Apport du modèle hamster syrien à la compréhension de la COVID-19 : Anosmie et validation thérapeutique

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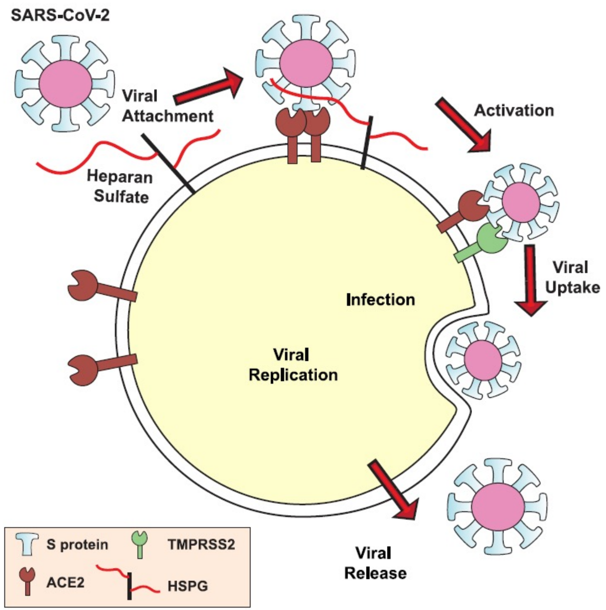
Déclaration de liens d'intérêt avec les industries de santé en rapport avec le thème de la présentation (loi du 04/03/2002) :

Intervenant : Nicolas Meunier

Titre: Apport du modèle hamster syrien à la compréhension de la COVID-19 : Anosmie et validation thérapeutique

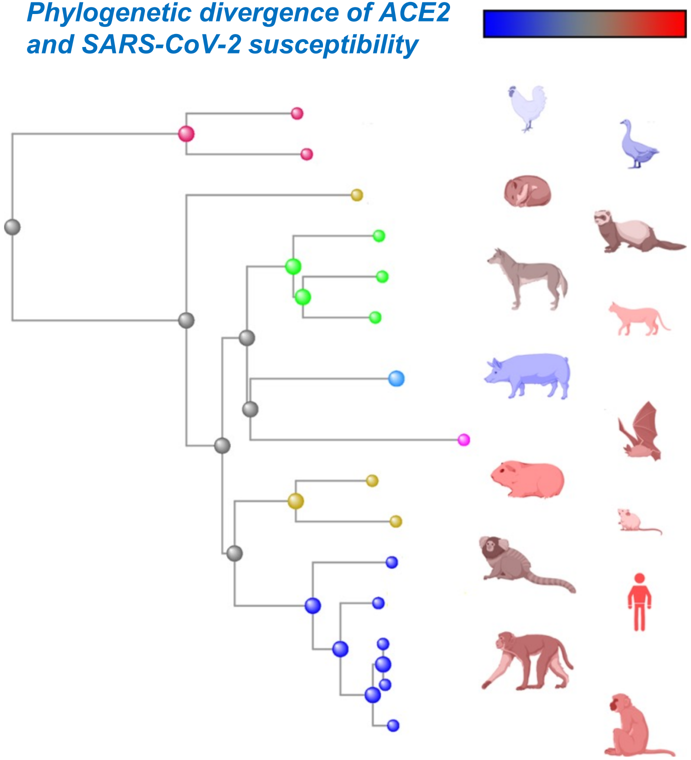
	OUI	NON
Consultant ou membre d'un conseil scientifique	☐	☑
Conférencier ou auteur/rédacteur rémunéré d'articles ou documents	☐	☑
Prise en charge de frais de voyage, d'hébergement ou d'inscription à des congrès ou autres manifestations	☐	☑
Investigateur principal d'une recherche ou d'une étude clinique	☐	☑

Les récepteurs d'entrée du SARS-CoV-2



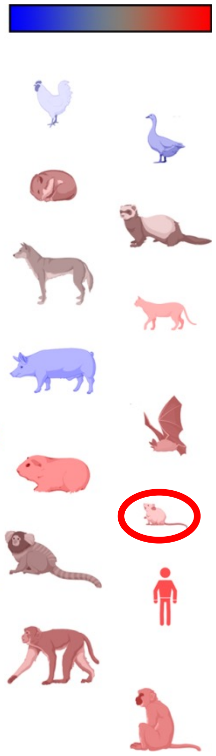
Clausen et al. (2020) SARS-CoV-2 Infection Depends on Cellular Heparan Sulfate and ACE2. ***Cell***

Phylogenetic divergence of ACE2 and SARS-CoV-2 susceptibility

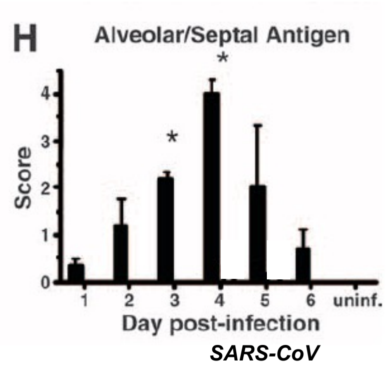


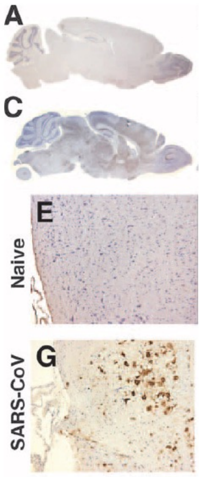
Johansen et al. (2020) Animal and translational models of SARS-CoV-2 infection and COVID-19. ***Mucosal Immuno***

Modèle animal: Souris



Humanized mice for ACE2 with a large expression panel



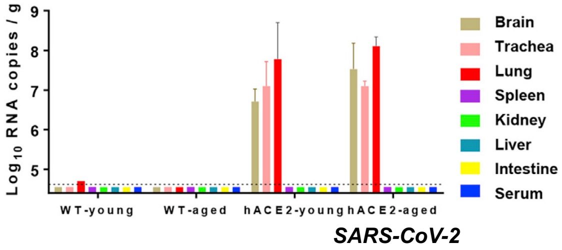


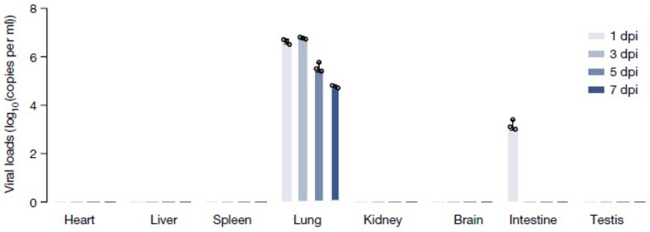
Symptoms allowing development of vaccines and antiviral compounds

Presence of the virus into the brain
Death by encephalopathies

Netland et al. (2008) Severe acute respiratory syndrome coronavirus infection causes neuronal death in the absence of encephalitis in mice transgenic for human ACE2. ***J Virol***

Humanized mice for ACE2 with ACE2 endogenous promoter (SARS-CoV-2)



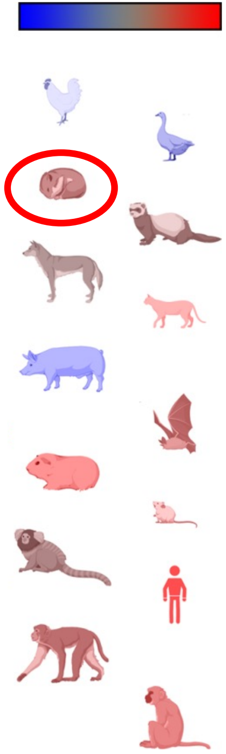


Symptoms allowing development of vaccines and antiviral compounds

Potential presence of the virus into the brain
No reflection of age susceptibility

