Long Covid Pathogen Reactivation: Testing and Therapeutic Options

Armin Schwarzbach MD PhD
Medical Doctor and Specialist for Laboratory Medicine

ArminLabs
Laboratory for tick-borne diseases
Tel. 0049 821 2182879
info@arminlabs.com
www.arminlabs.com

arminlabs
DIAGNOSING TICK-BORNE DISEASES


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Arminlabs
Clinical Laboratory
Augsburg, Germany
Armin Schwarzbach, MD, PhD

CAP Number 8408129
AU-ID: 1301491

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Agenda

- **Pathogen reactivation**
  - **DNA viruses**
  - RNA viruses
  - Bacteria
- Testing
- Therapeutic options

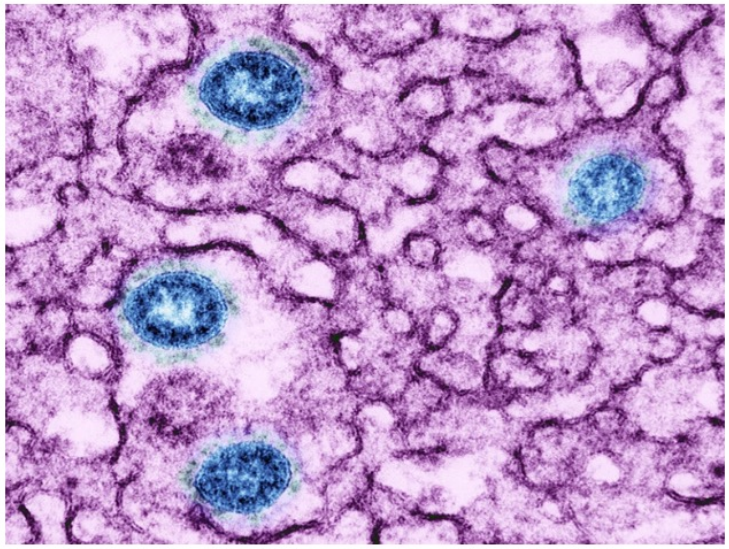
Study Aug. 2022 investigating the link between Long COVID and herpes viruses

NEWS | 25 August 2022

Could long COVID be linked to herpes viruses? Early data offer a hint

Low cortisol levels and herpes-virus reactivation are associated with prolonged COVID-19 symptoms, preliminary research suggests.

Emily Waltz



Particles of the SARS-CoV-2 virus (blue) inside an infected cell. Credit: NIH/SPL

"Most strikingly, the study found … hints that in people with long COVID, **Epstein-Barr virus**, which can cause mononucleosis, and **Varicella Zoster virus**, which causes chickenpox and shingles, might recently have been '**reactivated**'. **Both** of these viruses are in the herpes family, persist indefinitely in the body after infection and **can start to multiply again after a period of quiescence.**

Source: https://www.nature.com/articles/d41586-022-02296-5#:~:text=Low%20cortisol%20levels%20and%20herpes,19%20symptoms%2C%20preliminary%20research%20suggests.&text=Researchers%20looking%20for%20biological%20drivers,of%20a%20stress%20hormone1.

"Long COVID Symptoms Likely Caused by Epstein-Barr Virus Reactivation"

› Pathogens. 2021 Jun 17;10(6):763. doi: 10.3390/pathogens10060763.

Investigation of Long COVID Prevalence and Its Relationship to Epstein–Barr Virus Reactivation

Jeffrey E Gold [1], Ramazan A Okyay [2], Warren E Licht [3], David J Hurley [4]

Affiliations + expand

PMID: 34204243 PMCID: PMC8233978 DOI: 10.3390/pathogens10060763

Free PMC article

Abstract

Coronavirus disease 2019 (COVID-19) patients sometimes experience long-term symptoms following resolution of acute disease, including fatigue, brain fog, and rashes. Collectively these have become known as long COVID. Our aim was to first determine long COVID prevalence in 185 randomly surveyed COVID-19 patients and, subsequently, to determine if there was an association between occurrence of long COVID symptoms and reactivation of Epstein-Barr virus (EBV) in 68 COVID-19 patients recruited fron
30.3% (56/185), which
COVID symptoms. Ne
control subjects in ou
for EBV early antigen-
significant ($p < 0.001$,
subjects 21-90 days af
or concurrently with C
may not be a direct re
induced EBV reactivati...

We found that **66.7% (20/30) of long-term long COVID subjects versus 10% (2/20) of long-term control subjects were positive** for EBV reactivation

"We found similar rates of EBV reactivation in those who had long COVID symptoms for months, as in those with long COVID symptoms that began just weeks after testing positive for COVID-19," said coauthor David J. Hurley, PhD, a professor and molecular microbiologist at the University of Georgia. "**This indicated to us that EBV reactivation likely occurs simultaneously or soon after COVID-19 infection**."

Source: https://pubmed.ncbi.nlm.nih.gov/34204243/; https://www.news-medical.net/news/20210623/Epstein-Barr-virus-reactivation-may-be-the-cause-of-long-COVID-symptoms.aspx; https://world.org/EBV/

High EBV results post COVID, backed up by hundreds of lab tests

EBV EliSpot (lytic+latent)

1 EBV EliSpot (lytic) **!** **657 SI**

0-1 = negative
2-3 = weak positive
> 3 = positive

1 EBV EliSpot (latent) **!** **65 SI**

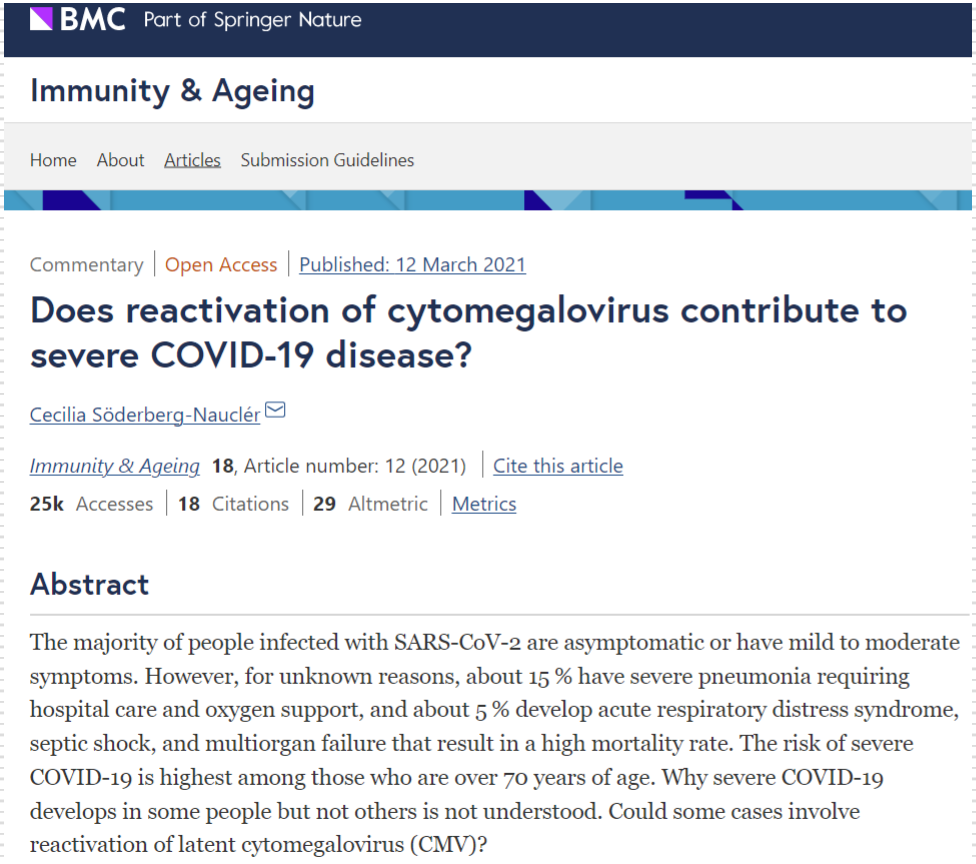
0-1 = negative
2-3 = weak positive
> 3 = positive

The result of the EliSpot test indicates current celluar activity against Epstein-Barr-Virus (EBV).

Explanation of EBV antigens:
EBV-lytic antigen: sign for replication of infectious EBV virions
EBV-latent antigen: sign for EBV latency with no production of infectious EBV virions

Source: Arminlabs laboratory results

CMV reactivation and virus-induced immune dysfunction may be underestimated as a driver



BMC Part of Springer Nature

Immunity & Ageing

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Commentary | Open Access | Published: 12 March 2021

Does reactivation of cytomegalovirus contribute to severe COVID-19 disease?

Cecilia Söderberg-Nauclér

Immunity & Ageing **18**, Article number: 12 (2021) | Cite this article

25k Accesses | **18** Citations | **29** Altmetric | Metrics

Abstract

The majority of people infected with SARS-CoV-2 are asymptomatic or have mild to moderate symptoms. However, for unknown reasons, about 15 % have severe pneumonia requiring hospital care and oxygen support, and about 5 % develop acute respiratory distress syndrome, septic shock, and multiorgan failure that result in a high mortality rate. The risk of severe COVID-19 is highest among those who are over 70 years of age. Why severe COVID-19 develops in some people but not others is not understood. Could some cases involve reactivation of latent cytomegalovirus (CMV)?

"CMV reactivation and virus induced immune dysfunction may be under-estimated as a driver of immuno-pathogenesis in patients with severe COVID-19."[1]

"… diagnosing CMV in COVID-19 patients could be well worth the effort." [1]

"Intriguingly, severe acute respiratory syndrome coronavirus 2 and cytomegalovirus may potentiate each other, since they share some innate immune pathways."[2]

Source: 1. *Söderberg-Nauclér, C. Does reactivation of cytomegalovirus contribute to severe COVID-19 disease?. Immun Ageing* ***18,*** *12 (2021). https://doi.org/10.1186/s12979-021-00218-z;* 2. *https://pubmed.ncbi.nlm.nih.gov/35101103/*

Our lab and others are seeing a definite correlation between COVID/Long COVID and CMV reactivation

CMV EliSpot

1 CMV EliSpot ! 13 SI

0-1 = negative
2-3 = weak positive
> 3 = positive

The result of the EliSpot test indicates current cellular activity against Cytomegalo-Virus.

May 2019, before COVID diagnosis

CMV EliSpot

1 CMV Lytisch ! 279 SI
0-1 = negative
2-3 = weak positive
> 3 = positive

1 CMV Latent ! 79 SI
0-1 = negative
2-3 = weak positive
> 3 = positive

The result of the EliSpot test indicates current cellular activity against Cytomegalo-Virus.

