

A microscopic image of a coronavirus particle, showing its characteristic spherical shape and the crown-like structure of its surface proteins. The image is in shades of blue and is slightly out of focus, serving as a background for the text.

Kinésithérapie et syndrome *d'hyperventilation* post-COVID

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Je déclare les liens d'intérêt suivants : Aerogen, APTAR, Boehringer, Chiesi

Décembre 2019
SARS-CoV2
(Wuhan)

Août 2020
OMS
COVID long

Long COVID

Long-haul COVID

Long-terms effects of COVID-19

Post-COVID condition

Post-COVID syndrome

Chronic COVID

Octobre 2021
OMS
Post-COVID-19



Affection post-COVID-19

Octobre 2021

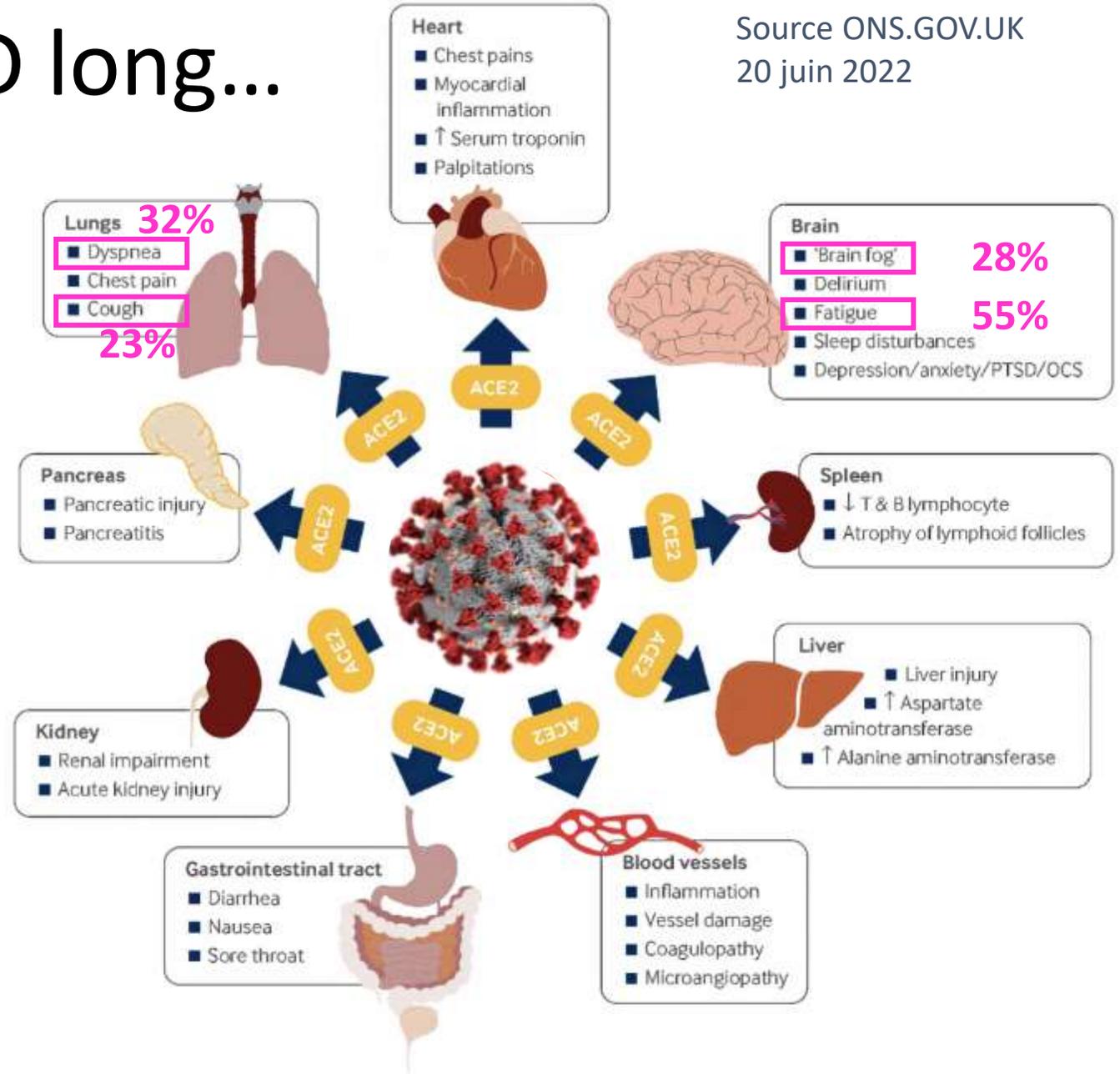
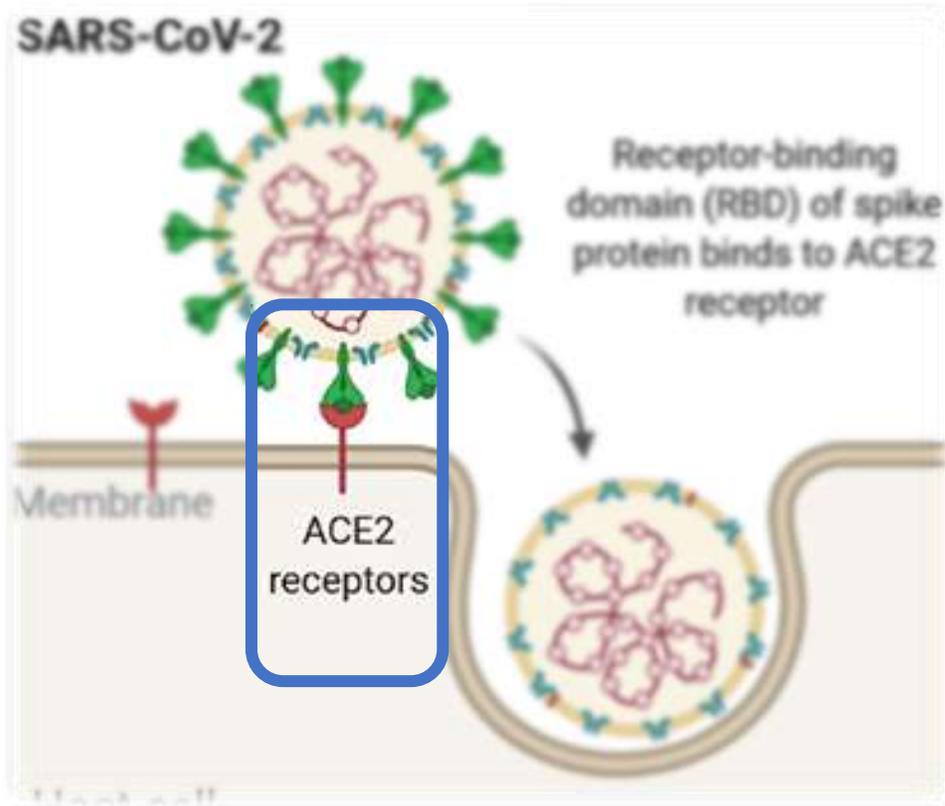


