

COVID long / Post COVID

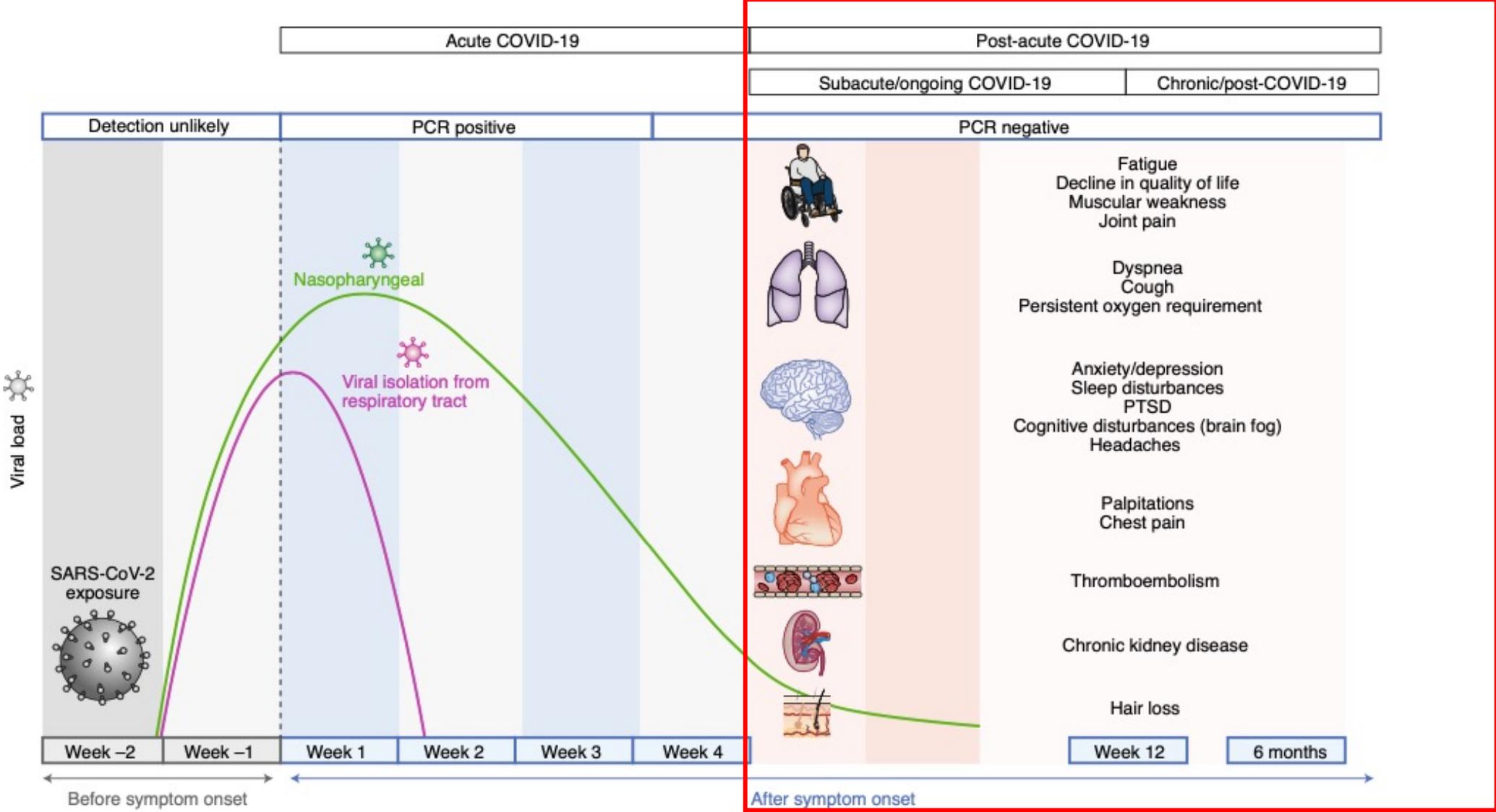
Dr Carole ELDIN

Dr Pierre DUDOUET

Plan

- Définition
- Quelle fréquence globale?
- Quelles atteintes?
 1. Anosmie/agueusie
 2. Neurocognitif
 3. Respiratoires
 4. Cardiovasculaires/Dysautonomie
 5. Psychologiques
 6. Autres
- Quel traitement?

Définition COVID long/Post-COVID



Nalbandian et al. Post Acute Covid-19 syndrome Nature Med.

NEWS | VOLUME 9, ISSUE 2, P129, FEBRUARY 01, 2021

NICE guideline on long COVID

Priya Venkatesan

Published: January 13, 2021 • DOI: [https://doi.org/10.1016/S2213-2600\(21\)00031-X](https://doi.org/10.1016/S2213-2600(21)00031-X) •



Check for updates

- 10% patients avec symptômes à S12 ou plus, en UK, soit 380000 personnes
- Importance donnée par les sociétés savantes anglaises et écossaises de la réhabilitation respiratoire, de la kinésithérapie

Définition COVID long/Post-COVID

Table 1. Modified proposal for the definition of acute and long COVID [15]

Acute COVID-19	Signs and symptoms of COVID-19 for up to 4 weeks
Ongoing symptomatic COVID-19	Signs and symptoms of COVID-19 from 4 weeks up to 12 weeks
Post-COVID-19 syndrome	Signs and symptoms that develop during or after an infection consistent with COVID-19, continue for more than 12 weeks and are not explained by an alternative diagnosis
Long COVID	Long COVID describes signs and symptoms that continue or develop after acute COVID-19; it includes both ongoing symptomatic COVID-19 (from 4 to 12 weeks) and post-COVID-19 syndrome (12 weeks or more)

Définition CDC



Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

Post-COVID Conditions

Updated Apr. 8, 2021

[Languages](#) ▼

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Although most people with COVID-19 get better within weeks of illness, some people experience post-COVID conditions. **Post-COVID conditions** are a wide range of new, returning, or ongoing health problems people can experience **more than four weeks** after first being infected with the virus that causes COVID-19. Even people who did not have symptoms when they were infected can have post-COVID conditions. These conditions can have different types and combinations of health problems for different lengths of time.

Types of Post-COVID Conditions



Centers for Disease Control and Prevention
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Long COVID

Long COVID is a range of symptoms that can last weeks or months after first being infected with the virus COVID-19 or can appear weeks after infection. Long COVID can happen to anyone who has had COVID-19, illness was mild, or they had no symptoms. People with long COVID report experiencing different combinations of the following symptoms:

- Tiredness or fatigue
- Difficulty thinking or concentrating (sometimes referred to as “brain fog”)
- Headache
- Loss of smell or taste
- Dizziness on standing
- Fast-beating or pounding heart (also known as heart palpitations)
- Chest pain
- Difficulty breathing or shortness of breath
- Cough
- Joint or muscle pain
- Depression or anxiety
- Fever
- Symptoms that get worse after physical or mental activities

Définition HAS

Février 2021



Repérer les personnes avec des symptômes prolongés après un épisode initial de la Covid-19, documenté cliniquement et/ou biologiquement

Sont plus particulièrement concernés, les patients qui répondent aux 3 critères suivants :

- **Épisode initial symptomatique** de la Covid-19 :
 - **soit confirmé** par au moins un critère parmi : PCR SARS-CoV-2 +, test antigénique SARS-CoV-2 +, Sérologie SARS-CoV-2 +, anosmie/agueusie prolongée de survenue brutale, scanner thoracique typique (pneumonie bilatérale en verre dépoli...),
 - **soit probable** par l'association d'au moins trois critères, de survenue brutale, dans un contexte épidémique, parmi : fièvre, céphalée, fatigue, myalgie, dyspnée, toux, douleurs thoraciques, diarrhée, odynophagie. Une sérologie SARS-CoV-2 positive peut aider à ce diagnostic.
- Présence d'au moins un des symptômes initiaux, **au-delà de 4 semaines suivant le début de la phase aiguë de la maladie.**
- Symptômes initiaux et prolongés **non expliqués par un autre diagnostic** sans lien connu avec la Covid-19.

Quelle fréquence?



Original article

Clinical sequelae of COVID-19 survivors in Wuhan, China: a single-centre longitudinal study

Qiutang Xiong^{1,†}, Ming Xu^{1,†}, Jiao Li^{1,†}, Yinghui Liu^{1,†}, Jixiang Zhang¹, Yu Xu^{2,**}, Weiguo Dong^{1,*}

¹ Department of Gastroenterology, Renmin Hospital of Wuhan University, Wuhan, China

² Department of Otorhinolaryngology, Renmin Hospital of Wuhan University, Wuhan, China

- 538 patients guéris du COVID vs 184 patients n'ayant pas eu le COVID
- 97 jours en moyenne après COVID

Table 2

Characteristics and prevalence of residual or new symptoms in 538 COVID-19 survivors 3 months after discharge from hospital and 184 cases in comparison group

Characteristic	COVID-19 survivors (n = 538)	Comparison group (n = 184)	p
General symptoms	267 (49.6)	22 (12.0)	<0.01
Physical decline/fatigue	152 (28.3)	17 (9.2)	<0.01
Sweating	127 (23.6)	3 (1.6)	<0.01
Myalgia	24 (4.5)	0 (0.0)	<0.01
Arthralgia	41 (7.6)	0 (0.0)	<0.01
Chills	25 (4.6)	0 (0.0)	<0.01
Limb oedema	14 (2.6)	0 (0.0)	0.03
Dizziness	14 (2.6)	3 (1.6)	0.58
Respiratory symptoms	210 (39)	11 (6.0)	<0.01
Postactivity polypnoea	115 (21.4)	10 (5.4)	<0.01
Nonmotor polypnoea	25 (4.7)	0 (0.0)	<0.01
Chest distress	76 (14.1)	0 (0.0)	<0.01
Chest pain	66 (12.3)	0 (0.0)	<0.01
Cough	38 (7.1)	1 (0.5)	<0.01
Sputum	16 (3)	1 (0.5)	0.09
Throat pain	17 (3.2)	0 (0.0)	<0.01
Cardiovascular-related symptoms	70 (13)	1 (0.5)	<0.01
Resting heart rate increase	60 (11.2)	0 (0.0)	<0.01
Discontinuous flushing	26 (4.8)	1 (0.5)	<0.01
Newly diagnosed hypertension	7 (1.3)	0 (0.0)	0.20
Psychosocial symptoms	122 (22.7)	14 (7.6)	<0.01
Somnipathy	95 (17.7)	9 (4.9)	<0.01
Depression	23 (4.3)	2 (1.1)	0.04
Anxiety	35 (6.5)	3 (1.6)	0.01
Dysphoria	9 (1.7)	1 (0.5)	0.47
Feelings of inferiority	3 (0.6)	0 (0.0)	0.57
Specific symptoms	154 (28.6)	0 (0.0)	<0.01
Alopecia	154 (28.6)	0 (0.0)	<0.01

Data are presented as n (%); p values were calculated by chi-square test or Fisher exact test, as appropriate.
 COVID-19, coronavirus disease 2019.

