

Subscribe to the OSS Weekly Newsletter!

Sign-Up Here (<https://www.mcgill.ca/oss/newsletter>)

Home (/oss/)

The Exaggerated Villainy of the Epstein-Barr Virus

From mono to cancer, the Epstein-Barr virus has been charged with very real crimes against human health. But some people have turned the virus into an all-inclusive scapegoat.



Jonathan Jarry M.Sc. (/oss/articles-by-author/Jonathan-Jarry-M.Sc.) | 16 Jul 2021

COVID-19 (/oss/category/article-categories/covid-19)

Critical Thinking (/oss/category/article-categories/critical-thinking)

Health (/oss/category/article-categories/health)

f (<http://www.facebook.com/sharer.php?u=https%3A%2F%2Fwww.mcgill.ca%2Foss%2Farticle%2Fcovid-19-critical-thinking-health%2Fexaggerated-villainy-epstein-barr-virus&t=The%20Exaggerated%20Villainy%20of%20the%20Epstein-Barr%20Virus>)

in (<http://www.linkedin.com/shareArticle?mini=true&url=https%3A%2F%2Fwww.mcgill.ca%2Foss%2Farticle%2Fcovid-19-critical-thinking-health%2Fexaggerated-villainy-epstein-barr-virus&title=The%20Exaggerated%20Villainy%20of%20the%20Epstein-Barr%20Virus&summary=What%20causes%20a%20disease%20and%20why%20is%20it%20so%20important%20medical%20question%20get%20raised%20during%20the%20pandemic.%20Some%20people%20refused%20to%20accept%20that%20the%20SARS-CoV-2%20coronavirus%20was%20causing%20COVID-19%20because%20it%20failed%20to%20meet%20antiquated%20criteria%20for%20proving%20a%20microorganism%20causes%20an%20infectious%20disease.&source=Office%20for%20Science%20and%20Society%20>)

(<http://twitter.com/share?url=https%3A%2F%2Fwww.mcgill.ca%2Foss%2Farticle%2Fcovid-19-critical-thinking-health%2Fexaggerated-villainy-epstein-barr-virus&count=horizontal&via=McGillOSS&text=The%20Exaggerated%20Villainy%20of%20the%20Epstein-Barr%20Virus&counturl=www.mcgill.ca%2Foss%2Farticle%2Fcovid-19-critical-thinking-health%2Fexaggerated-villainy-epstein-barr-virus>)

What causes a disease? We saw this important medical question get raised during the pandemic. Some people refused to accept that the SARS-CoV-2 coronavirus was causing COVID-19 because (<http://www.mcgill.ca/oss/article/covid-19-pseudoscience/psychiatrist-who-calmly-denies-reality>) it failed to meet antiquated criteria for proving a microorganism causes an infectious disease (<http://www.mcgill.ca/oss/article/covid-19-pseudoscience/psychiatrist-who-calmly-denies-reality>). But within some corners of the wellness space, we see an opposite mistake being made: being too quick to point the finger at a particular virus.

There is a virus inside most of us that has evolved into a universal boogeyman for people seeking a resolution to their frustrating medical odyssey. It has been called (<https://www.nejm.org/doi/full/10.1056/NEJM200008173430707>) "one of the most successful viruses" (<https://www.nejm.org/doi/full/10.1056/NEJM200008173430707>) in a review article published in the *New England Journal of Medicine* because it has managed to infect over 90% of the human population. And unlike many viruses, once you have it, it persists over your lifetime.

This infectious little bundle of DNA is the Epstein-Barr virus. Its rap sheet includes mononucleosis, certain forms of cancer, some disorders of the blood, and illnesses that target recipients of stem cell and organ transplants and of blood donations. But some people claim this criminal record can be extended to encompass chronic fatigue syndrome, vertigo, menopause... and maybe even long COVID.

The Epstein-Barr virus: real threat or convenient scapegoat?