Organisation
mondiale de la Santé

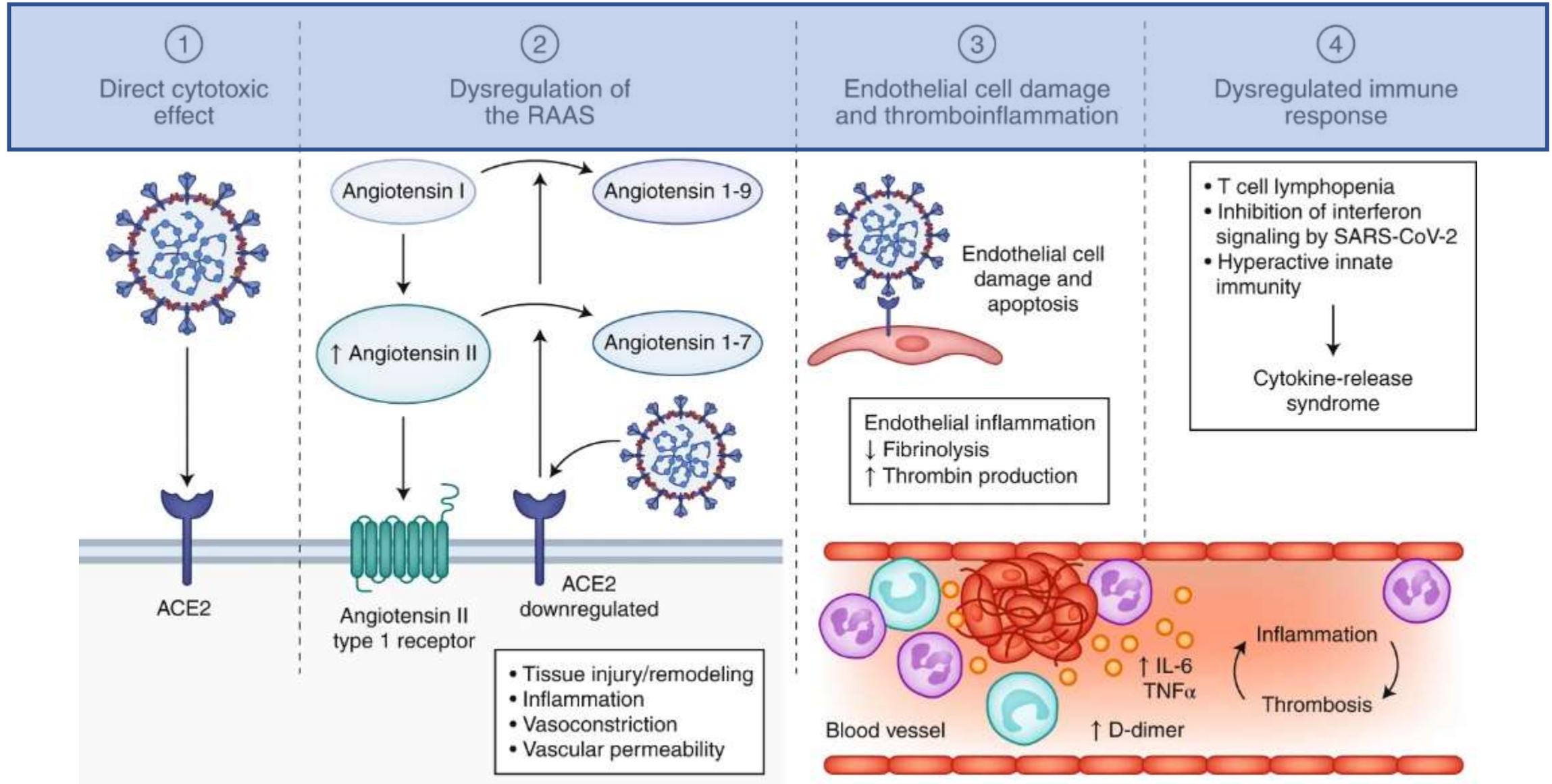
- Infection probable ou confirmée par le SARS-CoV-2
- 3 mois après l'apparition de la COVID-19 + symptômes qui persistent au moins 2 mois
- Autres diagnostic exclus
- Symptômes variés (fatigue, essoufflement, dysfonctionnement cognitif...) et, nouveaux, fluctuants voire récidivants
- Impact sur le quotidien

SARS-CoV2 et COVID long...

