

## POST-COVID-19 ACUTE SARCOPENIA:

Physiopathology and Management.



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# A study by Karolina Piotrowicz, Jerzy Gawoski, Jean-Pierre Michel, Nicola Veronese

The study aims to discuss the pathophysiologic and management aspects of acute sarcopenia in relation to SARS-CoV-2 infection

- Cite: Piotrowicz K, Gąsowski J, Michel JP, Veronese N. Post-COVID-19 acute sarcopenia: physiopathology and management. *Aging Clin Exp Res*. 2021 Oct;33(10):2887-2898. doi: 10.1007/s40520-021-01942-8. Epub 2021 Jul 30. PMID: 34328636; PMCID: PMC8323089.

This article gathers the information about how the SARS-CoV-2 hyper-inflammatory involvement exacerbates the immunosenescence process, enhances the endothelial damage, and due to mitochondrial dysfunction and autophagy, induces myofibrillar breakdown and muscle degradation.

### **Importance:**

Acute **sarcopenia** may largely impact patients' in-hospital prognosis as well as the vulnerability to the post-COVID-19 functional and physical deterioration.

◦ *“So, roughly speaking,*

*we might say that getting COVID-19 is like packing a year’s worth of risk into a week or two”*

*David Spiegelhalter*

*Statistician, communicator about evidence, risk, probability, chance, uncertainty, etc.*

*Chair, Winton Centre for Risk and Evidence Communication, Cambridge.*

# What is Sarcopenia

- **Sarcopenia** is a syndrome characterized by the loss of muscle, strength, and performance.
- It doesn't require the presence of underlying illness.

# Why is Sarcopenia important?

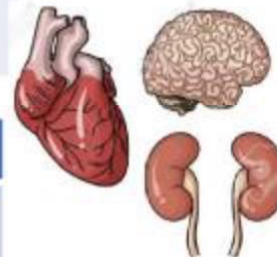
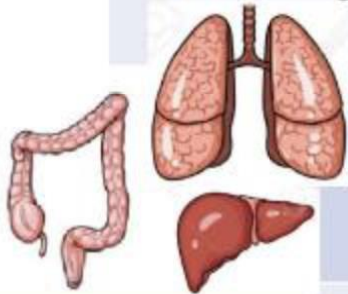
- It can cause pathological changes in organ systems and functional deterioration in patients exemplified by the inability to cope with the daily life tasks or development of the psychologic disturbances
- Associated with increased : functional impairment, disability, falls and mortality.

Most *cachexic* people are *sarcopenic* but

most *sarcopenic* people are not *cachexic*

### Pre-existing health conditions in old adults

Biological age	Individual health condition
Inflammaging	Multimorbidity
↗ Senescent cells	Obesity/Diabetes/HTA
↗ Reactive Oxygen Species	Suboptimal muscle performance
↗ ACE & ↗ CD6 receptors	Frailty/Disability
CMV +	Vitamin D deficit / poor oral health/Malnutrition?



