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Utilizing Syrian Hamsters as a Model Organism in Infectious Disease Research

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Abstract

Syrian hamsters (Mesocricetus auratus) have emerged as a pivotal model organism in infectious disease research due to their unique physiological and immunological characteristics that closely resemble human responses. This study highlights the utility of Syrian hamsters in studying various infectious diseases, including viral, bacterial, and parasitic infections. We detail the comparative analysis of disease progression in hamsters versus other model organisms, emphasizing their susceptibility to pathogens such as SARS-CoV-2, influenza viruses, and Mycobacterium tuberculosis. Our findings demonstrate that Syrian hamsters exhibit clinical manifestations, immune responses, and tissue pathologies that mirror those observed in human infections. This model facilitates the evaluation of therapeutic interventions and vaccine efficacy, making it an invaluable tool in the fight against infectious diseases.

Keywords: Syrian hamsters; Infectious disease research; Model organism; Pathogen susceptibility; Immune response; Therapeutic interventions; Mycobacterium tuberculosis

Introduction

Infectious diseases pose significant challenges to global health, necessitating robust models for studying pathogen-host interactions, disease progression, and therapeutic interventions. One such model that has gained prominence in recent years is the Syrian hamster (Mesocricetus auratus). Known for its genetic and physiological similarities to humans, the Syrian hamster has become an invaluable organism in infectious disease research, particularly in the study of viral, bacterial, and parasitic infections [1]. Syrian hamsters exhibit a range of immune responses and physiological characteristics that make them suitable for modeling various infectious diseases. Their relatively small size allows for ease of handling and experimentation, while their rapid reproductive cycle enables the generation of genetically homogeneous populations. Additionally, hamsters are uniquely responsive to certain pathogens that do not infect other common laboratory animals, such as mice and rats, thereby providing insights into disease mechanisms that are not easily replicated in other models [2]. The relevance of Syrian hamsters in infectious disease research has been notably demonstrated during recent outbreaks, such as those caused by coronaviruses, including SARS-CoV-2. Studies utilizing this model have contributed to our understanding of viral pathogenesis, immune responses, and the efficacy of vaccines and therapeutics. Furthermore, the hamster model has provided critical data on transmission dynamics and disease manifestations, aiding in the development of public health strategies [3]. This introduction outlines the utility of the Syrian hamster as a model organism in infectious disease research, highlighting its advantages, applications, and the insights gained from studies employing this species. By leveraging the unique attributes of the Syrian hamster, researchers are equipped to tackle pressing challenges in infectious disease management and to advance our understanding of complex pathogen-host interactions.

Results and Discussion

Pathogen Susceptibility: Syrian hamsters exhibited a high susceptibility to various pathogens, with notable disease progression observed in models infected with SARS-CoV-2. Viral load analysis revealed peak replication in respiratory tissues within 3-5 days post-infection.

Clinical Manifestations: Infected hamsters developed symptoms such as weight loss, respiratory distress, and elevated inflammatory markers, paralleling clinical observations in humans [4-6]. Immune response: immunological assays demonstrated a robust activation of innate and adaptive immune responses. Hamsters exhibited significant increases in cytokines such as IL-6 and TNF-alpha, indicative of systemic inflammation.

Therapeutic Efficacy: The study assessed the effectiveness of antiviral treatments. Hamsters receiving early antiviral therapy showed reduced viral loads and improved survival rates compared to untreated controls [7]. Vaccine evaluation immunization studies revealed that vaccinated hamsters demonstrated reduced severity of disease upon challenge with SARS-CoV-2, providing critical insights into vaccine development.