Explanation of CMV antigens:
CMV-lytic antigen: sign for replication of infectious CMV virions

June 2020, after COVID

Source: ArminLabs results, with permission

Herpes Simplex Virus also reactivating with COVID-19

microorganisms

MDPI

Article

Herpes Simplex Virus Re-Activation in Patients with SARS-CoV-2 Pneumonia: A Prospective, Observational Study

Erica Franceschini [1,*], Alessandro Cozzi-Lepri [2], Antonella Santoro [1], Erica Bacca [3], Guido Lancellotti [3], Marianna Menozzi [1], William Gennari [4], Marianna Meschiari [1], Andrea Bedini [1], Gabriella Orlando [1], Cinzia Puzzolante [1], Margherita Digaetano [1], Jovana Milic [3], Mauro Codeluppi [5], Monica Pecorari Federica Carli [1], Gianluca Cuomo [1], Gaetano Alfano [6], Luca Corradi [1], Roberto Tonelli [7], Nicola Stefano Busani [9], Emanuela Biagioni [9], Irene Coloretti [9], Giovanni Guaraldi [3], Mario Sarti [4], Mari Enrico Clini [7], Massimo Girardis [9], Inge C. Gyssens [11,12] and Cristina Mussini [1,3,*]

"Conclusions: our study shows a high incidence of HSV-1 reactivation both virologically and clinically in patients with SARS-CoV-2 severe pneumonia"[1]

Rheumatology International (2022) 42:1523–1530
https://doi.org/10.1007/s00296-022-05146-9

Rheumatology
INTERNATIONAL

OBSERVATIONAL RESEARCH

Herpesvirus infections and post-COVID-19 manifestations: a pilot observational study

Svitlana Zubchenko[1] · Iryna Kril[1] · Olena Nadizhko[1] · Oksana Matsyura[1] · Valentyna Chopyak[1]

Received: 17 March 2022 / Accepted: 5 May 2022 / Published online: 1 June 2022

Abstract
The global spread of SARS-CoV-2 points to unrivaled mutational variation of the virus, contributing to a variety of post-COVID sequelae in immunocompromised subjects and high mortality. Numerous studies have reported the reactivation of "sluggish" herpes virus infections in COVID-19, which exaggerate the course of the disease and complicate with lasting post-COVID manifestations CMV, EBV, HHV6). This study aimed to describe clinical and laboratory features of post-COVID manifestations accompanied by the reactivation of herpes virus infections (CMV, EBV, HHV6). 88 patients were recruited for this study, including subjects with reactivation of herpes viruses, 68 (72.3%) (main group) and 20 (27.7%) subjects without detectable DNA of herpesviruses (control group): 46 (52.3%) female and 42 (47.7%) male; median age was 41.4 ± 6.7 years. Patients with post-COVID manifestations presented with reactivation of EBV in 42.6%, HHV6 in 25.0%, and EBV plus HHV6 in 32.4%. Compared with controls, patients with herpes virus infections presented with more frequent slight fever temperature, headache, psycho-neurological disorders, pulmonary abnormalities and myalgia ($p < 0.01$), activation of liver enzymes, elevated CRP and D-dimer, and suppressed cellular immune response ($p \leq 0.05$). Preliminary results indicate a likely involvement of reactivated herpes virus infections, primarily EBV infections in severe COVID-19 and the formation of the post-COVID syndrome. Patients with the post-COVID syndrome and reactivation of EBV and HHV6 infections are at high risk of developing various pathologies, including rheumatologic diseases.

Keywords COVID-19 · Herpes virus · Epstein–Barr virus · Rheumatology · An autoimmune disease

Source: 1. *https://pubmed.ncbi.nlm.nih.gov/34576791/; https://pubmed.ncbi.nlm.nih.gov/34202515*

August 2022: Reactivation of HHV-6 and EBV

JOURNAL OF
MEDICAL VIROLOGY

SHORT COMMUNICATION | Free Access

Presence and clinical impact of human herpesvirus-6 infection in patients with moderate to critical coronavirus disease-19

Katia Lino, Lilian S. Alves, Jessica V. Raposo, Thalia Medeiros, Cintia F. Souza S. de Paula, Jorge R. Almeida

First published: 14 October 2021 | https://doi.org/10.1002/jmv.27392

Cohort of 67: **"We found that 15/67 (22.4%) patients had detectable EBV and 3/67 (4.5%) had detectable HHV-6"**

Viruses. 2022 Aug 25;14(9):1872. doi: 10.3390/v14091872.

Epstein–Barr Virus and Human Herpesvirus-6 Reactivation in Acute COVID-19 Patients

Bailey Brooks [1 2], Christina Tancredi [2], Yufeng Song [2], Alemu Tekewe Mogus [2], Meei-Li W Huang [3], Haiying Zhu [3], Tuan L Phan [4 5], Harrison Zhu [5 6], Alexandra Kadl [7 8], Judith Woodfolk [7 9], Keith R Jerome [3 10], Steven L Zeichner [2 9]

Affiliations + expand

PMID: 36146679 PMCID: PMC9504756 DOI: 10.3390/v14091872

Free PMC article

Abstract

Beyond their pulmonary disease, many COVID-19 patients experience a complex constellation of characteristics, including hyperinflammatory responses, autoimmune disorders, and coagulopathies. However, the pathogenesis of these aspects of COVID-19 is obscure. More than 90% of people are latently infected with the lymphotropic herpesviruses Epstein-Barr Virus (EBV) and/or Human Herpesvirus-6 (HHV-6). Some of the inflammatory features of COVID-19 resemble clinical syndromes seen during EBV and HHV-6 infection, and these latent viruses can be reactivated by inflammatory mediators. We hypothesized that EBV and HHV-6 reactivation might be a common feature of early COVID-19, particularly in patients with more inflammation. We tested for EBV and HHV-6 reactivation in 67 patients acutely hospitalized with COVID-19 using previously validated quantitative PCR assays on the plasma. In our cohort, we found that 15/67 (22.4%) patients had detectable EBV and 3/67 (4.5%) had detectable HHV-6. This frequency of activation is somewhat more than the frequency

Source: https://pubmed.ncbi.nlm.nih.gov/36146679/

Agenda

- **Pathogen reactivation**
  - DNA viruses
  - **RNA viruses**
  - Bacteria
- Testing
- Therapeutic options

Coxsackie virus and myocarditis/pericarditis as coinfections in COVID-19

Fulminant myocarditis as an early presentation of SARS-CoV-2

Tamara Naneishvili,[✉1] Arsalan Khalil,[1] Ryan O'Leary,[2] and Neeraj Prasad[1]

▸ Author information ▸ Article notes ▸ Copyright and License information Disclaimer

This article has been cited by other articles in PMC.

Abstract

Myocarditis is well known to be caused by viral infections s
herpes virus 6 and parvovirus B19. However, during the current emerging outbreak of SARS-CoV-2, there have been few case reports describing myocarditis as a possible presentation. In our case re-

"**Myocarditis** is well known to be caused by viral infections such as **Coxsackie virus group B**, human herpes virus 6 and parvovirus B19."[1]

"Both types of **[Coxsackie]**viruses (A and B) can cause meningitis, myocarditis, and pericarditis"[2]

Journal List > Elsevier Public Health Emergency Collection > PMC8503119

Elsevier Public Health Emergency Collection

Public Health Emergency COVID-19 Initiative

Chest. 2021 Oct; 160(4): A976. PMCID: PMC8503119

Published online 2021 Oct 11. doi: 10.1016/j.chest.2021.07.909

COVID-19 AND COXSACKIE B COINFECTION: A RARE CASE OF ACUTE PERICARDITIS

AMANDA ENG, NIKISHA PANDYA, and RATTAN PATEL

… this is the first case presenting **pericarditis caused by COVID 19 and Coxsackieviruses B (CV-B) coinfection**.

Source: 1. https://pubmed.ncbi.nlm.nih.gov/32928810/; 2. https://www.medicinenet.com/coxsackie_virus/article.htm; https://www.ncbi.nlm.nih.gov/labs/pmc/articles/PMC8503119/; https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8330013/pdf/IETT_0_1952985.pdf;

Signs of Echovirus reactivation, too, in the form of Echovirus-6 meningitis

Journal of Clinical Virology 162 (2023) 105425

Contents lists available at ScienceDirect

Journal of Clinical Virology

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

Increased detection of Echovirus 6-associated meningitis in patients hospitalized during the COVID-19 pandemic, Israel 2021–2022

Ilana S. Fratty [a,b,#], Or Kriger [c,#], Leah Weiss [b], Rinat Vasserman [b], Oran Erster [b], Ella Mendelson [a], Danit Sofer [a,#], Merav Weil [a,#,*]

[a] Central Virology Laboratory, Public Health Services, Ministry of Health and Sheba Medical Center, Ramat-Gan, Israel
[b] The Israel Center for Disease Control, Israel Ministry of Health, Ramat-Gan, Israel
[c] Sheba Medical Center, Pediatric Infectious Disease Unit, Ramat-Gan, Israel

ARTICLE INFO

Keywords:
Enterovirus
Meningitis
Echovirus-6
COVID-19
Omicron variant

ABSTRACT

Background: Outbreaks of enteroviral meningitis occur periodically and may lead to hospitalization and severe disease.
Objective: To analyze and describe the meningitis outbreak in patients hospitalized in Israel in 2021–2022, during the COVID-19 pandemic.
Results: In December 2021, before the emergence of the SARS-CoV-2 omicron variant, an off-season increase in enterovirus (EV) infections was observed among patients hospitalized with meningitis. In January 2022, enterovirus cases decreased by 66% in parallel with the peak of the Omicron wave, and then increased rapidly by 78% in March (compared with February) after a decline in Omicron cases. Sequencing of the enterovirus-positive samples showed a dominance of echovirus 6 (E-6) (29%) before and after the Omicron wave. Phylogenetic analysis found that all 29 samples were very similar and all clustered in the E-6 C1 subtype. The main E-6 symptoms observed were fever and headache, along with vomiting and neck stiffness. The median patient age was 25 years, with a broad range (0–60 years).
Conclusion: An upsurge in enterovirus cases was observed after the decline of the SARS-CoV-2 omicron wave. The dominant subtype was E-6, which was present prior to the emergence of the omicron variant, but increased rapidly only after the omicron wave decline. We hypothesize that the omicron wave delayed the rise in E-6-associated meningitis.

Reactivation of Enteroviruses (Coxsackie, Echovirus) also evident in many cases

Analysis		Result	Units	Reference Range	Chart
EBV-latent antigen: sign for EBV latency with no production of infectious EBV virions					
Coxsackie IgG-/IgA-antibodies					
4 Coxsackie-IgG Typ A7 (IFT)	**+**	**1:10000**		**< 1:100**	**[..... *>**
4 Coxsackie-IgG Typ B1 (IFT)	**+**	**1:10000**		**< 1:100**	**[..... *>**
7 Coxsackie-Virus IgA A7 (IFT)	**+**	**1:10**		**< 1:10**	**[..... *>**
7 Coxsackie-Virus IgA B1 (IFT)	**+**	**1:100**		**< 1:10**	**[..... *>**
The specific positive Coxsackie-Virus Type A7/B1-IgG-/IgA-antibodies indicate current humoral immune responses against Coxsackie-Virus Type A7 and Coxsackie-Virus Type B1 (recent infection with Coxsackie-Virus Type A7/B1?). The test system is highly specific for Coxsackie Virus antibodies. Other Enterovirus antibodies (for example Echovirus IgG/IgA-antibodies) are not detectable.					
(for example Echovirus IgG/IgA-antibodies) are not detectable.					
validated by					
Dr.Armin Schwarzbach					

Source: ArminLabs results, with permission

Agenda

- **Pathogen reactivation**
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  - RNA viruses
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- Therapeutic options

Can Covid lead to reactivation of Lyme Disease?

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scientific reports

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OPEN

Correlation between COVID-19 severity and previous exposure of patients to *Borrelia* spp.