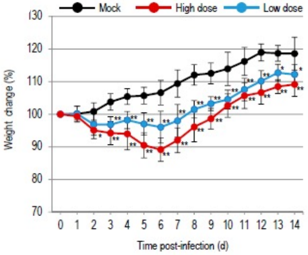
Sun et al. (2020) A Mouse Model of SARS-CoV-2 Infection and Pathogenesis. ***Cell Host Microbe***
Bao et al. (2020) The pathogenicity of SARS-CoV-2 in hACE2 transgenic mice. ***Nature***

Modèle animal: Hamster

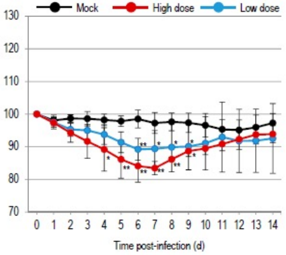


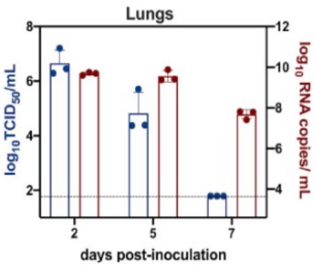
Nasal Instillation

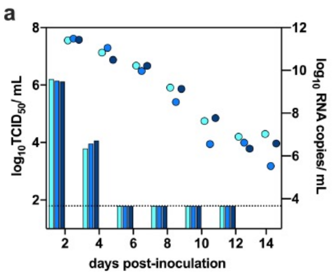
1 month old hamster



8 month old hamster

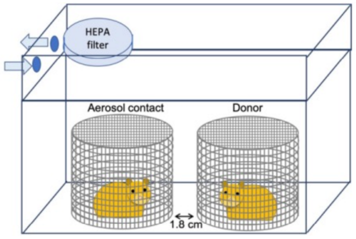


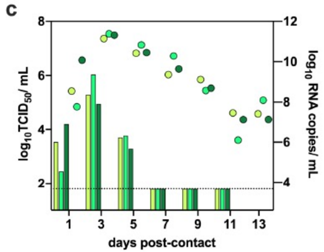




Nasal washes

Airborne transmission





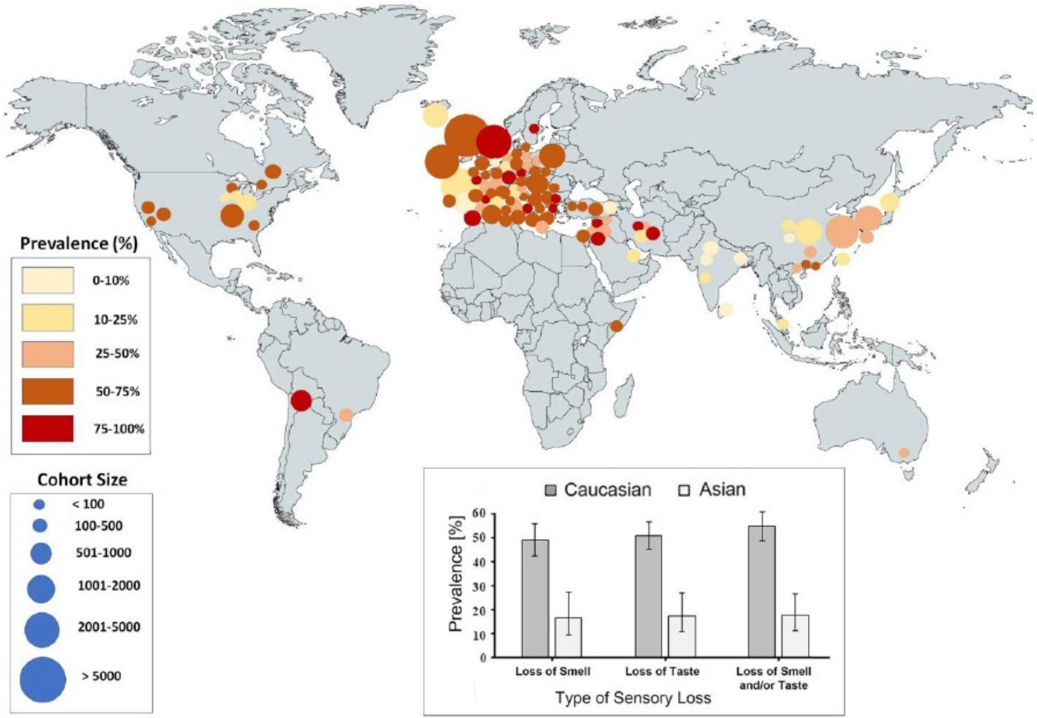
Nasal washes

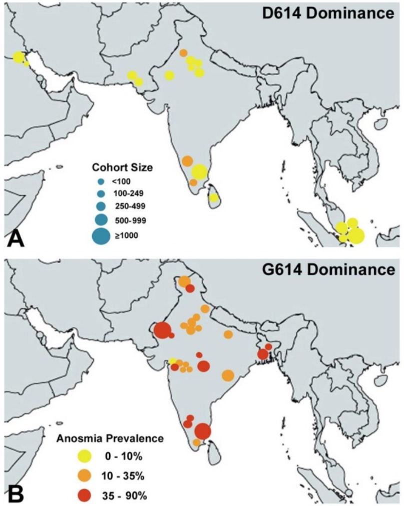
Symptoms allowing development of vaccines and antiviral compounds
Transmission of SARS-CoV-2 by aerosols
Pathophysiopathology similar to mild case in humans

Mild symptoms

Sia et al. (2020) Pathogenesis and transmission of SARS-CoV-2 in golden hamsters. ***Nature***
Imai etal. (2020) Syrian hamsters as a small animal model for SARS-CoV-2 infection and countermeasure development. ***PNAS***

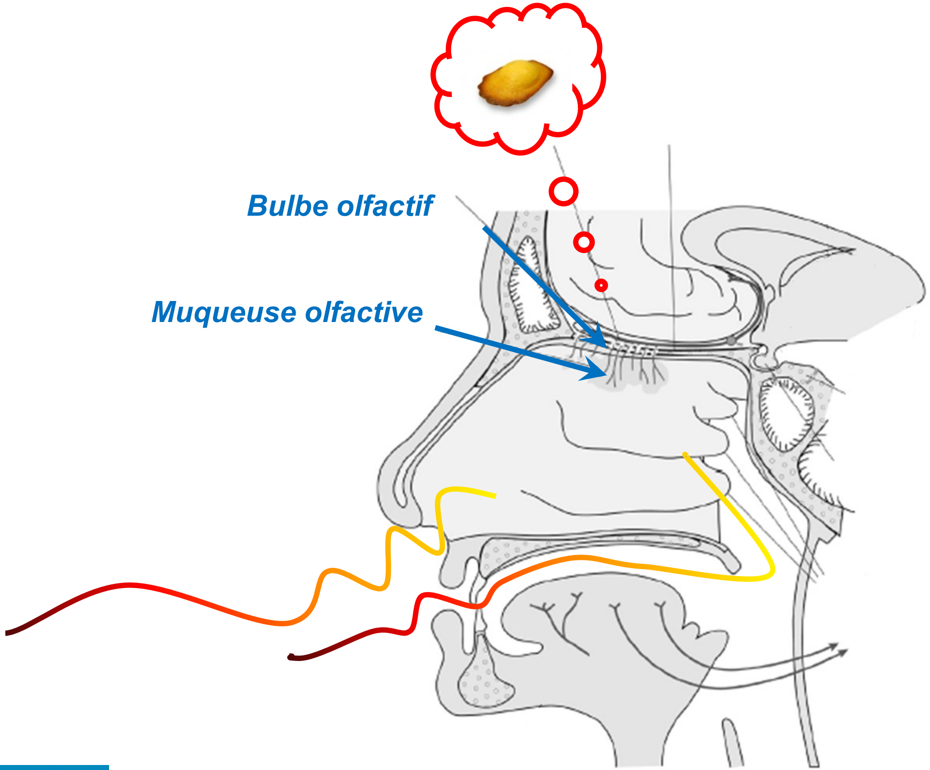
Prévalence de l'anosmie liée à la COVID-19