Clinical characteristics and outcomes of adult patients admitted with COVID-19 in East London: a retrospective cohort analysis

Daryl Cheng ,¹ Claire Calderwood,^{1,2} Erik Skjellberg,¹ Adam Ainley¹

- 1946 patients hospitalisés pour COVID-19
- 113 follow-up entre **6 et 12 semaines**: 70% de symptômes persistants
- 61% asthénie
- 36% dyspnée (score MRC)
- 17% toux
- 6% troubles mémoire, alopécie 6%
- 39% sans retour au travail

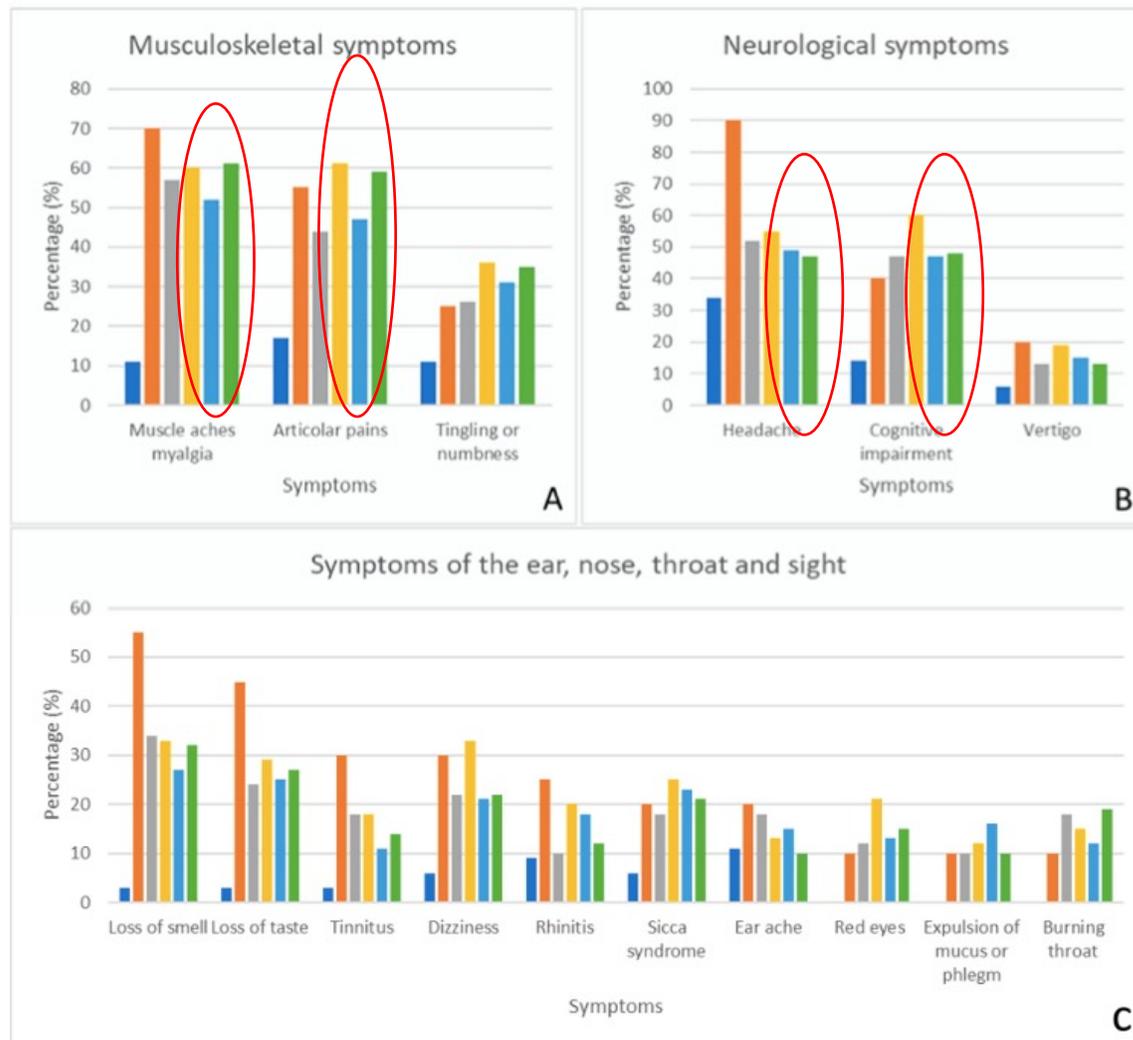
Article

Long-COVID Syndrome? A Study on the Persistence of Neurological, Psychological and Physiological Symptoms

Graziella Orrù ^{1,*} , Davide Bertelloni ¹, Francesca Diolaiuti ¹, Federico Mucci ² , Mariagrazia Di Giu Marco Biella ¹ , Angelo Gemignani ¹, Rebecca Ciacchini ¹ and Ciro Conversano ¹

- 517 patients
- Questionnaire téléphonique

LONG-COVID SYMPTOMS



Research Letter

July 9, 2020

Persistent Symptoms in Patients After Acute COVID-19

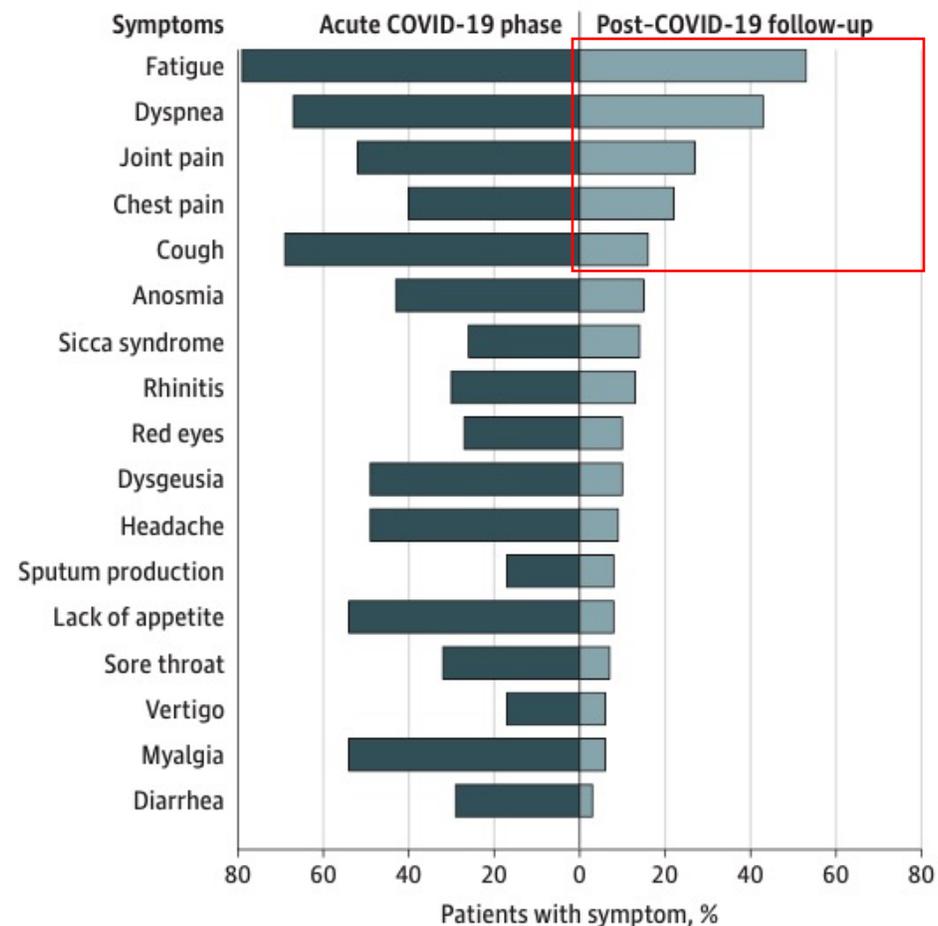
Angelo Carfì, MD¹; [Roberto Bernabei, MD¹](#); Francesco Landi, MD, PhD¹; [et al](#)

» [Author Affiliations](#) | [Article Information](#)

JAMA. 2020;324(6):603-605. doi:10.1001/jama.2020.12603

- 143 patients 60 jours post COVID en moyenne
- 32% au moins 1 symptôme

Figure. COVID-19–Related Symptoms



The figure shows percentages of patients presenting with specific coronavirus disease 2019 (COVID-19)–related symptoms during the acute phase of the disease (left) and at the time of the follow-up visit (right).

BMJ Open Multiorgan impairment in low-risk individuals with post-COVID-19 syndrome: a prospective, community-based study

December
2020

Andrea Dennis,¹ Malgorzata Wamil,^{2,3} Johann Alberts,⁴ Jude Oben,^{5,6} Daniel J Cuthbertson,⁷ Dan Wootton,^{8,9} Michael Crooks,^{10,11} Mark Gabbay,¹² Michael Brady,^{1,13} Lyth Hishmeh,¹⁴ Emily Attree,¹⁵ Melissa Heightman,¹⁶ Rajarshi Banerjee,¹ Amitava Banerjee ,^{16,17,18} On behalf of COVERSCAN study investigators

- 201 patients à risque faible de faire un COVID aigu sévère (âge moyen 45 ans, 71% de femmes, 19% hospitalisés, 20% obèses)
- Evaluation à 4 mois
- 98% fatigués, 87% douleurs musculaires, 88% dyspnée, 83% céphalées

Patients With Uncomplicated Coronavirus Disease 2019 (COVID-19) Have Long-Term Persistent Symptoms and Functional Impairment Similar to Patients with Severe COVID-19: A Cautionary Tale During a Global Pandemic FREE

Karen B Jacobson, Mallika Rao, Hector Bonilla, Aruna Subramanian, Isabelle Hack, Martina Madrigal, Upinder Singh, Prasanna Jagannathan ✉, Philip Grant

[Author Notes](#)

Clinical Infectious Diseases, ciab103, <https://doi.org/10.1093/cid/ciab103>

- 118 patients à 3-4 mois
- 64% des non hospitalisés avaient au moins 1 symptôme
- + fréquent: dyspnée et fatigue
- Dyspnée hospitalisés > non hospitalisés

Research paper

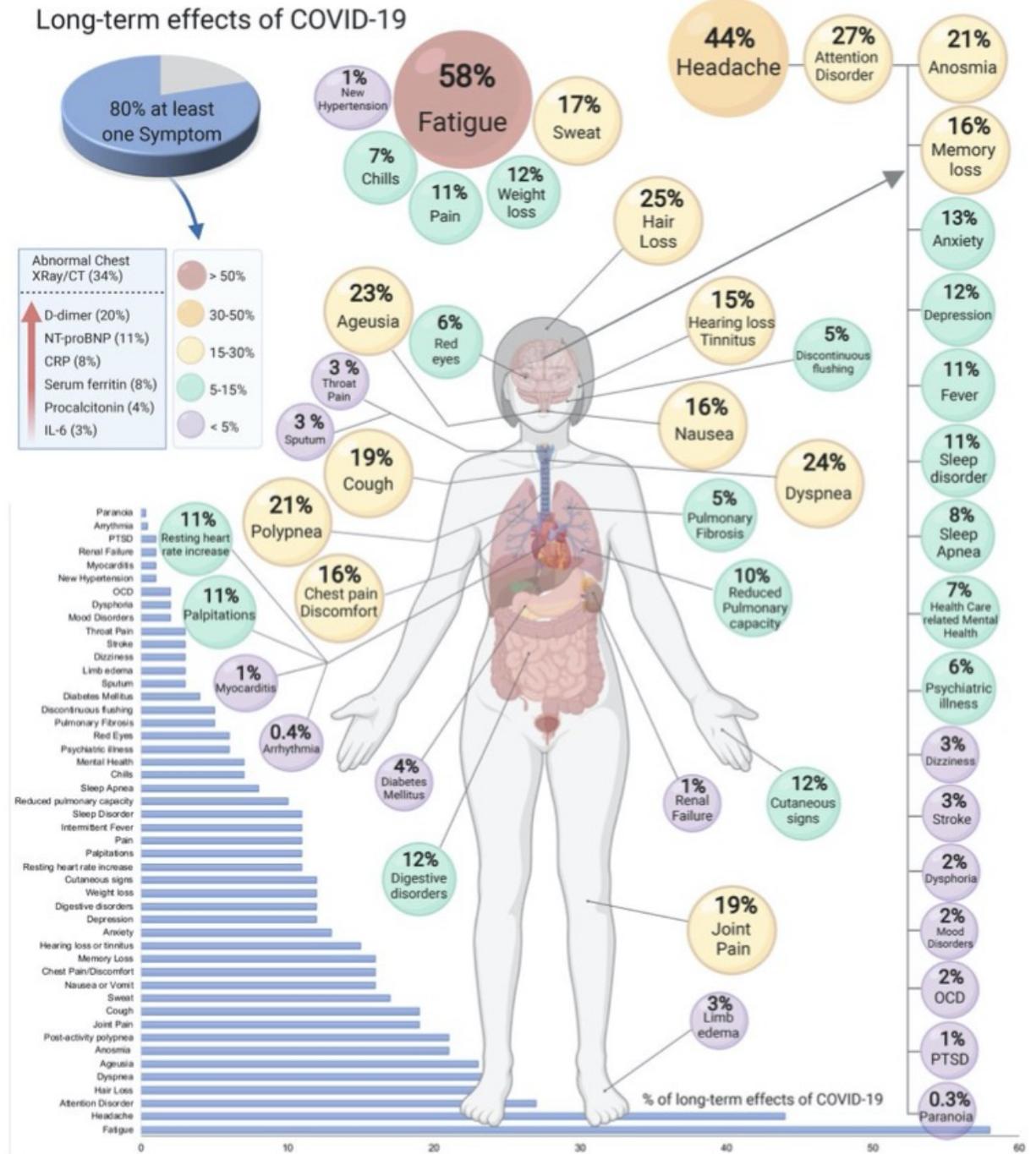
Post-COVID syndrome in non-hospitalised patients with COVID-19: a longitudinal prospective cohort study

