Smallpox

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Disease: Etiologic Agent
The variola virus that started to emerge in human populations thousands of years ago mainly causes the viral disease known as smallpox. This disease can be fatally infectious and caused raised bumps that start to appear on the face and body of an infected person (1). There are a total of 4 types of variola major smallpox: ordinary, modified, flat, and hemorrhagic. In the past, variola major proved to have a fatality rate of about 30%, but flat and hemorrhagic smallpox are proven to be fatal as well (1).

Transmission:
In general, smallpox can be transmitted through direct face-to-face contact from one person to another. This disease can also be spread through direct contact with the infected body fluids of patients or contaminated objects such as water cup, blanket, or clothing. The host for variola virus, cause agent of smallpox, is usually human. This virus spread usually in enclosed spaces such as houses, buses or trains (1).

Reservoirs
So far, humans are the only known reservoir for the smallpox viruses (2). Currently in the world right now, there are only 2 known sources of the viruses, the CDC (Center for disease Control and Prevention) in Atlanta, Georgia, and Vector (Russian State Centre for Research or Virology and Biotechnology) in Siberia, Russia. The treaty in 1972 involves the major countries in the world to get rid of their supplies on the viruses to prevent the future threat of bioterrorist (3). Up to date, there is no other natural reservoir exist for the disease (2). It is known to scientists and researchers that smallpox in humans, as seen throughout history, was the only known case of the virus’s transmissible form.

General Characteristics of MO
The variola viruses are a part of the family Poxviridae, subfamily Chodopoxvirirae, genus Orthopoxvirus. The Orthopoxvirus have a size of about 300x250x200 nm, and have an outside envelope and a second membrane underneath it (4). Instead of having a capsid like other viruses, the poxviruses have a nuclesome with genetic material in it and are usually surrounded by its own membrane. This kind of viruses can contain single, linear, or double –stranded DNA molecules of up to 130-275 kb pairs (4).

Key tests for Identification
Most of the common smallpox cases are usually identified by its characteristics or any sign of the symptoms appear on the patient’s body. Key tests
such as negative staining, VZV test, and virus’s observation through PCR can be use in the diagnosis process (1).

**Signs and Symptoms of Disease**

During the first 2 weeks of exposure to the virus, there are no known sign of symptoms. The first sign of symptoms during the prodromal period can include fever, malaise, vomiting, and body aches. After about 4 days of infected with those symptoms, rash emerges on the body as red spots. Eventually, big bumps start to appear on the body as well. Those bumps become pustules and those pustules will eventually form a crust and scab (1).

**Historical Information**

Smallpox has a history of infecting many people over the course of thousands of years. Early researchers found an Egyptian Pharaoh Ramses V (Deceased in 1157 BCE) that shown similar smallpox symptoms on his remains. The ancient Sanskrit medical texts dated around 1500 BCE, describing a disease called smallpox. This evidence shown that the disease itself has existed around Europe in 300 BCE (5). Around 20th century, more than 300 million people died from smallpox, and last known case for smallpox was in Somalia around 1977 (5). Around 1796, Edward Jenner came up with the method of immunization to prevent contacting the disease, and by 1980, his method was proven to be effective.

**Virulence Factors**

The variola viruses, the most virulent member of the Orthopoxvirus, infect only humans so far, and have no other reservoir. There are over 80 proteins of the variola virus located in the terminal regions of the genome. In up to date, only two of those proteins have been characterized; smallpox inhibitor of complement enzyme (SPICE) and a high affinity secreted chemokine-binding protein type II (6). For SPICE, it is a complex series of enzyme that can inactivate the immune response. SPICE can prevents the stabilization of human C3b and C4b, inactivates the convertases, and decreases the production of inflammatory mediators C3a, C4a, and C5a (6).

**Control/Treatment**

In the modern world today, there are no specific treatment for the smallpox disease. The most effective control/treatment route toward smallpox is through vaccination (1). Special fluids and medicines can be used to help control the symptoms. Usually an infected person need to be isolated from family members and treated with care until the symptoms began to withdraw. Post-vaccination shown that there are little or less symptoms in a non-infected person after immunization. Since smallpox require human reservoir, it is important to limit access to public reservoir, and prevent come in contacts with an infected individual (1).

**Prevention/Vaccine Info**

In the case of a smallpox outbreak, infected individuals are kept in isolation to control the spread of virus. Those that come in contact with the infected need to be vaccinated to lessen the severity of the disease within 4 days of exposure to the
virus (7). The vaccines use a live virus that is related to smallpox, which in turn, can cause serious complications such as infections that can affect the brain or heart. This is probably the main reason why a general vaccination program for everyone is not really recommended to the public mass (7).

**Local or Global Outbreaks and Cases**

The current global and local incidents for smallpox right now is 0. This is mainly due to the eradication of the disease around 1980 (1). The last natural outbreak in U.S occurred in 1949, where about 8 people contracted smallpox and 1 died, was prevented with vaccination to the virus. Around 1920, the incident rate in United States went up to around 110,620 per million. The last natural occurring case globally of smallpox was in 1977 in Somalia, with a population of about 400,000 and more than 800 cases has been detected in 239 outbreak (8). Prior to the eradication of smallpox, it had a high incident rate across the globe. Especially in 1920, around 26,400 incidence per million were reported in Italy, and about 126,420 incidences were reported in USSR (9).

**Work cited Reference**