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Physiology and the COVID-19 response

The Physiological Society

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Saving lives when confronted with a novel virus

Physiology helps us to understand how the body works in health and determine what goes wrong in disease. As such, physiology has been at the forefront of the search for answers at every stage of the pandemic. When COVID-19 patients started appearing in emergency departments, they didn't respond to standard treatment regimes. As such, healthcare professionals, and medicine as a whole, had to go back to first principles and understand systems physiology at work.

Ever-improving physiological insight changed how COVID-19 patients have been treated throughout the course of the pandemic. From how ventilators are deployed through to which medications are used, improved physiological knowledge has saved lives.

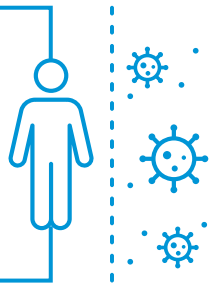
While initially COVID-19 was viewed as primarily a respiratory illness, we now know that this is only one facet of the disease, in addition to conditions such as thrombosis and the cytokine storm.

Our improved understanding of the impact of COVID-19 on our bodies has enabled clinicians to change their approach to treatment, such as no longer rushing to put patients on ventilators and instead placing patients in the prone position to improve gas exchange.

More information

To find out about The Physiological Society's collaboration with clinicians on the frontline, please visit:

physoc.org/covid19



"Physiologists are improving the outcomes of COVID-19 patients on ventilators by researching how ventilation can be tailored to the individual patient based on their respiratory system mechanics and function."

Dr Federico Formenti
King's College London, UK

"In early 2020, clinicians had to manage a totally new disease. While its trigger - the SARS-CoV-2 virus - was known, the biological changes driving symptoms were not understood at all. What drove the profound hypoxia seen? Why did kidneys so often fail? Was there a problem with the brain - and if so, what?

These are questions for clinically-trained and research-focused physiologists. To fully understand the impact of COVID-19, intensivists teamed up with physiologists, working together to try to understand this new disease, and how to treat it. We need to build on the relationships established over the last 18 months. This will not be our last pandemic."

Professor Hugh Montgomery
University College London, UK

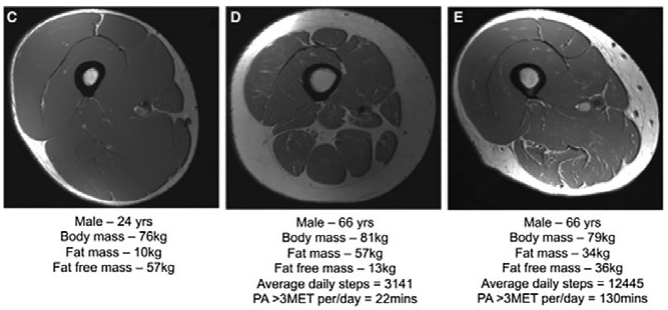
PROTECT

Supporting older people to remain healthy during lockdown

It was clear from the beginning of the pandemic that older people were disproportionately affected by COVID-19, with greater rates of hospitalisations and morbidity.

One consequence of measures designed to reduce the risk posed to older people by COVID-19, is that they made it harder for older people to stay active.

Physiological research has demonstrated that physical activity is an important factor in staying healthy and likely to have played a role in COVID-19 resilience.



McLeod et al. Biogerontology. 2016 Jun;17(3):497-510.

This image shows the impact of physical activity on the muscles of older people. On the right, is the leg muscle of an active older person compared to an inactive older person in the middle and a person 40 years younger on the left. This shows how physical activity is important to help older people retain muscle mass.

Physiological research has been crucial in identifying the health risks to a healthy older person from a dramatic reduction in physical activity as a result of lockdown or shielding. It has also helped advise on what measures can be put in place to ensure that older people are able to maintain function and physical resilience in an effective and safe way.

More information

To find out about The Physiological Society's collaboration with clinicians and public health officials to develop effective public health guidance for older people during lockdowns please visit:

physoc.org/policy/covid19resilience

INNOVATE

Developing safe and effective vaccines

Insights from cellular physiology have been crucial in understanding the building blocks of a virus and how it replicates and causes disease. This understanding has led to the development of new vaccine models including the mRNA vaccine which uses a small piece of a virus' genetic code. New approaches mean that vaccine development in the future could be quicker, safer and adapt to protect against a variety of infectious and non-infectious diseases[1].

1 https://www.nature.com/articles/d41586-019-03072-8

RESILIENCE

Long COVID – tackling the next public health crisis

The Office of National Statistics (ONS) estimated that in July 2021, **945,000 people living in private households in the UK (1.46% of the population) were experiencing self-reported "long COVID"**[2]. The most frequently self-reported symptoms included fatigue, shortness of breath and muscle ache but patients also reported fever, nausea, vomiting and memory loss or confusion. **Women were nearly twice as likely to report 'long COVID' symptoms and symptoms were most reported among those aged between 50-69** although all ages from 2-70+ were represented in the sample[3].

In England, the National Health Service (NHS) has provided £10 million for a network of 69 clinics: these have started to assess and help people with long COVID but few evidence-based treatments currently exist[4].

A much better understanding of the physiology that underpins long COVID is required than currently exists. This understanding will be crucial in the development of effective treatments and medications.

"COVID-19 impacts negatively on multiple organ systems and is associated with exacerbated fatigue and weakness following hospitalisation. Interventions that might enhance recovery from COVID-19 are not yet established. **Given the emphasis of physiology on integrating molecular, cellular, and organ systems to understand whole body function, the discipline will be fundamental in identifying the pathophysiological characteristics of COVID-19 and thereby providing the foundations for treatments to maximise recovery**. This represents a real opportunity for physiologists to positively impact on research and public health."

Professor Paul Greenhaff
University of Nottingham, UK

More information

To learn about The Physiological Society's work responding to clinical questions about COVID-19 please visit our long COVID project page:

physoc.org/longcovidpanel

2 https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/prevalenceofongoingsymptomsfollowingcoronaviruscovid19infectionintheuk/5august2021

3 https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/datasets/alldatarelatingtoprevalenceofongoingsymptomsfollowingcoronaviruscovid19infectionintheuk

4 https://www.nature.com/articles/d41586-021-01511-z

About The Physiological Society

As the largest network of physiologists in Europe, with academic journals of global reach, The Physiological Society continues a 145 year tradition of being at the forefront of the life sciences. Research in physiology helps us to understand how the body works in health, what goes wrong in disease, and how the body responds to the challenges of everyday life.

More information about The Society can be found at **physoc.org**

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