Max Augustin, MD^{a,b,c,1}, Philipp Schommers, M.D. PhD.^{a,c,d,1}, Melanie Stecher, Ph.D.^{a,c,1}, Felix Dewald, M.D.^d, Lutz Gieselmann, M.D.^d, Henning Gruell, M.D.^d, Carola Horn, M.D.^{a,b,c}, Kanika Vanshylla, Ph.D.^d, Veronica Di Cristanziano, M.D.^d, Luise Osebold^a, Maria Roventa^a, Toqeer Riaz^a, Nikolai Tschernoster, M.Sc^e, Janine Altmueller, M.D.^e, Leonard Rose, M.D.^f, Susanne Salomon, Ph.D.^d, Vanessa Priesner, M.D.^a, Jan Christoffer Luers, Prof.^g, Christian Albus, Prof.^h, Stephan Rosenkranz, Prof.^{b,i,j}, Birgit Gathof, Prof.^f, Gerd Fätkenheuer, Prof.^{a,c}, Michael Hallek, Prof.^{a,b,k,l}, Florian Klein, Prof.^{f,b,d}, Isabelle Suárez, M.D.^{a,c,2}, Clara Lehmann, Prof.^{a,b,c,2,*}

- 958 patients non hospitalisés en phase aigue
- A 4 mois: 8,6% dyspnée, 12,4% anosmie, 11,1 % agueusie, 9,7% asthénie
- A 4 mois 27,8% des patients avec au moins 1 symptômes, 34,8% à 7 mois
- A 7 mois : alopécie (2,5%), céphalées (3,7%), diarrhée (1,1%)
- FDR: IgG peu élevés à baseline, anosmie et diarrhée en phase aigue

« Covid long » =
un mot qui recouvre
des atteintes multiples

- **Asthénie++++**
- **Respiratoire**
- **ORL (Anosmie/agueusie)**
- **Neurologique (mémoire/
concentration)**
- **Cardiaque/dysautonomie: POTS**
- **Psychologique**
- **Dermatologique?**
- **Articulaire?**
- **Vasculaire?**



1. Anosmie/Agueusie

Patterns of smell recovery in 751 patients affected by the COVID-19 outbreak.

Running title: smell recovery in COVID-19.

Carlos M. Chiesa-Estomba* MD, MS^{1,5}, Jerome R. Lechien*, MD, PhD, MS^{1,3-5}, Thomas Radulesco MD,

PhD, MS^{1,6}, Justin Michel MD, PhD, MS^{1,6},

Leigh J Sowerby, MD, MHM, FRCSC^{1,7}, Claire Hopkins^o FRCS(ORLHNS) DM8, Sven Saussez^o, MD,

PhD^{2,4,9}

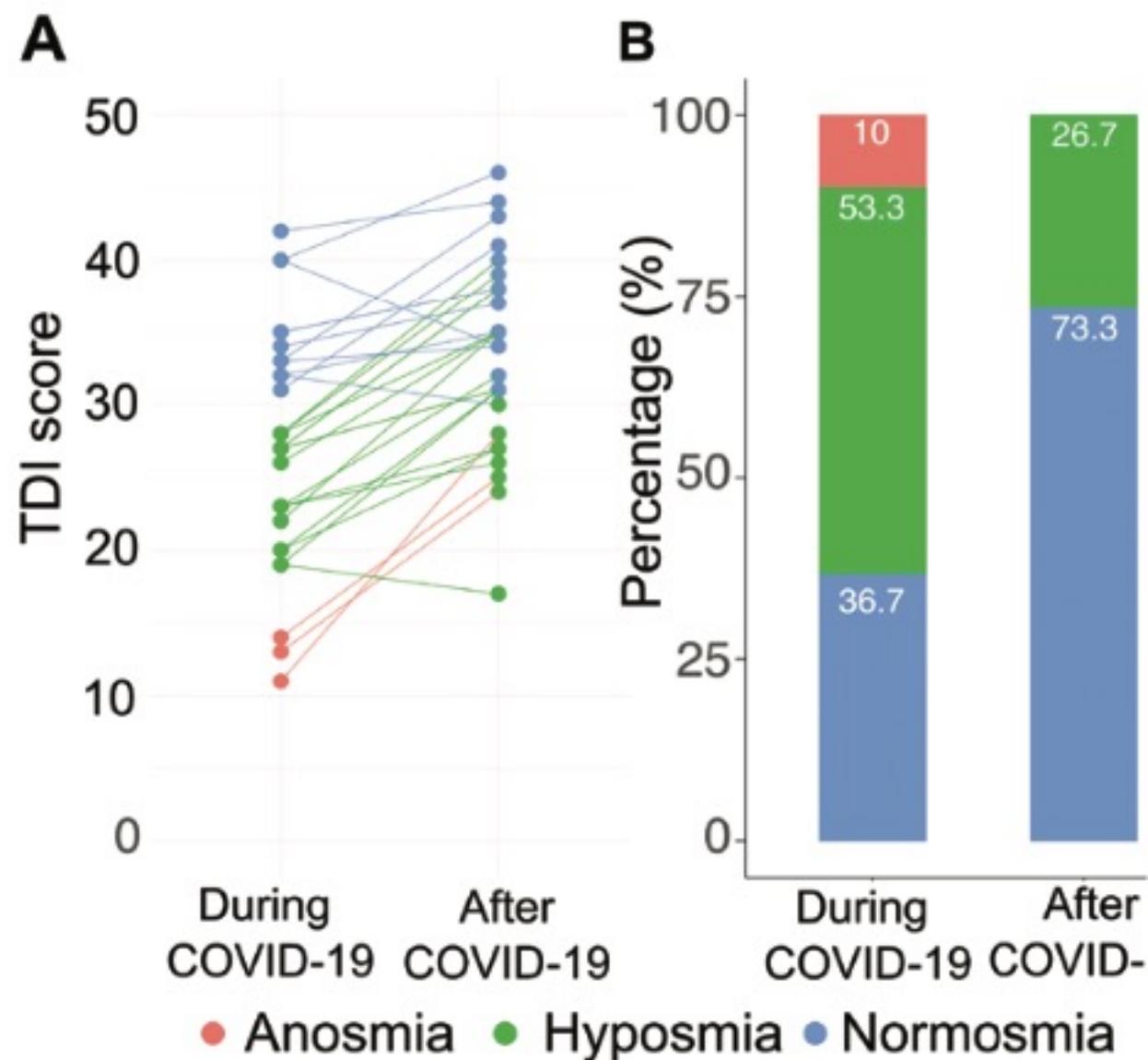
Eur Journal of Neurologie Nov 2020

- 751 patients
- 83% anosmie totale, 17% partielle
- **Suivi à J47**: 37% anosmie résiduelles, 14% récupération partielle, 49% récupération totale

Gaining Back What Is Lost: Recovering the Sense of Smell in Mild to Moderate Patients After COVID-19

Lucia Iannuzzi^{1,*}, Anna Eugenia Salzo^{1,*}, Giocchino Angarano², Vincenzo Ostilio Palmieri³, Piero Portincasa³, Annalisa Saracino², Matteo Gelardi⁴, Michele Dibattista⁵ and Nicola Quaranta¹

- 30 patients suivis sur 2 mois



Olfactory dysfunction in recovered COVID-19 patients

Jingwen Li ^{a,1}, MD, Xi Long ^{b,1}, MD, Chunli Zhu ^{c,1}, MD, Hengmin Wang ^c, MD, Tao Wang ^{a,*}, MD, Zhicheng Lin ^{d,2}, PhD, Jinghong Li ^{e, 2} MD, PhD, Nian Xiong ^{a,c,2,*}, MD

- 145 patients avec anosmie/dysosmie initiale
- 11% des patients avec dysosmie à J25
- Odeurs testées:
 - Ail: 5%
 - Ananas: 9%
 - Menthe : 8%
 - Gingembre: 26%
 - Rose: 16%

Prevalence and 6-month recovery of olfactory dysfunction: a multicentre study of 1363 COVID-19 patients

• J. R. Lechien^{1,2,3,4,*} , C. M. Chiesa-Estomba^{1,5,*}, E. Beckers⁶, V. Mustin⁶, M. Ducarme⁷, F. Journe², A. Marchant⁸, L. Jouffe⁹, M. R. Barillari^{1,10}, G. Cammaroto^{1,11}, M. P. Ciciu^{1,3}, S. Hans^{1,3,†} & S. Saussez^{1,2,4,†}

- 1363 patients réévalués à 60 jours et à 6 mois
- 98% de formes bénignes de COVID initial
- 24,5% de récupération incomplète à 60 jours
- 5 anosmies et 6 dysosmie à 6 mois (0,8%)
- Facteurs prédictifs: atteinte initiale sévère, âge

Table 2 (Continued)

Characteristics	All Patients (N = 1363)
Onset of smell dysfunction	N = 1339
Before the other symptoms	225 (16.8)
Concomitant with other symptoms	439 (32.8)
After the other symptoms	599 (44.7)
Did not remember/Missing data	76 (5.7)
Smell dysfunction duration	
1–4 days	157 (11.7)
5–8 days	213 (15.9)
9–14 days	172 (12.8)
15–30 days	186 (13.9)
31–45 days	152 (11.4)
45–60 days	131 (9.8)
Unresolved	328 (24.5)
Mean duration (Mean, SD, days)	21.6 ± 17.9

F/M, female/male; N, number; SD, standard deviation.

Anosmie: traitement?

European Archives of Oto-Rhino-Laryngology
<https://doi.org/10.1007/s00405-020-06520-8>

SHORT COMMUNICATION

Efficacy and safety of oral corticosteroids and olfactory training in the management of COVID-19-related loss of smell

Serge-Daniel Le Bon¹  · Deborah Konopnicki² · Nathalie Pisarski¹ · Léa Prunier¹ · Jérôme R. Lechien¹ · Mihaela Horoi¹

- 25 patients avec dysosmie persistante à S5
- 9 traités par rééducation olfactive+ CTC per os vs 18 rééducation seule
- Seuls ceux du groupe rééducation +CTC per os étaient améliorés significativement à 10 semaines

Anosmie: traitement?

[Buy article](#)

Efficacy of corticosteroid therapy in the treatment of long- lasting olfactory disorders in COVID-19 patients

Volume: 59 - Issue: 1

First page: 21 - Last page: 25

L.A. Vaira - C. Hopkins - M. Petrocelli - J.R. Lechien - S. Cutrupi - G. Salzano - C.M. Chiesa-Estomba - S. Saussez - G. De Riu

- 18 patients symptomatiques > 4 semaines
- 9 traités par CTC oral+ intranasal vs 9 sans traitement
- Evaluation à J20 et J40: Amélioration significative dans le groupe traité

Anosmie: traitement?