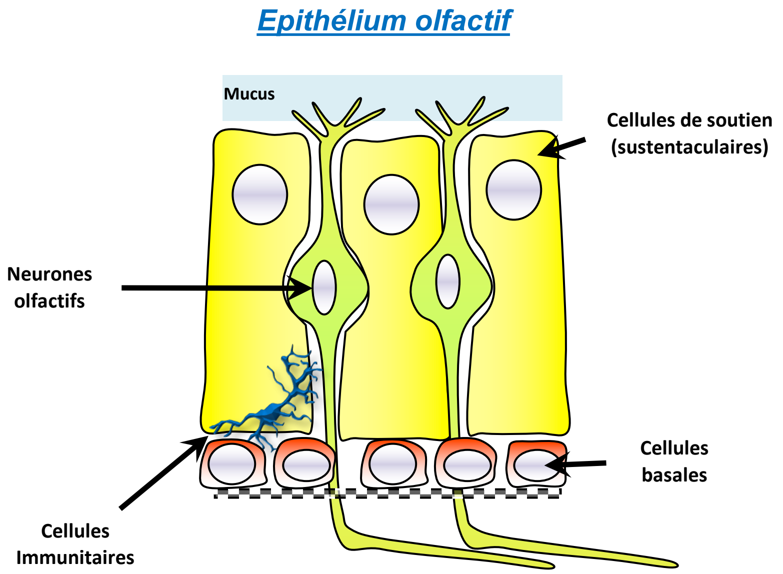




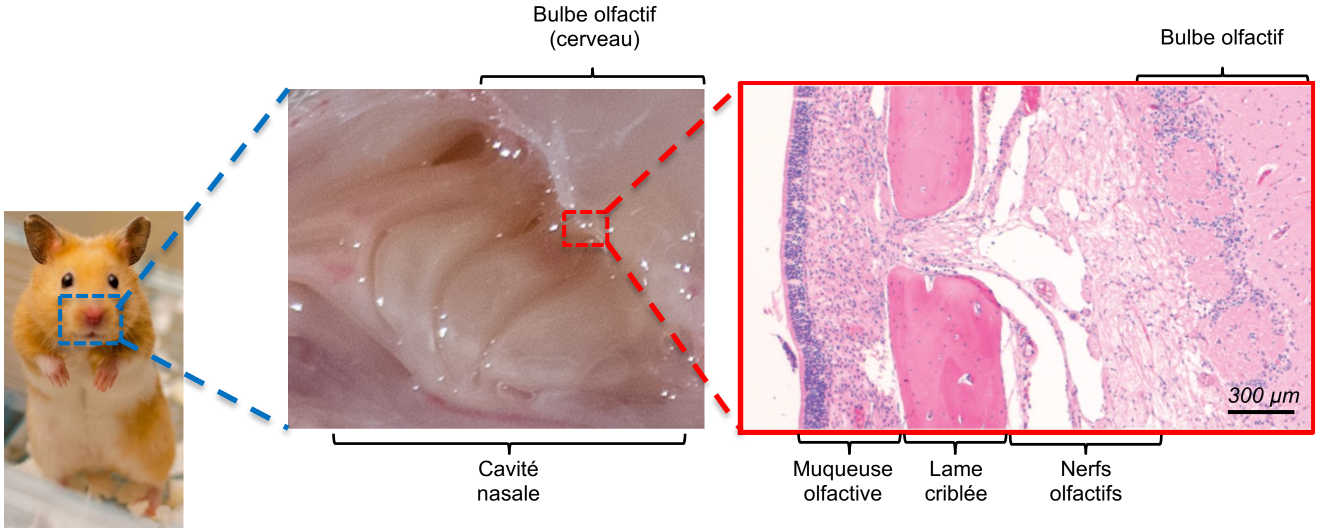
von Bartheld, C. S., et al. (2021). "The D614G virus mutation enhances anosmia in COVID-19 patients: Evidence from a systematic review and meta-analysis of studies from South Asia." 2021.2008.2011.21261934.

Comment débute l'olfaction ?

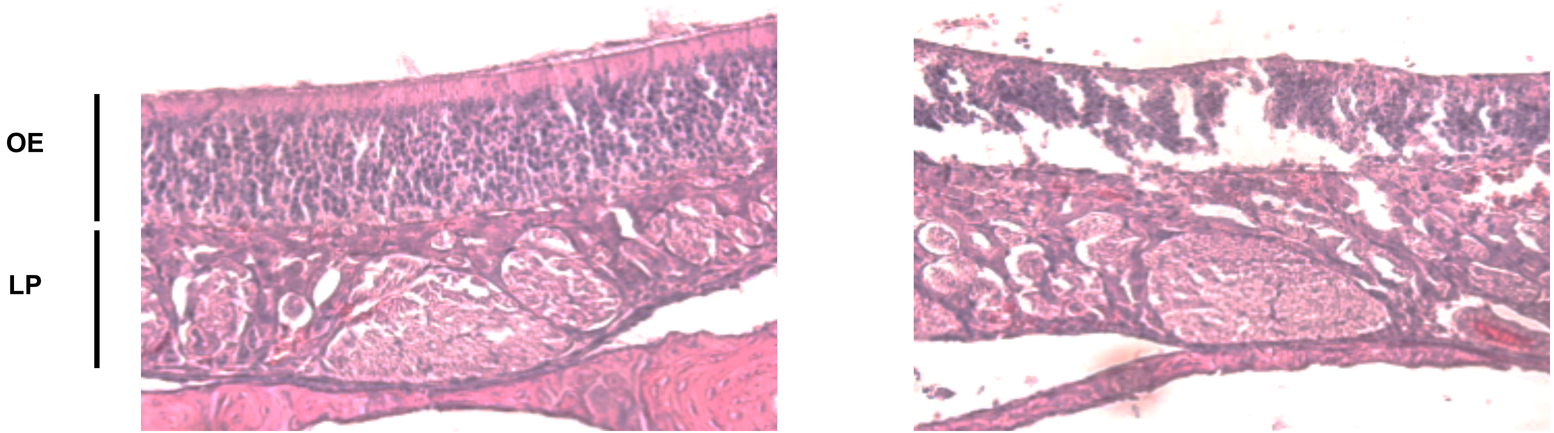




La muqueuse olfactive, une porte d'entrée des virus vers le cerveau ?



