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ZOONOTIC POTENTIAL AND MODEL VALUE OF ANIMAL HERPESVIRUSES IN HUMAN DISEASE RESEARCH

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3th – 5th of December 2025,
Bucharest

Introduction

- Herpesviridae: double-stranded DNA viruses **causing lifelong infections and latency**.
- Three major subfamilies: Alpha, Beta, Gamma, infecting **vertebrates** from **fish to mammals.**
- Numerous animal herpesviruses **share key biological and genetic features with human herpesviruses** (HHV-1 to HHV-8).
- Most display strict species tropism, yet their **conserved genome architecture** suggests a latent **potential to adapt.**
- **Cross-species events are rare, but documented** (e.g., B virus → humans).
- Viruses such as EHV-1 and MDV have been examined for **possible zoonotic transmission and for structural similarities** with oncogenic EBV/KSHV.
- Several animal herpesviruses (e.g., MHV-68, SVV) serve as valuable **experimental models** for human herpesvirus biology.
- Aim of this work: **to evaluate zoonotic risk and experimental model value** of animal herpesviruses in human disease research.

Materials and methods

Study Design. Narrative literature review synthesizing published evidence on:	- the possibility of human infection with animal herpesviruses - the use of animal herpesviruses as experimental models for human herpesvirus pathogenesis ➞ Qualitative integration of existing results (no original experimental data).
Sources. Major biomedical databases:	PubMed, Scopus, Web of Science, PMC Open Access Virology textbooks, technical reports, and relevant infectious disease monographs
Search Strategy. Combined medical terms, including:	“Herpesviridae”, “zoonosis”, “cross-species”, “host tropism”, “Marek’s Disease Virus”, “pseudorabies virus”, “animal models”, “herpes latency”, ”human herpesvirus”
Limitations	Narrative (not systematic) review → not exhaustive. Conclusions reflect available evidence and inconsistencies among published studies. No experimental data generated by the authors.

Results and discussions

A total of 20 articles met the inclusion criteria of this narrative review. Their distribution across the four predefined analytical categories is summarized below.

1. Evidence supporting zoonotic potential (4/20; 20%)

Two publications provided arguments suggesting that certain animal herpesviruses may pose a zoonotic risk. These studies referenced cross-species events involving primate herpesviruses (e.g., B virus), emphasizing that although rare, host-jump events can occur under specific exposure conditions.

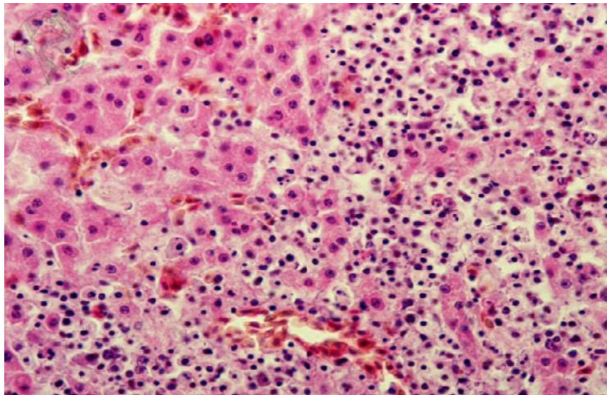
2. Structural/molecular similarities without evidence of infection (6/20; 30%)

Six articles reported conserved genomic or functional features—such as UL/US genomic architecture, latency-associated genes, and homologous immune-evasion proteins—shared between animal and human herpesviruses. However, none of these studies presented evidence of natural human infection. Their conclusions were limited to biological parallels, not zoonosis.

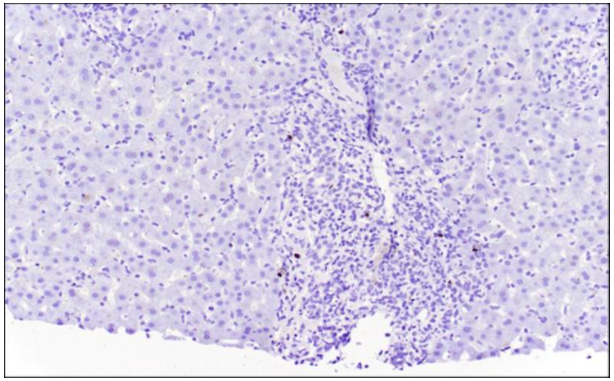
Results and discussions

3. Experimental/model value for human herpesvirus research (7/20; 35%)

Seven studies identified animal herpesviruses as reliable experimental systems for understanding human herpesvirus biology. Examples include MHV-68 as a model for EBV/KSHV lymphotropism and latency, and SVV as a model replicating VZV infection and reactivation. These publications consistently emphasized research utility rather than human pathogenicity.