ELSEVIER

Contents lists available at [ScienceDirect](#)

American Journal of Otolaryngology–Head and Neck
Medicine and Surgery

journal homepage: www.elsevier.com/locate/amjoto



Effect of nasal corticosteroid in the treatment of anosmia due to COVID-19:
A randomised double-blind placebo-controlled study

Rasheed Ali Rashid ^a, Atheer Zgair ^{b,*}, Raid M. Al-Ani ^c

^a Department of Surgery, College of Medicine, Tikrit University, Tikrit, 34001, Iraq

^b Department of Pharmacology and Toxicology, College of Pharmacy, University of Anbar, Ramadi, 31001, Iraq

^c Department of Surgery, College of Medicine, University of Anbar, Ramadi, 31001, Iraq

- 276 patients
- 138 béthaméthasone intranasale vs 138 gouttes de NaCl intranasal
- 83% de guérison à J30 et pas d'effet des CTC intranasal

2. Symptômes neurocognitifs



Article

Long-Lasting Cognitive Abnormalities after COVID-19

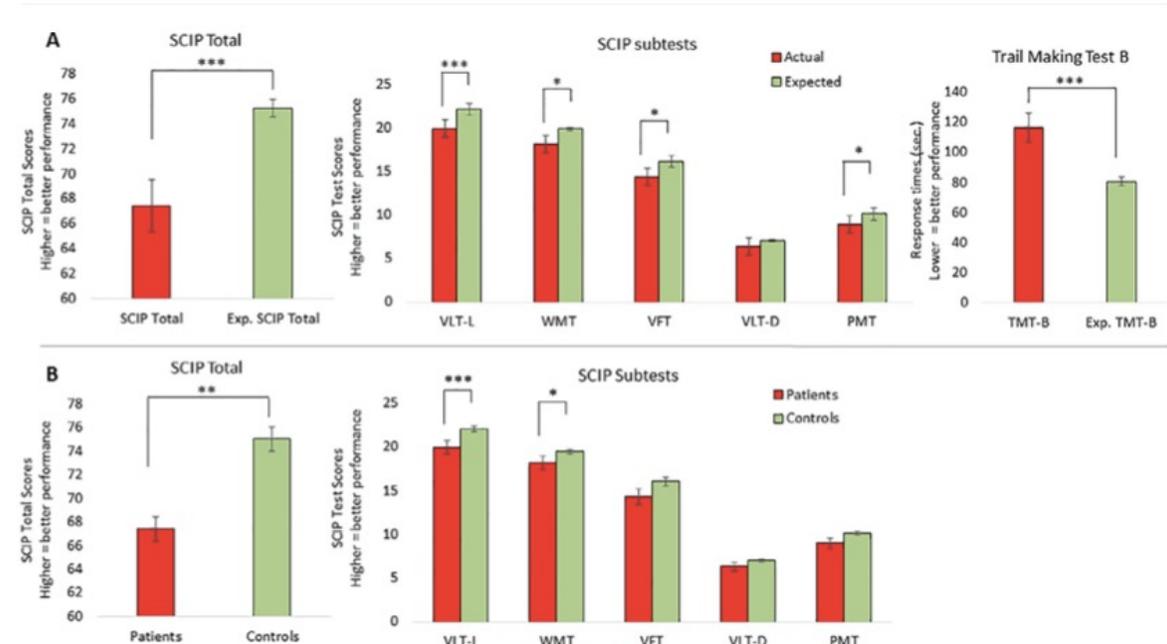
Roberta Ferrucci ^{1,2,3} , Michelangelo Dini ^{1,2,3} , Elisabetta Groppo ², Chiara Rosci ²,
Maria Rita Reitano ², Francesca Bai ^{2,3}, Barbara Poletti ⁴, Agostino Brugnera ⁵ , Vincenzo Silani ^{1,4,6} ,
Antonella D'Arminio Monforte ^{2,3} and Alberto Priori ^{1,2,3,*}

- 38 patients hospitalisés (pas en USI ni réa)
- Réévaluation à 5 mois: 42% déficit dans vitesse de traitement de l'information, 26% déficit en mémoire verbale, 21 % avec les 2 atteintes

Cognitive impairments four months after COVID-19 hospital discharge: Pattern, severity and association with illness variables

KW Miskowiak^{a,b,*}, S Johnsen^{c,d}, SM Sattler^{c,d}, S Nielsen^{a,b},
K Kunalan^c, J Rungby^{e,f}, T Lapperre^{g,h}, CM Porsberg^{c,d}

- 29 patients évalués à 4 mois
- 80% des patients avaient une plainte cognitive subjective sévère
- Troubles cognitifs significatifs cliniquement 59%
- Prédominance apprentissage verbal et fonctions exécutives
- Pas d'association avec sévérité initiale
- Possible association avec le niveau de D dimères



RESEARCH ARTICLE

Persistent neurologic symptoms and cognitive dysfunction in non-hospitalized Covid-19 “long haulers”

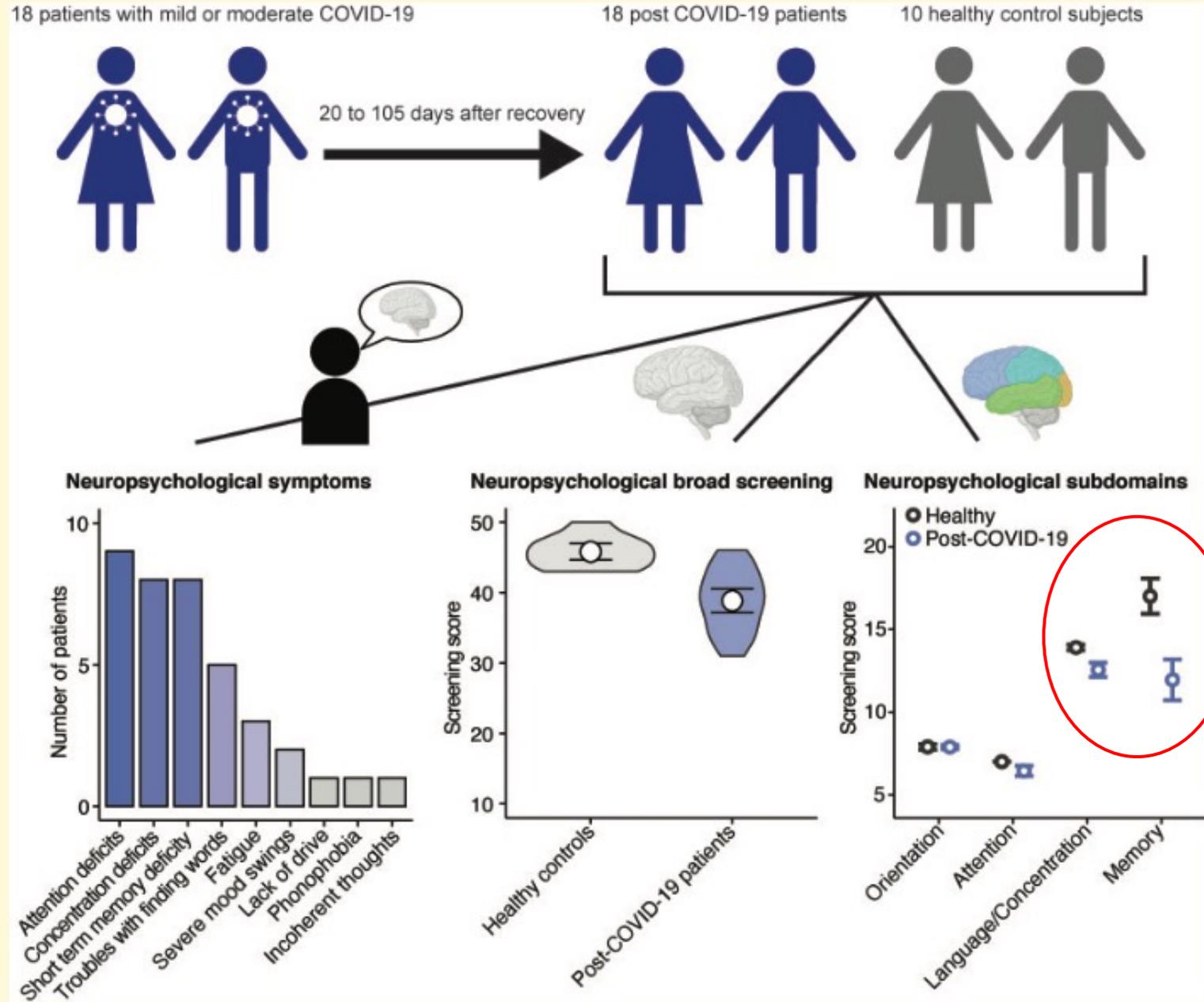
Edith L. Graham , Jeffrey R. Clark , Zachary S. Orban, Patrick H. Lim, April L. Szymanski, Carolyn Taylor, Rebecca M. DiBiase, Dan Tong Jia, Roumen Balabanov, Sam U. Ho, Ayush Batra, Eric M. Liotta & Igor J. Koralnik 

Davee Department of Neurology, Northwestern University Feinberg School of Medicine, Chicago, Illinois

- 100 patients **non hospitalisés**
- Moyenne d'âge 43 ans, 70% de femmes
- ATCDS: depression anxiété 44%, maladie auto immune 16%
- 81% « brouillard cérébral », 68% céphalées,

Free
reco

Marce
Alexand
Christo



PET scanner cérébral

Original Article | Published: 26 January 2021

¹⁸F-FDG brain PET hypometabolism in patients with long COVID

[E. Guedj](#) , [J. Y. Campion](#), [P. Dudouet](#), [E. Kaphan](#), [F. Bregeon](#), [H. Tissot-Dupont](#), [S. Guis](#), [F. Barthelemy](#), [P. Habert](#), [M. Ceccaldi](#), [M. Million](#), [D. Raoult](#), [S. Cammilleri](#) & [C. Eldin](#)

European Journal of Nuclear Medicine and Molecular Imaging (2021) | [Cite this article](#)

10k Accesses | 3 Citations | 163 Altmetric | [Metrics](#)

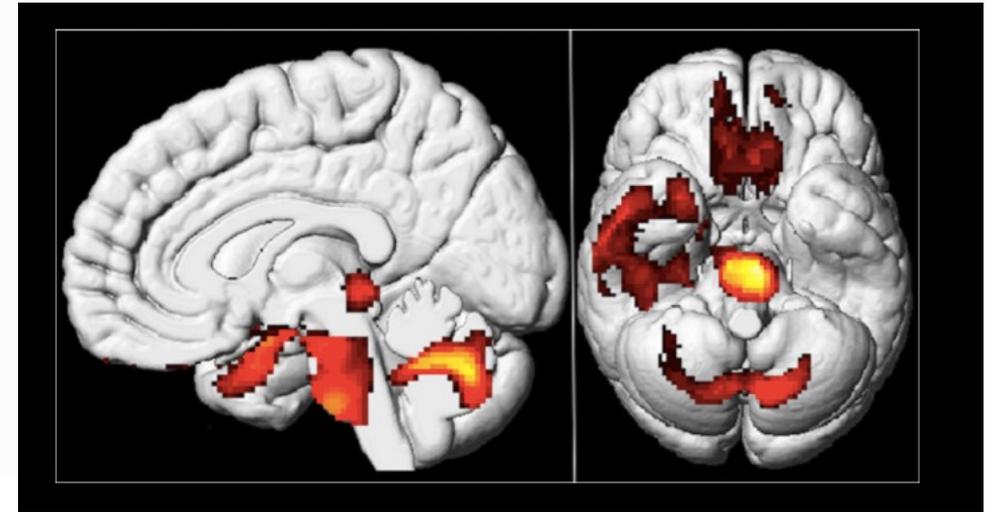
- 35 patients vs 44 contrôles
- 80% dyspnée, 66% douleur, 49% troubles de la mémoire, 46% insomnies, 29% anosmie, 26% agueusie, 33% PTSD
- **Hypométabolismes** : Cortex frontal/bulbes olfactifs/lobe temporal droit, amygdale, hypocampe, thalamus, tronc cérébral, cervelet

^{18}F -FDG brain PET hypometabolism in patients with long COVID

[E. Guedj](#) , [J. Y. Campion](#), [P. Dudouet](#), [E. Kaphan](#), [F. Bregeon](#), [H. Tissot-Dupont](#), [S. Guis](#), [F. Barthelemy](#), [P. Habert](#), [M. Ceccaldi](#), [M. Million](#), [D. Raoult](#), [S. Cammilleri](#) & [C. Eldin](#)

European Journal of Nuclear Medicine and Molecular Imaging (2021) | [Cite this article](#)

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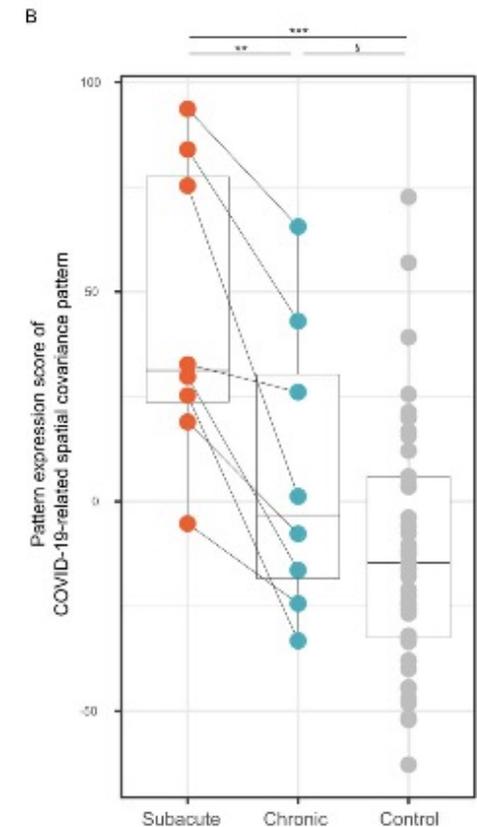
- Plaintes fonctionnelles multiples associées à atteintes du cervelet et du TC
- Lobe frontal associé à douleur
- Lobe temporal droit associé à douleur
- Tronc Cérébral associé à douleur et insomnies
- Cervelet associé à anosmie/agueusie et troubles de la mémoire

Symptômes neurocognitifs évolution?

