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Marburg Fever

Pathogen: *Marburg virus*

The Marburg virus was first isolated simultaneously in Germany and ex-Yugoslavia in 1967. It takes its name from the German city where the disease was described for the first time. The zoonotic (animal-to-person transmission) Marburg virus is part of the filoviridae family, which are characterised by their filamentous structure (from the Latin “filo” = thread-like). The protective lipid membrane of the viral particle encases a helically wound nucleo-capsid (spiral protein shell), which contains single-stranded, negative-sense RNA (single segment; approx. 19,100 bases). 80 nm in diameter and up to 1400 nm in length, filoviruses are the best known of RNA viruses.

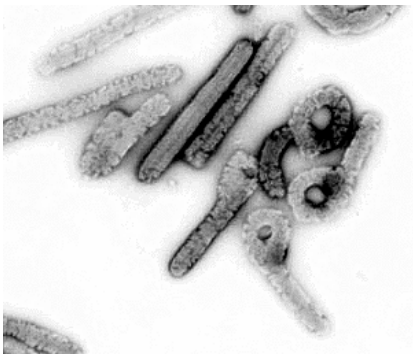

BILD: Columbia University, Oracle, USA.

Occurrence

Marburg viruses are endemic in Uganda, West Kenya, and possibly Zimbabwe. It is likely that the virus has spread to other regions. In Europe, the first cases of the Marburg virus were documented in 1967 (the source was vervet monkeys imported from Uganda). 31 people fell ill, of which 7 would later die within a few weeks. Since then, Europe has not had any new reported cases.

- In 1975, a man travelling in Africa contracted the virus (most probably in Zimbabwe) and fell fatally ill in South Africa. He had also infected his travelling companion and a nurse; both survived.
- In 1980 there were two cases in Kenya; in 1987 a further case was reported.
- Since March 1999, cases were reported in Durba (Congo). The source of the outbreak was gold miners and their relatives.
- Between March and September 2005, 374 people fell ill in Angola. 329 subsequently died, making the case-mortality extremely high – 88%. For the first time, the majority of victims were children (75%).

Transmission

The reservoir of the Marburg viruses is unknown. There is also little knowledge on how the virus spreads. The only indication so far is that it can be traced to monkeys imported from Uganda. In cases of Marburg virus to date, transmission occurred through direct contact with infected patients or monkeys, or through indirect contact with infected bodily fluids or contaminated objects. Filoviruses enter the body through the skin and mucous membranes. The ingestion of contaminated foodstuffs may also be a transmission route. Aerosol transmission has only been proven under laboratory conditions.

Symptoms (pathology)

The incubation period (time between infection and appearance of the first symptoms) varies widely from 5 to 10 days. After the incubation period, the onset of the illness is characterised by fever, headaches, muscle pain, vomiting, and in most cases watery diarrhoea. After a week, a rash appears on the whole body and the oral mucous membrane turns red.

Patients become delirious and eventually fall into a coma, or develop sensory dysfunction and paralysis. Frequently, bleeding in the gastrointestinal tract occurs. During the fatal phase of the disease, severe haemorrhaging in several organs occurs by the 10th day, which very quickly leads to coma and death. Surviving patients take several months to recover. Even 83 days after the onset of the illness, the virus has been found in ejaculate and in the aqueous fluid of the anterior chamber of the eye. The case-mortality rate for the Marburg virus is between 23% and 90%.

Diagnosis (identification)

The symptoms are the first indicator of infection. This diagnosis is then confirmed by immunological tests, e.g. ELISA (enzyme-linked immunosorbent assay), or molecular tests, such as reverse transcription polymerise chain reaction (RT-PCR).
Although the filamentous structure of the virus facilitates identification, only level 4 biosafety laboratories are authorised to carry out such procedures by means of an electron microscope. Since it is virtually impossible to detect the virus early and a confirmed diagnosis is time-intensive, containment of the disease becomes problematic, leading to relatively large outbreaks. Switzerland has yet to carry out any diagnostic procedures with regard to the Marburg virus.

Therapy

Neither a vaccine nor specific medication currently exists to treat Marburg viral infections. Recent vaccine trials with artificially manufactured filovirus membranes have produced very promising results in rodents and primates. Normally, the nucleoside analogue and antiviral drug Ribavirin is administered, (as for the Ebola viruses) during the first days following infection. However, the success of this therapy is slim. Supportive therapy generally involves intensive medical care. When treating infected patients, nursing staff must take the necessary measures to protect themselves.

BILD: Provinz von Uige, Angola, 2005
World Health Organization (WHO)

Filoviruses as biological weapons

Filoviruses meet main bioweapon criteria. They are highly contagious (person-to-person transmission) and have a high mortality rate. To date there is no prophylaxis or therapy, and the diagnosis of filoviruses must be carried out under special conditions, such as level 4 biosafety laboratories. However, filoviruses have a limited ability to survive in the environment and the effectiveness of aerosol infection is unclear. Genetic engineering may make it possible to manufacture aerosolised filoviruses, thus underlining their bioweapon potential.

Literature

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