



IZSAM G. CAPORALE
TERAMO

Espianti respiratori di animali come metodo di caratterizzazione rapida in caso di emergenze sanitarie

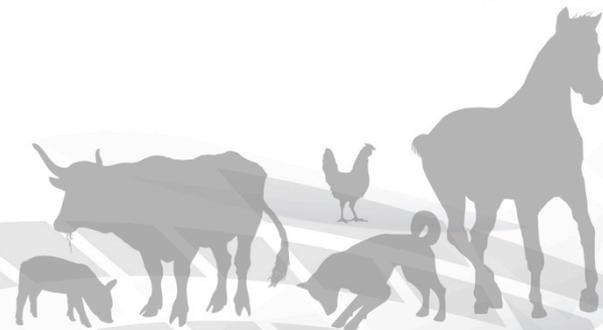


Teramo, 26 Giugno 2020



n° progetto: IZS AM 04/15 RC

Titolo progetto: Strategie innovative per la riduzione della sperimentazione animale: colture di espianti di tessuti e virus-istochimica





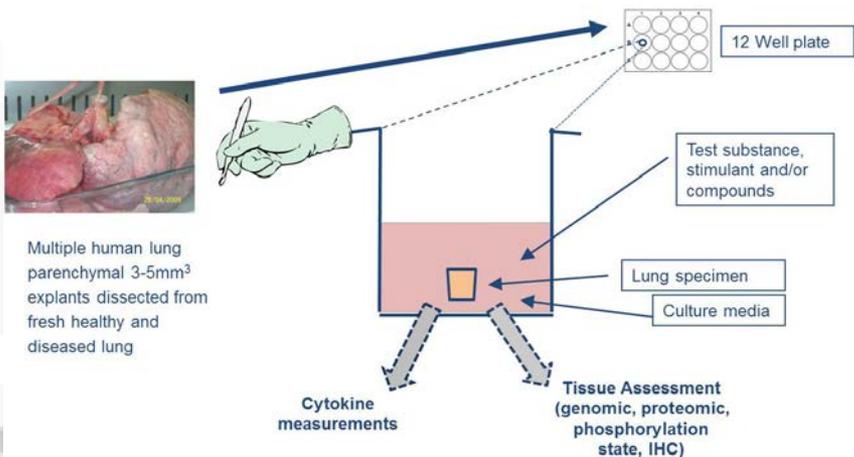
Cosa si intende per *Ex Vivo Organ Culture* (EVOC)



replacement
reduction
refinement



Explant Parenchymal Culture Methodology



Background della ricerca virus

Vol 440|23 March 2006

nature

H5N1

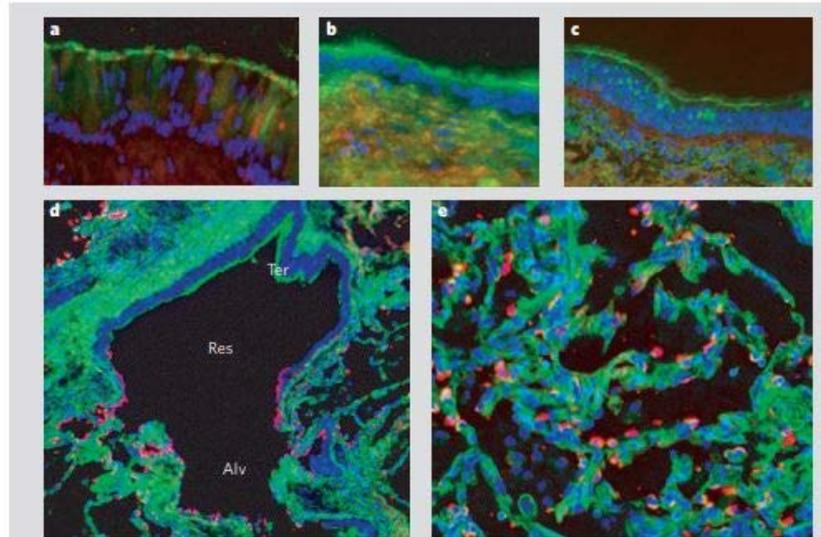
BRIEF COMMUNICATIONS

Influenza virus receptors in the human airway

Avian and human flu viruses seem to target different regions of a patient's respiratory tract.

Although more than 100 people have been infected by H5N1 influenza A viruses, human-to-human transmission is rare¹. What are the molecular barriers limiting human-to-human transmission? Here we demonstrate an anatomical difference in the distribution in the human airway of the different binding molecules preferred by the avian and human influenza viruses. The respective molecules are sialic acid linked to galactose by an α -2,3 linkage (SA α 2,3Gal) and by an α -2,6 linkage (SA α 2,6Gal)². Our findings may provide a rational explanation for why H5N1 viruses at present rarely infect and spread between humans although they can replicate efficiently in the lungs.

SA α 2,3Gal molecules have been found on cells artificially differentiated from isolated human tracheal and bronchial cells *in vitro*³. But the anatomical distribution and prevalence of SA α 2,3Gal and SA α 2,6Gal in the human airway was unknown. Using lectins



Novel Human
Respiratory

I. T. Kuok,^a Joanne H. M. Fong,^a

^aDepartment of Microbiology and Immunology, National Institute of Health, Hong Kong SAR, China; ^bDepartment of Microbiology and Immunology and Immunology, National Institute of Health, China, USA; ^cState Key Laboratory of Emerging

Human Influenza

Research, ^dColin R. Parrish,^f

^eDepartment of Veterinary Medicine, University of Glasgow, Glasgow, UK; ^fResearch Council, National Institute for Environmental Health Sciences, Research Triangle Park, North Carolina, USA; ^gDepartment of Microbiology, University of Maryland, Baltimore, USA; ^hDepartment of Microbiology, Cornell University, Ithaca, USA¹

nature
medicine

Tropis
(H5N1)
respira

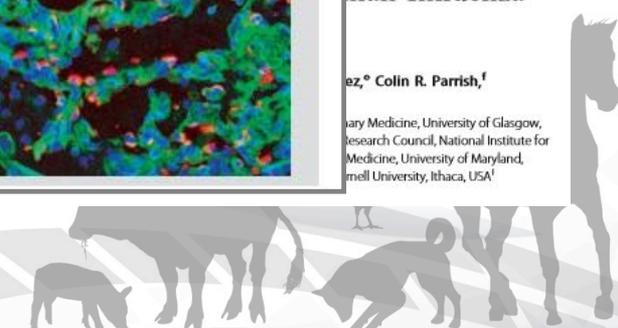
J M Nicholl
C Y Cheung
L L M Poon

ire.com/naturemedicine



Tropis
influen
culture

Michael C W Chan
John M Nicholls,



Background della ricerca: Pandemia SARS-CoV-2!!!