- 8 patients suivis en MOCA et PET scanner cérébral à 37 jours et 6 mois
- Comparés à 45 contrôles « sains »
- MOCA : moyenne à 19 +/- 4,5 à J37 vs 23,4 +/- 3,6 à 6 mois (P=0.03)
- 4 patients avec scores toujours anormal à M6 (mémoire, fonctions exécutives++)
- Amélioration significative des patterns d'hypométabolismes mais différents des contrôles
- Corrélation inverse scores MOCA/Patterns hypométabolismes

Slow but evident recovery from neocortical dysfunction and cognitive impairment in a series of chronic COVID-19 patients

Ganna Blazhenets*¹ M.Sc, Nils Schroeter*² M.D., Tobias Bornmann² Ph.D., Johannes Thurow¹ M.D., Dirk Wagner³ M.D., Lars Frings¹ Ph.D., Cornelius Weiller^{2,4} M.D., Philipp T. Meyer¹ M.D. Ph.D., Andrea Dressing*^{2,4} M.D., Jonas A. Hosp*² M.D.



Etudes autopsic

- Revue de 2
184 patients

Table 1:

Neuropathological findings in COVID-19 brain tissue Some histologic findings are likely to be under-reported as reviewed studies are variable in their focus.

Viral presence by RT-PCR	53.5% (54/101)
Viral presence by IHC	27.7% (23/83)
Microglial Activation	42.9% (79/184)
Microglial Nodules*	33.3% (14/42)
Lymphoid Inflammation	37.5% (69/184)
Perivascular	33.7% (62/184)
Parenchymal	23.9% (44/184)
Leptomeningeal	23.4% (43/184)
Acute Hypoxic-Ischemic Changes	29.9% (55/184)
Astrogliosis	27.7% (51/184)
Acute/Subacute Brain Infarcts	21.2% (39/184)
Spontaneous Hemorrhage	15.8% (29/184)
Microthrombi	15.2% (28/184)
Alzheimer Type II Astrocytosis	2.7% (5/184)
Neuronophagy	2.2% (4/184)
Neuronal Cell Loss	2.2% (4/184)
Hemorrhagic Transformation of Infarct	2.2% (4/184)
Foci of Demyelination	1.6% (3/184)
Vascular Neutrophilic Plugs	1.6% (3/184)
Perivascular Neutrophils	1.1% (2/184)
Parenchymal Neutrophilic Infiltration	1.1% (2/184)
Leptomeningeal Histiocytes	0.5% (1/184)
Acute Purulent Meningitis	0.5% (1/184)

* Only studies tabulating the prevalence of microglial nodules are included. Studies mentioning microglial nodules in their case series but not enumerating the frequency are excluded.

D): clinicopathological

¹, Madeline G. Olson¹, Ting
Sendahl², Samasuk
y V. Vinters^{1,4}, William H. Yong,

Etudes autopsiques

Check
updat

Brainstem neuropathology in two cases of COVID-19: SARS-CoV-2 trafficking between brain and lung

Gaetano Bulfamante^{2,4} · Tommaso Bocci^{1,4,5} · Monica Falleni^{2,4} · Laura Campiglio^{1,4,5} · Silvia Coppola^{3,4} · Delfina Tosi^{2,4} · Davide Chiumello^{3,4} · Alberto Priori^{1,4,5}

Received: 10 March 2021 / Revised: 4 May 2021 / Accepted: 5 May 2021
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- 2 patients décédés du COVID-19 vs 2 contrôles négatifs
- Macroscopie normale
- Neurones endommagés, activation gliale pont et moelle allongée+++chez les patients COVID
- Immunohistochimie positive à SARS-Cov 2 : nerf vague++++ moelle allongée et pont (endothelium vasculaire)

1733 patients
516 avec focus pulmonaire
suivi à 3 et 6 mois

THE LANCET

ARTICLES | [VOLUME 397, ISSUE 10270, P220-232, JANUARY 16, 2021](#)

6-month consequences of COVID-19 in patients discharged from hospital: a cohort study

[Chaolin Huang, MD](#) * • [Lixue Huang, MD](#) * • [Yeming Wang, MD](#) * • [Xia Li, MD](#) * • [Lili Ren, PhD](#) * • [Xiaoying Gu, PhD](#) * • et al. [Show all authors](#) • [Show footnotes](#)

Published: January 08, 2021 • DOI: [https://doi.org/10.1016/S0140-6736\(20\)32656-8](https://doi.org/10.1016/S0140-6736(20)32656-8)



Published: January 08, 2021 • DOI: [https://doi.org/10.1016/S0140-6736\(20\)32656-8](https://doi.org/10.1016/S0140-6736(20)32656-8)



test de marche 6 min, EFR, TDM

Test de marche anormal: 29% des patients

mMRC anormale : 25% des patients

DLCO altérée: 22-56% selon groupe de sévérité

VEMS : 8% dans tous les groupes

Anomalies TDM : 50% dont 1% de signe de fibrose pulmonaire

ANY SYMPTOMS : 76% des patients..

FULL LENGTH ARTICLE | VOLUME 82, ISSUE 3, P378-383, MARCH 01, 2021

Post-acute COVID-19 syndrome. Incidence and risk factors: A Mediterranean cohort study

[Oscar Moreno-Pérez](#) ¹  • [Esperanza Merino](#)  ¹  • [Jose-Manuel Leon-Ramirez](#) • ... [Vicente Boix](#) 

[Joan Gil](#) • [On behalf of COVID19-ALC research group](#) • [Show all authors](#) • [Show footnotes](#)

Published: January 11, 2021 • DOI: <https://doi.org/10.1016/j.jinf.2021.01.004> • 

- 277 patients mild or severe, suivi 10-14 semaines (mediane 77 jours)
- 36% symptoms (dyspnée), 9% d'anomalie EFR (S. obstructif)
- 19% d'anomalies chest radio
- Amélioration à 16-18 semaines (13.3% avec persistance des signes)

Research article | [Open Access](#) | Published: 20 May 2021

Sequelae, persistent symptomatology and outcomes after COVID-19 hospitalization: the ANCOHVID multicentre 6-month follow-up study

[Álvaro Romero-Duarte](#), [Mario Rivera-Izquierdo](#) , [Inmaculada Guerrero-Fernández de Alba](#), [Marina Pérez-Contreras](#), [Nicolás Francisco Fernández-Martínez](#), [Rafael Ruiz-Montero](#), [Álvaro Serrano-Ortiz](#), [Rocío Ortiz González-Serna](#), [Inmaculada Salcedo-Leal](#), [Eladio Jiménez-Mejías](#) & [Antonio Cárdenas-Cruz](#)

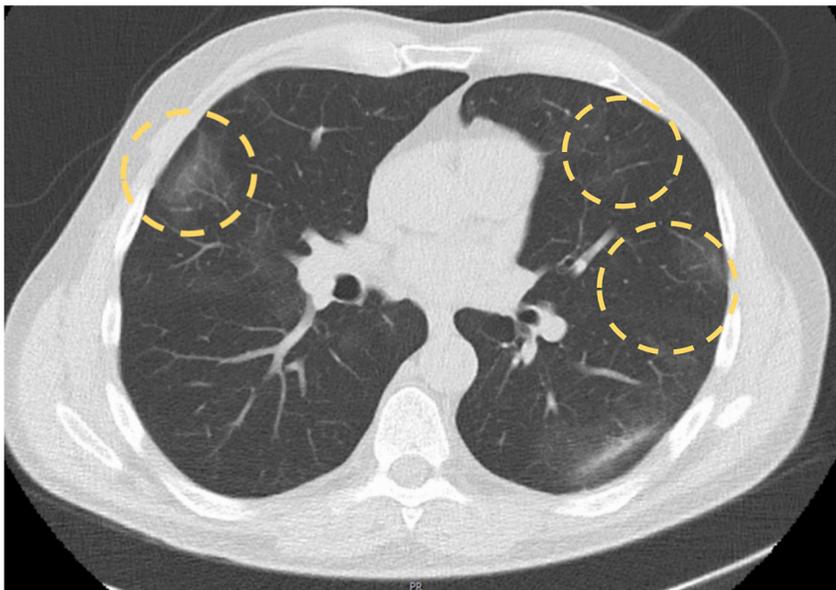
BMC Medicine **19**, Article number: 129 (2021) | [Cite this article](#)

1272 Accesses | 23 Altmetric | [Metrics](#)

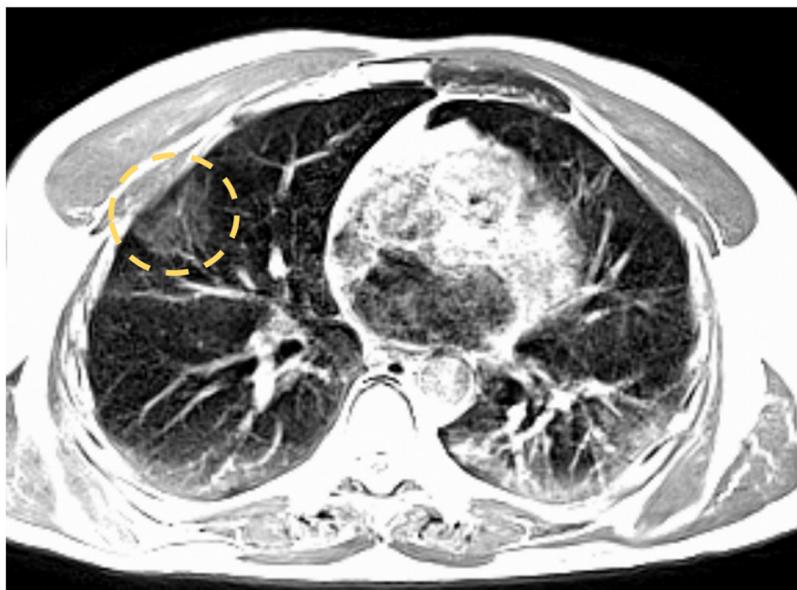
Étude prospective sur 797 patients hospitalisés

- **Symptôme le plus fréquent à 6 mois** : respiratoire (42%) comprenant dyspnée, toux, douleurs thoraciques, odynophagia
- **20%** des patients sont repassés par le SAU,
- **FDR étant** :
 - fièvre,
 - arythmie/palpitations
 - douleurs thoraciques
 - pneumonie

