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Antiviral Drug Screening and Development for Nipah Virus Infection: Laboratory Trials and Insights

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Introduction

Nipah Virus (NiV) is a highly pathogenic zoonotic virus that belongs to the Paramyxoviridae family. It was first identified in 1999 during an outbreak in Malaysia and Singapore, and since then, sporadic outbreaks have occurred in several countries, primarily in South Asia. NiV infection is associated with severe respiratory and neurological symptoms, including encephalitis, and has a high fatality rate, ranging from 40% to 75%. Currently, there are no approved antiviral drugs specifically targeting NiV, highlighting the urgent need for the development of effective therapeutic interventions. This article provides insights into the laboratory trials and advancements in antiviral drug screening for NiV infection [1].

Antiviral drug discovery for NiV infection involves various screening approaches, including *in vitro* and *in vivo* assays. *In vitro* screening methods are performed using NiV-infected cell cultures, allowing researchers to evaluate the efficacy of potential antiviral compounds. Commonly used assays include plaque reduction assays, viral yield reduction assays and cell viability assays. These methods provide valuable information about the antiviral activity and cytotoxicity profiles of candidate compounds [2].

Insights from *in vitro* studies: Several studies have identified potential antiviral candidates using *in vitro* screening approaches. One such study by Rockx et al. (2018) screened a library of FDA-approved drugs against NiV *in vitro* and identified several compounds with significant antiviral activity. Notably, the antimalarial drug chloroquine showed promising results by reducing NiV replication. Other compounds, such as mycophenolic acid and tilorone, also demonstrated inhibitory effects on NiV replication. These findings provide a foundation for further investigation and development of these compounds as potential antiviral therapeutics [3].

***In vivo* models**: To assess the efficacy of antiviral compounds in a more complex biological context, animal models are utilized. The development of suitable animal models for NiV infection has been a critical step in advancing antiviral drug research. The golden Syrian hamster model and the African green monkey model have been commonly used to evaluate antiviral interventions. These models mimic key aspects of NiV infection observed in humans and allow researchers to study viral pathogenesis, test drug candidates, and assess their safety and efficacy. One potential antiviral candidate for NiV infection is remdesivir, a broad-spectrum antiviral drug that has shown effectiveness against other RNA viruses such as Ebola and SARS-CoV-2. In a study by Lo et al [4]. (2021), remdesivir demonstrated potent antiviral activity against NiV both *in vitro* and in a hamster model. The study reported a significant reduction in viral load and improved survival rates in remdesivir-treated animals. These findings support further investigation of remdesivir as a potential therapeutic option for NiV infection.

Another promising approach involves the use of monoclonal Antibodies (mAbs) targeting the NiV envelope glycoprotein (G). A study by Zhu et al. (2018) identified two neutralizing mAbs, m102.4 and m102.3, which showed potent antiviral activity against NiV *in vitro*. These mAbs effectively neutralized multiple strains of NiV and protected hamsters from lethal NiV challenge. The development and utilization of mAbs hold great promise as a therapeutic strategy for NiV infection [5].

Conclusion

The development of effective antiviral drugs for NiV infection is crucial to combat this deadly virus. Laboratory trials employing *in vitro* and *in vivo* screening approaches have identified potential candidates, including repurposed drugs like chloroquine and remdesivir, as well as monoclonal antibodies targeting the NiV envelope glycoprotein. These studies provide valuable insights into the mechanisms of NiV infection and offer hope for the

development of effective therapeutic interventions against this deadly virus. Further research, including clinical trials, is warranted to advance these candidates towards approval and use in clinical settings, ultimately reducing the morbidity and mortality associated with NiV infection.

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