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# Gene signatures associated with foot-and-mouth disease virus infection and persistence part I: persistent FMDV in a three-dimensional model of the bovine soft palate

Sara Hägglund, Eve Laloy, Katarina Näslund, Florian Pfaff, Michael Eschbaumer, Aurore Romey, Anthony Relmy, Annika Rikberg, Anna Svensson, Hélène Huet, et al.

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Hägglund S.<sup>1\*</sup>, Laloy E.<sup>2\*</sup>, Näslund K.<sup>1\*</sup>, Pfaff F.<sup>3</sup>, Eschbaumer M.<sup>3</sup>, Romey A.<sup>2</sup>, Relmy A.<sup>2</sup>, Rikberg A.<sup>1</sup>, Svensson A.<sup>1</sup>, Huet, H.<sup>2</sup>, Gorna K.<sup>2</sup>, Zühlke D.<sup>4</sup>, Riedel K.<sup>4</sup>, Beer M.<sup>3</sup>, Zientara S.<sup>2</sup>, Bakkali-Kassimi L.<sup>2</sup>, Blaise-Boisseau S.<sup>2\*</sup> and Valarcher J.F.<sup>1\*\*</sup>

<sup>1</sup> Host Pathogen Interaction Group, Section of Ruminant Medicine, Dept. of Clinical Science, Swedish University of Agricultural Sciences (SLU), Ulls väg 26, 75007 Uppsala, Sweden, <sup>2</sup> Laboratoire de Santé Animale de Maisons-Alfort, UMR 1161 virologie, INRA, Ecole Nationale Vétérinaire d'Alfort, ANSES, Université Paris-Est, Maisons-Alfort, 94700, France, <sup>3</sup> Institute of Diagnostic Virology, Friedrich-Loeffler-Institut, Südufer 10, 17493 Greifswald-Insel Riems, Germany, <sup>4</sup> Institute of Microbiology, Department for Microbial Physiology and Molecular Biology, University of Greifswald, 17489 Greifswald, Germany

### BACKGROUND

Foot-and-mouth disease virus (FMDV) causes devastating vesicular disease in livestock and persists in epithelial cells of the dorsal soft palate (DSP) in cattle.

### OBJECTIVE

To enable the study of mechanisms, or the screening of molecules to detect or interfere in persistence, the objective was to establish persistent FMDV infection in vitro.

### MATERIAL AND METHODS

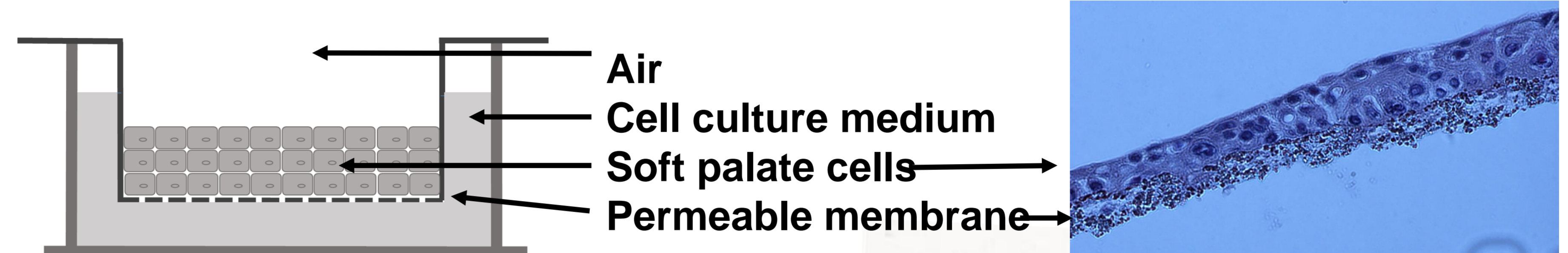
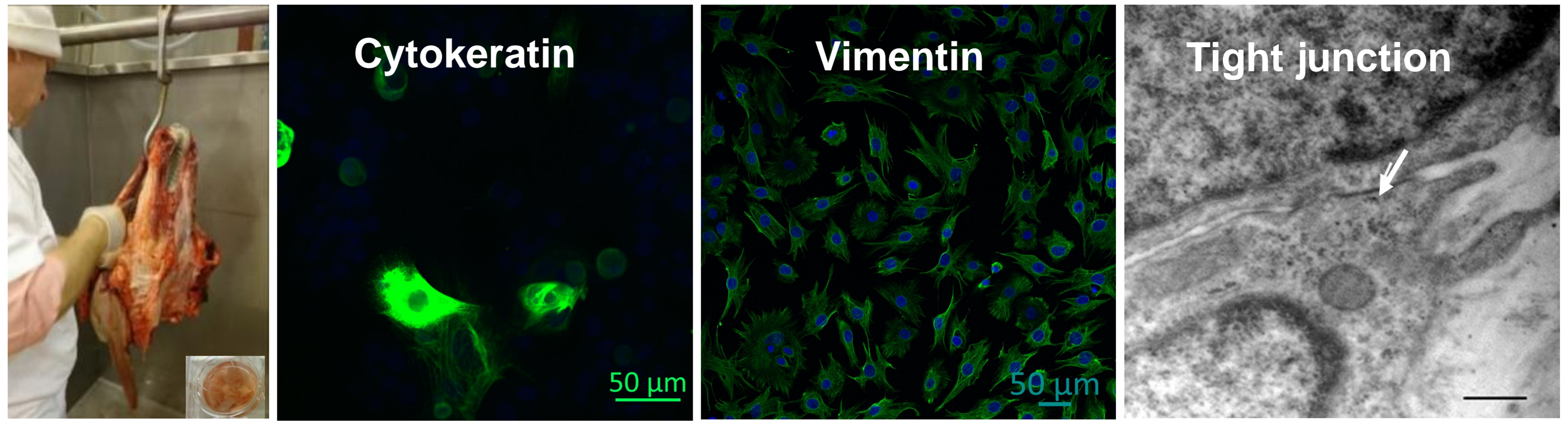
SP cells were isolated after commercial slaughter and were cultured in multilayers at the air-liquid interface. After 5 weeks of culture without passage, the cells were infected with a viral clone FMDV O derived from the FMDV/FRA/1/2001 strain.