THE LANCET
Respiratory Medicine

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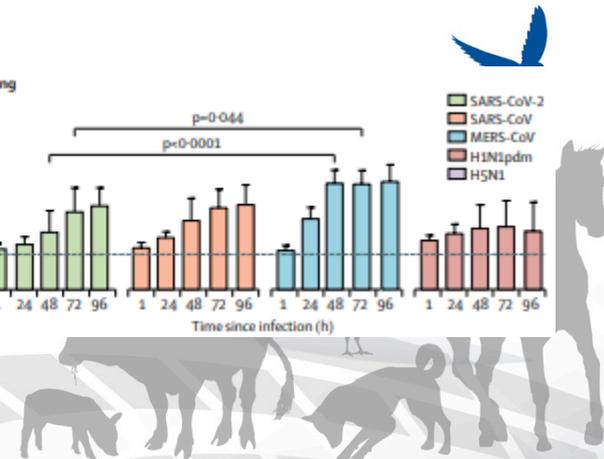
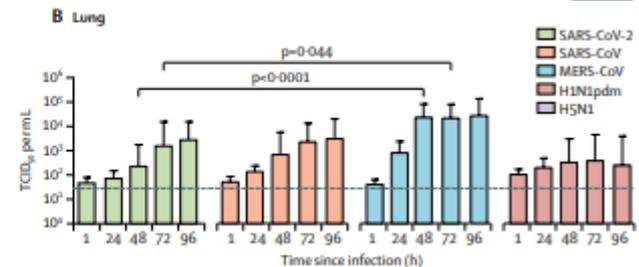
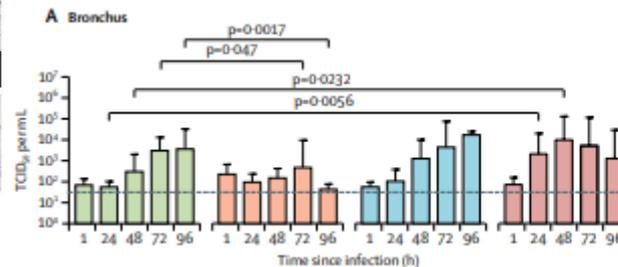
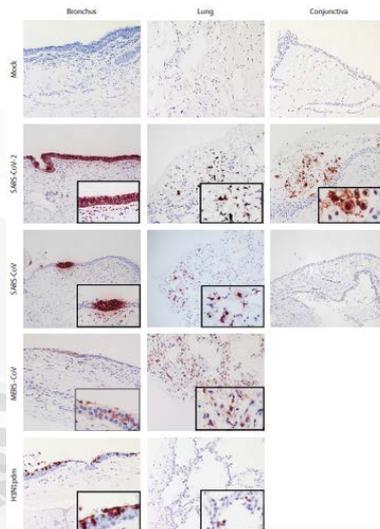
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Tropism, replication competence, and innate immune responses of the coronavirus SARS-CoV-2 in human respiratory tract and conjunctiva: an analysis in ex-vivo and in-vitro cultures

Kenrie P Y Hui, PhD • Man-Chun Cheung, MSc • Ranawaka A P M Perera, PhD • Ka-Chun Ng, BSc •
Christine H T Bui, PhD • John C W Ho, PhD • et al. [Show all authors](#)

Published: May 07, 2020 • DOI: [https://doi.org/10.1016/S2213-2600\(20\)30193-4](https://doi.org/10.1016/S2213-2600(20)30193-4) •  Check for updates

 PlumX Metrics



Esperienze maturate su espianti di bovino



Di Teodoro *et al. Vet Res (2018) 49:5*
<https://doi.org/10.1186/s13567-017-0500-z>



RESEARCH ARTICLE

Open Access

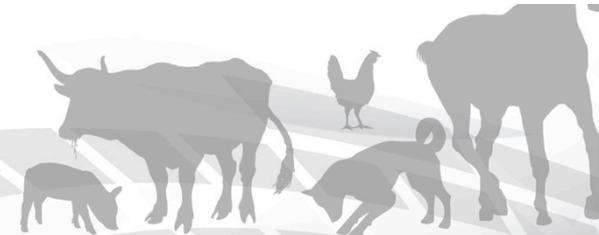
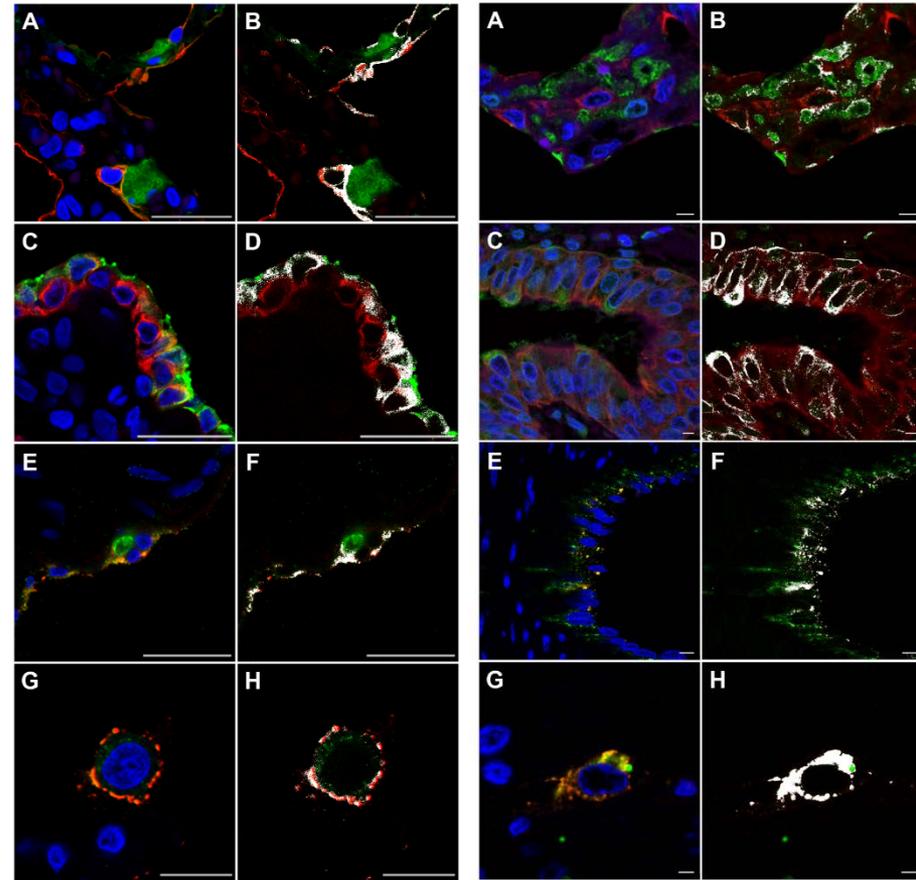
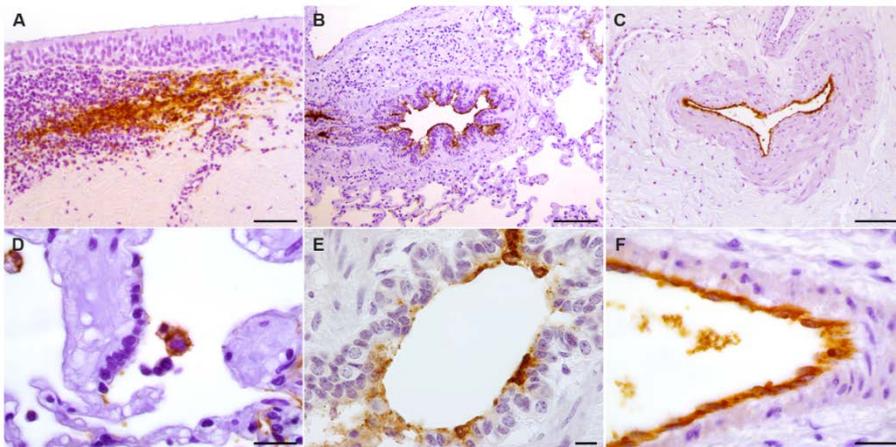
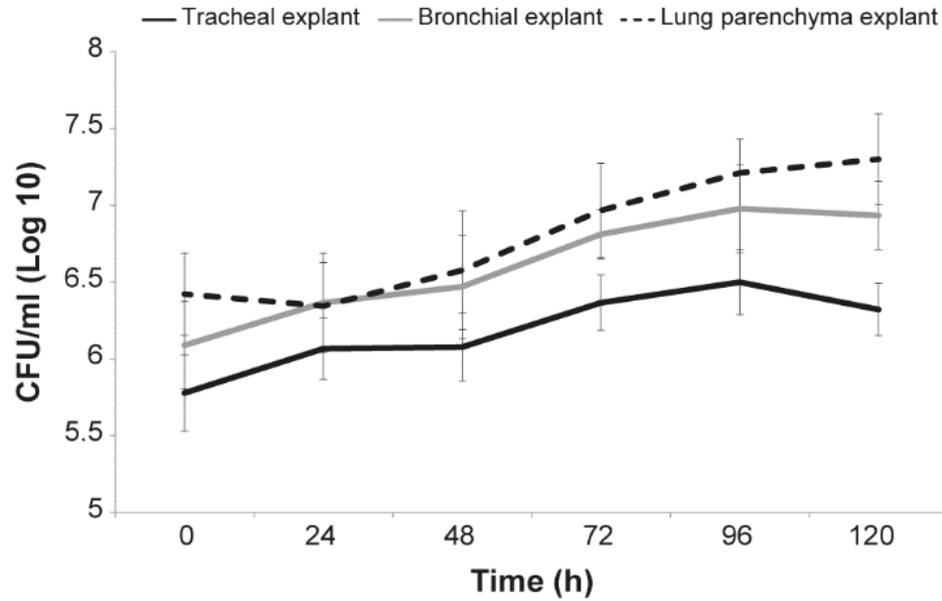