Source ONS.GOV.UK
20 juin 2022



Pathophysiology

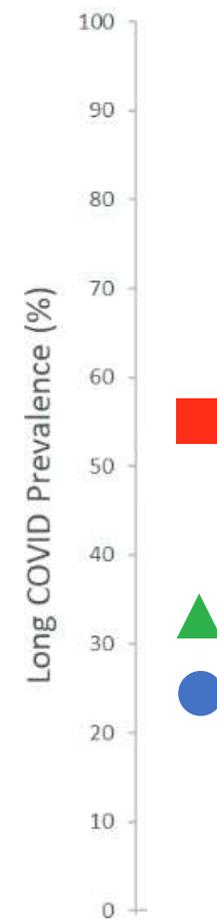
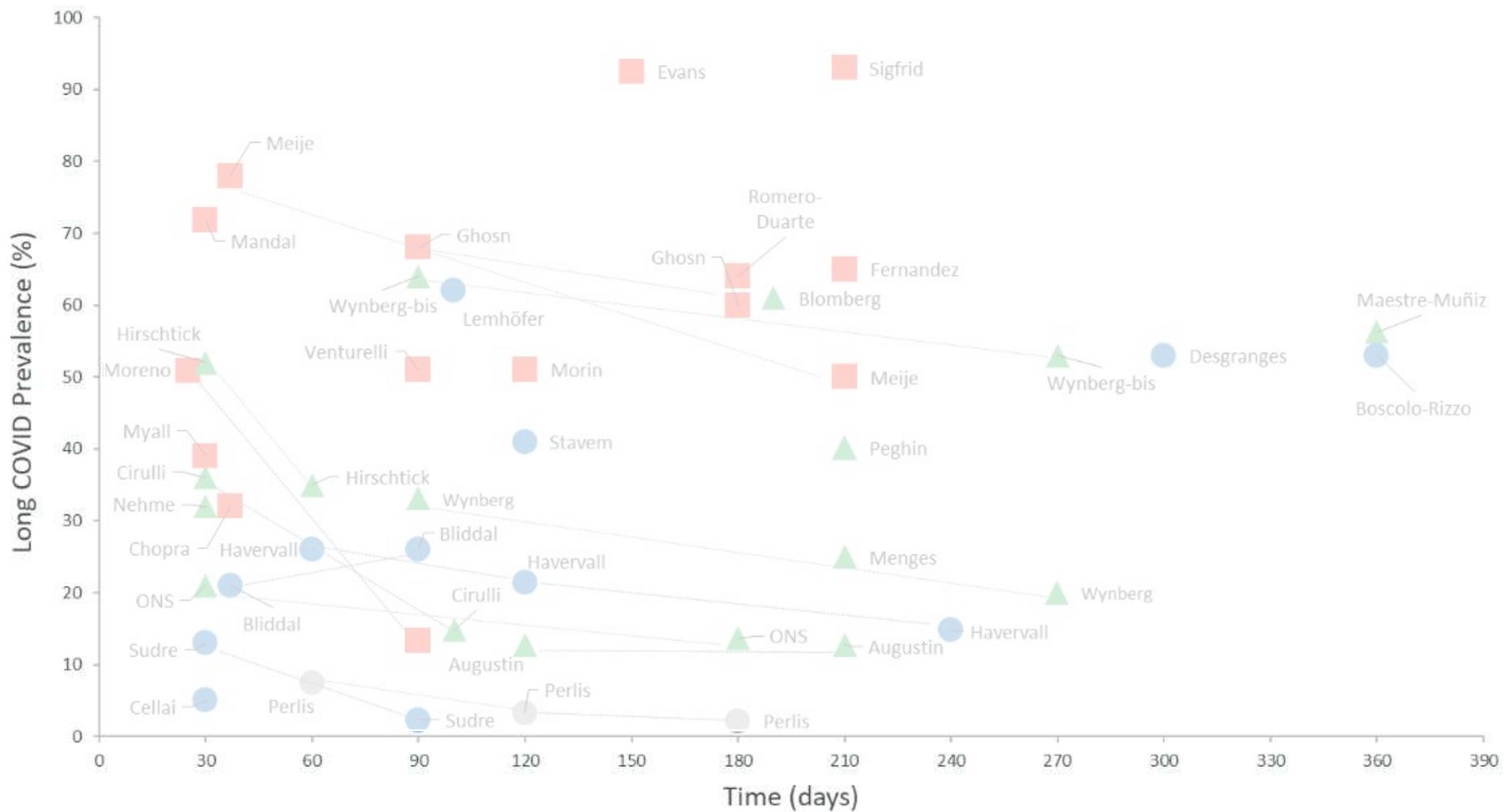


Daily new confirmed COVID-19 cases

7-day rolling average. Due to limited testing, the number of confirmed cases is lower than the true number of infections.

L'histoire est loin d'être finie...
Déjà plus de 400 millions de cas...





- Studies including only non-hospitalised patients
- ▲ Studies including mostly non-hospitalised patients
- Studies including mostly hospitalised patients





EUROPEAN RESPIRATORY *journal*

FLAGSHIP SCIENTIFIC JOURNAL OF ERS

Early View

Editorial

Phenotyping long COVID

Robert Naeije, Sergio Caravita

Please cite this article as: Naeije R, Caravita S. Phenotyping long COVID. *Eur Respir J* 2021; in press (<https://doi.org/10.1183/13993003.01763-2021>).

“...The long COVID remains
an enigma...”

Mécanismes physiopathologiques

Hypothèses

- *Lésions organiques*
- *Syndrome post-soins intensifs*
- *Dégradation d'une maladie sous-jacente*
- *Réponse immunitaire et inflammatoire à l'infection virale*