### RESULTS AND DISCUSSION

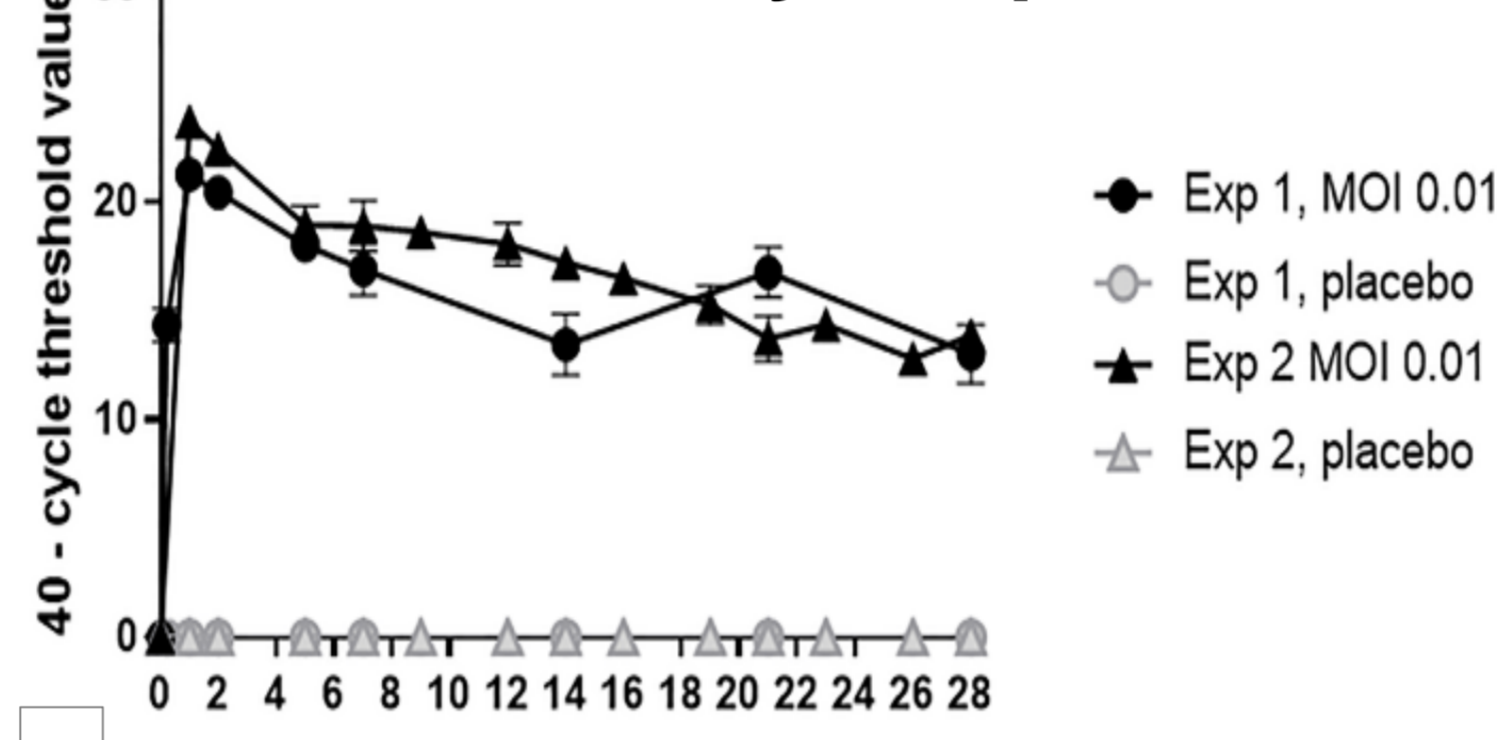
At infection, ~20% of cells had a polygonal morphology and displayed tight junctions, such as in stratified squamous epithelia. Some cells expressed cytokeratin and most or all cells expressed vimentin, which characterises epithelial cells in culture.