The current convictions

Viruses are (https://journals.co.za/doi/pdf/10.10520/AJA00382353_6229) "organisms at the edge of life." (https://journals.co.za/doi/pdf/10.10520/AJA00382353_6229) tiny packages that contain DNA or RNA and that require a host's cells to make copies of themselves. Herpesviruses are a family of DNA viruses, and they include such viral celebrities as the virus that causes chickenpox and shingles, those that cause herpes, and the Epstein-Barr virus. The members of this family also share an important characteristic: they can essentially lay dormant inside our

cells and stay in this “latent cycle” for a very long time. Occasionally, these dormant viruses can reactivate. Shingles is a painful example of a reactivated herpesvirus known as the varicella zoster virus. This virus can first cause chickenpox but subsequently remain inactive in our nerve cells before one day emerging from its dormancy and causing shingles.

The Epstein-Barr virus can sometimes cause cancer, alongside six other viruses which are presently (<https://journals.asm.org/doi/10.1128/CMR.00124-13>) known to cause cancer in humans (<https://journals.asm.org/doi/10.1128/CMR.00124-13>), and it is this link to cancer that led to researchers discovering the virus in this place. After World War II, an Irish surgeon by the name of Denis Parsons Burkitt spent many years in Uganda, where he described children with tumours in their jaw. This form of cancer became known as Burkitt lymphoma. One day, Dr. Burkitt was speaking about it and his lecture was attended by Dr. Anthony Epstein. Dr. Epstein was skilled in the use of an electron microscope—which is really good at seeing viruses despite their small sizes—and he was familiar with cancer-causing viruses in chickens. He wondered if this cancer of the jaw that Dr. Burkitt was lecturing about might have a viral origin, so (<https://www.bbc.com/news/health-26857610>) he asked Dr. Burkitt to fly tumour samples to him overnight from Uganda to England (<https://www.bbc.com/news/health-26857610>).

Initial attempts at finding a virus inside these cancer cells proved futile, but in December of 1963, the plane carrying the latest sample to London was diverted north to Manchester because of foggy conditions. By the time Dr. Epstein received the sample, it was in a cloudy liquid that suggested contamination. But when he looked at the cells floating in that liquid under the electron microscope, he saw cancer cells with viruses inside of them. The viruses looked similar to the herpesvirus that causes cold sores and genital herpes, but a bit smaller. Epstein, his Ph.D. student Yvonne Barr, and his colleague Bert Achong published their findings in *The Lancet* in 1964 and the virus would go on to be called the Epstein-Barr virus.

Finding a virus inside a diseased cell does not necessarily imply its guilt, just like finding candles at the site of a house fire does not automatically render them guilty. But in the intervening years, converging lines of evidence have convincingly shown that the Epstein-Barr virus does indeed cause Burkitt lymphoma and other illnesses as well. In infants and children, an Epstein-Barr viral infection usually results in no symptoms or in symptoms that look like an upper respiratory infection, a stomach bug, or an ear infection. When the virus is encountered for the first time in adolescence or in adulthood, it can result in infectious mononucleosis, commonly known as mono. The symptoms of mono are caused by the body’s own white blood cells attacking the virus, typically resulting in fatigue, fever, enlarged lymph nodes, and sore throat. Mono is also known as “kissing disease” since the virus is shed in the saliva.

In some people, the Epstein-Barr virus can cause specific cancers, like Burkitt lymphoma, Hodgkin’s disease (a type of blood cancer), and nasopharyngeal cancer (which affects the passage behind the nasal cavity leading to the throat). It can also cause problems in the blood known as lymphoproliferative disorders, and the virus can prove particularly worrisome for people whose immune system is significantly impaired. There is also evidence accumulating that this little virus may play an important role in multiple sclerosis, although further studies are warranted.

While this list of disease-causing activities can appear worrisome, it is important to put it in context. The vast majority of human beings have been infected with this virus, but it only contributes to (<https://pubmed.ncbi.nlm.nih.gov/30125149/>) approximately 1.5% of all human cancers worldwide (<https://pubmed.ncbi.nlm.nih.gov/30125149/>). The Epstein-Barr virus is fairly innocuous in the vast majority of people it infects and it remains poorly understood how and why it triggers a disease like cancer in a very small minority of people.

Even though scientists studying the virus are quick to say “more studies are needed,” some wellness influencers have jumped on their intuition—and, in one case, on the imagined words of an angelic being—to blame the Epstein-Barr virus for all manners of ills.