Impact histologique d'une instillation nasale du SARS-CoV-2 chez le hamster

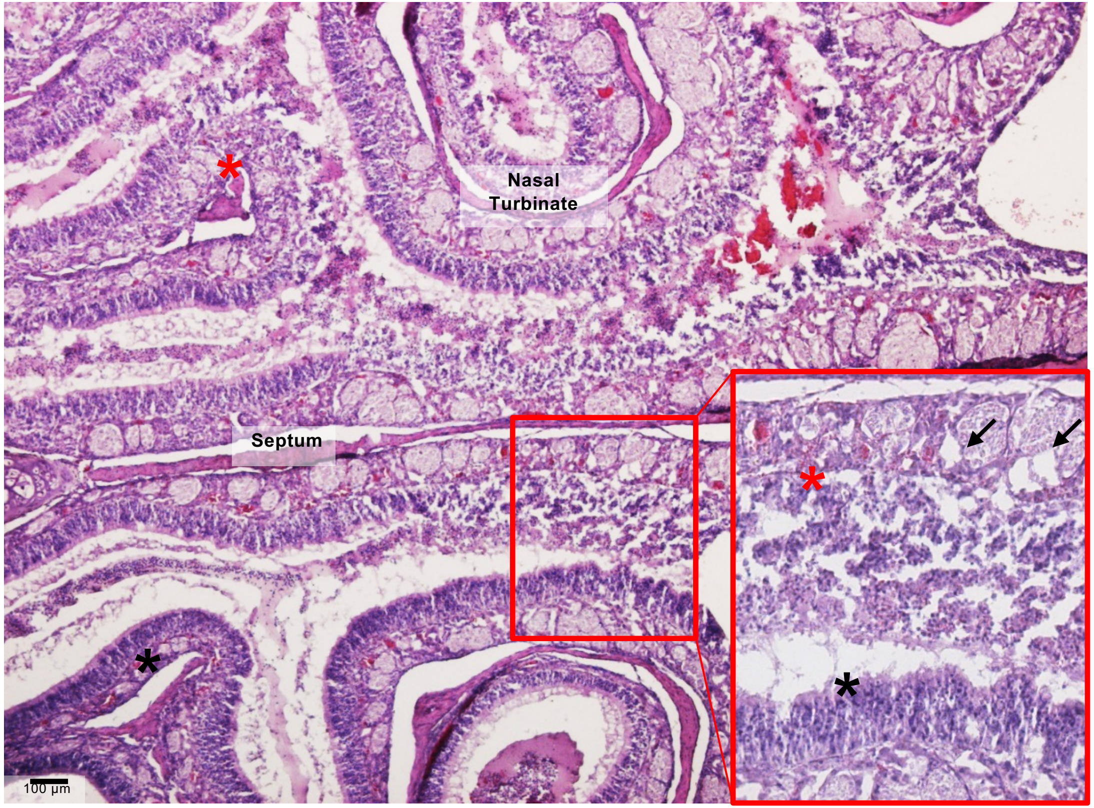


Contrôle

2 jours après infection

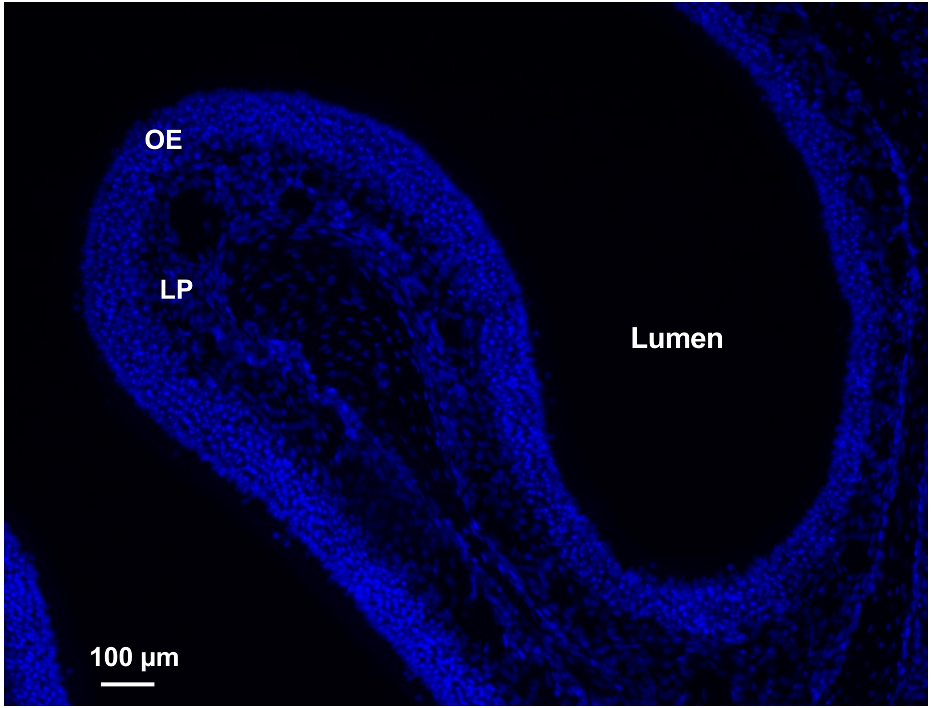
Bryche et al. (2020). Massive transient damage of the olfactory epithelium associated with infection of sustentacular cells by SARS-CoV-2 in golden Syrian hamsters. Brain Behav Immun 89, 579-586.

Impact histologique d'une instillation nasale du SARS-CoV-2 chez le hamster

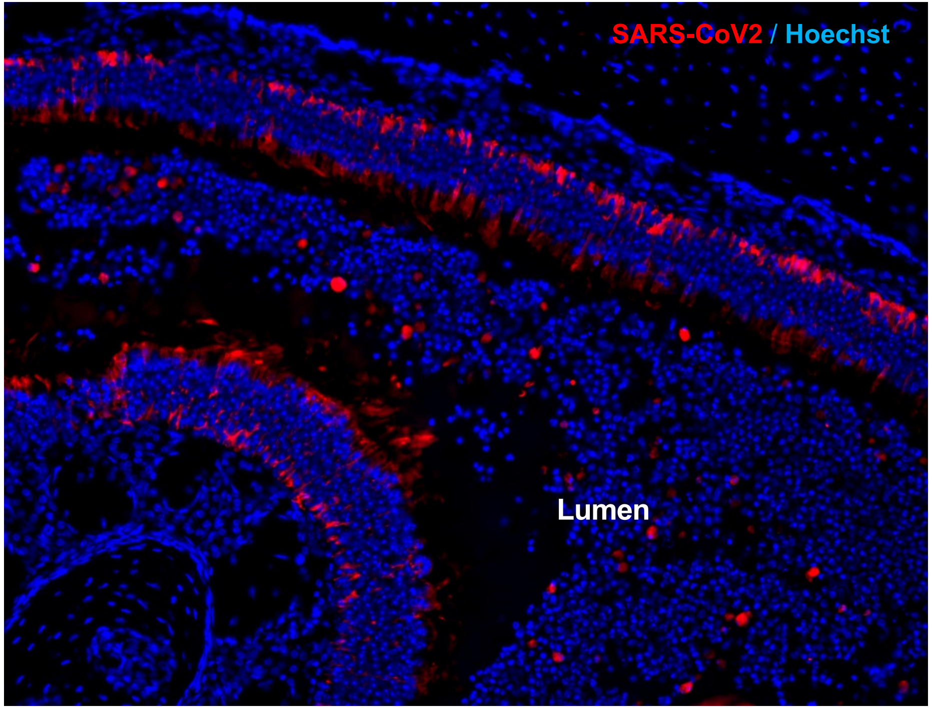


Bryche et al. (2020). Massive transient damage of the olfactory epithelium associated with infection of sustentacular cells by SARS-CoV-2 in golden Syrian hamsters. Brain Behav Immun 89, 579-586.