#### Immunological

↗ ↗ ↗ ↗ Hyper-inflammation

Dysfunction of monocytes/macrophages

#### Vascular

↗ Vascular endothelium growth factors

Endothelial damages & Micro/macro thrombosis

#### Altered diet

Anosmia & ageusia

Xerostomia & dysphagia

Altered microbiota

↘ Food intake/↘ food variety

↗ Catabolism

#### Physical inactivity

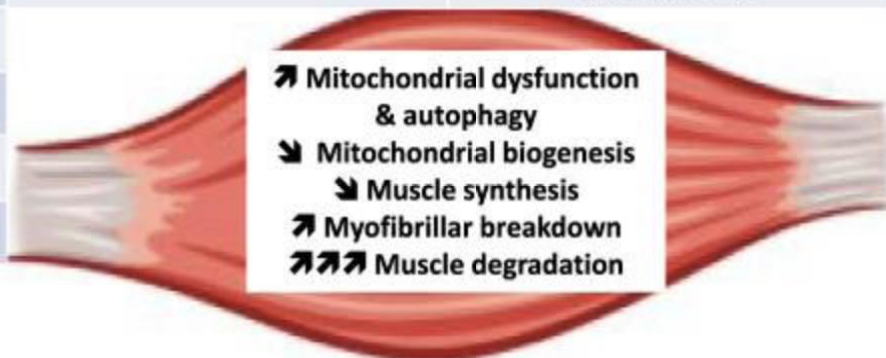
Imposed bedrest

Lock-down/quarantine

Hospitalisation

Intensive care

Various treatments



↗ Mitochondrial dysfunction & autophagy  
 ↘ Mitochondrial biogenesis  
 ↘ Muscle synthesis  
 ↗ Myofibrillar breakdown  
 ↗ ↗ ↗ Muscle degradation



# Variables

- general pre-infection medical condition(Immunosenescence, age-related changes in mitochondria, increased adiposity, type 2 diabetes mellitus)
- the degree of inflammatory involvement
- anorexia (due to loss of appetite resulting from acute disease, anosmia and ageusia)
- physical inactivity
- cardiovascular status
- gut microbiota.

# What happens in COVID?

- marked elevation of inflammatory markers (cytokine storm: increase interleukin-6 (IL-6) and tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ))
- during the acute phase of infection, the patient is at risk of losing 5–10% of body weight
- low physical activity and bedrest (due to acute disease or lock-down and social distancing)
- Diminished food intake due to poor oral health, poor denture, diminished strength of masticatory muscles and tongue and poor salivation
- Quality of diet

# COVID related factors contributing to **sarcopenia**:

- general pre-infection medical condition, the degree of inflammatory involvement, anorexia (due to loss of appetite resulting from acute disease, anosmia and ageusia), physical inactivity, cardiovascular status, and gut microbiota.

# Exacerbating conditions

- imposed physical inactivity
- lock-down
- quarantine or acute hospitalization with bedrest

**MANAGEMENT**

# Multidisciplinary approach

- Nutritional
- Physical
- Cardiopulmonary
- Psychologic
- Cognitive training

# Nutritional

- nutritional counseling
- Especially in older COVID-19 survivors
- Increase caloric intake
- Ensure adequate protein, vitamin, and mineral intakes\
- Oral nutritional supplements (ONS)
- Probiotics and prebiotics

***⚠ BEWARE OF REFEEDING SYNDROME ⚠***

# Physical and cardiopulmonary

- beneficiary effects of post-ICU post-COVID-19 daily 30 min multicomponent exercise program comprising resistance, endurance, and balance training
- neuromuscular electrical stimulation
- paucity of data



# Psychologic

- Emotional and the practical support
- **WHO message to people in isolation:**
  1. Older adults, especially in isolation and those with cognitive decline/dementia, may become more anxious, angry, stressed, agitated and withdrawn during the outbreak or while in quarantine. Provide practical and emotional support through informal networks (families) and health professionals.
  2. During times of stress, pay attention to your own needs and feelings. Engage in healthy activities that you enjoy and find relaxing. Exercise regularly, keep regular sleep routines and eat healthy food. Keep things in perspective. Public health agencies and experts in all countries are working on the outbreak to ensure the availability of the best care to those affected

# Cognitive training

- HomeCoRe rehabilitation program
- Telerehabilitation through a computer based exercises administered by a therapist
- 3 sessions/week for 45 mins

# Conclusion

- Acute sarcopenia due to COVID-19 may worsen the course of the disease in older patients which highlights the importance of a suitable evaluation, a patient-specific rehabilitation and dietary interventions.
- Holistic and early management of COVID-19 patients appears essential to minimize the disastrous functional outcomes of this disease and allow avoiding the long COVID-19 syndrome.

# Article of References

- 131 articles of reference were used including studies on COVID-19 survivors, patients with dementia and COVID-19 management in acute hospital settings

**THANK YOU FOR YOUR ATTENTION**