Dyspnée

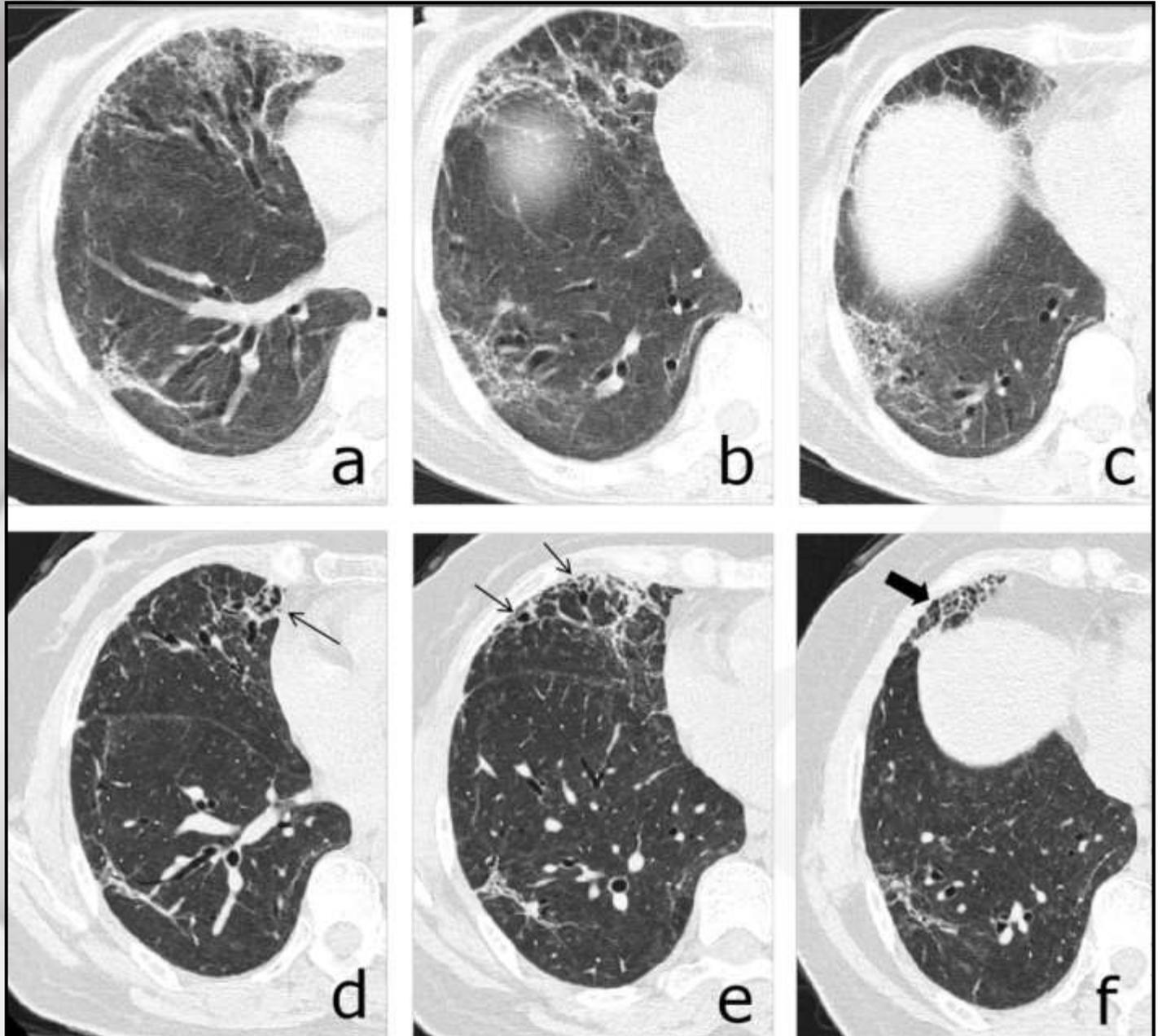
... au repos ou à l'effort

~~*... expliquée ou non*~~

~~*... résolutive ou persistante*~~

Dyspnée

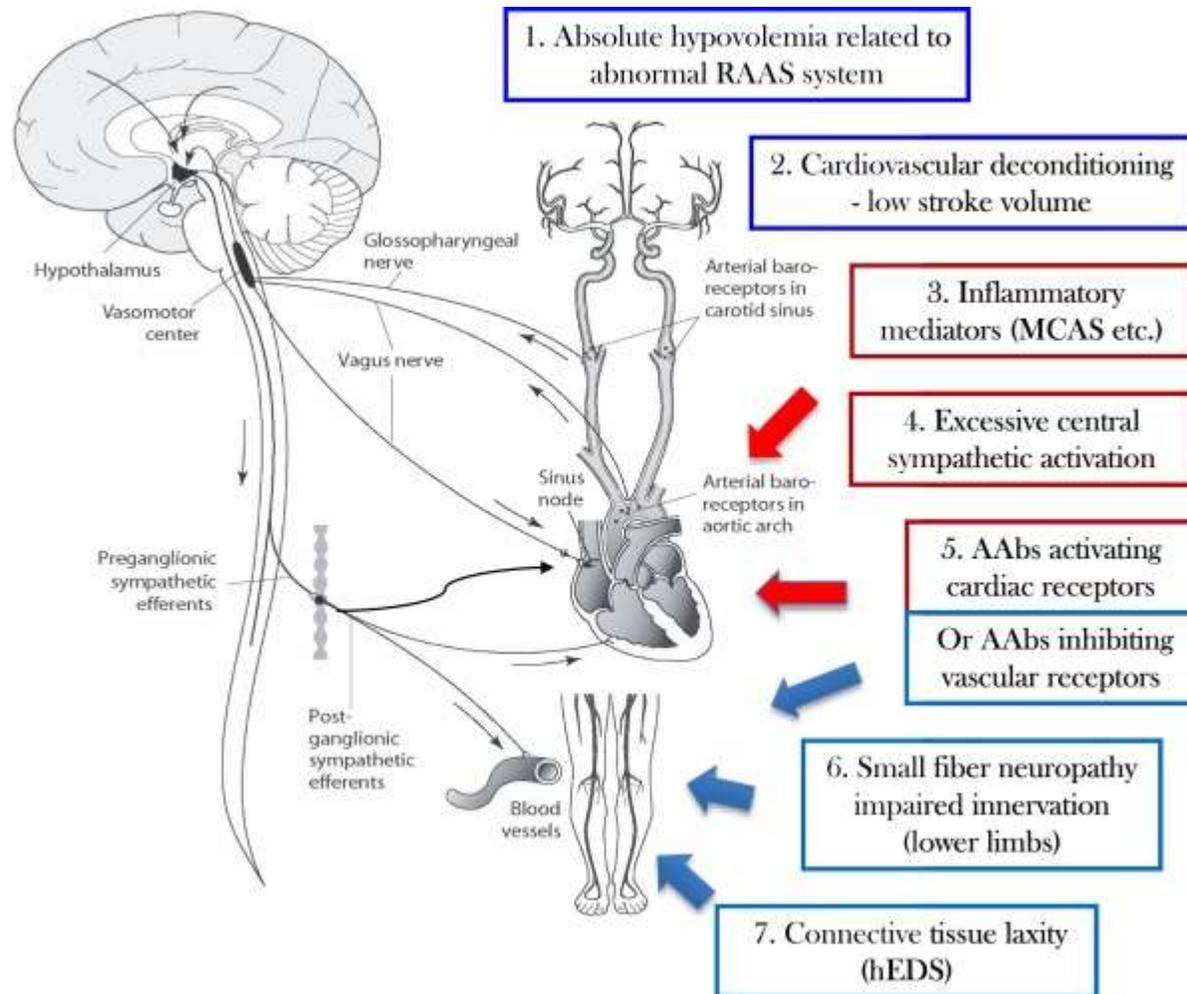
Concordance? **NON**



J32

J198

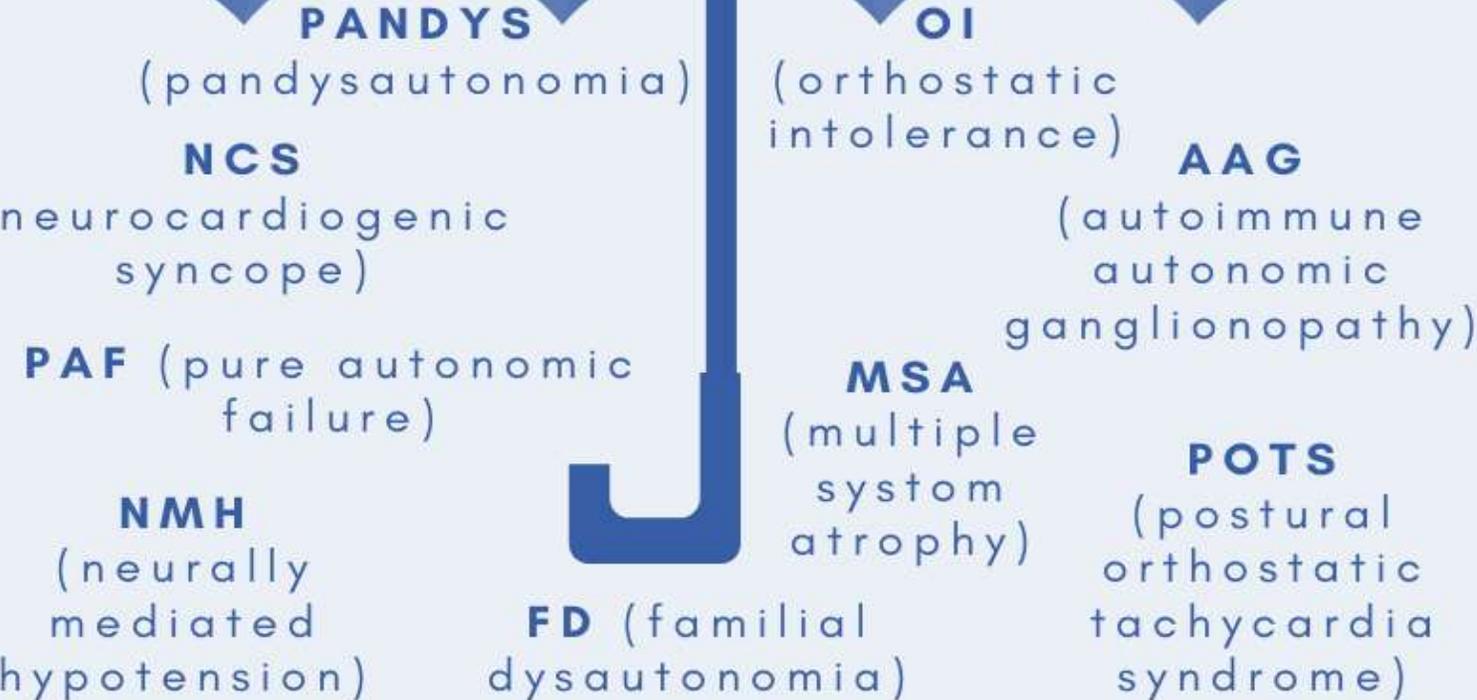
Dyspnée et dysautonomie



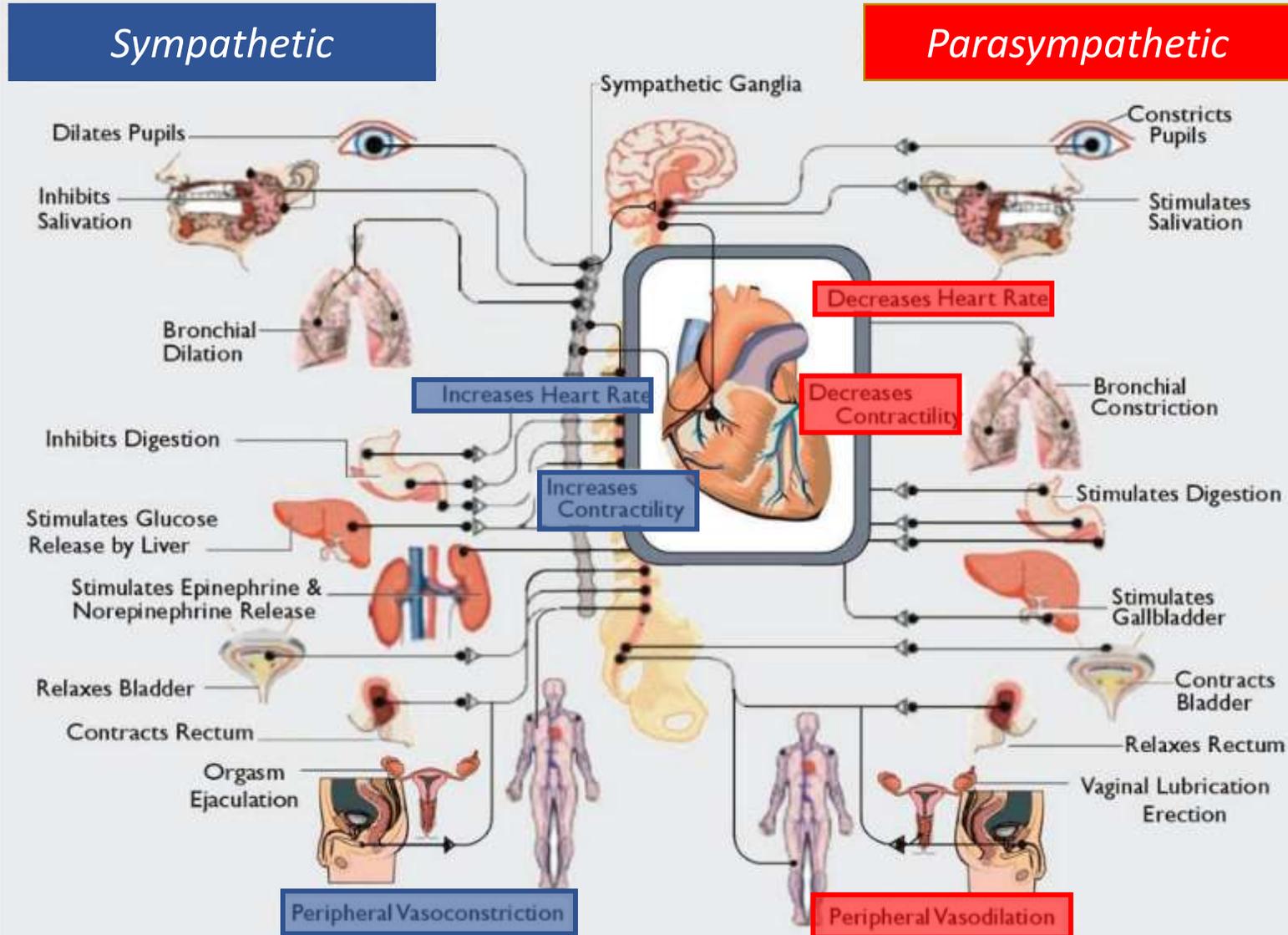
- Virus ou réponse immunitaire
- Atteintes des récepteurs intrathoraciques ou de la commande ventilatoire
- Syndrome d'intolérance orthostatique (*POTS*)
- Hypocapnie (hyperventilation?)
- Hyperventilation à l'effort (Montejunaite 2021)



- Direct action of the virus
- Consequence of postinfectious immune-mediated processes