The pseudoscientific accusations

While consulting the websites of health gurus, you might come to believe the Epstein-Barr virus is as evil as He Who Must Not Be Named. A naturopath writes that it can trigger rheumatoid arthritis and can affect (<https://www.nawellness.com/epstein-barr/>) your body’s ability to eliminate “toxins” (<https://www.nawellness.com/epstein-barr/>), these ill-defined and often imaginary demons of the wellness world. A self-described health coach was diagnosed with reactivated Epstein-Barr and claims to have been helped by (<https://www.elizabethrider.com/epstein-barr-virus-reactivation/>) all manners of bizarre interventions (<https://www.elizabethrider.com/epstein-barr-virus-reactivation/>), like blood ozone treatment (in which your blood is extracted from your body and mixed in with ozone gas to kill microbes) and the

ingestion of so-called “natural antivirals” like echinacea and a coconut oil derivative.

Gwyneth Paltrow’s wellness empire *goop* suggests (<https://goop.com/wellness/health/is-epstein-barr-virus-at-the-root-of-chronic-illness/>) a long list of “immune-boosting foods” (<https://goop.com/wellness/health/is-epstein-barr-virus-at-the-root-of-chronic-illness/>) to combat Epstein-Barr virus reactivation, including lemon balm and holy basil, while also (<https://goop.com/wellness/health/the-medical-medium-and-whats-potentially-at-the-root-of-medical-mysteries/platforming-the-Medical-Medium>) (<https://goop.com/wellness/health/the-medical-medium-and-whats-potentially-at-the-root-of-medical-mysteries/>), a *New York Times* bestselling author with no medical training who claims that a supernatural spirit from the future helps him diagnose health conditions doctors don’t know about yet. (*Goop* offers a bare-bones disclaimer of the “having your cake and eating it too” variety by indicating that their author is “operating well outside the bounds of medicine and science.”) Spiritual whispers from the future have informed the Medical Medium that the Epstein-Barr virus actually causes thyroid disease, vertigo, tinnitus, lupus and menopause, and that you might catch the virus by eating out, since chefs cut themselves all the time and bleed all over your food! His solution is a long list of fruits, vegetables, and supplements (and, presumably, sticking to home cooking).

There is a grain of truth to all of this holistic nonsense, and also a reason why blaming the Epstein-Barr virus for everything is appealing. As mentioned before, this virus can lay dormant in our cells, predominantly the white blood cells known as B cells, and evade detection by our immune system. As it transitions to this latent phase, the virus’ linear DNA molecule is turned into a circle (called an episome), and this ring of DNA gets copied at the same time as the cell’s own DNA prior to division. In some people, the virus emerges from this latent phase and becomes infectious again, and this reactivation can be triggered by the stress of an acute medical illness.

But just because a doctor detects the Epstein-Barr virus inside your body does not mean that it is causing illness. As Dr. Matthew Oughton, an attending physician at the Jewish General Hospital’s Division of Infectious Diseases, wrote to me, if a doctor looks hard enough for the purported cause of a particular disease in an adult patient, there is a very large chance they will find the Epstein-Barr virus in there, hibernating. It is similar, he wrote, to ‘proving’ that oxygen is the cause of human disease because we see evidence that all human bodies metabolize food into energy in the presence of oxygen. Just because it’s there does not necessarily imply it has been nefariously pulling the strings. Proving causation is hard, but receiving a clear (though wrong) diagnosis from a naturopath who tells you your symptoms are due to Epstein-Barr virus reactivation can alleviate stress, bring a sense of resolution, and put you in touch with a community of similarly labelled people.

And this brings us to long COVID.

The on-going investigations

Some researchers have published studies showing that many hospitalized patients with an active COVID-19 infection had evidence of an Epstein-Barr virus reactivation, meaning that the virus had awakened after lying dormant. A (<https://www.mdpi.com/2076-0817/10/6/763>) paper subsequently came out earlier this summer (<https://www.mdpi.com/2076-0817/10/6/763>) investigating the relationship between the Epstein-Barr virus and long COVID, a poorly understood constellation of long-term symptoms following the acute infection, including fatigue, shortness of breath, and brain fog. Could a reactivation of the Epstein-Barr virus be to blame?