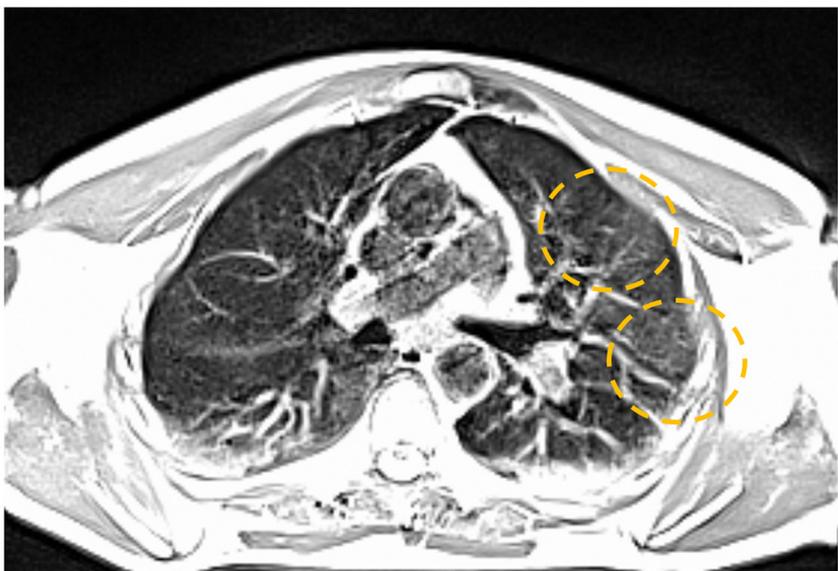
(a)



(b)



(c)



Magnetic Resonance Imaging

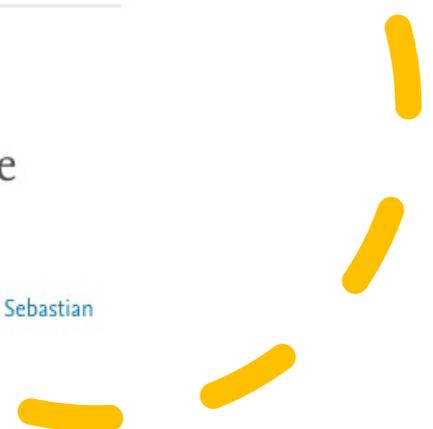
Volume 76, February 2021, Pages 49-51



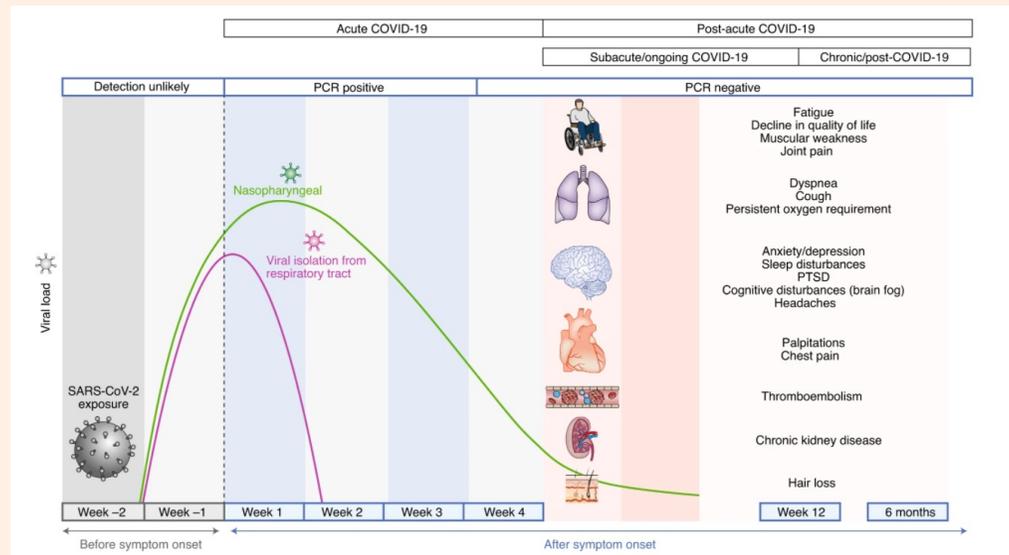
Case Report

High-performance low field MRI enables visualization of persistent pulmonary damage after COVID-19

Rafael Heiss ^a , David M. Grodzki ^b , Wilhelm Horger ^b , Michael Uder ^a , Armin M. Nagel ^a , Sebastian Bickelhaupt ^a



Nature Review



Review Article | Published: 22 March 2021

Post-acute COVID-19 syndrome

Ani Nalbandian, Kartik Sehgal, [...]Elaine Y. Wan

Nature Medicine 27, 601–615 (2021) | Cite this article

319k Accesses | 37 Citations | 2995 Altmetric | Metrics

nature medicine

11 études

Tout stade de
sévérité

- Dyspnée chez 44-66% des patients, à 60-100 jours de suivi
- Dyspnée chez 11-41% des patients à 6 mois de suivi
- Distance au test de marche de 6 min significativement moins importante à 6 mois (étude chinoise)
- Opacités en verre dépoli : anomalie TDM la plus fréquente à 3 mois (25%)
- Population à risqué : intubation/VNI/optiflow

SYSTEMATIC REVIEW | [Free Access](#)

Frequency, signs and symptoms, and criteria adopted for long COVID-19: A systematic review

Ana Luiza Cabrera Martimbianco, Rafael Leite Pacheco ✉, Ângela Maria Bagattini, Rachel Riera

First published: 11 May 2021 | <https://doi.org/10.1111/ijcp.14357>

PROSPERO: CRD42020214587

Funding information

This study was supported by Sociedade Beneficente de Senhoras Hospital Sírio-Libanês.

27 cohortes
observacionais

5440 patients

- Douleurs thoraciques 89%
- Dyspnée 61%
- Toux et crachats 59%
- FDR: hospitalization, âge > 65 ans, sévérité clinique initiale





Cardiologic and autonomic dysfunction

- **Request** : (long COVID [All fields]-19 OR long COVID [All fields] OR long-hauler [All fields] OR Chronic COVID [All fields]) AND (cardiology [All fields] OR cardiopathy [All fields] OR autonomic dysfunction [All fields] OR cardiac injury [All fields] OR POTS [All fields] OR orthostatic intolerance [All fields] OR pericarditis [All fields] OR palpitation [All fields] OR arrhythmia [All fields] OR myocarditis [All fields])
- 27 titres et résumés sélectionnés sur 46 articles
- Finalement 10 articles sélectionnés

Autonomic dysfunction in 'long COVID': rationale, physiology and management strategies

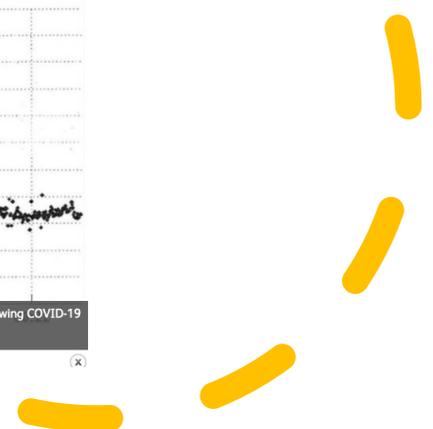
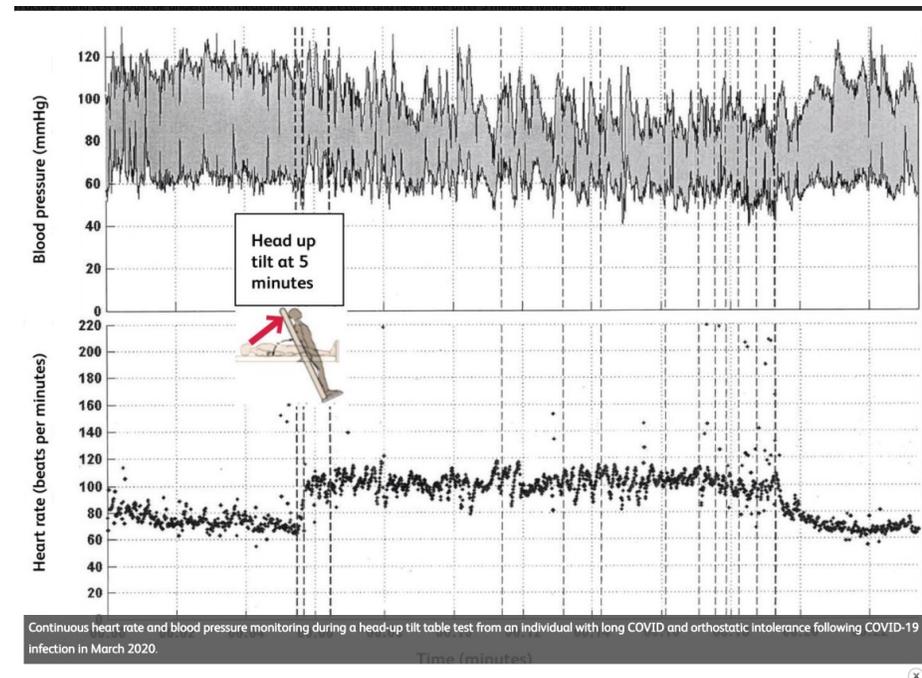
Melanie Dani, Andreas Dirksen, Patricia Taraborrelli, Miriam Torocastro, Dimitrios Panagopoulos, Richard Sutton and Phang Boon Lim

DOWNLOAD PDF

DOI: <https://doi.org/10.7861/clinmed.2020-0896>
Clin Med January 2021

6 cas de POTS

26-56 ans



Postural orthostatic tachycardia syndrome (POTS) and other autonomic disorders after COVID-19 infection: a case series of 20 patients

Svetlana Blitshteyn¹ · Sera Whitelaw² 

Received: 11 February 2021 / Accepted: 22 March 2021 / Published online: 30 March 2021

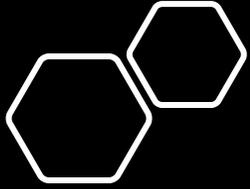
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20 patients
suivi pour POTS

analyse rétrospective

- 17 (85%) patients avec signes à 6 mois
- 12 (60%) ne pouvaient toujours pas aller au travail.





Revue des symptômes cardiovasculaires
à 60 jours, dans 4 études de cohortes

Approximativement :

20% de douleurs thoraciques

14% de palpitations

Coronary Heart Disease (S. Virani and S. Naderi, Section Editors) | Published: 13 May 2021

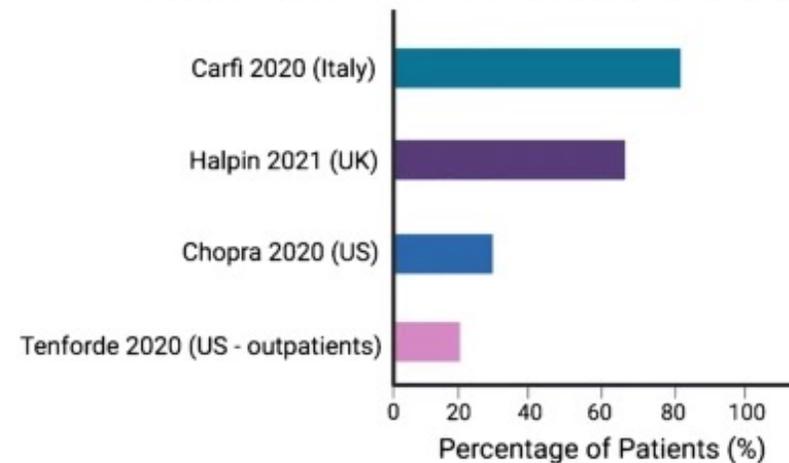
COVID and Cardiovascular Disease: What We Know in 2021

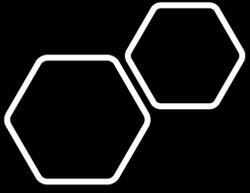
[Michael Chilazi](#), [Eamon Y. Duffy](#), [Aarti Thakkar](#) & [Erin D. Michos](#) ✉

[Current Atherosclerosis Reports](#) **23**, Article number: 37 (2021) | [Cite this article](#)