Peleteiro, M. C., Pinho, M., & Orvalho, J. S. (2001). Marek's disease – microscopy image – chicken. *Atlas of Veterinary Pathological Anatomy*. https://www.fmv.ulisboa.pt/atlas/figado/pages_us/figad065_ing.html

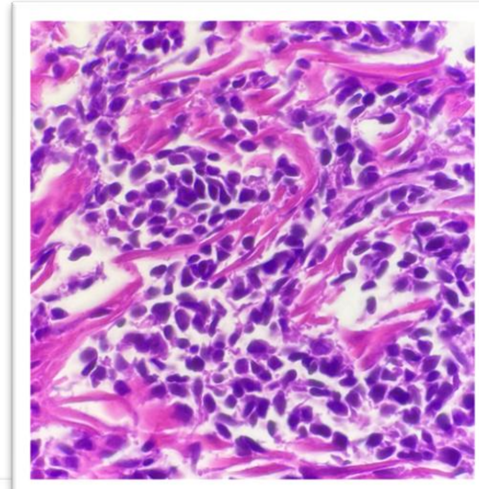


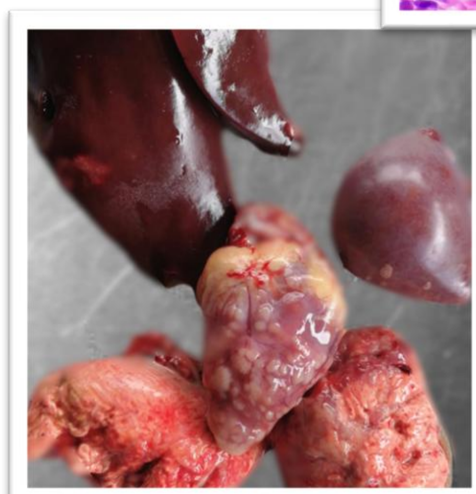
Cuber, A. & Chopra, S. (2025). Epstein-Barr virus hepatitis. *Pathology Outlines*. https://www.pathologyoutlines.com/topic/liverebv.html. Accessed September 30th, 2025.

Results and discussions

4. Evidence refuting zoonotic transmission (3/20; 15%)

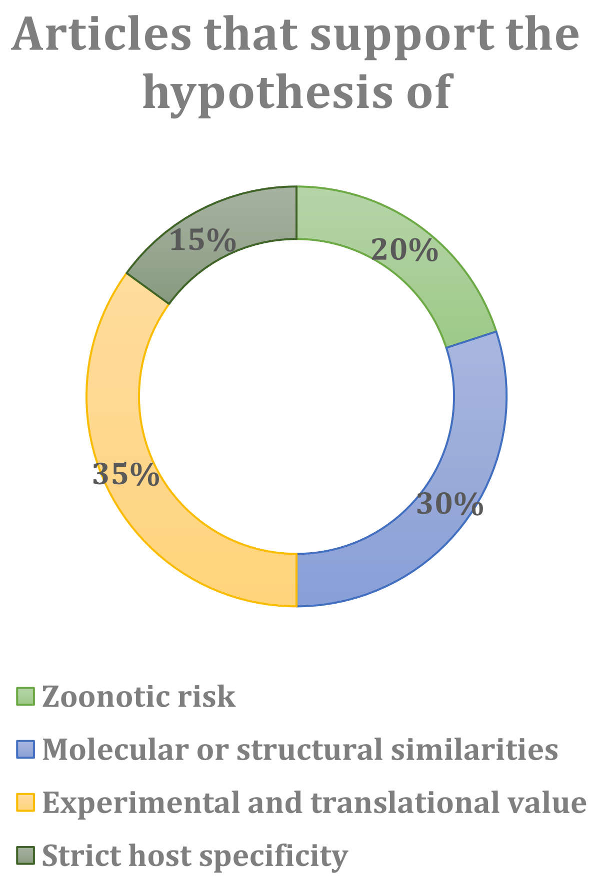
Three articles explicitly rejected the possibility of animal-to-human transmission. In particular, MDV studies demonstrated serological reactivity in exposed individuals but showed 0% PCR positivity for MDV DNA in human samples using modern molecular assays, supporting strict host specificity in avian herpesviruses.





Results and discussions

Collectively, the evidence positions animal herpesviruses primarily as research tools rather than emerging zoonotic pathogens. Serological findings should be interpreted cautiously in the absence of corroborating molecular data, and future work should focus on identifying genetic and immunological barriers governing host specificity.



Conclusions and recommendations

Animal herpesviruses represent a biologically diverse group of pathogens whose relevance to human health arises through two distinct but complementary perspectives.

- First, a very limited number of species demonstrate that **zoonotic transmission, although rare, is possible** and may result in severe disease.
- Second, **animal herpesviruses serve as powerful experimental models** that replicate key molecular and pathogenic features of human herpesvirus infections.
- Evidence from the 20 publications analysed indicates that current concern regarding zoonotic transmission of most animal herpesviruses is unsupported by molecular data, whereas *their contribution to understanding human viral latency, immune evasion, oncogenesis, and vaccine development is substantial.*

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Thank you for your attention!

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