Respiratory explants as a model to investigate early events of contagious bovine pleuropneumonia infection

Giovanni Di Teodoro^{1,2}, Giuseppe Marruchella^{2*} , Andrea Di Provido¹, Gianluca Orsini¹, Gaetano Federico Ronchi¹, Anna Rita D'Angelo¹, Nicola D'Alterio¹, Flavio Sacchini¹ and Massimo Scacchia¹



Patogenesi PPCB





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Veterinary Microbiology

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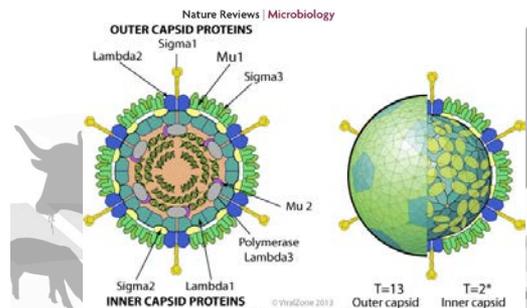
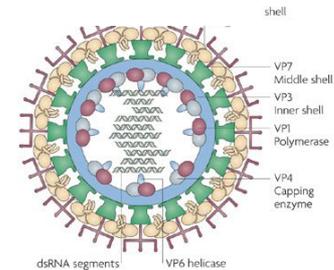
Replication kinetics and cellular tropism of emerging reoviruses in sheep and swine respiratory *ex vivo* organ cultures

Giovanni Di Teodoro^a, Alessio Bortolami^{a,b}, Liana Teodori^a, Alessandra Leone^a, Nicola D'Alterio^a, Daniela Malatesta^a, Alfonso Rosamilia^a, Maria Loredana Colaianni^c, Antonio Petri^a, Calogero Terregino^b, Giovanni Savini^a, Francesco Bonfante^b, Alessio Lorusso^{b,*}

^a OIE Reference Laboratory for Bluetongue, Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise (IZSAM), Teramo, Italy

^b Istituto Zooprofilattico Sperimentale delle Venezie (IZSVe), Italy

^c Istituto Zooprofilattico Sperimentale di Puglia e Basilicata (IZSPB), Foggia, Italy



Messa a punto espianti:

Valutazione morfologia e vitalità

Di Teodoro *et al. Vet Res* (2018) 49:5
<https://doi.org/10.1186/s13567-017-0500-z>



RESEARCH ARTICLE

Open Access



Respiratory explants as a model to investigate early events of contagious bovine pleuropneumonia infection

Giovanni Di Teodoro^{1,2}, Giuseppe Marruchella^{2*}, Andrea Di Provido¹, Gianluca Orsini¹, Gaetano Federico Ronchi¹, Anna Rita D'Angelo¹, Nicola D'Alterio¹, Flavio Sacchini¹ and Massimo Scacchia¹



Journal of General Virology (2015), 96, 969–974

DOI 10.1099/vir.0.000049



Short Communication

Correspondence
Pablo R. Murcia
Pablo.Murcia@glasgow.ac.uk

Phylogenetically distinct equine influenza viruses show different tropism for the swine respiratory tract

Livia V. Patrono,^{1,2} Francesco Bonfante,² Claudia Zanardello,³ Calogero Terregino,² Ilaria Capua² and Pablo R. Murcia⁴

¹Department of Animal Medicine, Production and Health, Doctoral School of Veterinary Sciences, University of Padova, Padova, Italy

²Division of Comparative Biomedical Sciences, Istituto Zooprofilattico Sperimentale delle Venezie, Legnaro, Padova, Italy

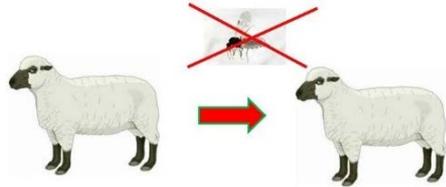
³Division of Specialised Diagnostics and Histopathology, Istituto Zooprofilattico Sperimentale delle Venezie, Legnaro, Padova, Italy

⁴Medical Research Council-University of Glasgow Centre for Virus Research, Glasgow, UK



Virus inclusi nello studio

- **Bluetongue virus (BTV-1/26/27)**
- **Pteropine orthoreovirus (PRV)**
- Parainfluenza 3 virus (PI-3 virus)
- **H3N2** swine influenza virus