Presence du SARS-CoV-2 dans l'épithélium olfactif ?



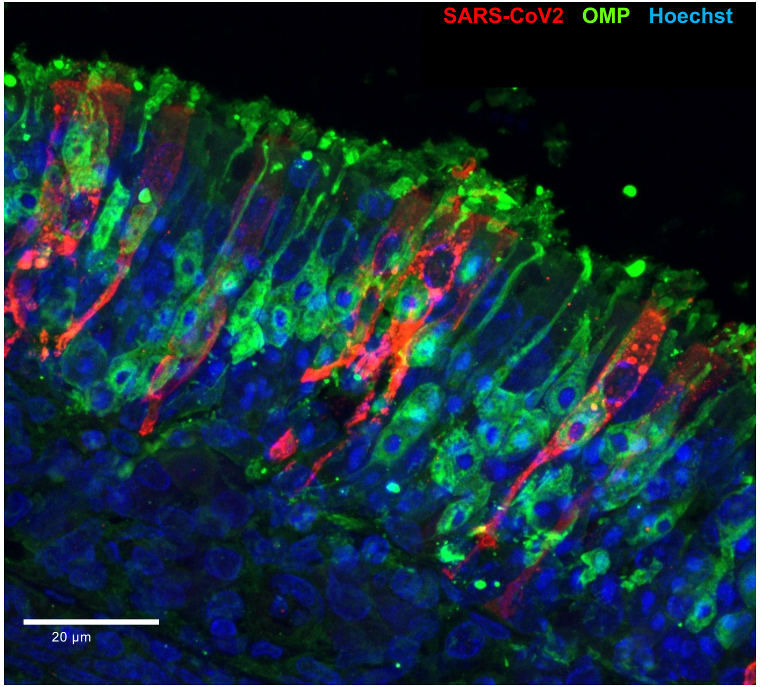
Mock



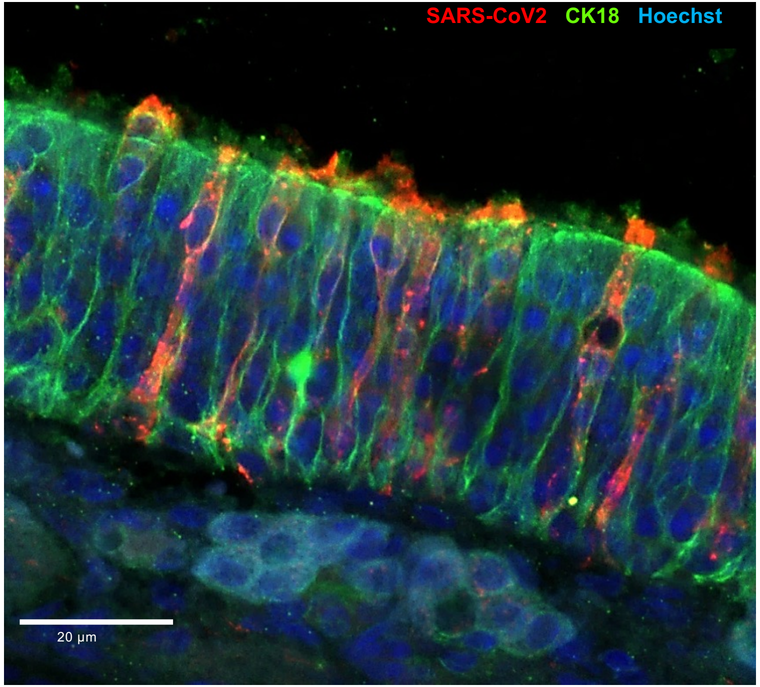
2 DPI

Unpublished data

Cellules infectées dans l'épithélium olfactif ?



