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Beyond Surveillance: Human Macrophage Responses as a Tool for Functional Risk Assessment of Emerging Influenza Viruses

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Influenza A viruses continue to emerge from animal reservoirs and challenge preparedness efforts. Current risk assessment strategies rely largely on genetic and epidemiological data, providing limited information on how emerging viruses interact with the human immune system. Macrophages are among the first immune cells encountered during infection and play a key role in antiviral and inflammatory responses. Functional characterization of virus-macrophage interactions may therefore complement surveillance efforts and improve our understanding of the consequences of human infection.

In this study, human monocyte-derived macrophages from six healthy donors were used to compare the replication dynamics and immunomodulatory properties of influenza A viruses representing different pathogenic and ecological backgrounds. Viral replication was quantified by qRT-PCR and infectivity assays, while flow cytometry was used to determine infection rates and characterize changes in immune markers. Integrating virological and immunological readouts revealed distinct response profiles associated with different influenza viruses.

These findings highlight the value of human macrophage models as a complementary approach for functional risk assessment while providing insights into how emerging influenza viruses replicate, modulate innate immunity and contribute to disease development. Together, this work contributes to a broader One Health framework for the evaluation of emerging influenza threats.

Keywords

Influenza A virus; Macrophages; Innate immunity; Risk assessment; One Health

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Professional Status of the Speaker

Postdoc

Junior Scientist Status

Yes, I am a Junior Scientist.

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