Received: 7 July 2017
DOI: 10.1111/ibed.12780

ORIGINAL ARTICLE

WILEY

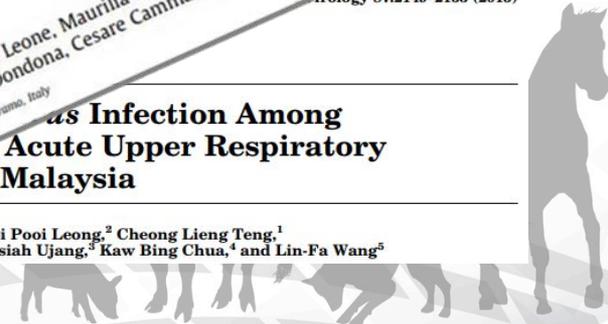
Bluetongue virus serotype 27: Experimental infection of goats, sheep and cattle with three BTV-27 variants reveal atypical characteristics and likely direct contact transmission BTV-27 between goats

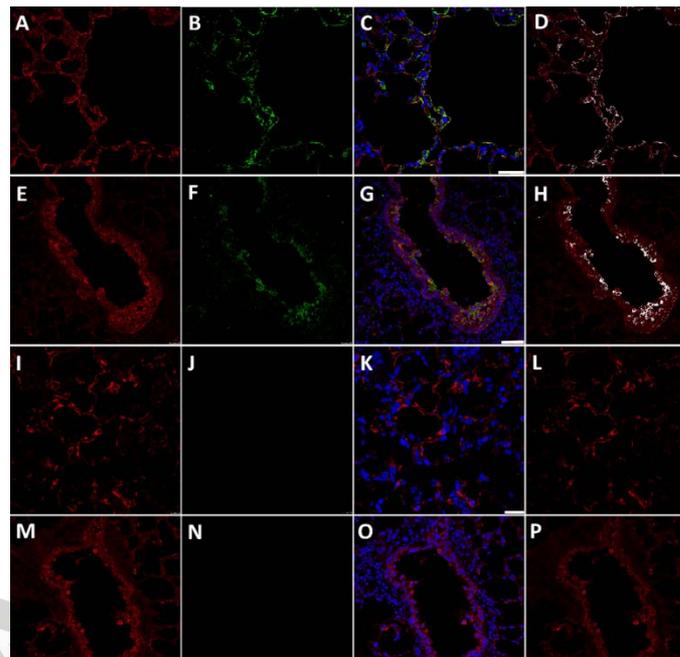
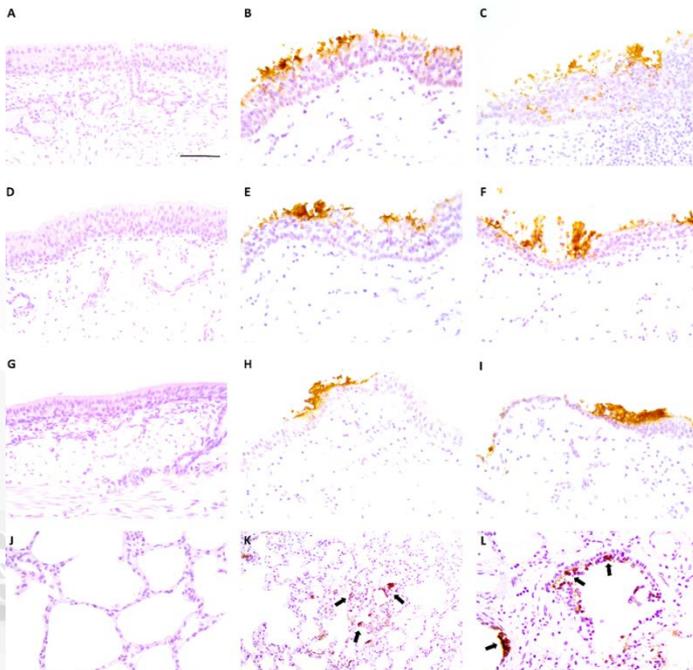
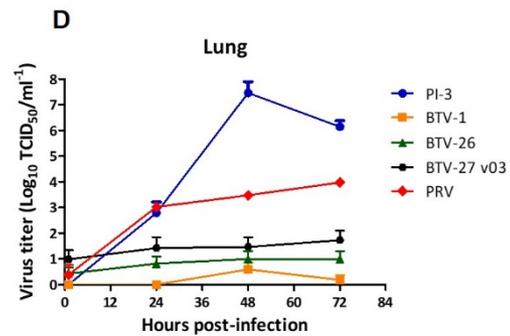
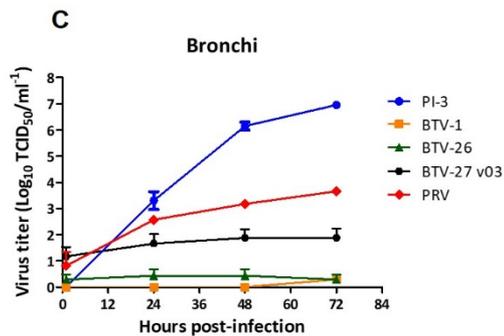
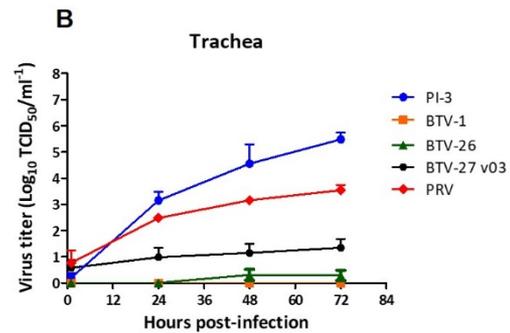
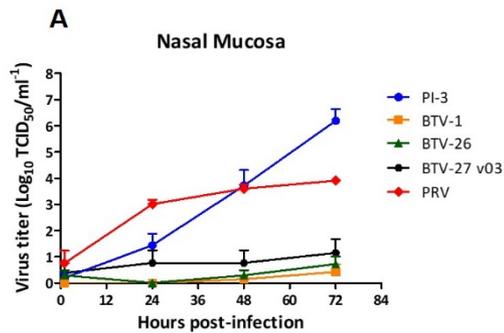
E. Bréard¹ | C. Schulz² | C. Sailleau¹ | C. Bernelin-Cottet³ | C. Viarouge¹ | D. Vitour¹ | B. Guillaume⁴ | G. Caignard¹ | A. Gorlier¹ | H. Attoui¹ | M. Gallois⁵ | B. Hoffmann² | S. Zientara¹ | M. Beer²