A limited cytopathic effect was observed, restricted to the upper cell layers. FMDV antigen, FMDV RNA and live FMDV were detected through day 1 to 28, with peaks at day 1 and 2. A maximum of infected cells (36%) was detected 24 hours after infection at an MOI of 1. At day 28, when animals are considered as carriers, FMDV antigen could still be detected in sparse cells (0.2%-2.1%) and live virus was isolated from supernatants of 6/8 cultures.

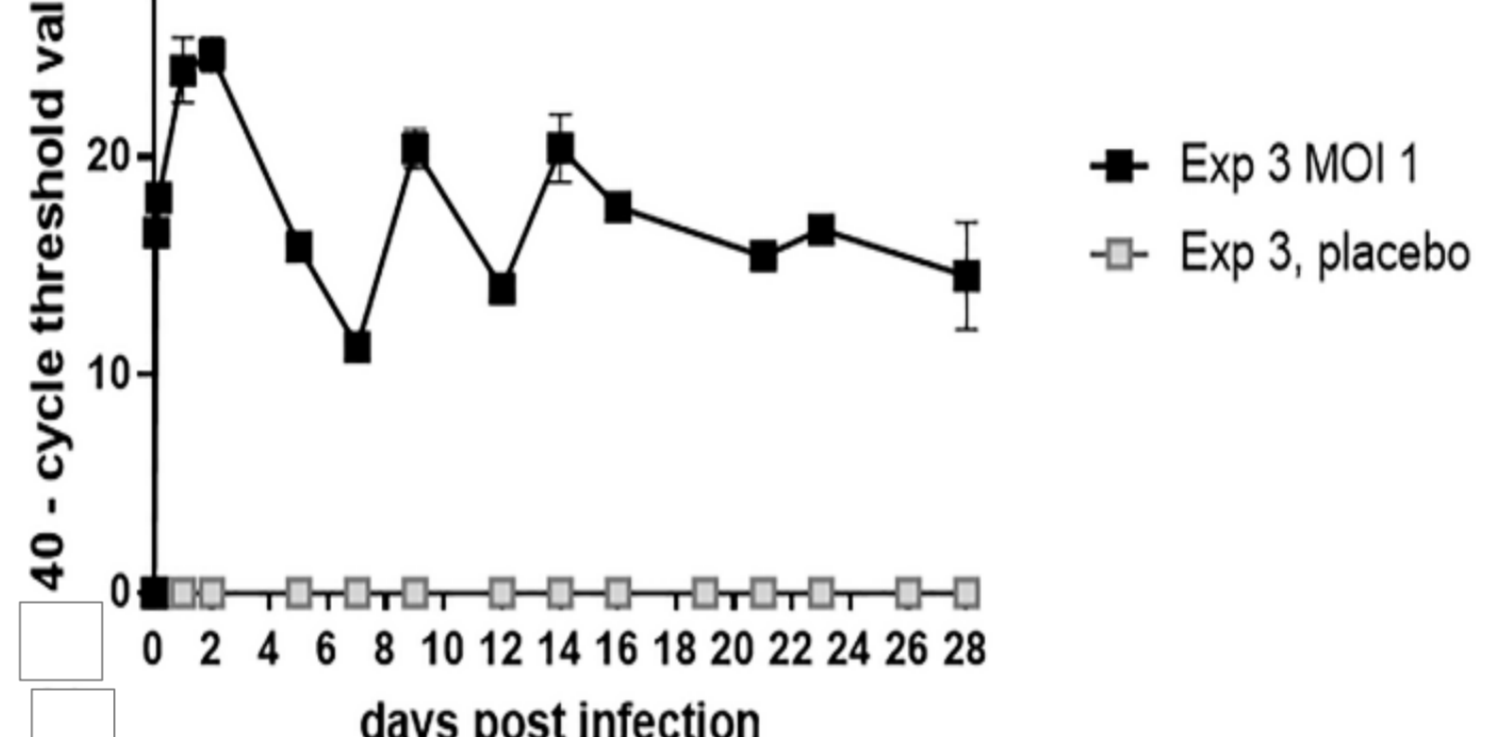
*Transcriptomic data are presented in an oral communication and have been published (Pfaff et al., viruses, 2019).*