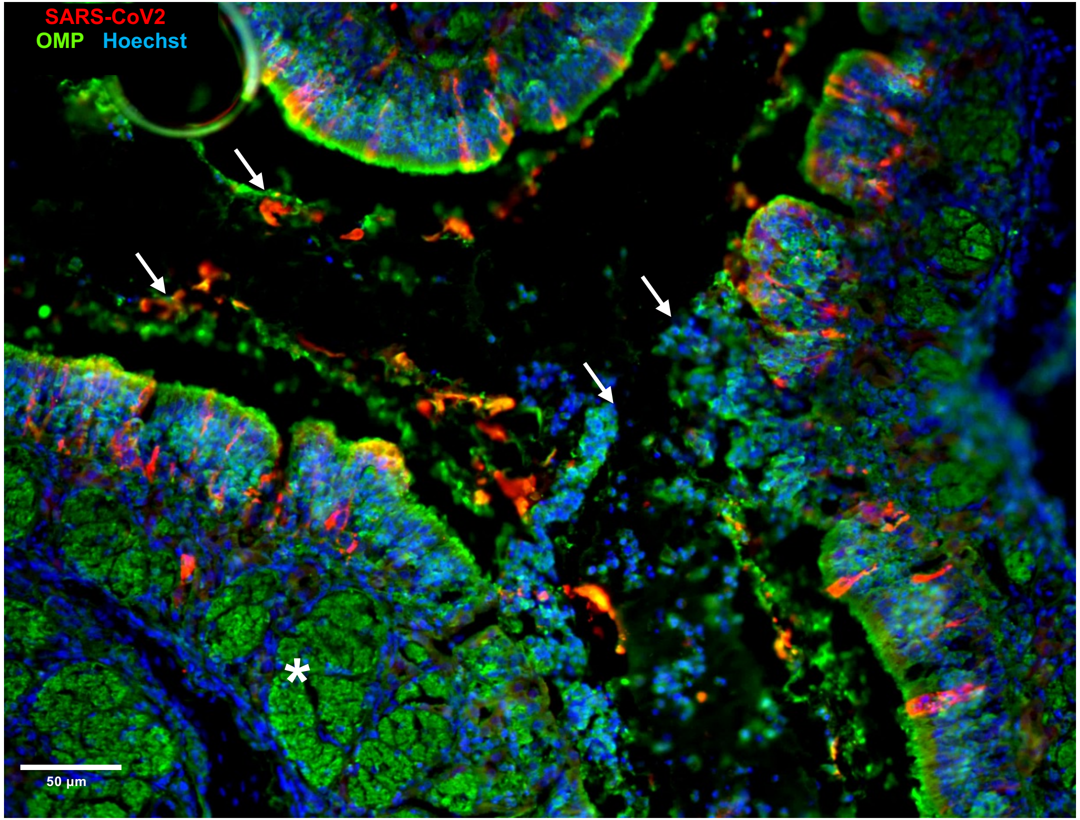
OMP, *marker of olfactory neurons*



CK18, *marker of sustentacular cells*

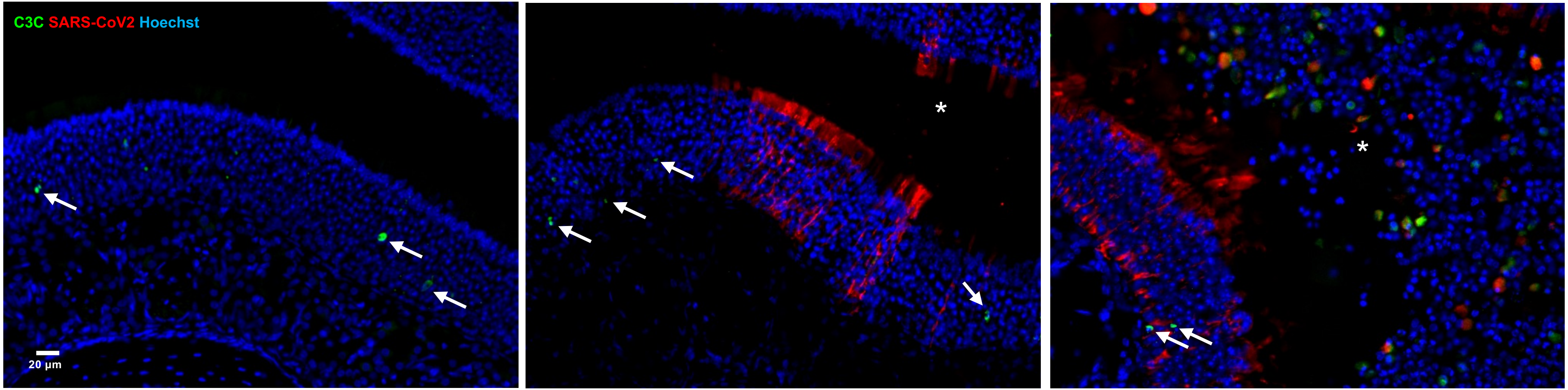
Bryche et al. (2020). Massive transient damage of the olfactory epithelium associated with infection of sustentacular cells by SARS-CoV-2 in golden Syrian hamsters. Brain Behav Immun 89, 579-586.

Perte de neurones olfactifs?



Bryche et al. (2020). Massive transient damage of the olfactory epithelium associated with infection of sustentacular cells by SARS-CoV-2 in golden Syrian hamsters. Brain Behav Immun 89, 579-586.

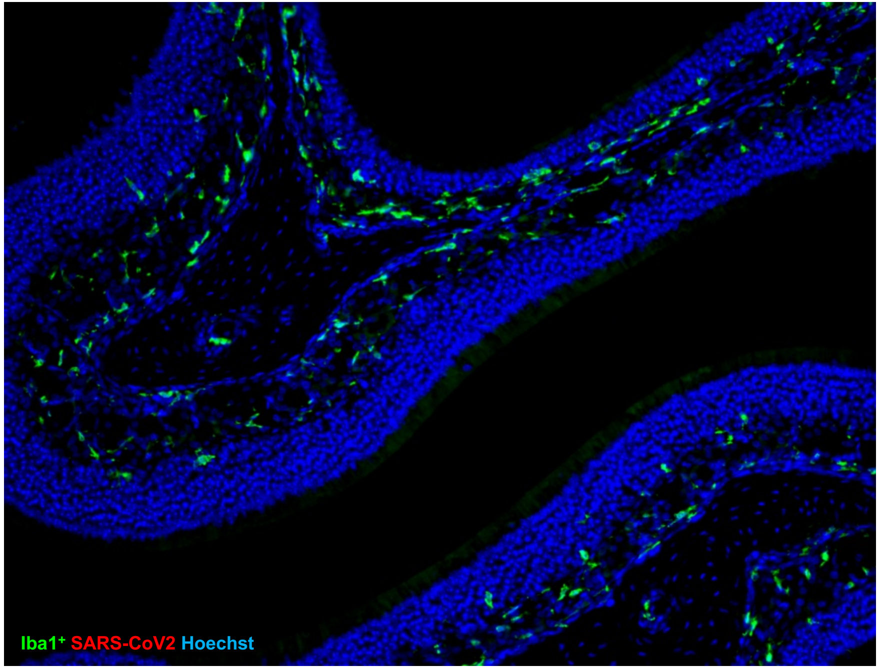
Mort cellulaire induite par le virus ?

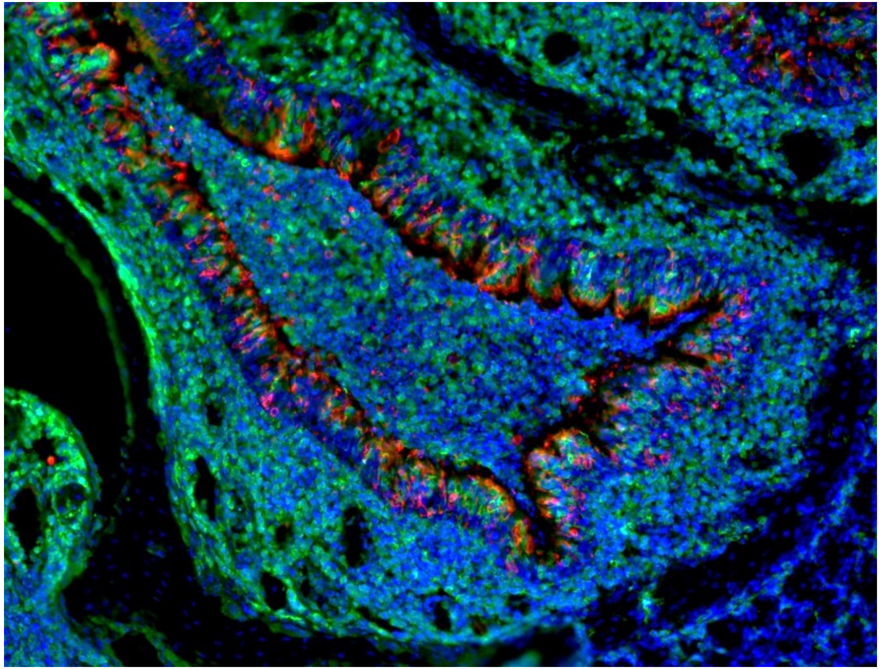


Control | 1 dpi: mildly infected zone | 1 dpi: strongly infected zone

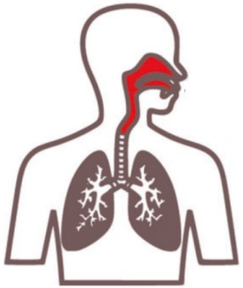
Unpublished data

Importance des cellules immunitaires ?





Traiter la cavité nasale contre la COVID-19 ?



