stocks of infectious variola viruses have been destroyed. However, it can not be excluded that poxviruses inducing smallpox or smallpox-like diseases might again become a major health problem. In addition, there is a risk that a poxvirus disease of animals is spread to humans.

Moreover, there may also be other situations in which it is desirable to induce a rapid immune response, e.g. it might be desirable to induce a rapid immune response against diseases which are endemic in some parts of the world if it is necessary to travel to such a country at short notice.

Detailed description of the invention

The present invention relates to a method for the rapid induction of a protective immune response in an animal, including a human, comprising the step of administering to the animal, including the human a poxvirus that is replication incompetent in said animal, including the human. The invention further relates to the use of said replication incompetent poxvirus for the preparation of a vaccine for the rapid induction of a protective immune response and to a poxvirus as vaccine for the rapid induction of a protective immune response, wherein the poxvirus is a replication incompetent in said animal, including the human.

In one aspect, there is provided the use of a Modified Vaccinia Virus Ankara (MVA) for the preparation of a vaccine for inducing a protective immune response to an infectious agent in an animal, including a human, wherein the vaccine is administered to the animal within 7 days or less prior to infection with the infectious agent.

In one aspect, there is provided the use of a modified Modified Vaccinia Virus Ankara (MVA) for inducing a protective immune response to an infectious agent in an animal, including a human, wherein the MVA is administered to the animal within 7 days or less prior to infection with the infectious agent.

The term "replication incompetent poxvirus" and the synonymous term virus that is "not capable of being replicated to infectious progeny virus" refer to poxviruses that do not replicate at all in the cells of the vaccinated animal and to viruses that show a minor residual replication activity that is controlled by the immune system of the animal, including the human to which the poxvirus is administered.

According to an embodiment of the present invention the replication incompetent poxviruses are viruses that are capable of infecting cells of the animal, including the human in which the virus is used as vaccine. Viruses that are „capable of infecting cells" are viruses that are capable of interacting with the host cells to such an extent that the virus or at least the viral genome becomes incorporated into the host cell. Although the viruses used according to the present invention

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Use of a Modified Vaccinia Virus Ankara (MVA) for the preparation of a vaccine for inducing a protective immune response to an infectious agent in an animal, including a human, wherein the vaccine is administered to the animal within 7 days or less prior to infection with the infectious agent.

2. Use of a modified Modified Vaccinia Virus Ankara (MVA) for inducing a protective immune response to an infectious agent in an animal, including a human, wherein the MVA is administered to the animal within 7 days or less prior to infection with the infectious agent.

3. A method for inducing a protective immune response to an infectious agent in an animal, including a human, comprising administering to the animal, including the human, a Modified Vaccinia Virus Ankara (MVA) 7 days or less prior to infection with the infectious agent.

4. The use according to claim 1 or claim 2, or the method according to claim 3, wherein the MVA is MVA-BN.

5. The use according to claim 1 or claim 2, or the method according to claim 3 or claim 4, wherein the MVA is selected from MVA strains MVA 575 and MVA 572.

6. The use according to any one of claims 1, 2, 4 or 5, or the method according to any one of claims 3 to 5, wherein the MVA is a clone purified virus.

7. The use according to any one of claims 1, 2 or 4 to 6, or the method according to any one of claims 3 to 6, wherein the MVA has been obtained in a serum free cultivation process.

8. The use according to any one of claims 1, 2 or 4 to 7, or the method according to any one of claims 3 to 7, wherein the MVA is administered in a dose of 10^5 to $5x10^8$ $TCID_{50}$/ml.

9. The use according to any one of claims 1, 2 or 4 to 8, or the method according to any one of claims 3 to 8, wherein the MVA is administered intravenously, intramuscularly or subcutaneously.

10. The use according to any one of claims 1, 2 or 4 to 9, or the method according to any one of claims 3 to 9, wherein the protective immune response is a protective immune response against a poxvirus infection.

11. The use or method according to claim 10, wherein the immune response is against a smallpox infection.

12. The use according to any one of claims 1, 2 or 4 to 11, or the method according to any one of claims 3 to 11, wherein the MVA is a recombinant poxvirus.

13. The use or method according to claim 12, wherein the recombinant poxvirus comprises at least one heterologous nucleic acid sequence.

14. The use or method according to claim 13, wherein the heterologous nucleic acid sequence is a sequence coding for at least one antigen, antigenic epitope, and/or a therapeutic compound.

15. The use or method according to claim 14, wherein the antigenic epitopes and/or the antigens are antigenic epitopes and/or antigens of the infectious agent.

16. The use or method according to claim 15, wherein the infectious agent is selected from viruses, fungi, pathogenic unicellular eukaryotic and/or prokaryotic organisms, parasitic organisms.

17. The use or method according to claim 16, wherein the infectious agent is selected from the family of Influenza virus, Flavivirus, Paramyxovirus, Hepatitis virus, Human immunodeficiency virus or from viruses causing hemorrhagic fever.

18. The use or method according to any one of claims 15 to 17, wherein the immune protection is against the infectious agent from which the antigenic epitope and/or antigen is derived.

CLAIMS:

1. Use of a Modified Vaccinia Virus Ankara (MVA) for the preparation of a vaccine for inducing a protective immune response to an infectious agent in an animal, including a human, wherein the vaccine is administered to the animal within 7 days or less prior to infection with the infectious agent.

2. Use of a modified Modified Vaccinia Virus Ankara (MVA) for inducing a protective immune response to an infectious agent in an animal, including a human, wherein the MVA is administered to the animal within 7 days or less prior to infection with the infectious agent.

3. The use according to claim 1 or claim 2, wherein the MVA is MVA-BN.

4. The use according to any one of claims 1 to 3, wherein the MVA is selected from MVA strains MVA 575 and MVA 572.

5. The use according to any one of claims 1, 2, 3 or 4, wherein the MVA is a clone purified virus.

6. The use according to any one of claims 1 to 5, wherein the MVA has been obtained in a serum free cultivation process.

7. The use according to any one of claims 1 to 6, wherein the MVA is administered in a dose of 10^5 to $5x10^8$ $TCID_{50}$/ml.

8. The use according to any one of claims 1 to 7, wherein the MVA is administered intravenously, intramuscularly or subcutaneously.

9. The use according to any one of claims 1 to 8, wherein the protective immune response is a protective immune response against a poxvirus infection.

10. The use according to claim 9, wherein the immune response is against a smallpox infection.

11. The use according to any one of claims 1 to 10, wherein the MVA is a recombinant poxvirus.

12. The use according to claim 11, wherein the recombinant poxvirus comprises at least one heterologous nucleic acid sequence.

13. The use according to claim 12, wherein the heterologous nucleic acid sequence is a sequence coding for at least one antigen, antigenic epitope, and/or a therapeutic compound.

14. The use according to claim 13, wherein the antigenic epitopes and/or the antigens are antigenic epitopes and/or antigens of the infectious agent.

15. The use according to claim 14, wherein the infectious agent is selected from viruses, fungi, pathogenic unicellular eukaryotic and/or prokaryotic organisms, parasitic organisms.

16. The use according to claim 15, wherein the infectious agent is selected from the family of Influenza virus, Flavivirus, Paramyxovirus, Hepatitis virus, Human immunodeficiency virus or from viruses causing hemorrhagic fever.

17. The use according to any one of claims 14 to 16, wherein the immune protection is against the infectious agent from which the antigenic epitope and/or antigen is derived.