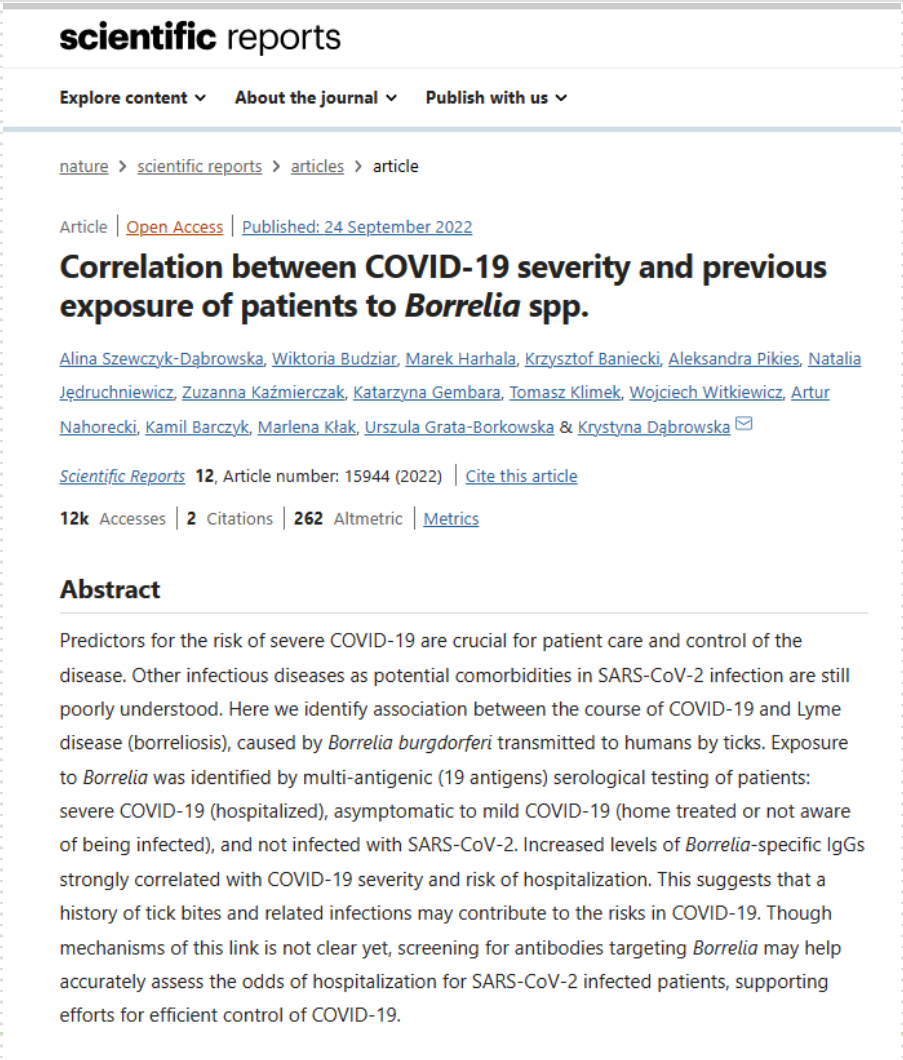
Alina Szewczyk-Dąbrowska[1,2], Wiktoria Budziar[1], Marek Harhala[1,4], Krzysztof Baniecki[3], Aleksandra Pikies[3], Natalia Jędruchniewicz[1], Zuzanna Kaźmierczak[1,4], Katarzyna Gembara[1,4], Tomasz Klimek[1], Wojciech Witkiewicz[1], Artur Nahorecki[3], Kamil Barczyk[3], Marlena Kłak[1], Urszula Grata-Borkowska[2] & Krystyna Dąbrowska[1,4]✉

Predictors for the risk of severe COVID-19 are crucial for patient care and control of the disease. Other infectious diseases as potential comorbidities in SARS-CoV-2 infection are still poorly understood. Here we identify association between the course of COVID-19 and Lyme disease (borreliosis), caused by *Borrelia burgdorferi* transmitted to humans by ticks. Exposure to *Borrelia* was identified by multi-antigenic (19 antigens) serological testing of patients: severe COVID-19 (hospitalized), asymptomatic to mild COVID-19 (home treated or not aware of being infected), and not infected with SARS-CoV-2. Increased levels of *Borrelia*-specific IgGs strongly correlated with COVID-19 severity and risk of hospitalization. This suggests that a history of tick bites and related infections may contribute to the risks in COVID-19. Though mechanisms of this link is not clear yet, screening for antibodies targeting *Borrelia* may help accurately assess the odds of hospitalization for SARS-CoV-2 infected patients, supporting efforts for efficient control of COVID-19.

"increased levels of *Borrelia*-specific IgGs strongly correlated with COVID-19 severity and with the risk of hospitalization"

Source: Szewczyk-Dąbrowska A et al. Correlation between COVID-19 severity and previous exposure of patients to Borrelia spp. Sci Rep. 2022 Sep 24;12(1):15944

Correlations becoming evident



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Article | Open Access | Published: 24 September 2022

Correlation between COVID-19 severity and previous exposure of patients to *Borrelia* spp.

Alina Szewczyk-Dąbrowska, Wiktoria Budziar, Marek Harhala, Krzysztof Baniecki, Aleksandra Pikies, Natalia Jędruchniewicz, Zuzanna Kaźmierczak, Katarzyna Gembara, Tomasz Klimek, Wojciech Witkiewicz, Artur Nahorecki, Kamil Barczyk, Marlena Kłak, Urszula Grata-Borkowska & Krystyna Dąbrowska

Scientific Reports **12**, Article number: 15944 (2022) | Cite this article

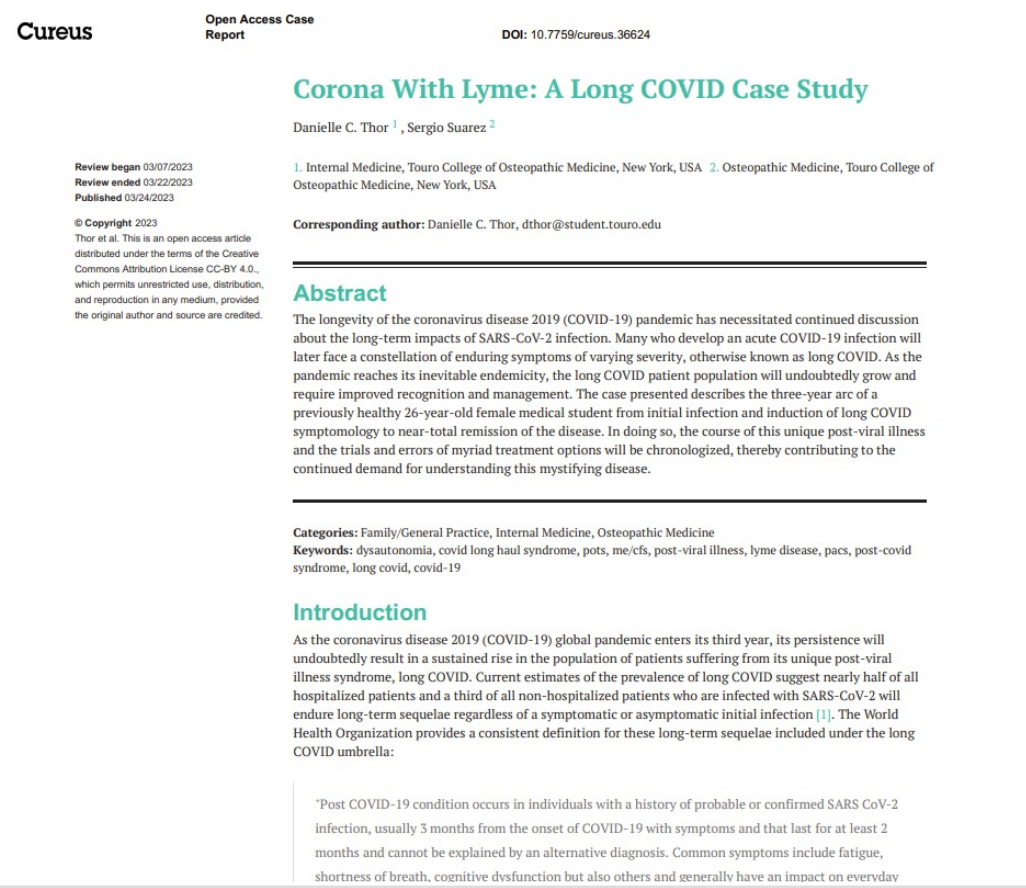
12k Accesses | **2** Citations | **262** Altmetric | Metrics

Abstract

Predictors for the risk of severe COVID-19 are crucial for patient care and control of the disease. Other infectious diseases as potential comorbidities in SARS-CoV-2 infection are still poorly understood. Here we identify association between the course of COVID-19 and Lyme disease (borreliosis), caused by *Borrelia burgdorferi* transmitted to humans by ticks. Exposure to *Borrelia* was identified by multi-antigenic (19 antigens) serological testing of patients: severe COVID-19 (hospitalized), asymptomatic to mild COVID-19 (home treated or not aware of being infected), and not infected with SARS-CoV-2. Increased levels of *Borrelia*-specific IgGs strongly correlated with COVID-19 severity and risk of hospitalization. This suggests that a history of tick bites and related infections may contribute to the risks in COVID-19. Though mechanisms of this link is not clear yet, screening for antibodies targeting *Borrelia* may help accurately assess the odds of hospitalization for SARS-CoV-2 infected patients, supporting efforts for efficient control of COVID-19.

"Increased levels of *Borrelia*-specific IgGs strongly correlated with COVID-19 severity and risk of hospitalization."

Peer-reviewed studies now beginning to appear



Cureus

Open Access Case Report

DOI: 10.7759/cureus.36624

Corona With Lyme: A Long COVID Case Study

Danielle C. Thor [1], Sergio Suarez [2]

1. Internal Medicine, Touro College of Osteopathic Medicine, New York, USA 2. Osteopathic Medicine, Touro College of Osteopathic Medicine, New York, USA

Corresponding author: Danielle C. Thor, dthor@student.touro.edu

Review began 03/07/2023
Review ended 03/22/2023
Published 03/24/2023

Abstract

The longevity of the coronavirus disease 2019 (COVID-19) pandemic has necessitated continued discussion about the long-term impacts of SARS-CoV-2 infection. Many who develop an acute COVID-19 infection will later face a constellation of enduring symptoms of varying severity, otherwise known as long COVID. As the pandemic reaches its inevitable endemicity, the long COVID patient population will undoubtedly grow and require improved recognition and management. The case presented describes the three-year arc of a previously healthy 26-year-old female medical student from initial infection and induction of long COVID symptomology to near-total remission of the disease. In doing so, the course of this unique post-viral illness and the trials and errors of myriad treatment options will be chronologized, thereby contributing to the continued demand for understanding this mystifying disease.

Categories: Family/General Practice, Internal Medicine, Osteopathic Medicine
Keywords: dysautonomia, covid long haul syndrome, pots, me/cfs, post-viral illness, lyme disease, pacs, post-covid syndrome, long covid, covid-19

Introduction

As the coronavirus disease 2019 (COVID-19) global pandemic enters its third year, its persistence will undoubtedly result in a sustained rise in the population of patients suffering from its unique post-viral illness syndrome, long COVID. Current estimates of the prevalence of long COVID suggest nearly half of all hospitalized patients and a third of all non-hospitalized patients who are infected with SARS-CoV-2 will endure long-term sequelae regardless of a symptomatic or asymptomatic initial infection [1]. The World Health Organization provides a consistent definition for these long-term sequelae included under the long COVID umbrella:

> "Post COVID-19 condition occurs in individuals with a history of probable or confirmed SARS CoV-2 infection, usually 3 months from the onset of COVID-19 with symptoms and that last for at least 2 months and cannot be explained by an alternative diagnosis. Common symptoms include fatigue, shortness of breath, cognitive dysfunction but also others and generally have an impact on everyday

Source: Thor DC, Suarez S. Corona With Lyme: A Long COVID Case Study. Cureus. 2023 Mar 24;15(3):e36624.