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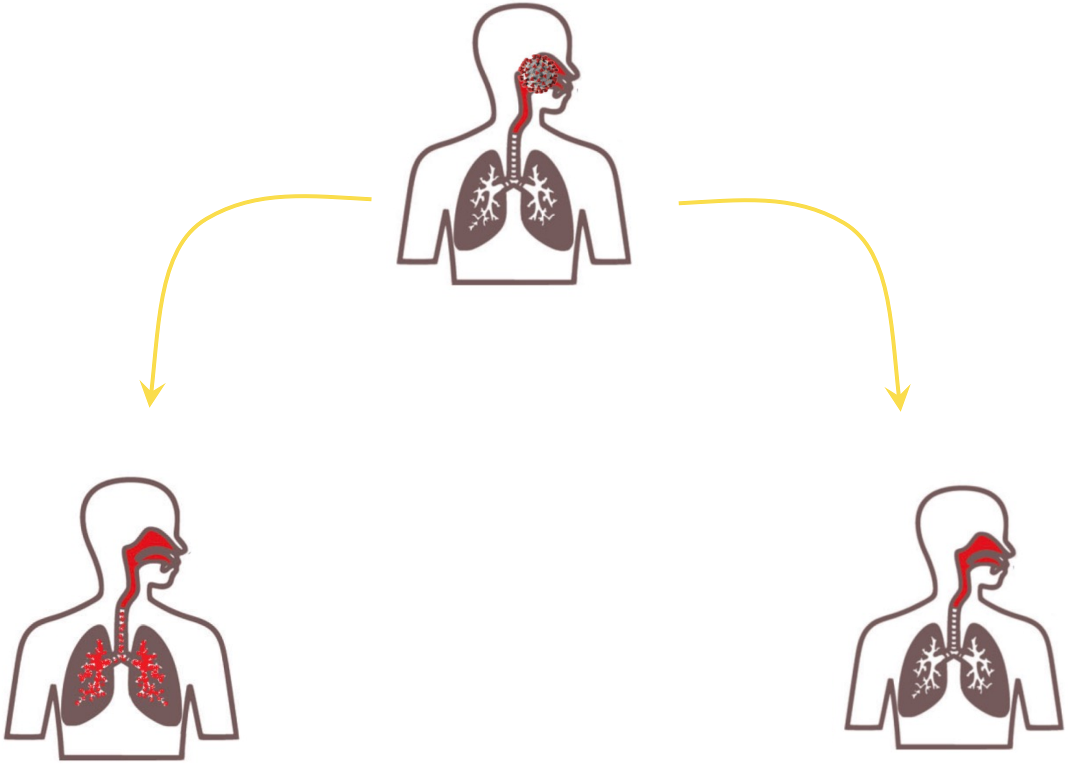
Traiter la cavité nasale contre la COVID-19 ?



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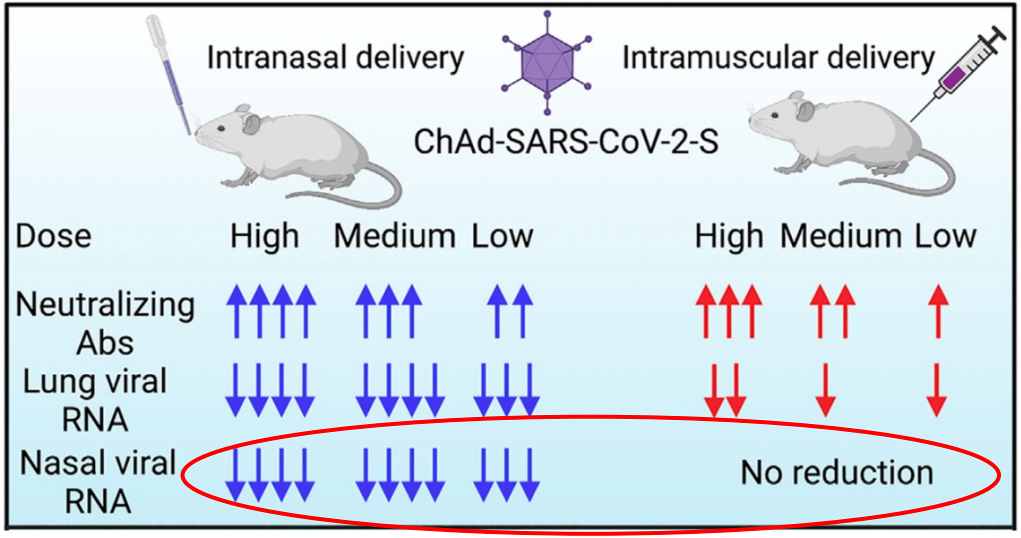
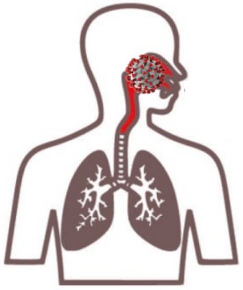
Vaccin intranasal ?

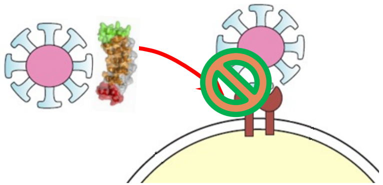


Transmissibilité ?

Hassan, et al. (2021). An intranasal vaccine durably protects against SARS-CoV-2 variants in mice. *Cell Rep* **36**, 109452.

Développer des antiviraux contre la COVID-19 ?





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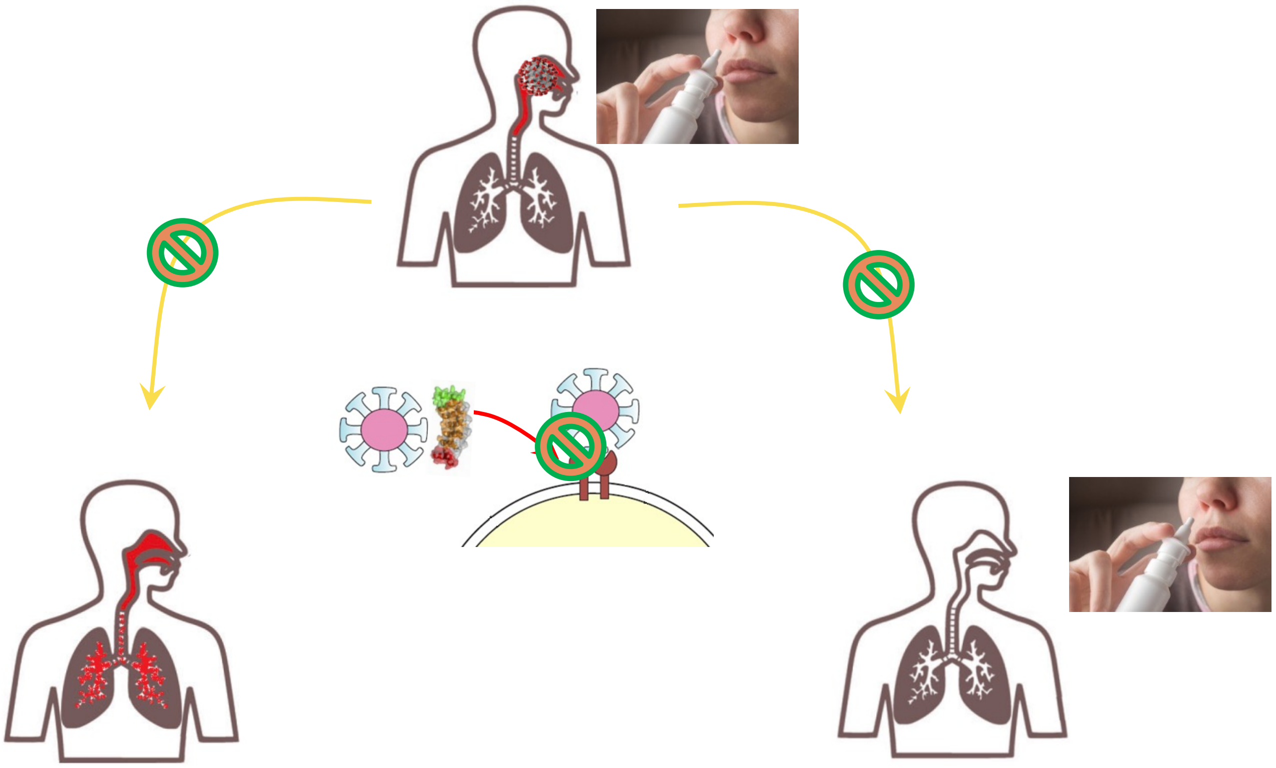
αRep

Petit peptide bactérien avec motif aléatoire sélectionné contre le RBD du spike

Développer des antiviraux contre la COVID-19 ?