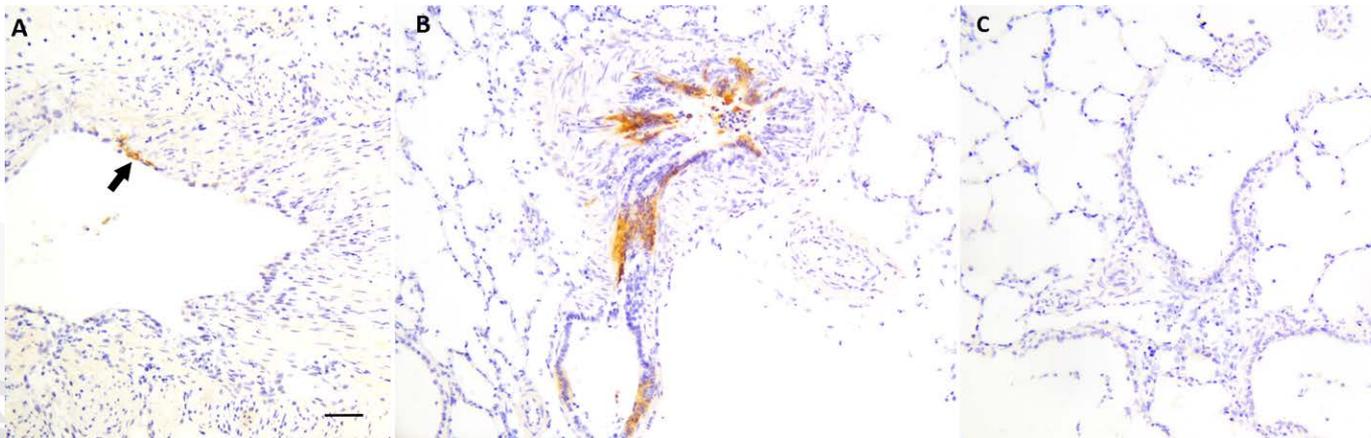
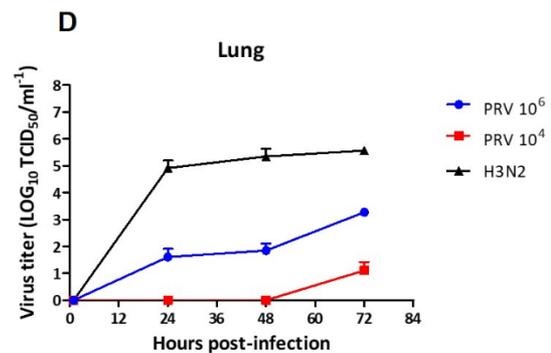
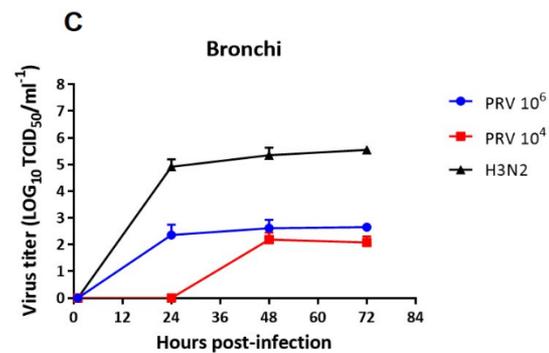
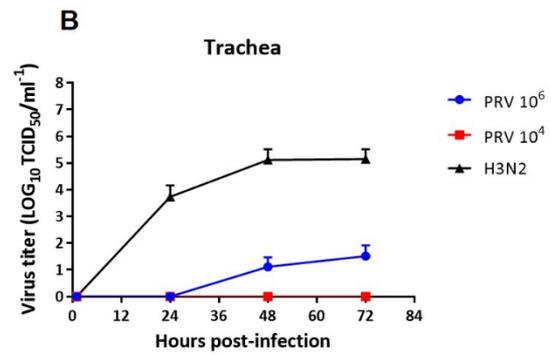
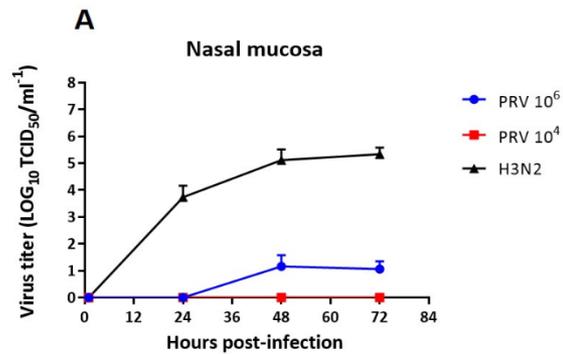
HENDRA
Infection, Genetics and Evolution 30 (2015) 55–58
Contents lists available at ScienceDirect
Infection, Genetics and Evolution
journal homepage: www.elsevier.com/locate/meegid

A new member of the Pteropine Orthoreovirus species isolated from fruit bats imported to Italy
Alessio Lorusso^{*}, Liana Teodori, Alessandra Leone, Maurilia Marcacci, Iolanda Mangone, Massimiliano Orsini, Andrea Capobianco-Dondona, Cesare Camma¹, Federica Monaco, Giovanni Savini
Istituto Zooprofilattico Sperimentale dell'Abruzzo e Molise, ISSAM, Teramo, Italy

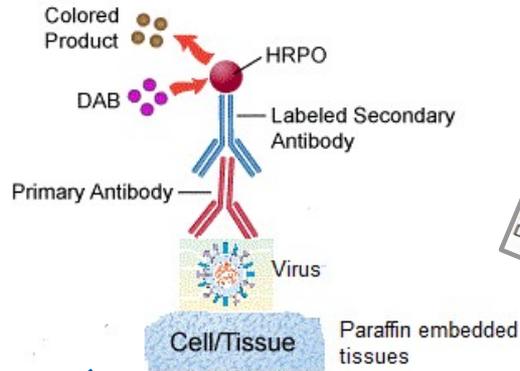
Acute Upper Respiratory Infection Among Pigs in Malaysia
Yeh Fong Tan,^{1*} Pooi Pooi Leong,² Cheong Lieng Teng,¹ Gunasekaran Gunnasekaran,³ Kamsiah Ujang,³ Kaw Bing Chua,⁴ and Lin-Fa Wang⁵







...Virus-istochimica (VHC)

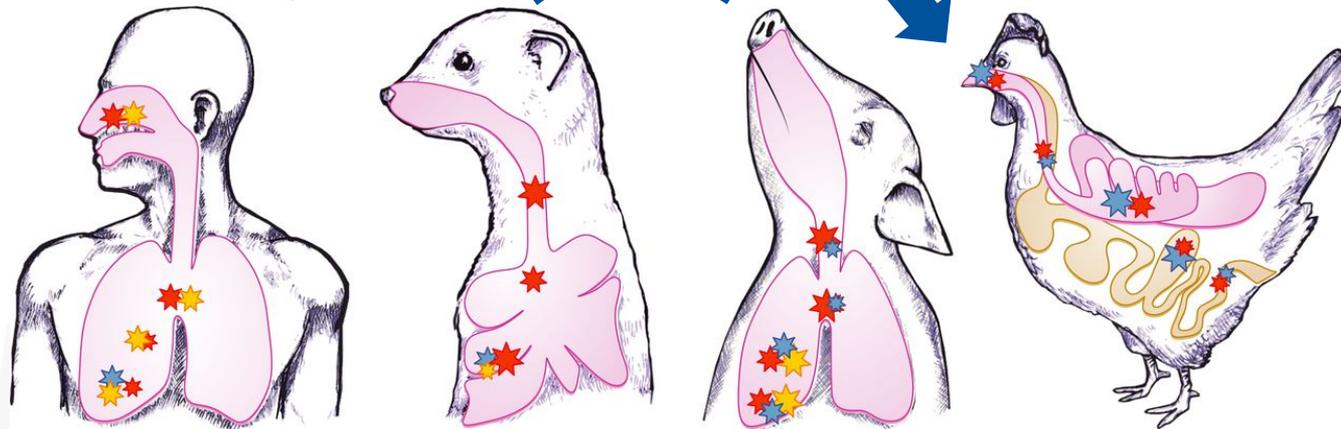


Science

H5N1 Virus Attachment to Lower Respiratory Tract

Debby van Riel, Vincent J. Munster, Emmie de Wit, Guus F. Rimmelzwaan, Ron A. M. Fouchier, Ab D. M. E. Osterhaus and Thijs Kuiken