Many luminaries in the field have seen clinical indications

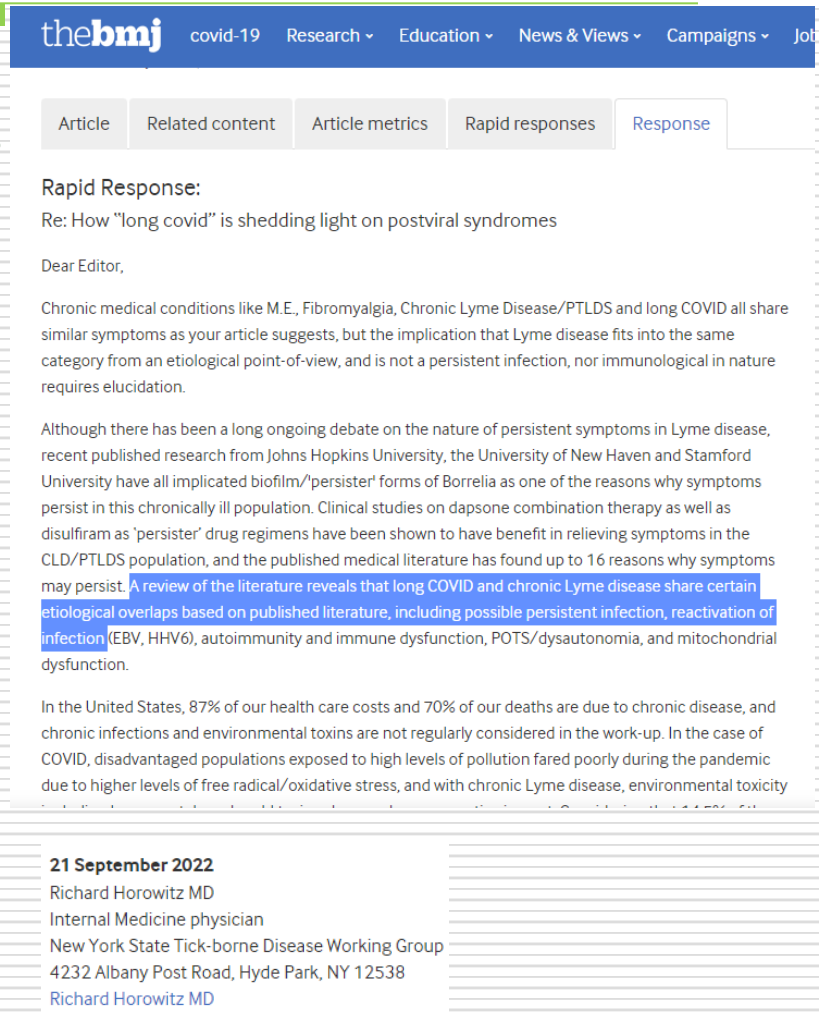
Dr. Richard Horowitz: Has been alluding to this since the start of the Pandemic, many presentations and podcasts

Dr. Joe Burrascano: Yes (numerous statements in interviews)

Dr. Robert Bransfield: A Tale of Two Pandemics
https://aonm.org/webinars/

Dr. Joseph Jemsek: Lyme Borreliosis Complex and COVID-19
https://aonm.org/view-past-webinars/

Dr. Daniel Kinderlehrer: has heard of this “most often in association with Bartonella and Mycoplasma, both capable of causing serious autoimmune problems”



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Rapid Response:

Re: How "long covid" is shedding light on postviral syndromes

Dear Editor,

Chronic medical conditions like M.E., Fibromyalgia, Chronic Lyme Disease/PTLDS and long COVID all share similar symptoms as your article suggests, but the implication that Lyme disease fits into the same category from an etiological point-of-view, and is not a persistent infection, nor immunological in nature requires elucidation.

Although there has been a long ongoing debate on the nature of persistent symptoms in Lyme disease, recent published research from Johns Hopkins University, the University of New Haven and Stamford University have all implicated biofilm/'persister' forms of Borrelia as one of the reasons why symptoms persist in this chronically ill population. Clinical studies on dapsone combination therapy as well as disulfiram as 'persister' drug regimens have been shown to have benefit in relieving symptoms in the CLD/PTLDS population, and the published medical literature has found up to 16 reasons why symptoms may persist. A review of the literature reveals that long COVID and chronic Lyme disease share certain etiological overlaps based on published literature, including possible persistent infection, reactivation of infection (EBV, HHV6), autoimmunity and immune dysfunction, POTS/dysautonomia, and mitochondrial dysfunction.

In the United States, 87% of our health care costs and 70% of our deaths are due to chronic disease, and chronic infections and environmental toxins are not regularly considered in the work-up. In the case of COVID, disadvantaged populations exposed to high levels of pollution fared poorly during the pandemic due to higher levels of free radical/oxidative stress, and with chronic Lyme disease, environmental toxicity

21 September 2022

Richard Horowitz MD
Internal Medicine physician
New York State Tick-borne Disease Working Group
4232 Albany Post Road, Hyde Park, NY 12538
Richard Horowitz MD

Considerable % of respiratory pathogens in CV-19: Chlamydia/Mycoplasma pneumoniae and others

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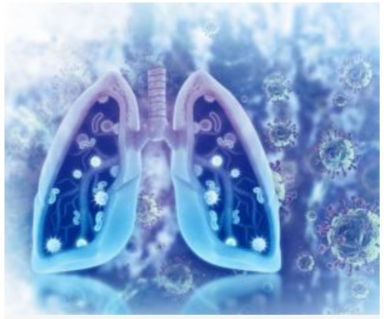
Researchers report 21% COVID-19 co-infection rate

Filed Under: COVID-19

Mary Van Beusekom | News Writer | CIDRAP News | Apr 16, 2020 Share Tweet LinkedIn Email Print & PDF

A research letter published yesterday in *JAMA* found that rates of COVID-19 co-infections with other respiratory pathogens are 21%, higher than previously thought, suggesting that identification of another pathogen may not rule out the presence of the novel coronavirus.

Also, a letter yesterday in the *Annals of Internal Medicine* detailing survey results on 272 primary care physicians in Lombardy, Italy, who cared for about 400,000 COVID-19 patients found that 40% had symptoms suggestive of the disease, and most had to buy their own personal protective equipment (PPE) and educate themselves on coronavirus management.



Mohammed Haneefa Nizamudeen / iStock

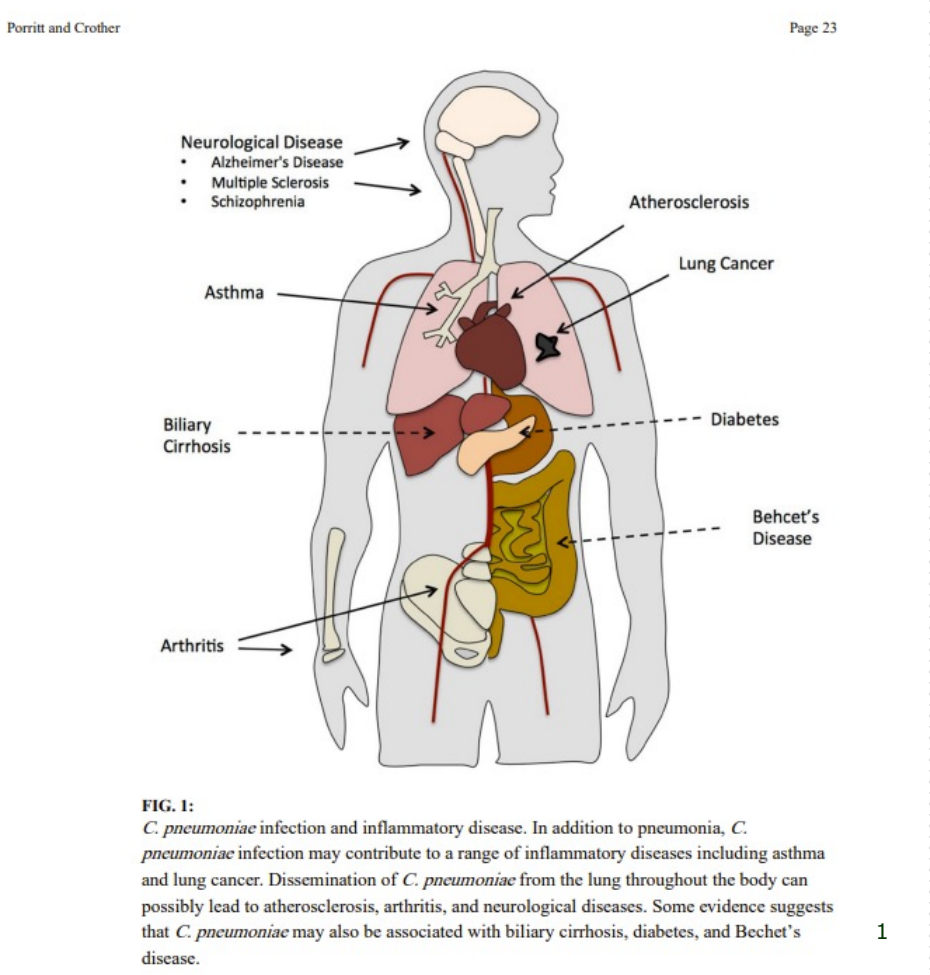
Co-infection rate higher than thought

Early in the pandemic, reports from China indicated that co-infection of COVID-19 and other respiratory pathogens was uncommon, suggesting that patients who tested positive for other pathogens could be assumed to not have the novel coronavirus.

Some sites tested the specimens for COVID-19 as well as influenza A and B, respiratory syncytial virus (RSV), non–COVID-19 coronaviruses, adenovirus, parainfluenza 1 through 4, human metapneumovirus, rhinovirus/enterovirus, *Chlamydia pneumoniae,* and *Myco plasma pneumoniae.*

Source: https://www.cidrap.umn.edu/news-perspective/2020/04/researchers-report-21-covid-19-co-infection-rate; https://www.clinicalmicrobiologyandinfection.com/article/S1198-743X(20)30494-8/fulltext

Chlamydia pneumoniae lives in the mucosal membranes, but can also act as a reservoir of chronic infection



"Chlamydia pneumoniae has long been found to be a clinically relevant coinfection … **causes arthritis** but **also affects the nervous system and the heart**, which renders the differential diagnosis difficult…[2]

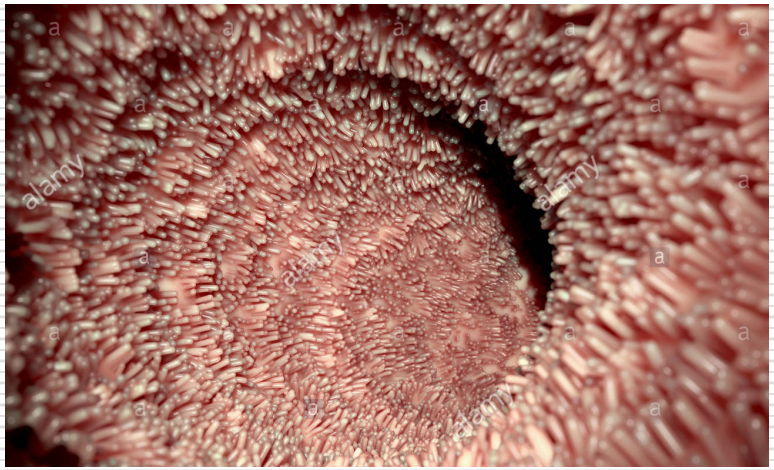
Specifically, C. pneumoniae has been demonstrated to elicit ROS overproduction by upregulating NOX and cyclooxygenase (COX-2) and downregulating antioxidant enzyme systems, such as catalase, SOD-1, and thioredoxin-1 [65]. There is also evidence that C. pneumoniae-induced oxidative stress may contribute to **endothelial dysfunction** by decreasing eNOS expression and, hence, nitric oxide synthesis in endothelial cells [66,67]. … C. pneumoniae is able to survive in monocytes/macrophages, considered as **a reservoir of chronic infection**.[3]

