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Uncovering the role of chicken IFITM-mediated viral restriction.

T. Whitehead[1], A. Steyn[1], J. Backeroun[1], I. Bassano[2], Alice Gray[1], Andrew Broadbent[1], P. Kellam[2] and M. Fife[1]

[1]The Pirbright Institute, Ash Road, Pirbright, Woking, UK mark.fife@pribright.ac.uk (Corresponding Author)

[2]Imperial College London, South Kensington Campus, London, SW7 2AZ, UK.

Summary

Interferon-inducible transmembrane (IFITM) proteins are host cell derived restriction factors. These proteins act as the cells first line of defense against invading viral pathogens. Mammalian IFITM proteins have been shown to confer antiviral resistance when challenged with a variety of both enveloped and non-enveloped viruses. For the first time, we are able to demonstrate the anti-viral role that chIFITM proteins play in restricting avian viruses in the host cell.

Keywords: chicken, interferon inducible transmembrane protein, virus, replication, viral restriction.

Introduction

We are able to report detailed characterisation of new cell lines that allow for the high-throughput assessment of chIFITM-mediated restriction of a diverse range of avian virus. We have successfully generated stably overexpressing DF-1 (immortalized chick embryo fibroblast) and OU-2 (chemically immortalized chick embryo) cells that express chIFITM1, 2, 3 and 3^{Mut}(C71AC72A). We have also generated a CRISPR/cas9 edited DF-1 cell line that lacks the entire chIFITM locus (chIFITM1, 2, 3 and 5). We have been able to challenge these cell lines with a diverse range of avian viruses including influenza A virus (IAV), infectious bronchitis virus (IBV) and Mareks disease virus (MDV) to assess the level to which these chIFITM proteins are able to restrict viral replication *in vitro*. As well as assessing chIFITM-mediated viral restriction *in vitro*, we are also looking to characterize the diverse range of chicken breeds that are found in remote parts of Africa. We hypothesize that strong immune pressure will drive mutation within the chIFITM locus, making some birds more susceptible and others more resistant to viral pathogens.

Conclusion

It is estimated that poultry will be the major global source of meat by 2018 and will account for 46% of meat consumed by 2022. However, infectious diseases are a continuous threat to poultry industry. With over 60 billion chickens produced annually, it is vital that the poultry industry is protected so that food security is maintained.

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