Science 312 (5772), 399.
DOI: 10.1126/science.1125548 originally published online March 23, 2006



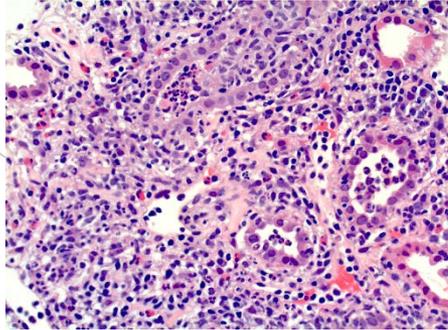
α 2,6 SA	
★	+++
★	++
★	+

α 2,3 SA MAA-I	
★	+++
★	++
★	+

α 2,3 SA MAA-II	
★	+++
★	++
★	+



Feline Morbillivirus (FeMV)



Feline morbillivirus, a previously undescribed paramyxovirus associated with tubulointerstitial nephritis in domestic cats

Patrick C. Y. Woo^{a,b,c,d,1}, Susanna K. P. Lau^{a,b,c,d,1}, Beatrice H. L. Wong^b, Rachel Y. Y. Fan^b, Annette Y. P. Wong^b, Anna J. X. Zhang^b, Ying Wu^b, Garnet K. Y. Choi^b, Kenneth S. M. Li^b, Janet Hui^c, Ming Wang^f, Bo-Jian Zheng^{a,b,c,d}, K. H. Chan^b, and Kwok-Yung Yuen^{a,b,c,d,2}

^aState Key Laboratory of Emerging Infectious Diseases, ^bDepartment of Microbiology, ^cResearch Centre of Infection and Immunology, and ^dCarol Yu Centre of Infection, University of Hong Kong, Queen Mary Hospital, Hong Kong Special Administrative Region, China; ^ePathLab Medical Laboratories, Hong Kong; and ^fGuangzhou Center for Disease Control and Prevention, Guangzhou, China

PNAS



RAPID COMMUNICATION

First report of feline morbillivirus in Europe

Alessio Lorusso^{1*}, Morena Di Tommaso², Elisabetta Di Felice¹, Guendalina Zaccaria¹, Alessia Luciani², Maurilia Marcacci¹, Giovanni Aste², Andrea Boari² & Giovanni Savini¹

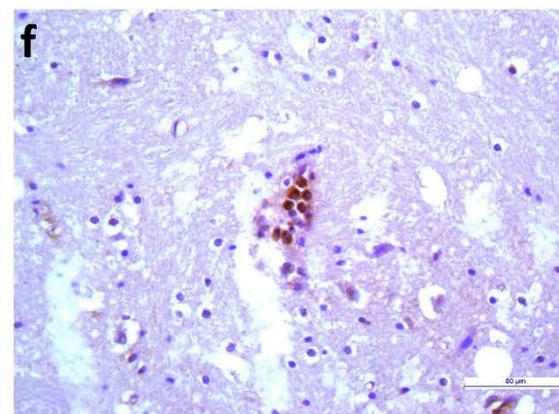
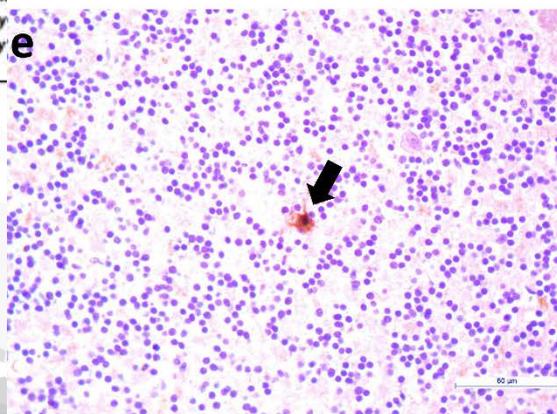
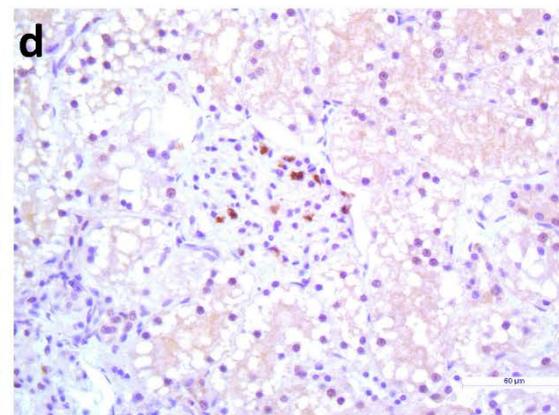
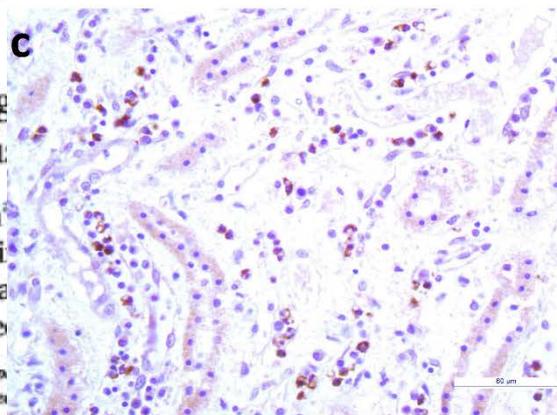
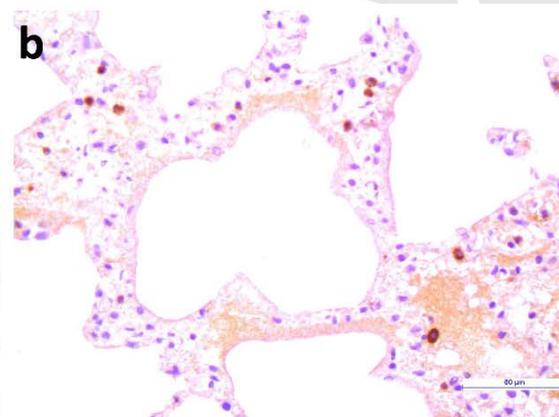
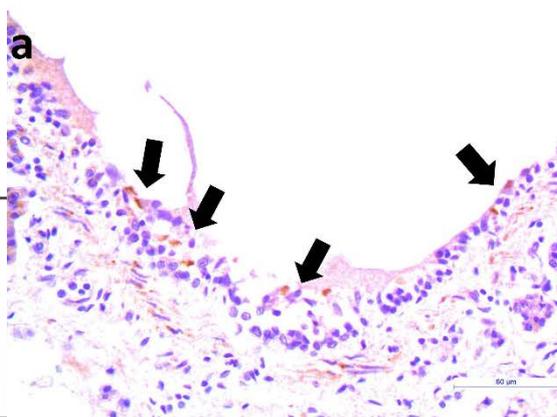
¹Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise 'G. Caporale', Campo Boario, 64100 Teramo, Italy.

