University of Pittsburgh Safety Manual Section V, Policy 05-003 for more details on Biosafety level 3 requirements.

3. References

3.1. Kuhn, S., Twele-Montecinos, L., MacDonald, J., Webster, P., and B. Law. Case report: probably transmission of vaccine strain of yellow fever virus to an infant via breast milk. CMAJ. 183(4): E243-E245, 2011.

3.2. Bentlin, M. R., Monteiro de Barros Almeida, R. A., Coelho, K. I. R., Ribeiro, A. F., Siciliano, M. M., C. M. Castelo Branco Fortaleza. Perinatal transmission of yellow fever, Brazil, 2009. Emerg. Inf. Dis. 17(9): 1779-1780, 2011.