The paper itself is far from offering a definitive proof. Its authors posted online ads seeking recovered COVID-19 patients. Via questionnaire, they saw that about a third of them were still suffering from long COVID symptoms. Some of the “long haulers” and some of the people who had fully recovered were chosen to get their blood drawn at a laboratory that would test them for markers of Epstein-Barr virus reactivation. The authors report that a majority of the long haulers were positive for reactivation, compared to a tiny number of the fully recovered.

But this labelling of test results as “positive for reactivation” relies heavily on one single marker, an early antigen-diffuse antibody against the virus known as EA-D IgG. The (<https://www.cdc.gov/epstein-barr/laboratory-testing.html>) Centers for Disease Control (CDC) state (<https://www.cdc.gov/epstein-barr/laboratory-testing.html>) that 1 in 5 healthy people may have this type of antibody for years. The sample size is also on the low end of the spectrum, with 30 long haulers getting their blood tested and only 20 being “positive for reactivation.” What about the other ten?

What’s more, I am a little perplexed as to who the authors of this recent paper are. The first author lists himself as being an (<https://www.researchgate.net/profile/Jeffrey-Gold-3/experience>) “independent researcher” (<https://www.researchgate.net/profile/Jeffrey-Gold-3/experience>).

since 1999 at the "World Organization" he founded in Georgia, USA. He only has four publications to his name listed in PubMed and they all have to do with COVID-19. The last author (who is typically in charge of the research group where a study was conducted) is a (https://vet.uga.edu/person/david_hurley/) professor emeritus at a college of veterinary medicine (https://vet.uga.edu/person/david_hurley/), whose research interests include the immune system of rodents and farm animals. To be fair, he has a Ph.D. in microbiology/biophysics and he is listed as having taught special topics in population health. But in light of all this, it is fair to say that the link between long COVID and Epstein-Barr virus reactivation is far from having been shown.

Given how successful the Epstein-Barr virus has been at infecting humanity, it's no wonder its fingerprints are always there at the scene of the crime. But whether or not it deserves to be put behind bars for a particular ill is a more complex question than it seems. Let's not jump the gun.

Take-home message:

- The Epstein-Barr virus has infected over 90% of all humans and it can cause mono, certain forms of cancer, and other blood disorders
- It is extremely common to find evidence of an Epstein-Barr infection given how successful the virus has been at infecting us, but the fact that the virus is present does not automatically mean it is causing a specific illness
- Certain health gurus are blaming all sorts of symptoms on a reactivation of the Epstein-Barr virus and recommending unproven or disproven remedies to get rid of it, like blood ozone therapy and natural health products
- A study claimed to have discovered a link between long COVID and Epstein-Barr virus reactivation but this study is far from definitive

@CrackedScience (<https://twitter.com/crackedscience>)

Leave a comment! (<https://www.facebook.com/McGillOSS/posts/4183151168390973>)

Keywords:

Epstein-Barr virus (</oss/category/tags/epstein-barr-virus>)
mono (</oss/category/tags/mono>) mononucleosis (</oss/category/tags/mononucleosis>)
cancer (</oss/taxonomy/term/3285>) health (</oss/category/tags/health>)
virus (</oss/category/tags/virus>) viral (</oss/category/tags/viral>)
blood disorder (</oss/category/tags/blood-disorder>) blood (</oss/category/tags/blood>)
long COVID (</oss/category/tags/long-covid>)

What to read next

 <p>Do vaccine incentives actually work? (/oss/article/covid-19-health/do-vaccine-incentives-actually-work) 6 Aug 2021</p>	 <p>Can You Turn Nausea Off at the Wrist? (/oss/article/critical-thinking-health-technology/can-you-turn-nausea-wrist) 6 Aug 2021</p>	 <p>The Kiss of Death Almost (/oss/article/health-history/kiss-death-almost) 4 Aug 2021</p>
 <p>The Emerald Chlorophyll of Oz (/oss/article/health-nutrition/emerald-chlorophyll-oz-0) 30 Jul 2021</p>	 <p>What We Know About Kids and Masks (/oss/article/covid-19-health/what-we-know-about-kids-and-masks) 23 Jul 2021</p>	 <p>How We Know That the COVID-19 Vaccines Work (/oss/article/covid-19-health/how-we-know-covid-19-vaccines-work) 23 Jul 2021</p>