4968 Accesses | 126 Altmetric | [Metrics](#)

Range of Prevalence of Chronic Cardiopulmonary Symptoms





150 patients avec ETT

âge médian : 42

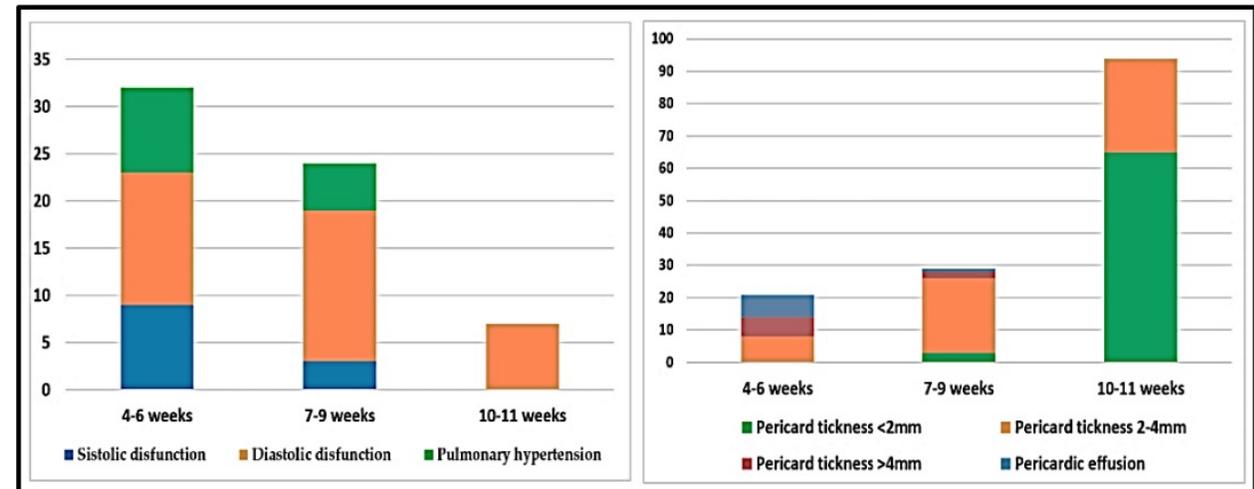
4-12 semaines au moins

- 25% d'anomalies cardiaques
 - 9% d'HTP
 - 9% de FEVG altérée
 - 14% de dysfonction diastolique
 - 10% de péricardite

Open Access Article

Associations between the Severity of the Post-Acute COVID-19 Syndrome and Echocardiographic Abnormalities in Previously Healthy Outpatients Following Infection with SARS-CoV-2

by [Cristina Tudoran](#)^{1,2,3}, [Mariana Tudoran](#)^{1,2,3,*}, [Gheorghe Nicusor Pop](#)⁴, [Catalina Giurgi-Oncu](#)^{3,5}, [Talida Georgiana Cut](#)⁶, [Voichita Elena Lazureanu](#)⁶, [Cristian Oancea](#)⁶, [Florina Parv](#)^{1,2,3}, [Tudor Ciocarlie](#)^{1,2,3} and [Felix Bende](#)^{3,7,8}



5.Troubles psychologiques



Prevalence of Post-traumatic Stress Symptoms and Its Associations With Quality of Life, Demographic and Clinical Characteristics in COVID-19 Survivors During the Post-COVID-19 Era

OPEN ACCESS

Yuan Yuan^{1†}, Zi-Han Liu^{2,3,4†}, Yan-Jie Zhao^{2,3,4†}, Qinge Zhang^{5,6,7†}, Ling Zhang^{5,6,7†}, Teris Cheung⁸, Todd Jackson⁹, Guo-Qing Jiang^{1} and Yu-Tao Xiang^{2,3,4*}*

- 134 patients post COVID vs 214 contrôles
- 18% de PTSD en post COVID vs 5% chez les contrôles ($p < 0.001$)

6. Autre. Syndrome de fatigue Chronique

COVID-19 and post-infectious myalgic encephalomyelitis/chronic fatigue syndrome: a narrative review

Sonia Poenaru, Sara J. Abdallah, Vicente Corrales-Medina and Juthaporn Cowan

- Asthénie au premier plan
- SFC post COVID?

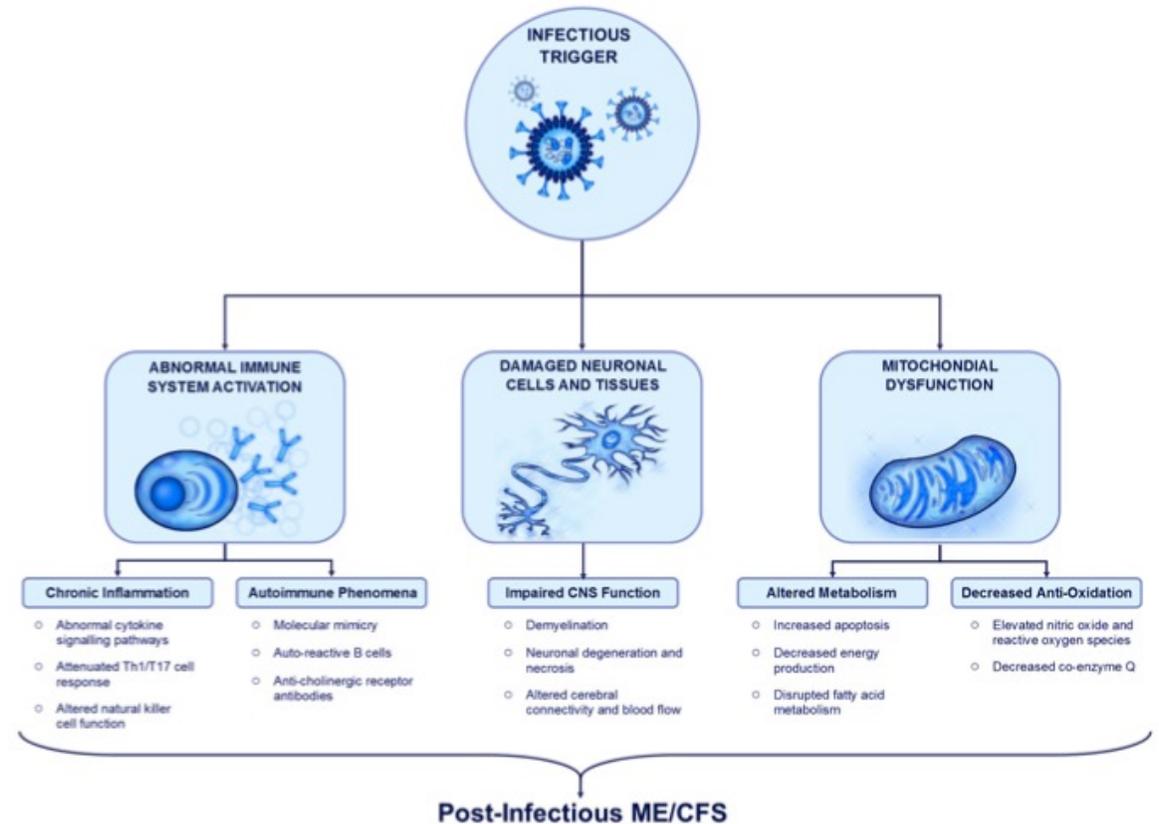


Table 2. Post-acute COVID-19 symptom frequency.

Author	Country	Population	Sample size	Follow-up (days)	Recovered at follow-up (%)	Most common symptoms (%)	Risk factors
Huang et al. ⁷⁵	China	Inpatient	1733	186	24	Fatigue/myalgia (63) Sleep disturbance (26) Hair loss (22)	Age Female sex Disease severity
Nehme et al. ⁸¹	Switzerland	Inpatient	669	43	68	Fatigue (-) Dyspnea (-) Anosmia (-)	-
Khalaf et al. ⁷⁹	Egypt	Mixed (51% Inpatient, 49% Outpatient)	538	82	15	Fatigue (59) Subjective fever (47) Diarrhea (24)	Disease severity Hydroxychloroquine use Azithromycin use Multivitamin use
Xiong et al. ⁸⁵	China	Inpatient	538	97	50	Fatigue (28) Diaphoresis (24) Post-exertion polypnea (21)	Age Female sex Hospital length of stay
Chopra et al. ⁸¹	United States	Inpatient	488	60	-	Physical limitation (39) Exertional dyspnea (23) Anosmia (13)	-
Mohamed-Hussain et al. ⁸²	Egypt	Mixed (76% Inpatient, 24% Outpatient)	444	35	20	-	Age Female sex Disease severity Seasonal flu vaccine Smoking history Any medical comorbidity
Galal et al. ⁸³	Egypt	Mixed (24% Inpatient, 76% Outpatient)	430	-	14	Myalgia (60) Arthralgia (57) Physical limitation (57)	Any medical comorbidity Disease severity Influenza vaccination
Mandal et al. ⁸³	England	Inpatient	384	54	28	Fatigue (67) Dyspnea (53) Cough (34) Sleep disturbance (61) Dyspnea (55)	-
Moradian et al. ⁸⁴	Iran	Inpatient	200	42	42	Dyspnea (20) Weakness (19) Myalgia (18)	-
Jacobs et al. ⁸⁷	United States	Inpatient	183	35	27	Fatigue (66) Myalgia (51) Dyspnea (46)	Age Female sex
Petersen et al. ⁷⁸	Faroe Islands	Outpatient	180	125	47	Fatigue (-) Anosmia (-) Myalgia (-)	Age
Pilotto et al. ⁸⁸	Italy	Inpatient	165	97	50	Fatigue (34) Memory loss (31) Sleep disturbance (30)	Age Disease severity

Table 2. (Continued)

Author	Country	Population	Sample size	Follow-up (days)	Recovered at follow-up (%)	Most common symptoms (%)	Risk factors
Townsend et al. ⁷⁴	Ireland	Mixed (48% inpatient, 52% outpatient)	153	75	38	Fatigue (48)	-
Carli et al. ⁷²	Italy	Inpatient	143	60	13	Fatigue (53) Dyspnea (43) Arthralgia (27)	-
Galvan-Tejada et al. ¹⁶	Mexico	Inpatient	141	36	16	Cough (25) Anosmia (24) Emesis (15)	-
Wang et al. ⁷⁸	China	Inpatient	131	30	86	Cough (9) Dyspnea (2) Pharyngitis (2)	-
Garrigues et al. ⁷⁷	France	Inpatient	120	111	-	Fatigue (55) Dyspnea (42) Memory loss (34)	-
Pellaud et al. ⁸⁵	Switzerland	Inpatient	116	30	37	Fatigue (67) Respiratory symptoms (56) Anosmia (10)	-
Varghese et al. ¹⁸	Germany	Mixed (9% Inpatient, 91% Outpatient)	116	66	79	Fatigue (11) Dyspnea (6) Anosmia (5)	Reduced serum IgA
Arnold et al. ⁸²	England	Inpatient	110	90	26	Fatigue (39) Dyspnea (39) Insomnia (24)	-
Halpin et al. ⁷⁵	England	Inpatient	100	48	-	Fatigue (63) Dyspnea (50) Post-traumatic stress disorder symptom (31)	-
Darley et al. ⁷⁹	Australia	Mixed (88% Inpatient, 12% Outpatient)	78	69	60	Fatigue (22) Dyspnea (19) Chest tightness (5)	-
Wong et al. ¹⁸⁰	Canada	Inpatient	78	90	24	Reduced quality of life (51) Dyspnea (50) Cough (23)	-
Stavem et al. ¹⁹¹	Norway	Outpatient	70	117	58	Dyspnea (16) Anosmia (12) Dysgeusia (10)	Medical comorbidities Number of acute symptoms
Miyazato et al. ¹⁸²	Japan	Inpatient	63	120	-	Dyspnea (11) Fatigue (10) Anosmia (10)	-
Zhao et al. ¹⁸³	China	Inpatient	55	64-93	-	Gastrointestinal (31) Headache (18) Fatigue (16)	-