²Faculty of Veterinary Medicine, University of Teramo, 64100 Teramo, Italy.

* Corresponding author at: Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise 'G. Caporale', Campo Boario, 64100 Teramo, Italy.
Tel.: +39 0861 332440, Fax: +39 0861 332251, e-mail: a.lorusso@izs.it.



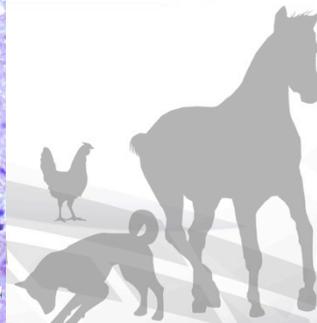
VHC-FeMV



Epidemiologia
morbillivirale

Eliana De Luca
 Daria Di Sabatini
 Maria Loredana
 Giovanni Di Teo

^a Istituto Zooprofilattico SpA
^b Faculty of Veterinary Medicine
^c Istituto Zooprofilattico SpA
^d Department of Veterinary
^e Department of Veterinary



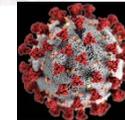
RESEARCH

Science
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CORONAVIRUS

Susceptibility of ferrets, cats, dogs, and other domesticated animals to SARS-coronavirus 2

Jianzhong Shi^{1*}, Zhiyuan Wen^{1*}, Gongxun Zhong^{1*}, Huanliang Yang^{1*}, Chong Wang^{1*}, Baoying Huang^{2*}, Renqiang Liu¹, Xijun He³, Lei Shuai¹, Ziruo Sun¹, Yubo Zhao¹, Peipei Liu², Libin Liang¹, Pengfei Cui¹, Jinliang Wang¹, Xianfeng Zhang³, Yuntao Guan³, Wenjie Tan², Guizhen Wu^{2†}, Hualan Chen^{1†}, Zhigao Bu^{1,3†}



Microbes and Infection 22 (2020) 221–225



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Short communication

Predicting the angiotensin converting enzyme 2 (ACE2) utilizing capability as the receptor of SARS-CoV-2

Ye Qiu¹, Yuan-Bo Zhao¹, Qiong Wang, Jin-Yan Li, Zhi-Jian Zhou, Ce-Heng Liao, Xing-Yi Ge*

Hunan Provincial Key Laboratory of Medical Virology, Institute of Pathogen Biology and Immunology, College of Biology, Hunan University, 27 Tianma Rd., Changsha, Hunan, 410012, China



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Structure and Assembly

Comparison of SARS-CoV-2 spike protein binding to ACE2 receptors from human, pets, farm animals, and putative intermediate hosts

Xiaofeng Zhai, Jiumeng Sun, Ziqing Yan, Jie Zhang, Jin Zhao, Zongzheng Zhao, Qi Gao, Wan-Ting He, Michael Veit, Shuo Su

DOI: 10.1128/JVI.00831-20

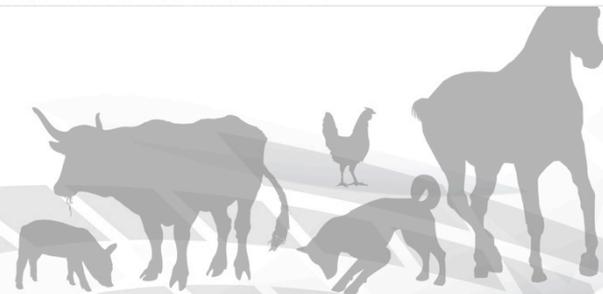
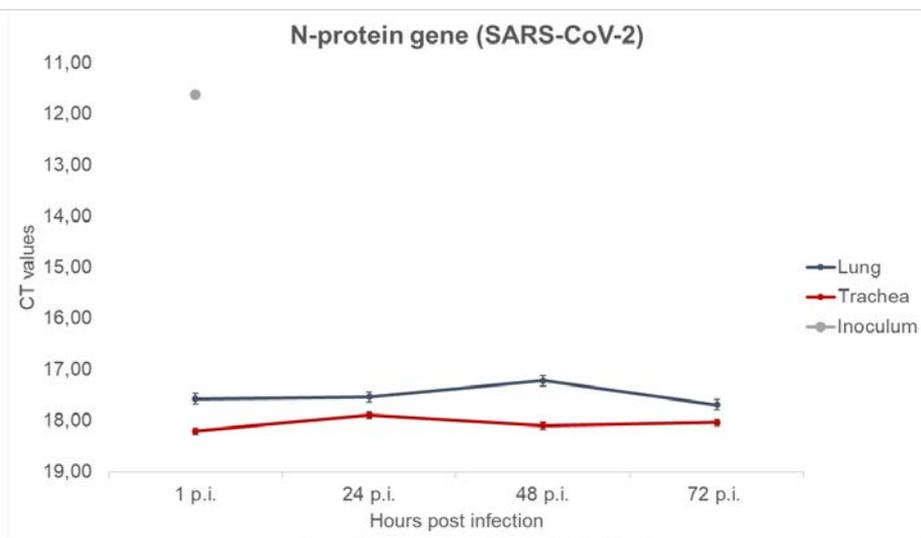
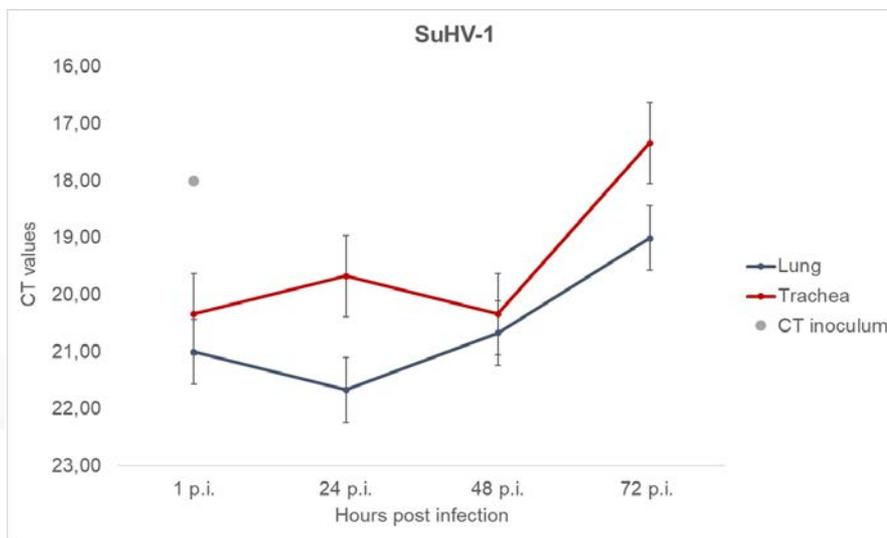