Source: 1. https://pubmed.ncbi.nlm.nih.gov/30687565/; 2. Berghoff W. Chronic Lyme Disease and Co-infections: Differential Diagnosis. Open Neurol J. 2012; 6: 158–178. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3565243/table/T3/; Kashyap S, Sarkar, M. Mycoplasma pneumonia: Clinical features and management. Lung India. 2010 Apr-Jun; 27(2): 75–85; 3. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8301438/pdf/biomedicines-09-00723.pdf

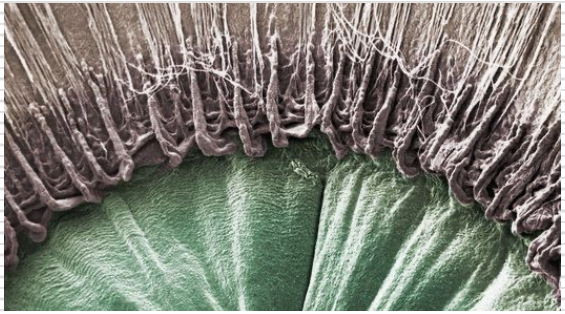
Mycoplasma: huge affinity for mucous membranes

Mycoplasmas populate mucous membrane systems associated with ciliary structures:

- **Entire respiratory system**
- **Small intestine**
- **Vagina, fallopian tubes and uterus**
- **Vesicles of the brain that circulate cerebrospinal fluid,**
- **Cilia of the eyes' photoreceptors**
- **Synovial tissues in the joints**



Most mycoplasmal symptoms come from infection and damage of cilia. Mycoplasma use inflammation to make epithelial and endothelial structures more porous, penetrating to deeper cilia, giving access even to the mitochondria.

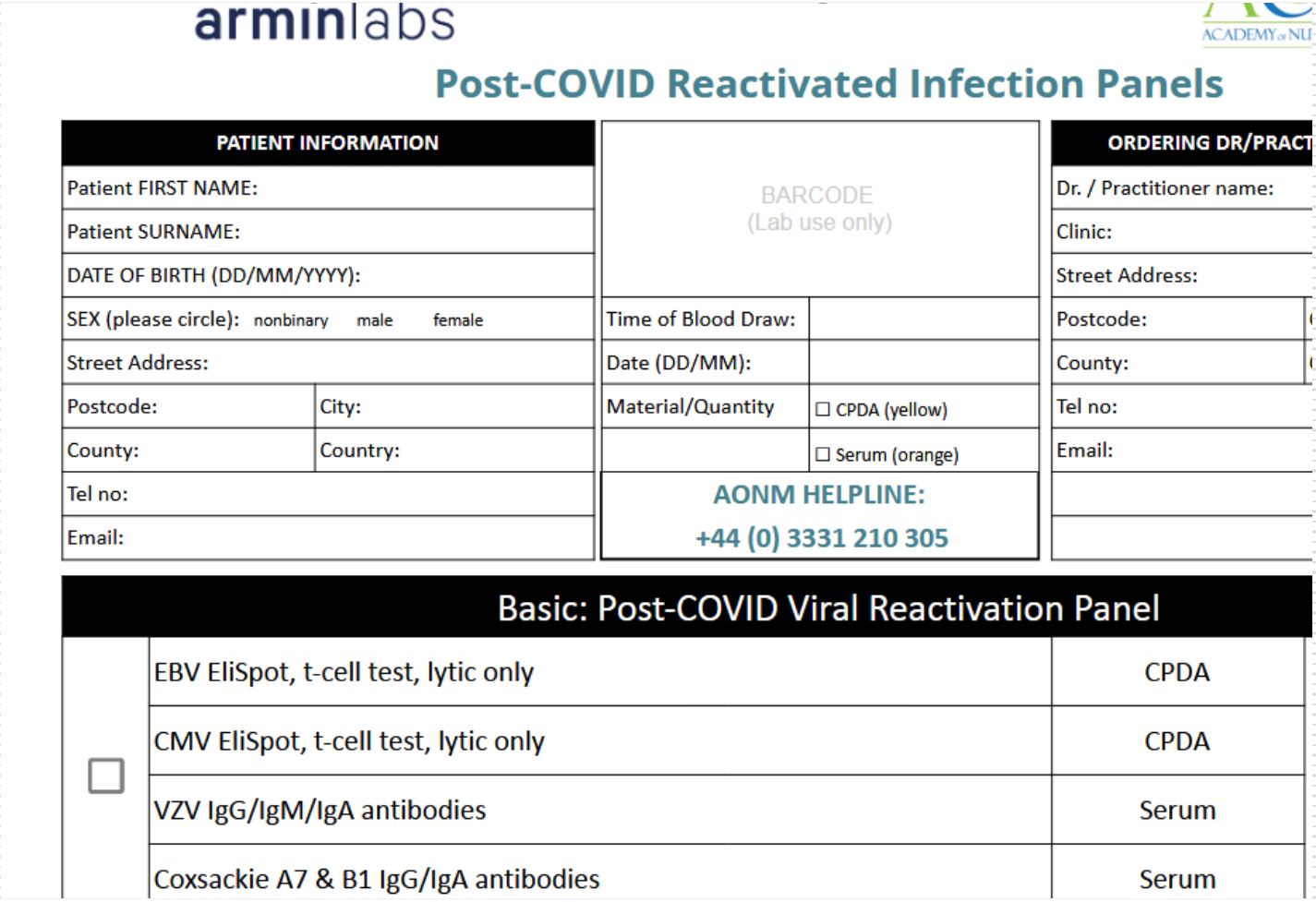


Source: Ciliary and Flagellar Membranes. Bloodwood, E (Ed.), 1990, Springer; Prince OA et al. In Vitro Spatial and Temporal Analysis of Mycoplasma pneumoniae Colonization of Human Airway Epithelium. Infect Immun. 2014 Feb; 82(2): 579–586

Agenda

- Pathogen reactivation
  - DNA viruses
  - RNA viruses
  - Bacteria
- **Testing**
- Therapeutic options

NEW: ArminLabs Post-COVID Viral Reactivation Panels: Basic and Advanced



arminlabs

ACADEMY of NU

Post-COVID Reactivated Infection Panels

PATIENT INFORMATION		BARCODE (Lab use only)		ORDERING DR/PRACT
Patient FIRST NAME:				Dr. / Practitioner name:
Patient SURNAME:				Clinic:
DATE OF BIRTH (DD/MM/YYYY):				Street Address:
SEX (please circle): nonbinary male female		Time of Blood Draw:		Postcode:
Street Address:		Date (DD/MM):		County:
Postcode:	City:	Material/Quantity	☐ CPDA (yellow)	Tel no:
County:	Country:		☐ Serum (orange)	Email:
Tel no:		AONM HELPLINE:		
Email:		+44 (0) 3331 210 305		

Basic: Post-COVID Viral Reactivation Panel		
☐	EBV EliSpot, t-cell test, lytic only	CPDA
	CMV EliSpot, t-cell test, lytic only	CPDA
	VZV IgG/IgM/IgA antibodies	Serum
	Coxsackie A7 & B1 IgG/IgA antibodies	Serum

Advanced reactivated infection panel includes further viruses, and bacteria

	Advanced: Post-COVID Reactivated Infection Panel	
☐	EBV EliSpot, t-cell test, lytic only	CPDA
	CMV EliSpot, t-cell test, lytic only	CPDA
	VZV IgG/IgM/IgA antibodies	Serum
	Coxsackie A7 & B1 IgG/IgA antibodies	Serum
	HSV 1 & 2 IgG/IgM/IgA antibodies	Serum
	HHV6 EliSpot, t-cell test	CPDA
	Chlamydia pneumoniae IgG/IgA antibodies	Serum
	Mycoplasma pneumoniae IgG/IgA antibodies	Serum

Electronic checklist helps decide which coinfections to test for in Post-COVID; fills automatically

Post-Covid Checklist

arminlabs

Name, first name ..... Date (DD/MM/YYYY) .....

	Your current and former symptoms Please click on the boxes next to the symptoms that you suffer from	X
1	Stomach ache, gut problems	☐
2	Anaemia	☐
3	Diarhoea intermittent, intestinal crampings/pain	☐
4	Fever or feverish feeling	☐
5	Lack of concentration, memory loss, forgetfulness	☒
6	Encephalitis/Inflammation of the brain	☐
7	Yellowish colour of the skin/eyes	☐
8	Painful joints or swollen joints	☒
9	General aches and pains, tendon problems	☐
10	Flu-like symptoms	☒
11	Rash(es), striae, exanthema	☐
12	Small red/purple spots of the skin	☐
13	Heart problems, disturbed cardiac rhythm	☐
14	Cough, expectoration, "air-hunger"	☐
15	Headache, dizziness	☐
16	Impaired liver function/ liver laboratory values	☐
17	Pneumonia, bronchitis	☐
18	Swollen lymph nodes	☒
19	Enlargement of the spleen	☐
20	Fatigue / exhaustion, intermittent or chronic CFS	☒
21	Muscle pain, muscle weakness	☐
22	Shivering, chill	☐
23	Blurred, foggy, cloudy, flickering, double vision	☐
24	Nausea, vomiting	☐
25	Dark urine	☐
26	Itching or pain when urinating	☐
27	Tingling, numbness, "burning" sensations	☐
28	Neck pain, neck stiffness	☐
29	Shoulder pain	☐

Academy of Nutritional Medicine (AONM),
St. John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS
info@aonm.org | 03331 210 305