5. Autre: Thyroïdites subaigues

Ref	Patient	Délai post COVID	Thyroïde	Traitement
Brancatella et al. Subacute thyroiditis after SARS-CoV 2 infection. J clini Endocrinol Metab July 2020	Femme 18 ans , tableau aigu peu sévère	1 mois	Douleur , Augmentation volume T4 T3 élevée TSH effondrée	CTC évoluton favorable
Mattar et al. Subacute thyroiditis associated with COVID-19. BMJ case reports	Homme 34 ans	J9	Goitre + tachycardie T4 T3 élevée TSH effondrée	CTC évolution favorable
Tee et al. COVID-10 complicated by Hashimoto thyroiditis. Singapore Med J 2021	Homme 45 ans	J9	TSH élevée T3 T4 Basses Ac anti TPO	L tyroxine
Ippolito et al. SARS-CoV-2: a potential trigger for subacute thyroiditis? Insights from a case report.J Endocrinol Invetisgation . 2020	Femme 69 ans	J5	Palpitations insomnies T4 T3 élevée TSH effondrée	CTC évolution favorable

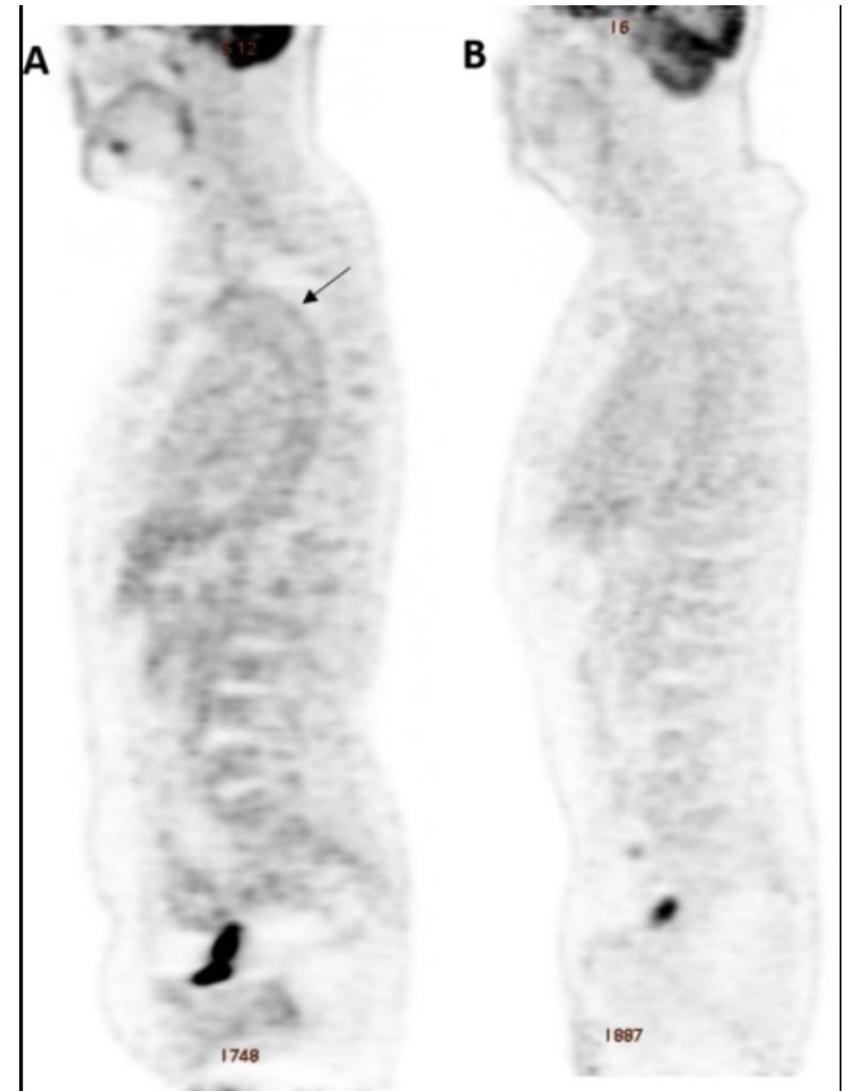
6. Autre. Aortites

> *Clin Microbiol Infect.* 2021 Sep 27;S1198-743X(21)00542-5. doi: 10.1016/j.cmi.2021.09.020.
Online ahead of print.

Aortic [18F] FDG-PET/CT hypermetabolism in patients with long COVID: a retrospective study

Pierre Dudouet ¹, Serge Cammilleri ², Eric Guedj ², Alexis Jacquier ³, Didier Raoult ¹,
Carole Eldin ⁴

- 10 patients en post COVID avec hypermétabolisme aorte thoracique
- Versus 37 autres post COVID
- Douleur thoracique plus fréquente



Traitement

- Lors de la consultation expliquer que les patients ont un temps de récupération variable
- Impression d'une amélioration globale dans le temps pour la majorité des patients
- Pas de traitement étiologique mais importance de prise en charge adaptée aux symptômes
- Ex: anxiété prise en charge psychiatrique
- Rééducation++++respiratoire/effort/olfactive

Infectious Diseases

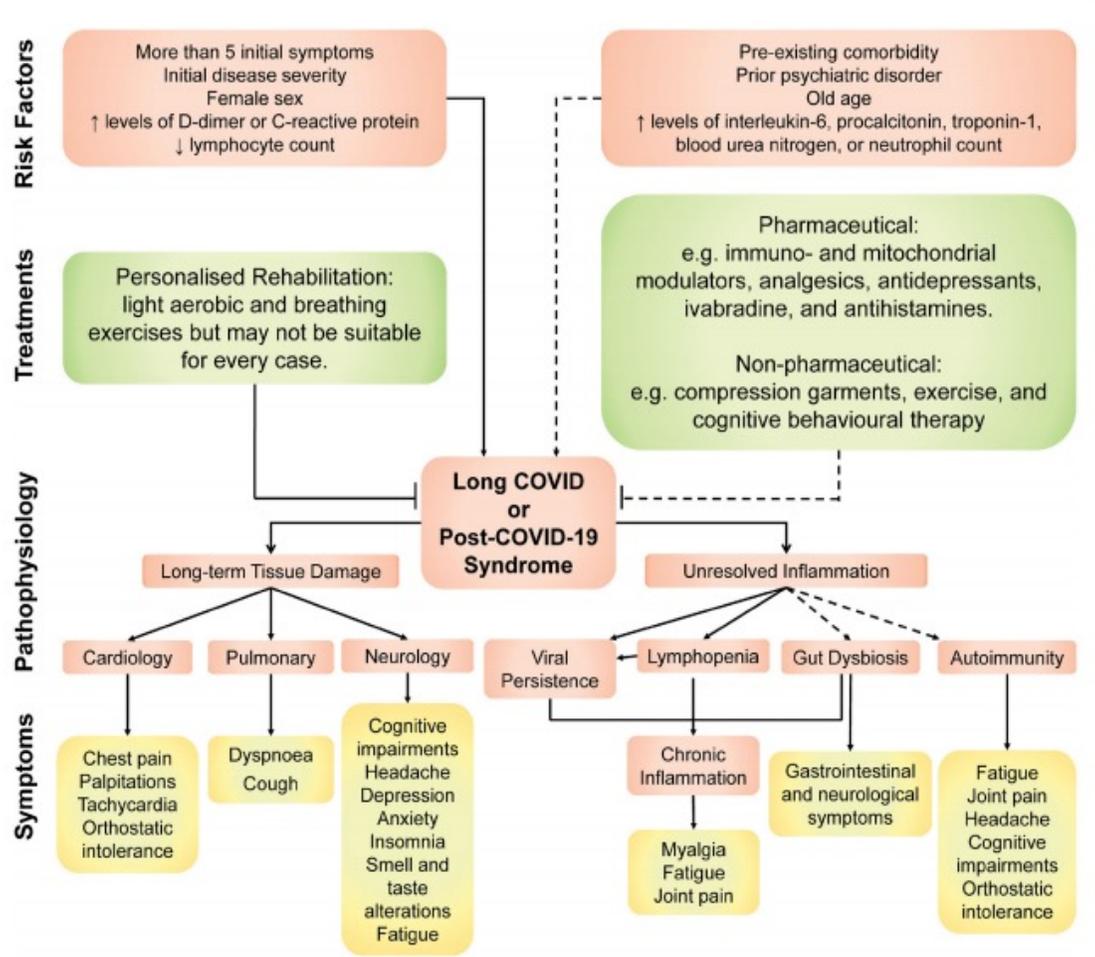


Figure 1. An overview of the symptoms, putative pathophysiology, associated risk factors, and potential treatments involved in long COVID. Note: Dashed lines represent areas where evidence is relatively lacking compared to non-dashed lines. (Color online only).

Long COVID or post-COVID-19 syndrome: putative pathophysiology, risk factors, and treatments

Shin Jie Yong

To cite this article: Shin Jie Yong (2021): Long COVID or post-COVID-19 syndrome: putative pathophysiology, risk factors, and treatments, Infectious Diseases, DOI: [10.1080/23744235.2021.1924397](https://doi.org/10.1080/23744235.2021.1924397)

To link to this article: <https://doi.org/10.1080/23744235.2021.1924397>

- Revue exhaustive de 27 articles
- 13 185 patients au total, entre 2 et 6 mois de suivi
- Dyspnée dans 11-61% des cas, dépendant de la sévérité initiale.
- **Propositions thérapeutiques :**
 - Rééducation pulmonaire et réadaptation sportive
 - AINS-Paracétamol

COVID-19 Note: Dashed lines represent areas where evidence is relatively lacking compared to non-dashed lines. (Color online only).





ORIGINAL ARTICLE
COVID-19

Benefits of pulmonary rehabilitation in COVID-19: a prospective observational cohort study

Rainer Gloeckl^{1,2,7}, Daniela Leitl^{1,2,7}, Inga Jarosch^{1,2}, Tessa Schneeberger^{1,2}, Christoph Nell³, Nikola Stenzel⁴, Claus F. Vogelmeier⁵, Klaus Kenn^{1,2} and Andreas R. Koczulla^{1,2,6}

Étude prospective observationnelle

3 semaines de « réhabilitation pulmonaire »

Test de marche de 6 min, CVF, SF-36 avant et après la rééducation

50 patients

RESULTATS:

-Test de marche = + 48m/+124m

-CVF = +7.7%/+ 11.3%

-SF-36 = + 5.6/+14.4 points

Pulmonary

Is there a role for antifibrotic therapy for the prevention of development of pulmonary fibrosis and other respiratory complications in COVID-19 survivors?	NCT04652518 NCT04282902 NCT04541680 NCT04527354
Does pulmonary rehabilitation improve pulmonary outcomes in post-acute COVID-19?	NCT04649918 NCT04365738 NCT04406532 NCT04642040

Trials and studies in progress...

Symptômes neurocognitifs

- Etude observationnelle 50 patients
- 24 semaines post aigu en moyenne
- Troubles mémoire, fluence verbale, anxiété dépression
- 8 semaines de rééducation (physique + TCC)
- Amélioration sur toutes les dimensions

LETTER TO THE EDITOR

Neuropsychological rehabilitation program for patients with post-COVID-19 syndrome: a clinical experience[☆]

Vaccin et COVID long?

Risk factors and disease profile of post-vaccination SARS-CoV-2 infection in UK users of the COVID Symptom Study app: a prospective, community-based, nested, case-control study

Michela Antonelli, Rose S Penfold, Jordi Merino, Carole H Sudre, Erika Molteni, Sarah Berry, Liane S Canas, Mark S Graham, Kerstin Klaser, Marc Modat, Benjamin Murray, Eric Kerfoot, Liyuan Chen, Jie Deng, Marc F Österdahl, Nathan J Cheetham, David A Drew, Long H Nguyen, Joan Capdevila Pujol, Christina Hu, Somesh Selvachandran, Lorenzo Polidori, Anna May, Jonathan Wolf, Andrew T Chan, Alexander Hammers, Emma L Duncan, Tim D Spector, Sebastien Ourselin, Claire J Steves**

Les patients ayant contracté le COVID après vaccination 2 doses ont moins de symptômes après 28 jours que les patients ayant eu le COVID non vaccinés.

Merci de votre attention