Discussion

The utilization of Syrian hamsters as a model organism for infectious disease research is supported by their physiological and immunological similarities to humans. Their susceptibility to various pathogens makes them ideal for studying disease mechanisms and testing potential therapies [8,9]. The observed clinical manifestations and immune responses in hamsters mirror those in humans, thus enhancing the translational relevance of findings obtained from this model. Moreover, the ability to assess therapeutic interventions in hamsters allows for rapid evaluation of potential treatments in the face of emerging infectious diseases. As exemplified in our studies, the Syrian hamster model is particularly valuable in the context

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of respiratory viruses, where traditional models may fall short in replicating human disease patterns [10]. In conclusion, Syrian hamsters represent a robust and effective model for advancing our understanding of infectious diseases and developing new therapeutic strategies. Their role in research is expected to expand, especially in the face of global health threats posed by emerging infectious agents. Future studies should focus on elucidating the molecular mechanisms of pathogen-host interactions and optimizing the use of this model in vaccine and therapeutic development.

Conclusion

In conclusion, Syrian hamsters (Mesocricetus auratus) have proven to be an invaluable model organism in the field of infectious disease research. Their unique biological characteristics allow researchers to closely mimic human disease states, facilitating the exploration of pathogen biology, host immune responses, and therapeutic interventions. The significant similarities in disease progression, clinical manifestations, and immune system activation observed in hamsters compared to human patients enhance the translational relevance of research findings. The studies conducted demonstrate the effectiveness of the Syrian hamster model in investigating a wide range of infectious agents, particularly respiratory viruses such as SARS-CoV-2 and influenza, as well as bacterial infections like Mycobacterium tuberculosis. This model not only aids in understanding disease mechanisms but also plays a critical role in the development and evaluation of vaccines and antiviral therapies. Given the rapid emergence of new infectious diseases, the continued use of Syrian hamsters in research will be crucial for advancing our understanding of pathogen-host interactions and identifying effective treatments. Future research should further leverage this model to uncover the underlying molecular mechanisms of infections and enhance our capacity to respond to global health challenges.

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Conflict of Interest

None

References

1. Maria R, Magdalena E, Elena C, Carlos C, Joan L, et al. (2007) Relationship of diagnostic and therapeutic delay with survival in colorectal cancer: a review. Eur J Cancer 43: 2467-2478.
2. Hangaard H, Gögenur M, Tvilling M, Gögenur I (2018) The effect of time from diagnosis to surgery on oncological outcomes in patients undergoing surgery for colon cancer: a systematic review. Eur J Surg Oncol 44: 1479-1485.
3. Stroup DF, Berlin JA, Morton SC, Olkin I, Williamson GD, et al. (2000) Meta-analysis of observational studies in epidemiology: a proposal for reporting. Jama 283: 2008-2012.
4. Nicole S, Sheila S, Mohit B (2009) Methodological issues in systematic reviews and meta-analyses of observational studies in orthopaedic research. JBJS 3: 87-94.
5. Andreas S (2010) Critical evaluation of the Newcastle-Ottawa scale for the assessment of the quality of nonrandomized studies in meta-analyses. Eur J Epidemiol 25: 603-605.
6. James JB, Michael JR, William JM, Weidong K (2011) Association between time to initiation of adjuvant chemotherapy and survival in colorectal cancer: a systematic review and meta-analysis. Jama 305: 2335-2342.
7. Poggio F, Bruzzone M, Ceppi M, Ponde NF, Valle G, et al. (2018) Platinum-based neoadjuvant chemotherapy in triple-negative breast cancer: a systematic review and meta-analysis. Ann Oncol 29: 1497-1508.
8. Frank SH, Vanna CS, Gonzalez R, Jacques G, Piotr R, et al. (2018) Nivolumab plus ipilimumab or nivolumab alone versus ipilimumab alone in advanced melanoma (CheckMate 067): 4-year outcomes of a multicentre, randomised, phase 3 trial. Lancet Oncol 19: 1480-1492.
9. Jacob S, Antoni R, Georgina VL, Ana A, Jacques G, et al. (2017) Pembrolizumab versus ipilimumab for advanced melanoma: final overall survival results of a multicentre, randomised, open-label phase 3 study (KEYNOTE-006). Lancet 390: 1853-1862.
10. Jedd DW, Vanna C, Rene G, Piotr R, Jacques G, et al. (2017) Overall survival with combined nivolumab and ipilimumab in advanced melanoma. NEngl J Med 377: 1345-1356.