FMDV RNA by RTqPCR



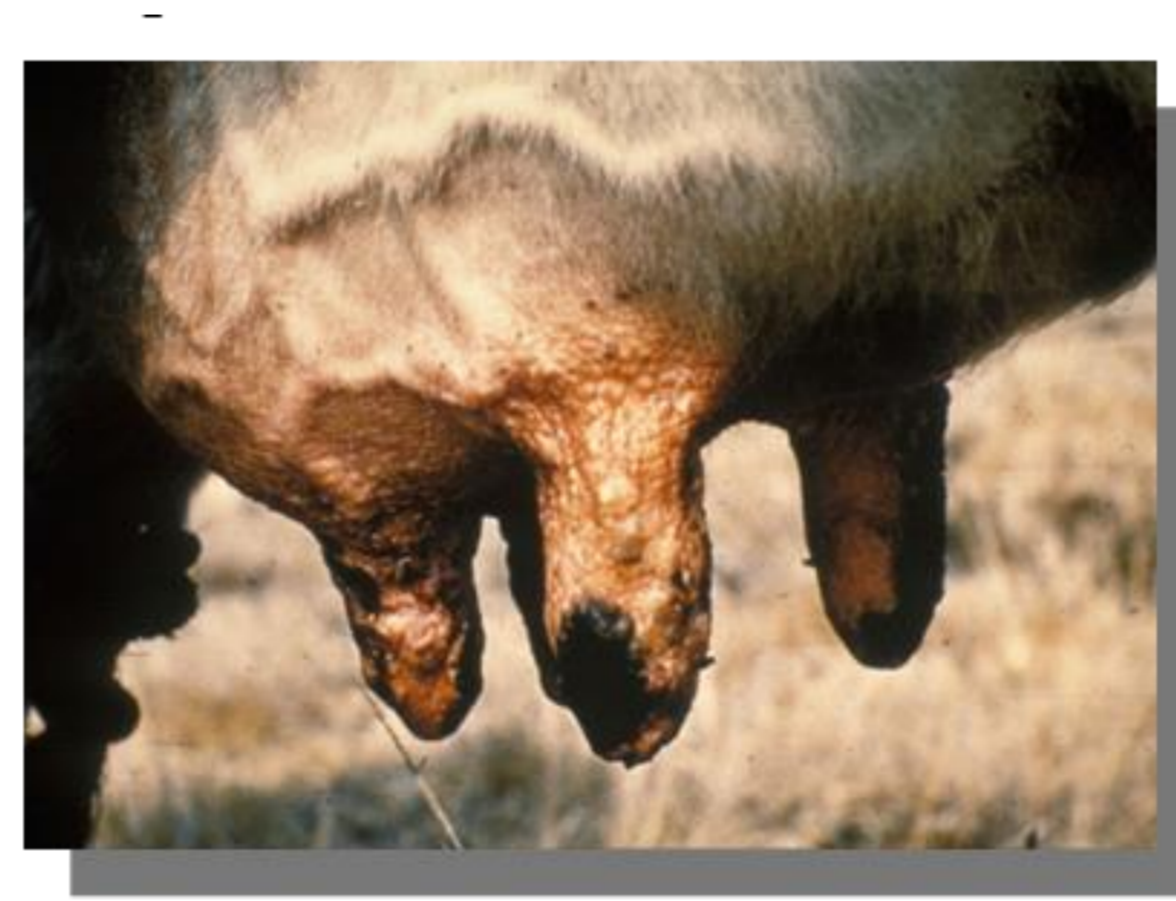
FMDV positive cells by IHC



Persistent FMDV



- Isolation, characterisation and FMDV infection of bovine dorsal soft palate cells



<http://www.afrivip.org/sites/default/files/FMD/diagnosis.html>



Photo: Jean-François Valarcher, SLU



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- Vesicular lesions caused by foot-and-mouth disease virus in cattle

### CONCLUSION

Bovine dorsal soft palate cells were propagated in multilayers at the air-liquid interface. Persistent FMDV infection was established in sparse cells in all layers. The model will enable to get a better understanding of the mechanisms underlying persistence in order to develop ways to control this infection and to improve the diagnostics.

