Molecular Detection of Smallpox Virus and Other Orthopoxviruses

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Technology description

Description

The National Microbiology Laboratory (NML) has developed a highly sensitive toolkit to identify orthopoxvirus and distinguish human smallpox from monkey smallpox camel smallpox and vaccines. It contains primers, amplification solution for DNA strand polymerization, positive control, confirming that the test is conducted under conditions conducive to polymerization, and establishing synthetic models to produce genetic material corresponding to HA and cmB gene sequences of human smallpox and monkey smallpox viruses.

The length polymorphism of amplified DNA restriction fragment (PCR-RFLP) was analyzed by NML kit to identify orthopoxvirus. The strands of DNA molecules are isolated and used as a matrix to produce the same DNA molecules as the starting molecules. The NML kit contains primers capable of matching and elongating specific regions (HA or crmb regions) in the DNA strand of the orthopoxvirus. In the presence of orthopoxvirus, appropriate primers bind and produce DNA strands. The obtained genetic material is then subjected to restriction endonucleases (Sau3AI and SPE I of the HA region, and DrI, Alw44I, SSP I and HPA I for crmb), which interact with specific fragments of the genetic material and fragment the chain.

Through the analysis of the enzyme sections, we can identify the existence of orthopoxvirus strains.

Business Opportunities

Smallpox detection technology is an important tool in the bioterrorism toolkit. The National Microbiology Laboratory kit detects smallpox virus and distinguishes it from other orthopoxviruses, and includes a positive control to verify that test conditions produce reliable results. This is a terrible weapon in smallpox control. I don't think RFLP technology is suitable for field use.

Challenges

Smallpox is a highly contagious and often fatal disease caused by the orthopoxvirus. The effective treatment of smallpox is unclear, and the mortality rate of non-immunized individuals is about 30%. One hundred dollars. The virus is usually transmitted by droplets from the throat. The disease is

characterized by fever, headache, discomfort, and low back pain and usually occurs between 12 and 14 days after infection. The rash occurs about three days after the initial symptoms. If the result is fatal, death usually occurs 5-6 days after the eruption.
The last reported case of smallpox occurred in Somalia in October 1977 and is estimated to have been eradicated. Vaccination against smallpox ceased in North America and almost all European countries in the 1970s and has been completely stopped since the 1980s. Over time, however, immunity gained through immunization has declined. All smallpox isolates will be destroyed or stored in United States or Russian Sokuk, but may still be used for bioterrorist purposes.
We need smallpox control tools to address the threat of bioterrorism. It is important to quickly identify infections so that rapid action can be taken to avert epidemics. However, in medicine, formal identification of the virus remains difficult, as smallpox is easily confused with chickenpox and is almost impossible to distinguish from smallpox in monkeys, whose pathogens also belong to the genus Orthopoxia. Many orthopox testing techniques are incapable of distinguishing between species or lack of positive controls, and it is not possible to determine whether the test was conducted under the correct conditions. A method of identifying positive smallpox, distinguishing human smallpox from monkey smallpox, camel smallpox and vaccine, supplemented by a positive control, will be an important tool for preventing smallpox epidemics.

Institution

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