Dysautonomie

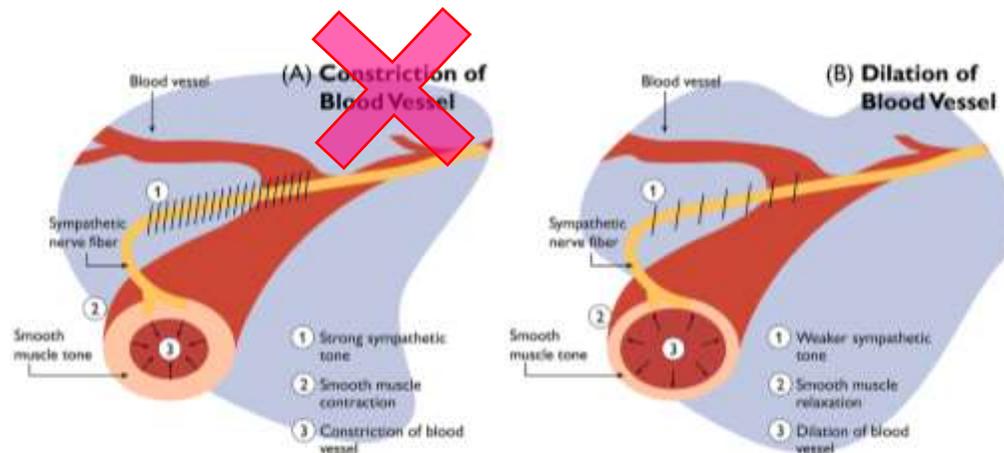
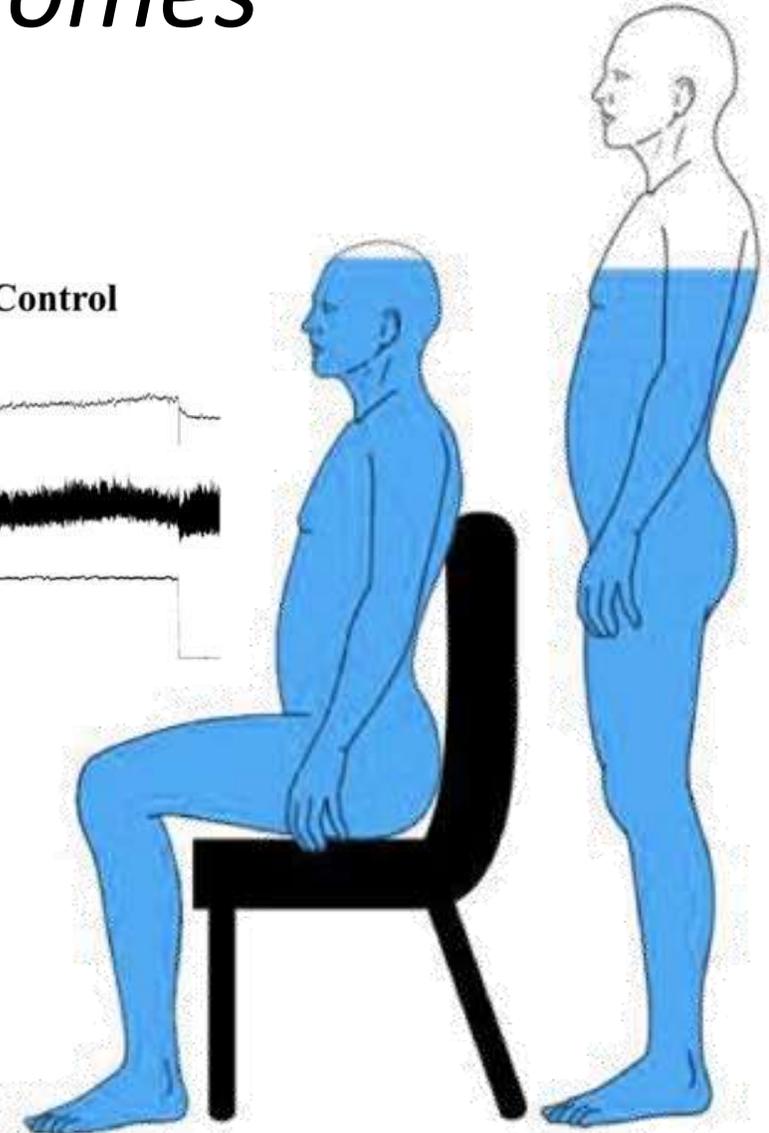
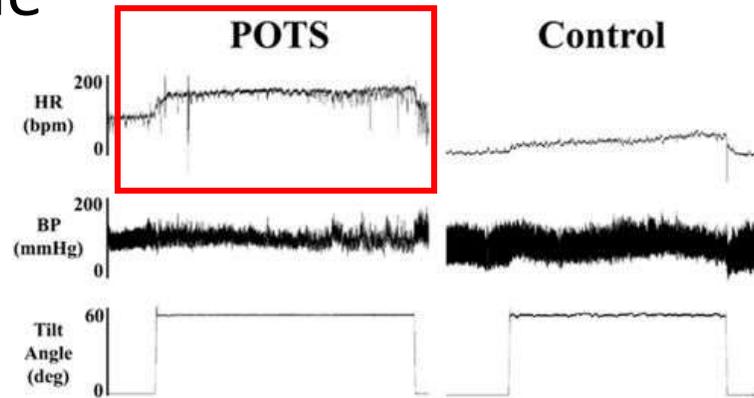


Autonomic disorders

- Deafferentation of the central autonomic centers
- Autonomic efferent neuron lesions
- Drugs or antibodies acting on autonomic neuron receptors

Orthostatic intolerance syndromes

- Hypotension orthostatique
- Syncope vaguale
- Syndrome de tachycardie orthostatique posturale (STOP ou *POTS*)



Hyperventilation au repos

All participants
(*n* = 82)

Female 56 (68)
 Age in years, median (range) 42 (13–79)
 Hospitalized for acute COVID-19 infection 6 (7)
 Time since COVID-19 infection in days, median (range) 416 (120–501)

End-tidal carbon dioxide, median (IQR) 32 (8)