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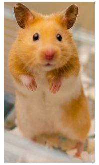
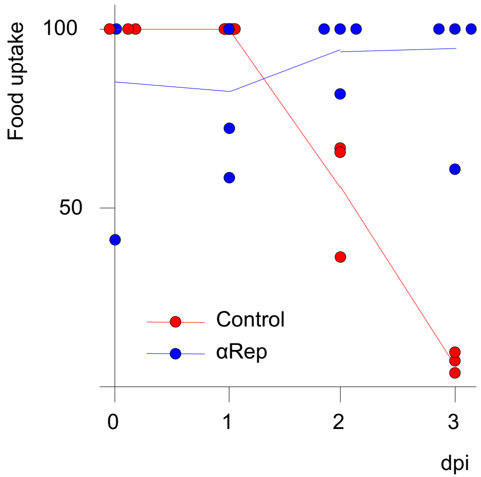
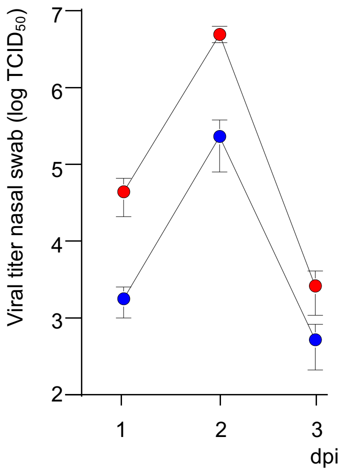
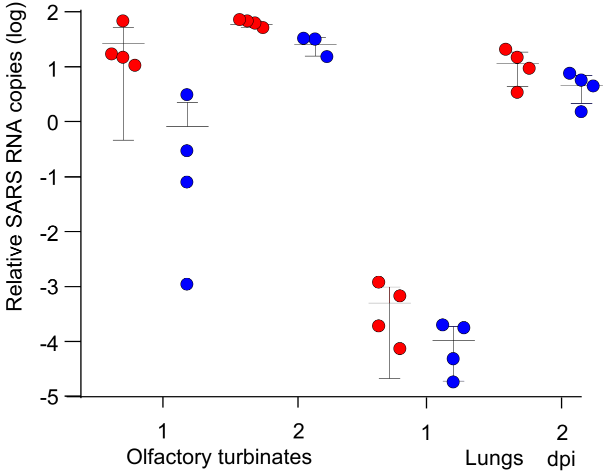
Développer des antiviraux contre la COVID-19 ?



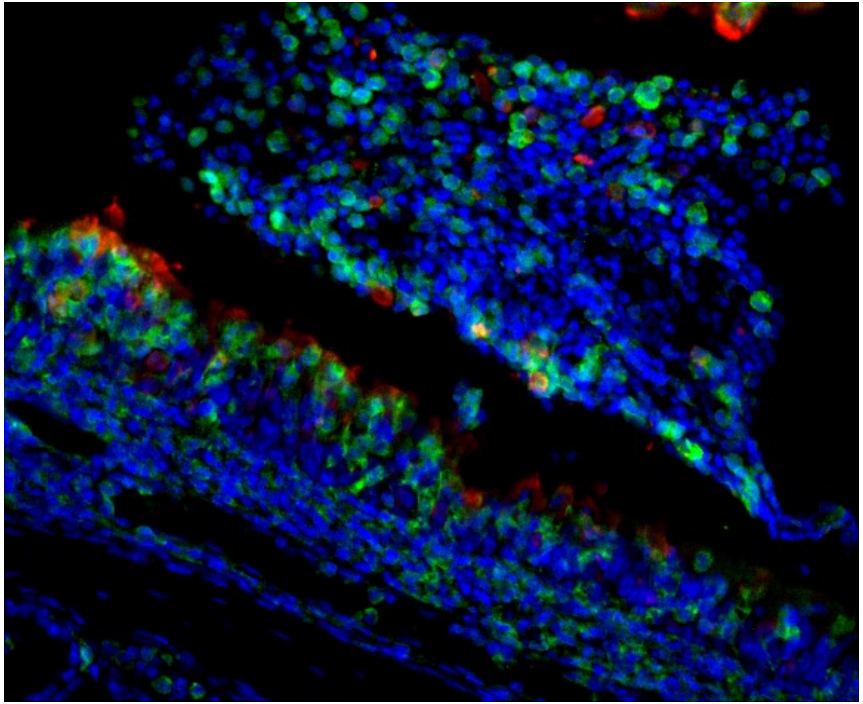


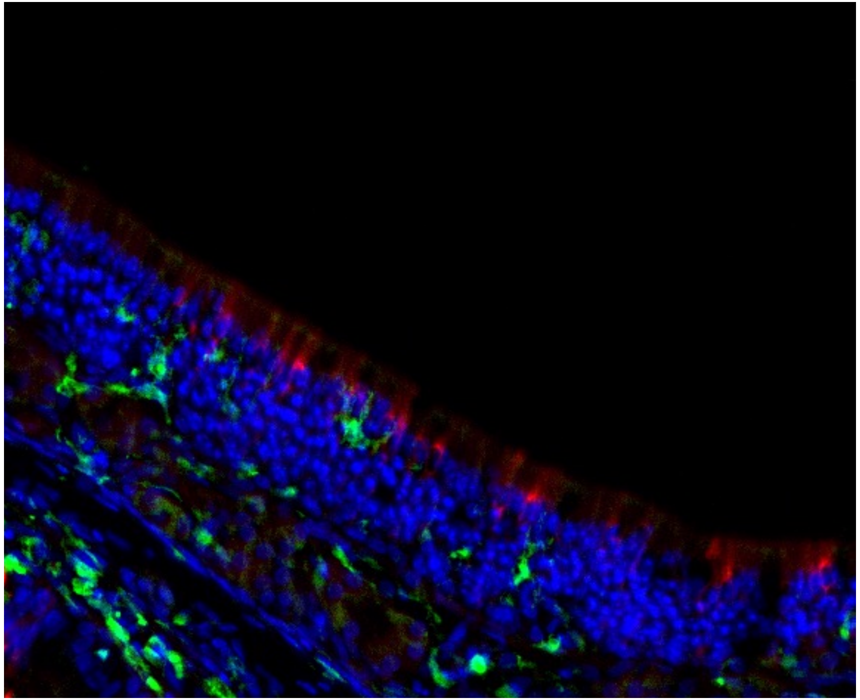




Unpublished data

Développer des antiviraux contre la COVID-19 ?





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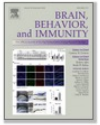

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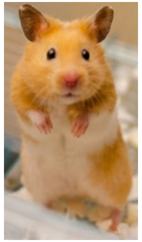

Bertrand Bryche [a], Audrey St Albin [a], Severine Murri [b], Sandra Lacôte [b], Coralie Pulido [c], Meriadeg Ar Gouilh [d, e], Sandrine Lesellier [f], Alexandre Servat [f], Marine Wasniewski [f], Evelyne Picard-Meyer [f], Elodie Monchatre-Leroy [f], Romain Volmer [g], Olivier Rampin [h], Ronan Le Goffic [a], Philippe Marianneau [b], Nicolas Meunier [a]