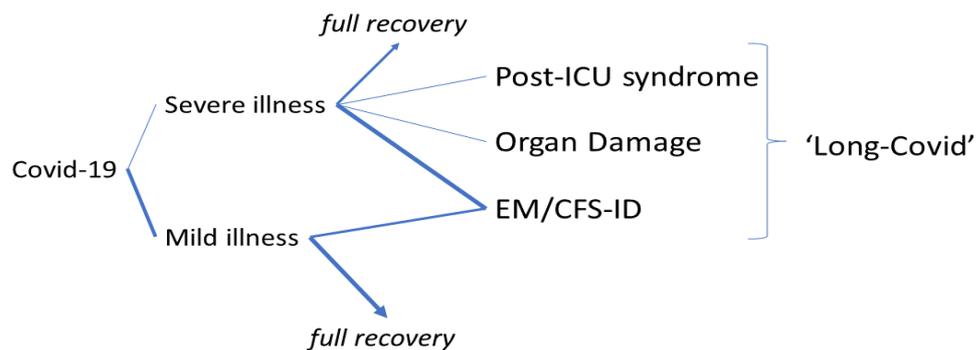


Links Covid Long Haulers & ME/CFS-ID

A Mechanisms-Based Explanation

The terms “Covid Long-Haulers,” “Long-Covids,” and “Post-Covid Syndrome,” are being used interchangeably to define Covid patients who continue to experience lingering symptoms after “recovery” from Covid. However, even if fatigue is a common denominator of the symptoms experienced, it is unhelpful to use the same term for all. Doing so misleads healthcare providers and stops patients from being helped appropriately. There are essentially 3 ‘Long-Covid’ subsets:

1. Critically-ill patients, most of them admitted to intensive care, who have a long recovery period and may have permanent organ damage and/or dysfunction.
2. Severely ill patients who have been admitted to intensive care, most often connected to a ventilator, who develop a post-ICU syndrome (muscle weakness, cognitive and psychological problems).
3. The majority of recovering patients, sometimes estimated at up to 10%¹⁻², with no sign of organ damage or dysfunction but with severe exhaustion, headaches, myalgias, flu-like symptoms, mood and cognitive disturbances. This subset has symptoms that most closely resemble post-viral fatigue syndromes, and specifically Myalgic Encephalomyelitis/ Chronic Fatigue Syndrome (ME/CFS). ME/CFS has been linked to previous infectious disease outbreaks, and most notably to the previous SARS and MERS coronaviruses epidemics³⁻⁷. ME/CFS appears to be the most significant inflammatory complication following any severity of Covid-19 infection affecting more women than men². ME/CFS is indeed a debilitating, long-lasting condition of the immune system that predominantly affects women.



Given the multiple post-infectious outcomes of Covid-19, it is very important to start thinking beyond clinical solutions focusing on efficient pathogen elimination, which are needed now, and to prepare for confronting the peak in inflammatory syndromes and diseases that will come. This peak could be one of the largest ever mass disability events, with major long-term health, social and economic impacts.

BMSystems has long been working on inflammatory syndromes and in particular on the inflammatory branch of ME/CFS, renamed ME/CFS-Immune Dysfunction (ME/CFS-ID)⁸, that regroups the vast majority of ME/CFS patients. ME/CFS-ID is problematic for both patients and health care providers, not only because of a lack of universal diagnosis or recognition, but also because there is no treatment that improves their daily life. BMSystems' research has shown that people diagnosed with ME/CFS-ID suffer from a systemic low-grade inflammatory disease. This is maintained by an autoimmune-like response caused by overlapping immune strategies misleading the immune system into opposing and often mutually-cancelling strategies (including both humoral and cellular responses). The result is that the immune system "locks up" in a constant, low-potency pro-inflammatory mode with the physical manifestation of ME/CFS symptoms. One of the major triggers for such responses are acute infections with positive-sense ssRNA viruses such as coronaviruses.

BMSystems has modelled the causal mechanisms of the inflammatory branch of ME/CFS and is working to transform ME/CFS-ID from a syndrome without concrete diagnostic criteria and treatment, into a universally recognisable, diagnosable and treatable organic disease. In this, it is supported by the French ME/CFS patient association (ASFC), member of the European ME Alliance (EMEA). BMSystems has developed diagnostic and therapeutic solutions that, with support of BioWin, the leading life sciences Belgian cluster, are now ready to start a pilot experimental clinical evaluation including subsets of long-Covid and ME/CFS patients, before launching the clinical evaluation phases.

References:

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About Bio-Modeling Systems (BMSystems)

Bio-Modeling Systems, an innovative company founded in 2004, is the first and, to date, only company to successfully create in-silico heuristic models validated *in-vivo*. BMSystems' heuristic models, built by its biologists using an integrated IT solution called CADI™ (Computer Assisted Deductive Integration) have led to discoveries and patents in the fields of infectious diseases, oncology, neurology, psychiatry, dermatology, immunology, metabolic disorders, innovative bioprocesses for industrial biotech and the creation of new companies exploiting these patents. [Pherecydes-Pharma](#), BMSystems' first therapeutic spin-off develops innovative and adaptive solutions to fight multi-resistant bacterial infections and closed its IPO Alternextgrowth on February 5, 2021 with a 4 times oversubscribed offer and a post-listing valuation at €50 million. [CEA's therapeutic spin-off](#), (French Alternative Energies and Atomic Energy Commission) spin-off is based on a CEA/BMSystems collaborative research in psychiatric and neurological disorders that led to the co-owned patent WO201029131 with a worldwide exclusive license to it, that is also listed on Alternextgrowth and has successfully completed its phase 2 on Parkinson's disease.

BMSystems' models describe the biological phenomena involved in pathological states and provide novel mechanistic integration to explain the causes of certain diseases, to identify and select predictive biomarkers, and to offer both new combinations of molecules and new therapeutic strategies. BMSystems CADI™ discovery models are the laureates of two awards: Bio IT World Best Practice Award 2009 & European Commission 2010 as "State-of-the-Art Systems Biology applications in Medicine". It is currently a partner in the 14 M€ funding Horizon 2020 program 'GEMMA' exploring interactions between gut microbiome, metabolome, epigenome and immune function in Autism Spectrum Disorders.

For more information and access to presentations and publications, please visit <https://www.bmsystems.org>.

About the French Chronic Fatigue Syndrome Association (ASFC):

ASFC is the only association approved by the French Ministry of Health that represents patients with ME/CFS. The association provides a phone hotline and organizes regular meetings between patients and volunteers everywhere in France, as well as meetings and live webinars with expert scientists. The ASFC welcomes everyone suffering from unexplained chronic fatigue, post-viral fatigue syndrome, and ME/CFS, and informs and guides them to obtain an accurate diagnosis. The ASFC also promotes research protocols (scientific, medical or multidisciplinary) and is engaged in awareness-raising in order to influence government strategy for recognition of ME/CFS in France.

One of the challenges of the partnership will be to aggregate a network of care-givers in Europe, around this mechanism-based medicine project for ME/CFS.

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