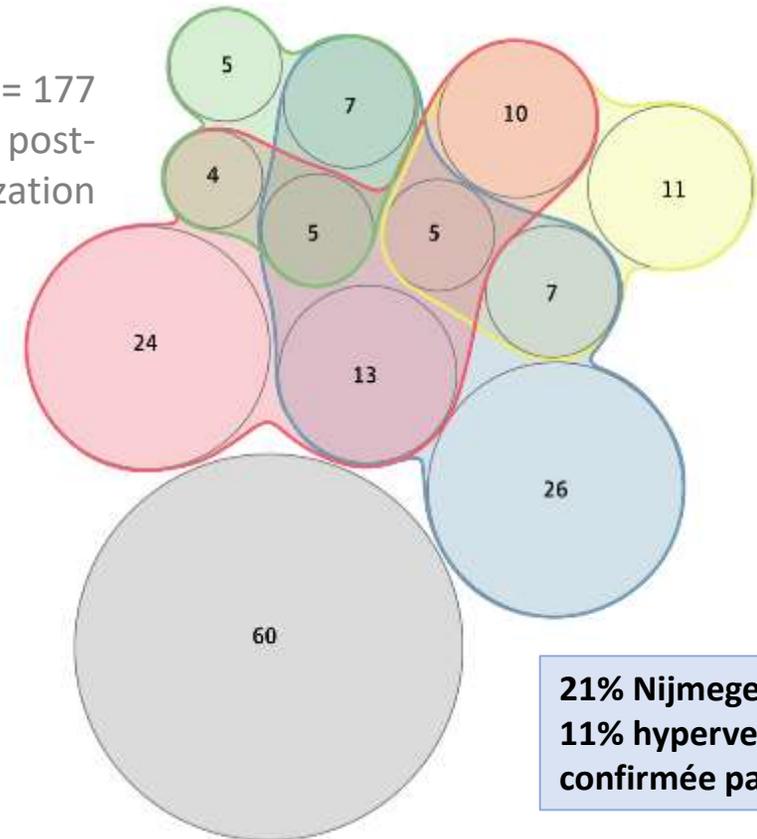
Respiratory rate, median (IQR) 13 (6)

ETCO₂ < 35 mmHg: 61 (74%)

ETCO₂ – RR: $r = -0.4$ ($p < 0.01$)