Modelli animali *ex vivo* per lo studio di virus zoonotici emergenti...SARS-CoV-2

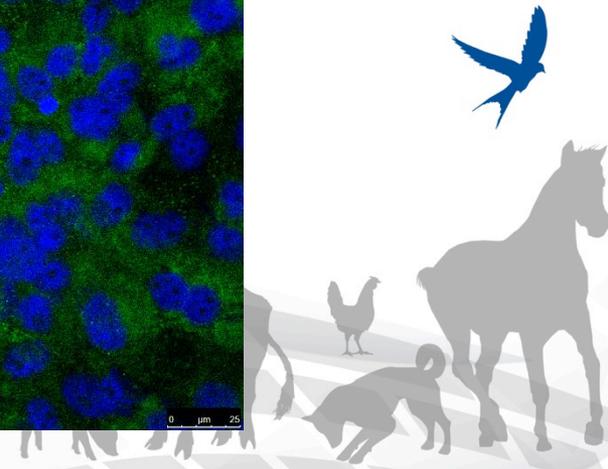
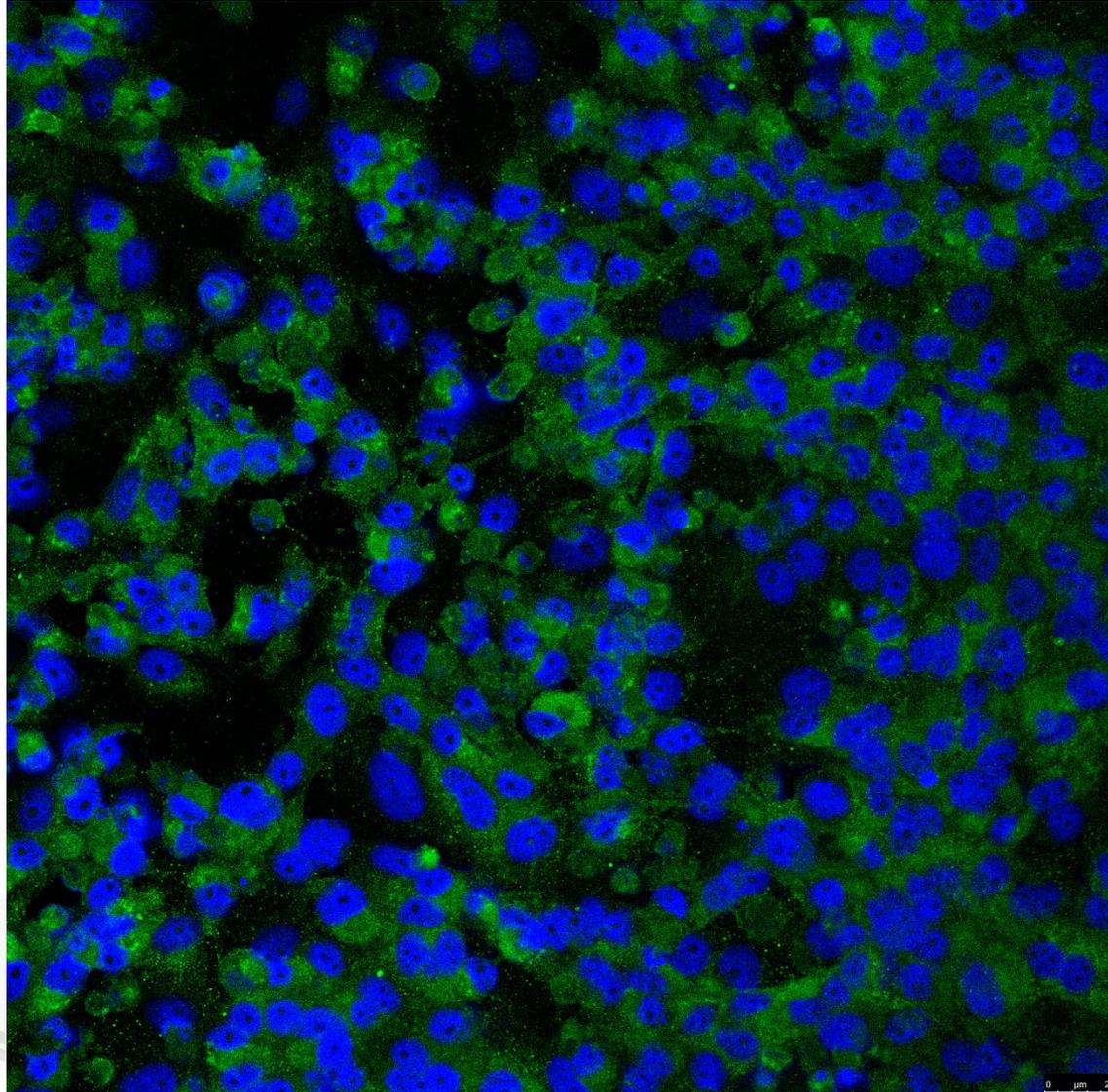
Control Virus

SARS-CoV-2

Swine EVOCs



Anti-SARS-CoV-2 antibody

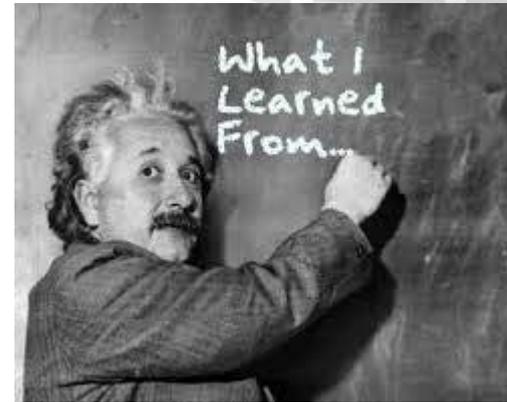


Conclusioni e prossimi step



- 
- **Espianti** di ottimo ausilio per caratterizzare **patogeni emergenti** anche con potenziale **zoonotico** o a **rischio introduzione** senza ricorrere all'utilizzo di animali da esperimento
 - Messa a punto **espanti da altre specie (Cane, Gatto, Coniglio)** per valutare tropismo **SARS-CoV-2** e studio su recettori **ACE2** di queste specie tramite **VHC**





- **Modelli alternativi** (Ex Vivo, Virus-istochimica) ottimi strumenti per indagini **preliminari**
- Caratterizzazione di **patogeni sconosciuti o emergenti** 
- Indirizzare la **sperimentazione *in vivo***



Grazie per l'attenzione!!!



Email: g.diteodoro@izs.it