WWW.AONM.ORG

AONM ACADEMY OF NUTRITIONAL MEDICINE

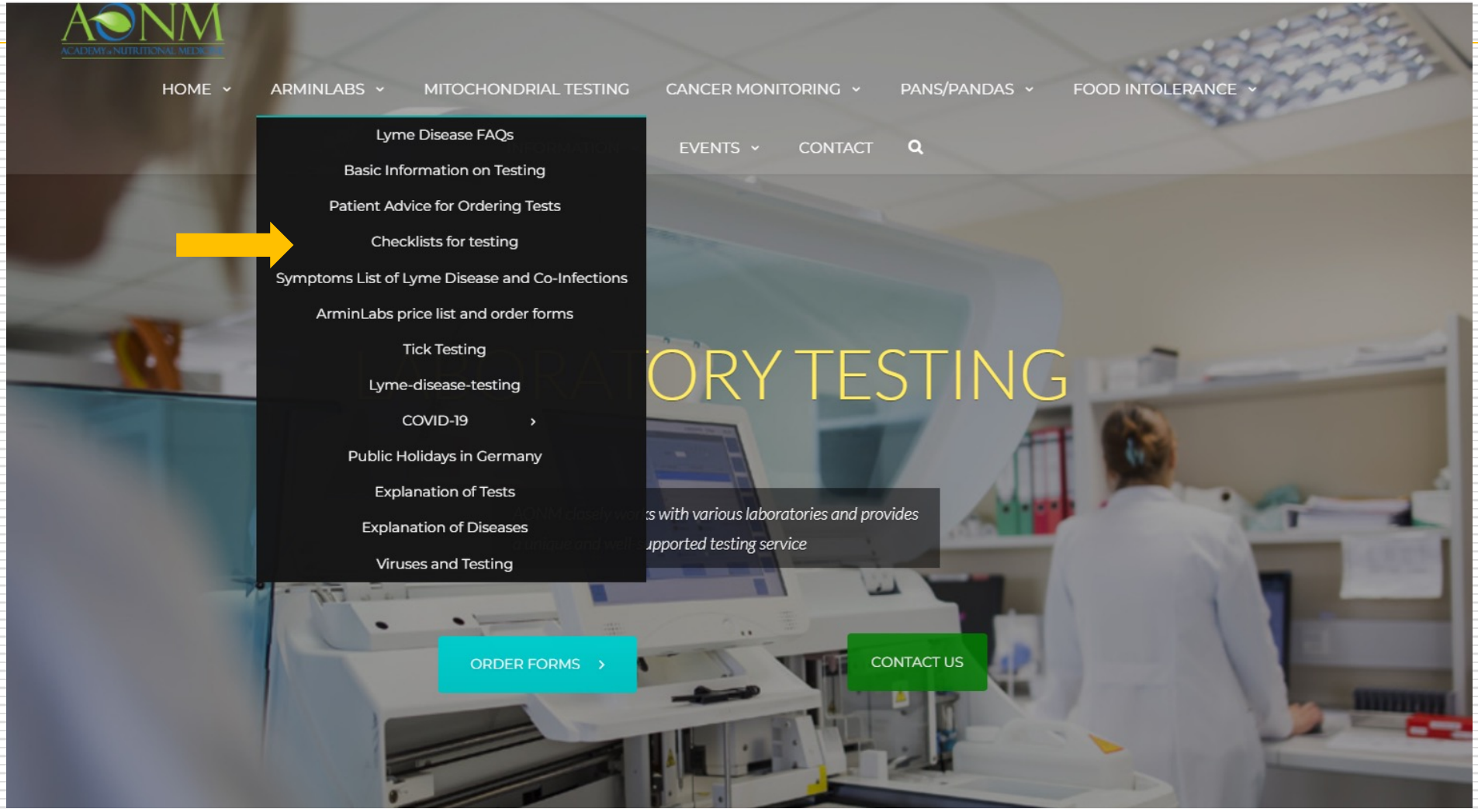
Ranked in order of priority:
CPn, Mycoplasma and the Herpesviruses draw for first place here ↓

Below you'll find the number of the symptoms for each of the infections that we test for and the ranking, in which order you should test for them

Ranking of the infections	No. of symptoms	Rank
Chlamydia pneumoniae	4	1
Mycoplasma pneumoniae	4	1
Yersinia	2	3
Campylobacter	2	3
HSV 1/2	4	1
EBV	4	1
CMV	4	1
VZV	3	2
HHV 6	4	1
Parvovirus	3	2
Coxsackie-Virus	3	2
Echovirus	2	3

Where to find the checklists:

www.aonm.org – ArminLabs tab



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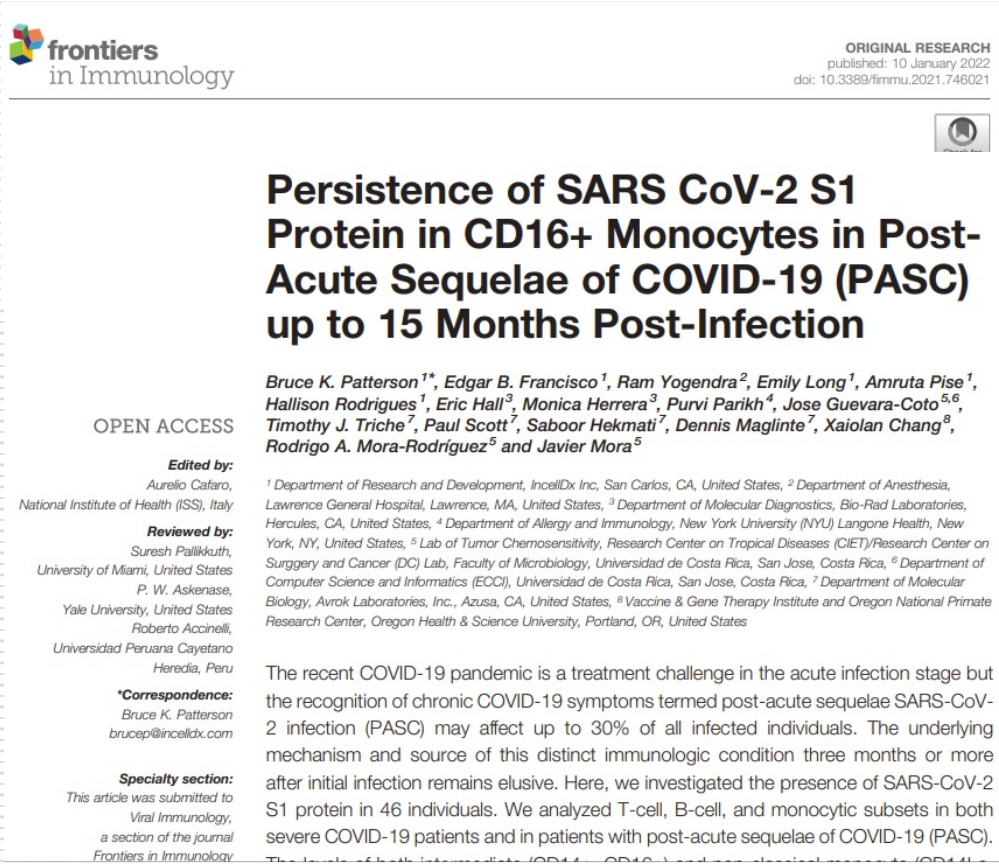
Seminal "Frontiers" article: S1 protein in Post-COVID patients up to 15 months post infection …



frontiers in Immunology

ORIGINAL RESEARCH
published: 10 January 2022
doi: 10.3389/fimmu.2021.746021

Persistence of SARS CoV-2 S1 Protein in CD16+ Monocytes in Post-Acute Sequelae of COVID-19 (PASC) up to 15 Months Post-Infection

Bruce K. Patterson[1], Edgar B. Francisco[1], Ram Yogendra[2], Emily Long[1], Amruta Pise[1], Hallison Rodrigues[1], Eric Hall[3], Monica Herrera[3], Purvi Parikh[4], Jose Guevara-Coto[5,6], Timothy J. Triche[7], Paul Scott[7], Saboor Hekmati[7], Dennis Maglinte[7], Xaiolan Chang[8], Rodrigo A. Mora-Rodríguez[5] and Javier Mora[5]*

[1] Department of Research and Development, IncellDx Inc, San Carlos, CA, United States, [2] Department of Anesthesia, Lawrence General Hospital, Lawrence, MA, United States, [3] Department of Molecular Diagnostics, Bio-Rad Laboratories, Hercules, CA, United States, [4] Department of Allergy and Immunology, New York University (NYU) Langone Health, New York, NY, United States, [5] Lab of Tumor Chemosensitivity, Research Center on Tropical Diseases (CIET)/Research Center on Surggery and Cancer (DC) Lab, Faculty of Microbiology, Universidad de Costa Rica, San Jose, Costa Rica, [6] Department of Computer Science and Informatics (ECCI), Universidad de Costa Rica, San Jose, Costa Rica, [7] Department of Molecular Biology, Avrok Laboratories, Inc., Azusa, CA, United States, [8] Vaccine & Gene Therapy Institute and Oregon National Primate Research Center, Oregon Health & Science University, Portland, OR, United States

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Edited by:
Aurelio Cafaro, National Institute of Health (ISS), Italy

Reviewed by:
Suresh Pallikkuth, University of Miami, United States
P. W. Askenase, Yale University, United States
Roberto Accinelli, Universidad Peruana Cayetano Heredia, Peru

***Correspondence:**
Bruce K. Patterson
brucep@incelldx.com

Specialty section:
This article was submitted to Viral Immunology, a section of the journal Frontiers in Immunology

The recent COVID-19 pandemic is a treatment challenge in the acute infection stage but the recognition of chronic COVID-19 symptoms termed post-acute sequelae SARS-CoV-2 infection (PASC) may affect up to 30% of all infected individuals. The underlying mechanism and source of this distinct immunologic condition three months or more after initial infection remains elusive. Here, we investigated the presence of SARS-CoV-2 S1 protein in 46 individuals. We analyzed T-cell, B-cell, and monocytic subsets in both severe COVID-19 patients and in patients with post-acute sequelae of COVID-19 (PASC).

"This means the body has literally been sprayed with the virus and it spends 15 months, in a sense, trying to clean out the spike protein from our tissues. **No wonder people have Long-COVID syndrome."**

Board-certified internist and cardiologist Dr. Peter McCullough, https://www.facebook.com/watch/?v=1149250505479349, minute 6.18

Clin Infect Dis. 2023 Feb 8;76(3):e487-e490. doi: 10.1093/cid/ciac722.

Persistent Circulating Severe Acute Respiratory Syndrome Coronavirus 2 Spike Is Associated With Post-acute Coronavirus Disease 2019 Sequelae

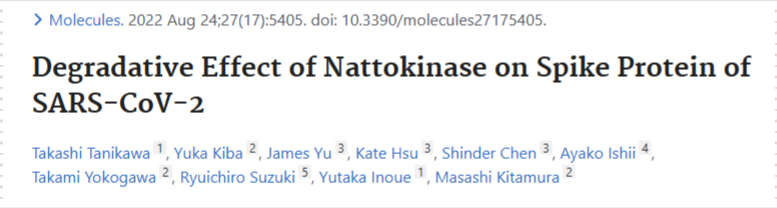
Zoe Swank [1 2 3], Yasmeen Senussi [1 2 3], Zachary Manickas-Hill [4], Xu G Yu [1 4 5], Jonathan Z Li [1 5], Galit Alter [4 6], David R Walt [1 2 3]

Confirmed a year later, in Feb. 2023 ↑

Source: Patterson BK et al. Persistence of SARS CoV-2 S1 Protein in CD16+ Monocytes in Post-Acute Sequelae of COVID-19 (PASC) up to 15 Months Post-Infection. Front Immunol. 2022 Jan 10;12:746021.

… so it's likely important to counter the spike protein in those suffering Long Covid/post-Covid reinfection

Nattokinase



Dandelion extract

Nigella sativa

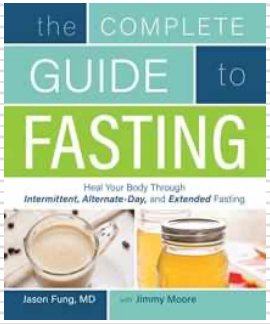
Autophagy/Mitophagy

Source: Further sources available

Supporting autophagy particularly vital because SARS-CoV-2 and reactivated pathogens disable it*

Interventions

Dietary
Calorie restriction/intermittent fasting



Complete Guide To Fasting: Heal Your Body Through Intermittent, Alternate-Day, and Extended Fasting

Exercise

> Front Physiol. 2019 Aug 22;10:1088. doi: 10.3389/fphys.2019.01088. eCollection 2019.

