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Development of an equine tracheal cell culture model

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Why develop an equine tracheal cell culture model?

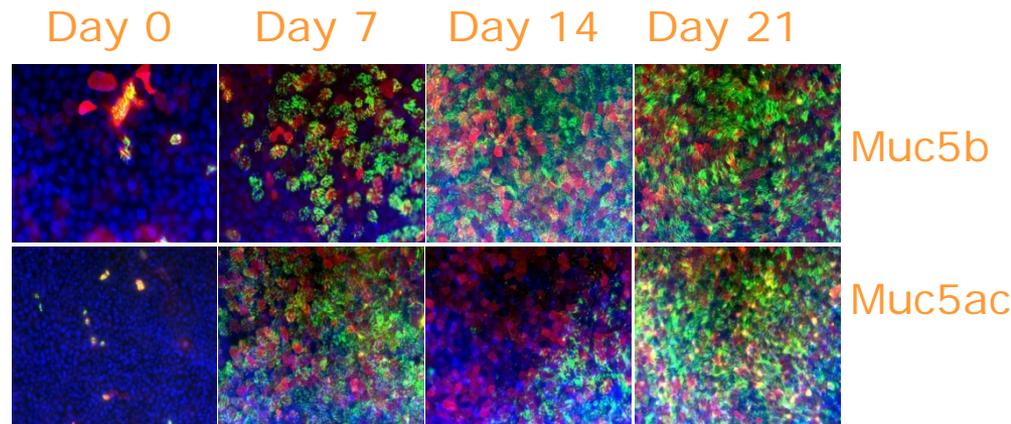


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- Scientists are increasingly striving to reduce the need to include live animals in research
 - To be useful, laboratory models need to function the same ways as the target tissue does in real life
 - The aim of this study was to produce a model of the equine trachea which will be useful for studying both infectious and inflammatory diseases of the airway, a common cause of poor performance in racehorses
 - A key function of “real life” tracheal cells is that they have small hair-like attachments (cilia) which beat in synchrony to sweep debris out of the lungs towards the throat.
 - Tracheal cells also produce mucus, so a useful model would also produce mucus.
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The cultures display a mucociliary phenotype



- The cultures contain ciliated (green) and mucin-producing cells (red)
- The cultures exhibit rotational mucociliary transport (a key clearance mechanism in the live animal)



Details of the mucins produced by the cultures



- Muc5ac & Muc5b (the two major mucins produced *in vivo*) are secreted from the apical surface of the cultures
 - Muc5b is the predominant mucin (*as in vivo*)
 - Muc5ac & Muc5b exhibit similar properties to their *in vivo* counterparts
 - Mucin production and properties can be manipulated
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Implications



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- Novel model system to investigate:
 - mucin/mucus regulation
 - how mucus properties (composition) are coupled with efficient mucociliary clearance
 - the efficacy of current and future therapeutics targeted at modulating mucus production and properties
 - Provides an *in vitro* model of equine mucociliary epithelium that will reduce the use of experimental animals
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