Cohorte long COVID (12 semaines) sans séquelles organiques

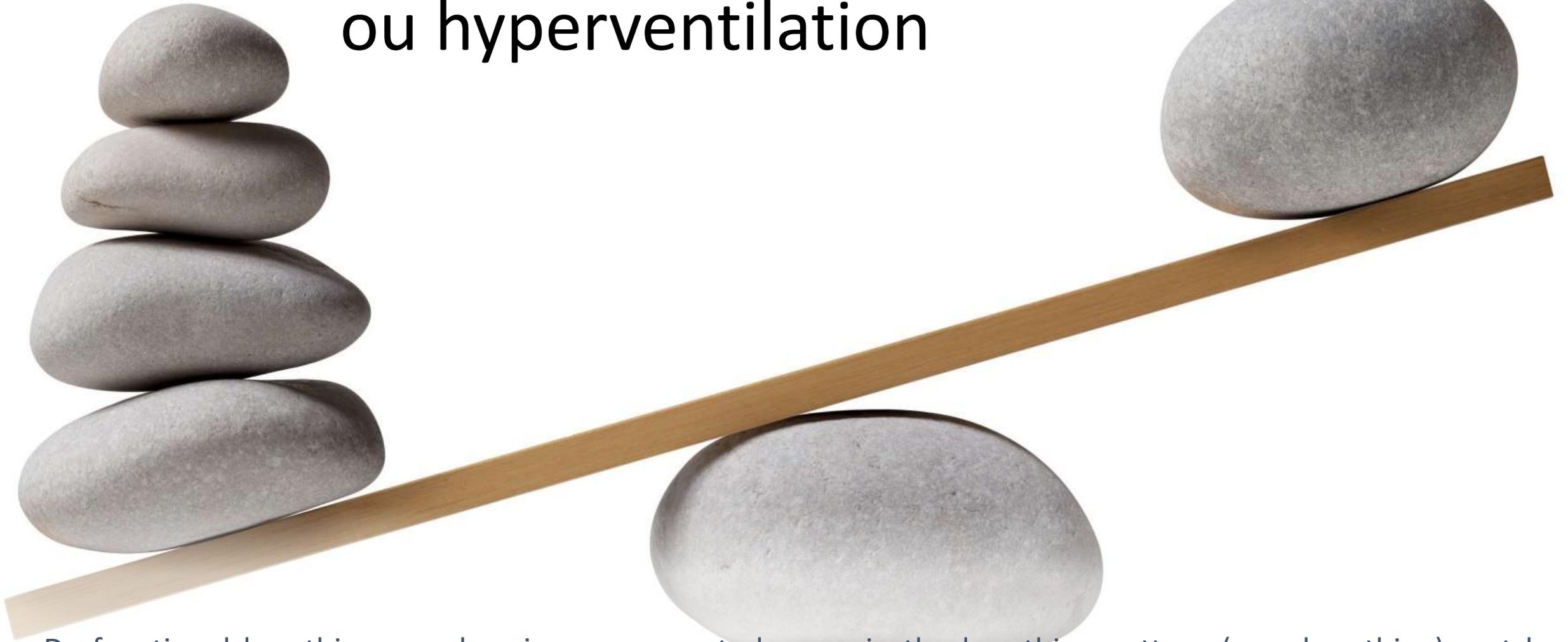
n = 177
4 months post-hospitalization



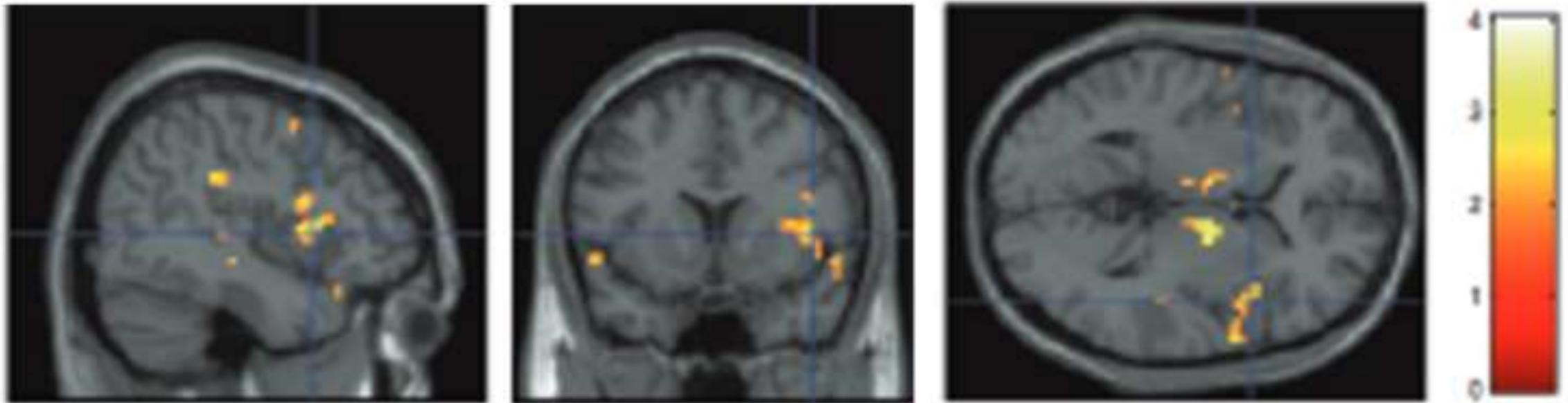
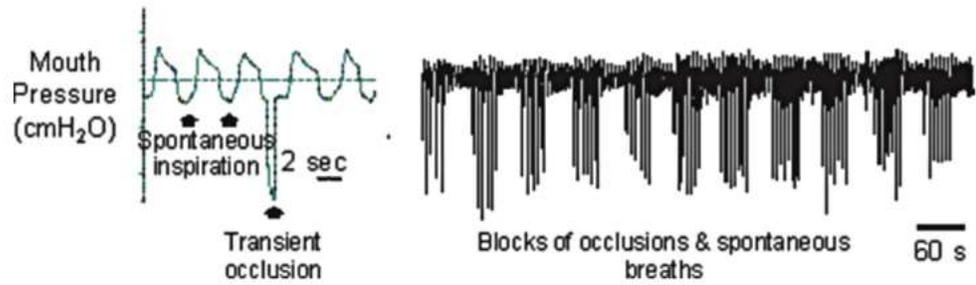
**21% Nijmegen positif
11% hyperventilation confirmée par HPT**

■ Cognitive impairment (*n* = 61) ■ Psychiatric symptoms (*n* = 63)
■ Dysfunctional breathing (*n* = 21) ■ No symptoms reported (*n* = 60)
■ Fibrotic lesions (*n* = 33)

Le syndrome de respiration dysfonctionnelle ou hyperventilation



Dysfunctional breathing are chronic or recurrent changes in the breathing pattern (over-breathing), not be attributed to a specific medical diagnosis. It is not a disease process, but rather alterations in breathing patterns that interfere with normal respiratory processes.



The brain activity observed in response to respiratory stimulation supports the hypothesis that breathlessness in IHV may reflect inappropriate cortical processing



Spasm



Overexertion



Exhaustion



Body tingling



Hyperventilation

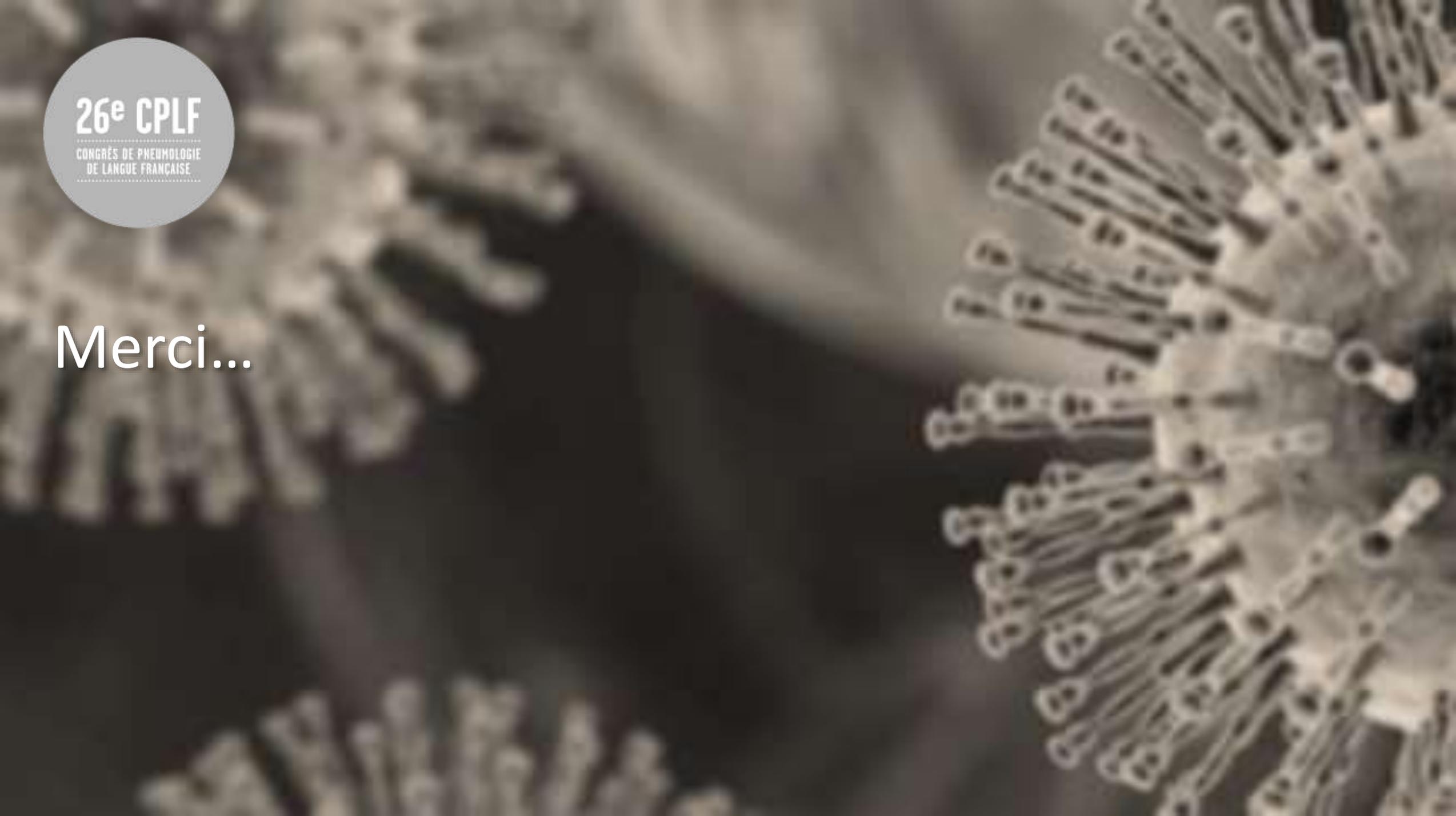
Conséquence du problème mais cause des symptômes



Confusion



Anxiety



26^e CPLF

CONGRÈS DE PNEUMOLOGIE
DE LANGUE FRANÇAISE

Merci...