Regular Endurance Exercise Promotes Fission, Mitophagy, and Oxidative Phosphorylation in Human Skeletal Muscle Independently of Age

Estelle Balan [1], Céline Schwalm [1], Damien Naslain [1], Henri Nielens [2], Marc Francaux [1], Louise Deldicque [1]

Herbal/nutraceutical

E.g. Urolithin A, Spermidine, Resveratrol (Japanese knotweed), Curcumin, Berberine, Quercetin, Sulphurophane







* References on this and presentation available from info@aonm.org

Monolaurin and Baicalein with evidenced antibacterial efficacy

Monolaurin

An organic compound derived from lauric acid.
Found in coconut oil (highest natural source), and breast milk.
A bioactive lipid with proven antimicrobial properties.

"Monolaurin is a bioactive lipid from medium-chain fatty acids that have been proven safe for consumption, **has a broad spectrum as an antibacterial**, boosts the immune system, and acts as an antiviral."[1]

"The most effective antimicrobial compounds against all morphological forms of the two tested Borrelia sp. were baicalein and **monolaurin**. This might indicate that the presence of fatty acid and phenyl groups is important for comprehensive antibacterial activity."[2]

Food Research 4 (6) : 2355 - 2365 (December 2020)
Journal homepage: http://www.myfoodresearch.com
FOOD RESEARCH

Bioactive monolaurin as an antimicrobial and its potential to improve the immune system and against COVID-19: a review

*Subroto, E. and Indiarto, R.

Department of Food Industrial Technology, Faculty of Agro-Industrial Technology, Universitas Padjadjaran, Jl.Raya Bandung-Sumedang Km. 21, Jatinangor, Sumedang 40600, Indonesia

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Antiviral,
COVID-19

DOI:
https://doi.org/10.26656/fr.2017.4(6).324

Abstract

Monolaurin is monoacylglycerol which is a bioactive lipid since it can affect the human biological systems. This review discusses the bioactive properties of monolaurin, especially its role as an antibacterial, immune system enhancement, and its ability as an antiviral so that it has the potential to fight against various viral attacks. Monolaurin can act as an antibacterial in inhibiting the growth of several pathogenic bacteria, especially gram-positive bacteria. Monolaurin is known to be able to enhance the immune system through modulation of various immune systems, controlling pro-inflammatory cytokines, activating and attracting leukocytes to the site of infection. Monolaurin can also act as an antiviral, especially against enveloped viruses, such as Maedi-visna virus, vesicular stomatitis, herpes simplex-1, measles, HIV, cytomegalovirus, influenza, and corona. Monolaurin inhibits the virus through the mechanism of the disintegration of the viral membrane, prevents binding of the viral protein to the host-cell membrane, inhibits the process of assembling the viral RNA, and the process of virus maturation in the replication cycle. Therefore monolaurin has the potential for human consumption to boost the immune system and ward off various virus attacks, including severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which is the cause of COVID-19 which became a pandemic in the world.

Sources: 1. Subroto, Edy & Indiarto, Rossi. (2020). Bioactive monolaurin as an antimicrobial and its potential to improve the immune system and against COVID-19: a review. Food Research. 4. 2355-2365. 10.26656/fr.2017.4(6).324.; 2. Goc, A., Niedzwiecki, A. and Rath, M. (2015), *In vitro evaluation of antibacterial activity of phytochemicals and micronutrients against Borrelia burgdorferi and Borrelia garinii.* J Appl Microbiol, 119: 1561–1572. doi:10.1111/jam.12970

Many phytonutrients with action against the pleomorphic form of Borrelia, the “round body“ or cyst form

Chlorella pyrenoidosa, Stinging Nettle extract, Bilberry extract, Cranberry extract, Lingonberry fruit powder, Artichoke extract, Sage leaf extract, Wild garlic, Cistus incanus









A review of the literature reveals that long COVID and chronic Lyme disease share certain etiological overlaps based on published literature, including possible persistent infection, reactivation of infection

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Institut Pasteur

Microbes and Infection 18 (2016) 484–495

www.elsevier.com/locate/micinf

Original article

Pleomorphic forms of *Borrelia burgdorferi* induce distinct immune responses

Leena Meriläinen [a,*], Heini Brander [a], Anni Herranen [a], Armin Schwarzbach [b], Leona Gilbert [a]

[a] *Department of Biological and Environmental Sciences and Nanoscience Center, University of Jyvaskyla, P.O. Box 35, FI-40014 Jyvaskyla, Finland*
[b] *Arminlab, Zirbelstrasse 58, 86154 Augsburg, Germany*

Received 12 July 2015; accepted 8 April 2016
Available online 30 April 2016

For reactivated viral infections (1/2)

Herpes, especially Epstein Barr, Cytomegalovirus, Varicella Zoster virus

Liquorice: Its component glycyrrhizin is particularly responsible for its antiviral activity; "novel way to interrupt latency" of EBV[1]

Andrographis paniculata: Andrographolide, the active extract from plants of the Andrographis genus, has broad-spectrum antiviral properties: "miraculous compound to restrain virus replication and virus-induced pathogenesis … shown to inhibit transcription of EBV IE genes and the production of EBV virions"[2]

Scullcap/Baicalein: Noted antiviral properties, also against Coxsackie[3]

Dandelion: Blocks the interaction between ACE2 cell surface receptor and SARS-CoV-2 spike protein[4]

Artemisia annua: "Artemisia annua L. extracts inhibit the *in vitro* replication of SARS-CoV-2 and two of its variants."[5] "**…**the bioactivity of artemisinin and its semisynthetic derivative artesunate is even broader and includes the inhibition of certain viruses, such as human cytomegalovirus and other members of the *Herpesviridae* family (e.g., herpes simplex virus type 1 and Epstein-Barr virus)"[6]

Sources: 1. https://www.ncbi.nlm.nih.gov/labs/pmc/articles/PMC1052015/; 2. Gupta S et al. Broad-spectrum antiviral properties of andrographolide. Arch Virol. 2017 Mar;162(3):611-623; 2. Andrei G et al. Novel Therapeutics for Epstein¯Barr Virus. Molecules. 2019 Mar 12;24(5):997; Lin, TP et al. Inhibition of the Epstein–Barr virus lytic cycle by andrographolide. Biol. Pharm. Bull. 2008, 31, 2018–2023; 3. Fu Q, Gao L, Fu X, Meng Q, Lu Z. Scutellaria baicalensis Inhibits Coxsackievirus B3-Induced Myocarditis Via AKT and p38 Pathways. J Microbiol Biotechnol. 2019 Aug 28; 4. https://www.biorxiv.org/content/10.1101/2021.03.19.435959v1.article-info; 5. https://www.sciencedirect.com/science/article/pii/S0378874121002439; 6. https://academic.oup.com/cid/article/47/6/804/325924.

For the reactivated infections (2/2)

Herbal and nutraceutical remedies contd.

Nigella sativa (Black Seed oil): Black Seed oil from Nigella sativa seeds has been found to act against seasonal allergic rhinitis, avian influenza and cytomegalovirus.[1, 2]. It has virucidal activity against herpes simplex[3]

Quercetin and **zinc:** Quercetin acts as an ionophore and carries the zinc deep into the cell[4]

Curcumin: Antiviral and immunomodulatory[5,] "improves mitochondrial dynamics regarding mitochondrial biogenesis and mitophagy"[6]

Cistus incanus tea – demonstrated antiviral action on several viruses, including SARS-CoV-2[7]

The amino acid L-Lysine appears to apply universally across the entire family of herpes viruses[8]

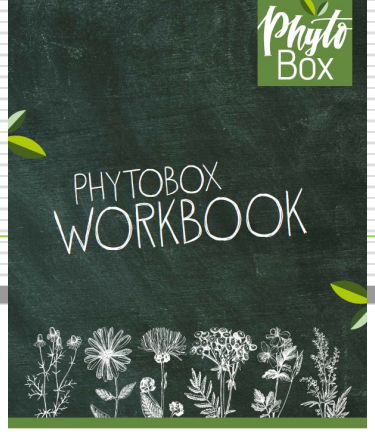
Support for immunity/natural killer cell activity:

Glutathione – liposomal; N-Acetyl Cysteine: precursor to GSH, mucolytic and perturbs SARS-CoV-2 spike protein conformation[9]; releases histamine however[10], beware with MCAS

Enzymatically modified rice bran

Sources: 1. https://pubmed.ncbi.nlm.nih.gov/23855426/; 2. https://pharmacologyonline.silae.it/files/newsletter/2019/vol2/ PhOL_2019_2_NL007_Molla.pdf; 3. https://www.sciencedirect.com/science/article/abs/pii/S0192056100000369?via%3Dihub; 4. https://journals.plos.org/ plospathogens/article?id=10.1371/journal.ppat.1001176; 5. *https://www.ncbi.nlm.nih.gov/labs/pmc/ articles/PMC7899028/; 6. de Oliveira MR et al. Curcumin, mitochondrial biogenesis, and mitophagy: Exploring recent data and indicating future needs. Biotechnol Adv. 2016;34(5):813-826; Ungvari, Z et al. (2011). 7. https://www.sciencepublishinggroup.com/journal/paperinfo?journalid =320&doi=10.11648/ j.jdmp.20210703.13; 8. https://www.research gate.net/publication/344210822_Lysine_Therapy_for_SARS-CoV-2; 9* https://chemrxiv.org/engage/apigateway/chemrxiv/assets/ orp/resource/ item/60c753ec4c89190f3bad43ca/original/n-acetyl-cysteine-a-tool-to-perturb-sars-co-v-2-spike-protein-conformation.pdf; 10. *https://pubmed.ncbi.nlm.nih.gov/ 2409763/; All images from Wikipedia, free to use on Commons License*

Many of these ingredients available in the PhytoBox range



NUTRINED NutraMedix präventa

Phyto Box

INGREDIENTS:

PhytoBox NO. 01

Support for Borrelia and intracellular infective pathogens

INGREDIENTS (4 CAPSULES):	DAILY DOSAGE	%RQ*
Monolaurine	900 mg	-
Baikal skullcap extract	1000 mg	-

PHYTOBOX NO. 02

Support for neuroborreliosis and neuropathic dysfunctions

INGREDIENTS (2 CAPSULES):	DAILY DOSAGE	%RQ*
Andrographis paniculata extract 4:1	400 mg	-
Uncaria rhynchophylla	320 mg	-
Thereof Ginsenosides	256 mg	-
Polygonum cuspidatum	168,4 mg	-
Thereof trans-Resveratrol	159,8 mg	-
Grapefruit seed extract	60 mg	-
Thereof Bioflavonoids	27 mg	-

PHYTOBOX NO. 03

Breakdown of pleomorphic forms and support of detoxification & purification

INGREDIENTS (4 CAPSULES):	DAILY DOSAGE	%RQ*
Chlorella pyrenoidosa	800 mg	-
Stinging Nettle extract 10:1	160 mg	-
Bilberry extract	160 mg	-
Thereof Anthocyanidins	40 mg	-
Cranberry extract	160 mg	-
Thereof Polyphenols	40 mg	-
Lingonberry fruit powder	160 mg	-
Artichoke extract 12:1	160 mg	-
Thereof Cynarin	4 mg	-
Sage leaf extract 4:1	100 mg	-
Wild garlic herb extract 4:1	50 mg	-
Cistus incanus	50 mg	-

*RQ = Reference quantity for daily intake

PHYTOBOX NO. 04

Anti-inflammatory support

INGREDIENTS (4 CAPSULES):	DAILY DOSAGE	%RQ*
OPC Grape seed extract	200 mg	-
Thereof Polyphenols	190 mg	-
Thereof OPC	100 mg	-
Curcuma Extract	200 mg	-
Thereof Curcuminoids	180 mg	-
Thereof Curcumin	140 mg	-
Rutin Powder	189,4 mg	-
Thereof Rutin	179,8 mg	-
Polygonum cuspidatum	147,4 mg	-
Thereof trans-Resveratrol	140 mg	-

