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Commentary

Advancements in Monkeypox Vaccines: A Comprehensive Review and Future Prospects

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DESCRIPTION

Monkeypox, a zoonotic disease caused by the Monkeypox Virus (MPXV), has been a growing concern in recent years. It was first identified in 1958 when outbreaks occurred in monkeys kept for research purposes, hence the name "monkeypox." The virus can also infect humans, leading to a disease with clinical similarities to smallpox. While monkeypox is less severe than smallpox, it can still cause significant morbidity and mortality.

Due to the potential for human-to-human transmission, particularly in densely populated regions of Africa, and the risk of global spread through travel, the development of effective monkeypox vaccines has been a priority in public health.

History of monkeypox vaccines

The development of monkeypox vaccines has followed a trajectory similar to that of smallpox vaccines. The first vaccine, which was used during the smallpox eradication campaign, was based on vaccinia virus, a related virus that provides cross-protection against monkeypox. This vaccine demonstrated efficacy against monkeypox and was instrumental in controlling outbreaks.

Development of modern monkeypox vaccines

Modified Vaccinia Ankara (MVA), a highly attenuated vaccinia virus, has been used as a vector for the development of monkeypox vaccines. The MVA-based vaccine expresses selected MPXV antigens, triggering an immune response in the host without causing the disease. Several studies have demonstrated the safety and immunogenicity of MVA-based monkeypox vaccines.

DNA-based monkeypox vaccine

DNA-based vaccines, utilizing plasmids encoding MPXV antigens, have shown promise in preclinical studies. These vaccines offer the advantage of easy and cost-effective production. Ongoing research aims to optimize the immunogenicity and stability of DNA-based monkeypox vaccines.

Recombinant protein subunit vaccines

Recombinant protein subunit vaccines, containing specific MPXV antigens, have been developed and tested in animal models. These vaccines aim to induce a targeted immune response against the virus. While they have shown efficacy in animal studies, further clinical trials are needed to assess their safety and efficacy in humans.

Efficacy and safety of monkeypox vaccines

Evaluating the efficacy and safety of monkeypox vaccines is crucial for their widespread use. Clinical trials have been conducted for various monkeypox vaccines, including MVA-based vaccines, DNA-based vaccines, and recombinant protein subunit vaccines.

Efficacy: Several studies have demonstrated the efficacy of MVA-based monkeypox vaccines in animal models, providing protection against lethal MPXV challenges. However, clinical trials in humans are limited, and more research is needed to establish their efficacy conclusively.

Safety: Safety is a paramount concern in vaccine development. MVA-based vaccines have shown good safety profiles in clinical trials, with mild and transient adverse events. DNA-based vaccines have also exhibited safety in preclinical studies. Nevertheless, rigorous clinical trials are necessary to assess their safety in humans comprehensively.

CONCLUSION

Monkeypox is a zoonotic disease with the potential for human-to-human transmission. The development of effective monkeypox vaccines is crucial to mitigate the risk of outbreaks

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and protect public health. Various vaccine candidates, including MVA-based vaccines, DNA-based vaccines, and recombinant protein subunit vaccines, have shown promise in preclinical studies and early clinical trials. However, more extensive research is needed to establish their efficacy and safety conclusively. As of the last update in September 2021, no monkeypox vaccine was widely approved, but ongoing research aimed to address this gap in the fight against monkeypox.