PHYTOBOX NO. 05

Synbiotic with prebiotic

INGREDIENTS (4 CAPSULES):	DAILY DOSAGE	%RQ*
Acacia fibre	1.400 mg	
thereof dietary fibre	1.260 mg	
Bacterial cultures	ca. 1,2* 10^10 CFUs**	
Biotin	50 µg	100
Niacin	16 mg	100
Riboflavin	1,4 mg	100

**CFUs = colony forming units

PHYTOBOX NO. 06

For chronic opportunistic virus infections, especially the herpes viruses

INGREDIENTS (3 CAPSULES):	DAILY DOSAGE	%RQ*
Zinc	10 mg	100%
Triphala extract	600 mg	-
thereof tannins	240 mg	-
Propolis extract	120 mg	-
thereof flavonoids	17 mg	-
Lemon balm extract	100 mg	-
thereof rosmarinic acid	3 mg	-
Pomegranate extract	100 mg	-
thereof ellagic acid	40 mg	-
Thyme extract	80 mg	-
thereof essential oil	1,6 mg	-
Ginger extract	50 mg	-

PHYTOBOX NO. 07

Support in cytokine storms

INGREDIENTS (4 CAPSULES):	DAILY DOSAGE	%RQ*
Licorice root extract	880mg	-
thereof glycyrrhizin	26mg	-
Shiitake extract	650mg	-
Black cumin extract	600mg	-
Astaxanthin	4mg	-

PHYTOBOX NO. 08

Support in Bartonella infection

INGREDIENTS (2 CAPSULES):	DAILY DOSAGE	%RQ*
Houttuynia cordata extract 4:1	150 mg	-
Oregano extract	90 mg	-
thereof rosmatinic acid	1,8 mg	-
Fenugreek seed 8:1 extract	75 mg	-
thereof saponins	15 mg	-
Cinnamon extract 10:1	50 mg	-
Liquorice root	27 mg	-
Willow bark dry extract	25 mg	-
thereof Salicin	3,75 mg	-
Cistus incanus extract	25 mg	-
thereof polyphenols	16,25 mg	-
Grapefruit seed extract	25 mg	-
thereof flavonoids	11,25 mg	-
Cloves 4:1 extract	17 mg	-
thereof flavonoids	11,25 mg	-
Uncaria rhynchophylla 10:1 extract	4,75 mg	-
thereof indole alkaloids	0,9 mg	-
Garlic 15:1 extract	3,5 mg	-
thereof alliin	0,9 mg	-

*RQ = Reference quantity for daily intake

PHYTOBOX NO. 09

Support in Chlamydia Pneumoniae infection

INGREDIENTS (3 CAPSULES):	DAILY DOSAGE	%RQ*
Vitamin C	200 mg	250
Nasturtium extract	500 mg	-
Horseradish root extract	500 mg	-
Chinese Lime Tree Extract	300 mg	-
White mustard extract	120 mg	-
of which Sinalbin	7,2 mg	-
Barberry extract	85 mg	-

PHYTOBOX NO. 10

NK Cell support

INGREDIENTS (4 CAPSULES):	DAILY DOSAGE	%RQ*
Vitamin C	40 mg	50
Reishi Extract	600 mg	-
Shiitake extract	600 mg	-
Spirulina Powder	350 mg	-
Cordyceps Extract	300 mg	-
Maitake extract	300 mg	-
Ginseng root extract	35 mg	-
thereof ginsenosides	2,8 mg	-

PHYTOBOX NO. 11

Support in Coxsackie and Echoviruses infections

INGREDIENTS (3 CAPSULES):	DAILY DOSAGE	%RQ*
Elderflower extract	500 mg	-
thereof Rutin	25 mg	-
Rhodiola rosea extract	250 mg	-
thereof Salidrosides	7,5 mg	-
Astragalus membranaceus root extract	250 mg	-
Oregano extract	180 mg	-
thereof Rosmarinic acid	3,6 mg	-
Barberry extract	150 mg	-
Mint, Tibetan	150 mg	-
Ginkgo biloba	80 mg	-
thereof Flavone glycosides	19 mg	-
thereof ginkgolides	4,8 mg	-
St. John's Wort extract	50 mg	-
thereof Hypericin	0,15 mg	-

Source: https://shop.aonm.org/

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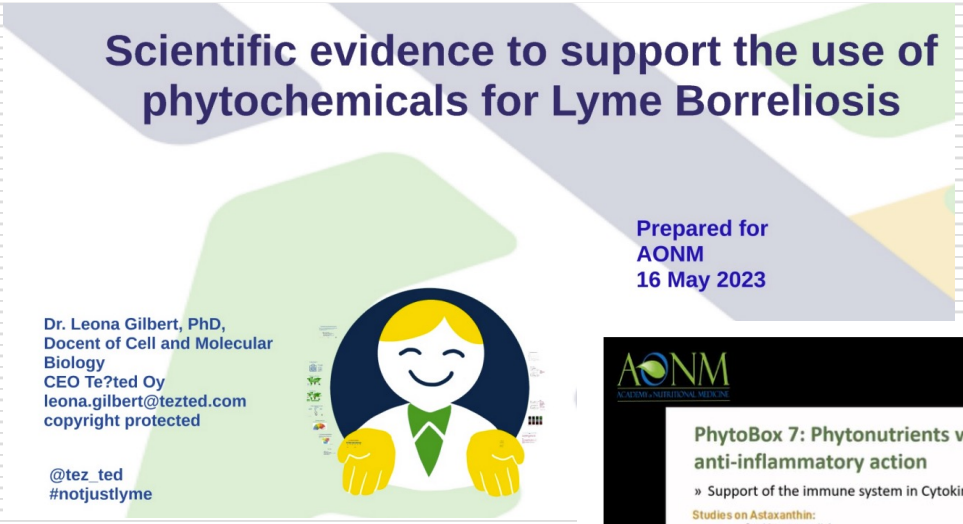

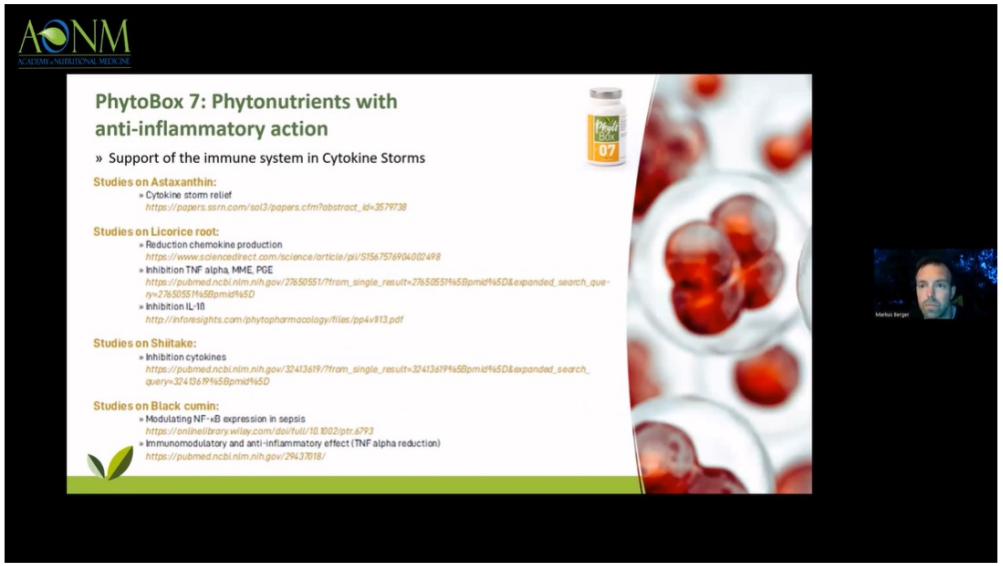

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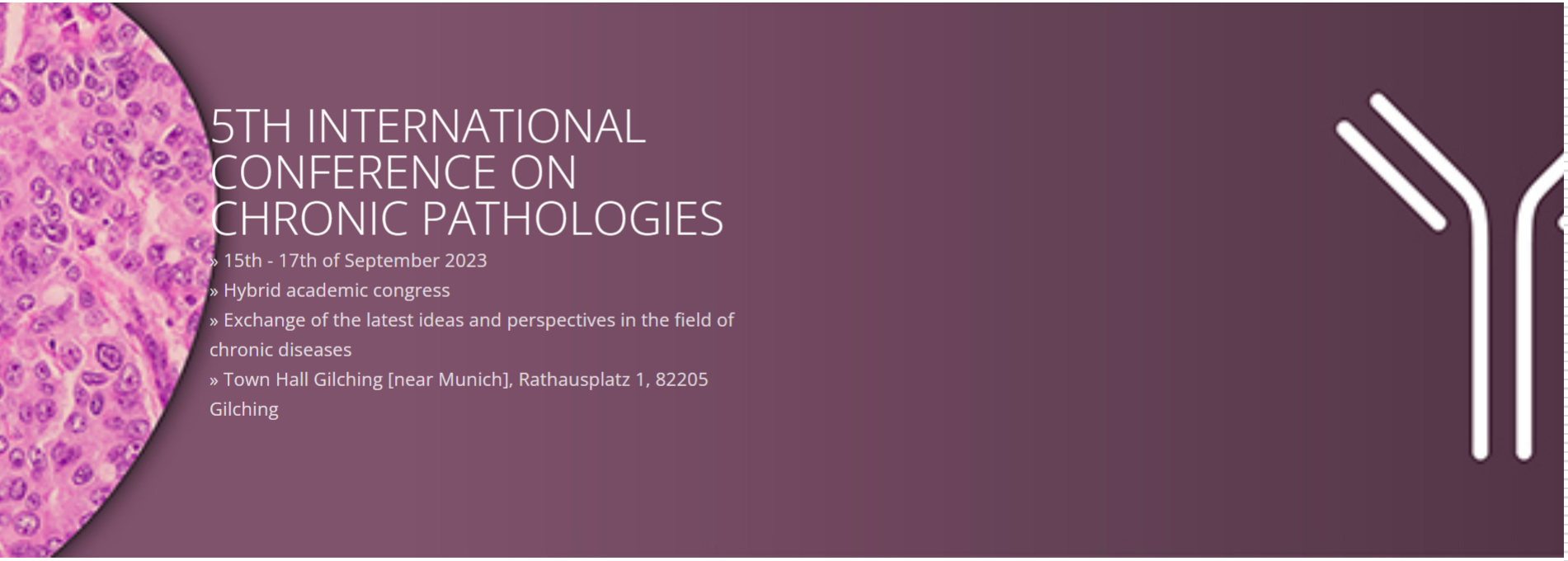

Thank you very much!
Q&A/Discussion

Armin Schwarzbach MD PhD
Medical Doctor and Specialist for Laboratory Medicine

ArminLabs
Laboratory for tick-borne diseases
Tel. 0049 821 2182879
info@arminlabs.com
www.arminlabs.com

arminlabs
DIAGNOSING TICK-BORNE DISEASES


COLLEGE of AMERICAN PATHOLOGISTS
CERTIFICATE OF ACCREDITATION
Arminlabs
Clinical Laboratory
Augsburg, Germany
Armin Schwarzbach, MD, PhD

www.aonm.org

AONM
ACADEMY of NUTRITIONAL MEDICINE

info@aonm.org
0044 3331 21 0305