Long COVID Syndrome and Impairments

Why are long COVID symptoms so debilitating?

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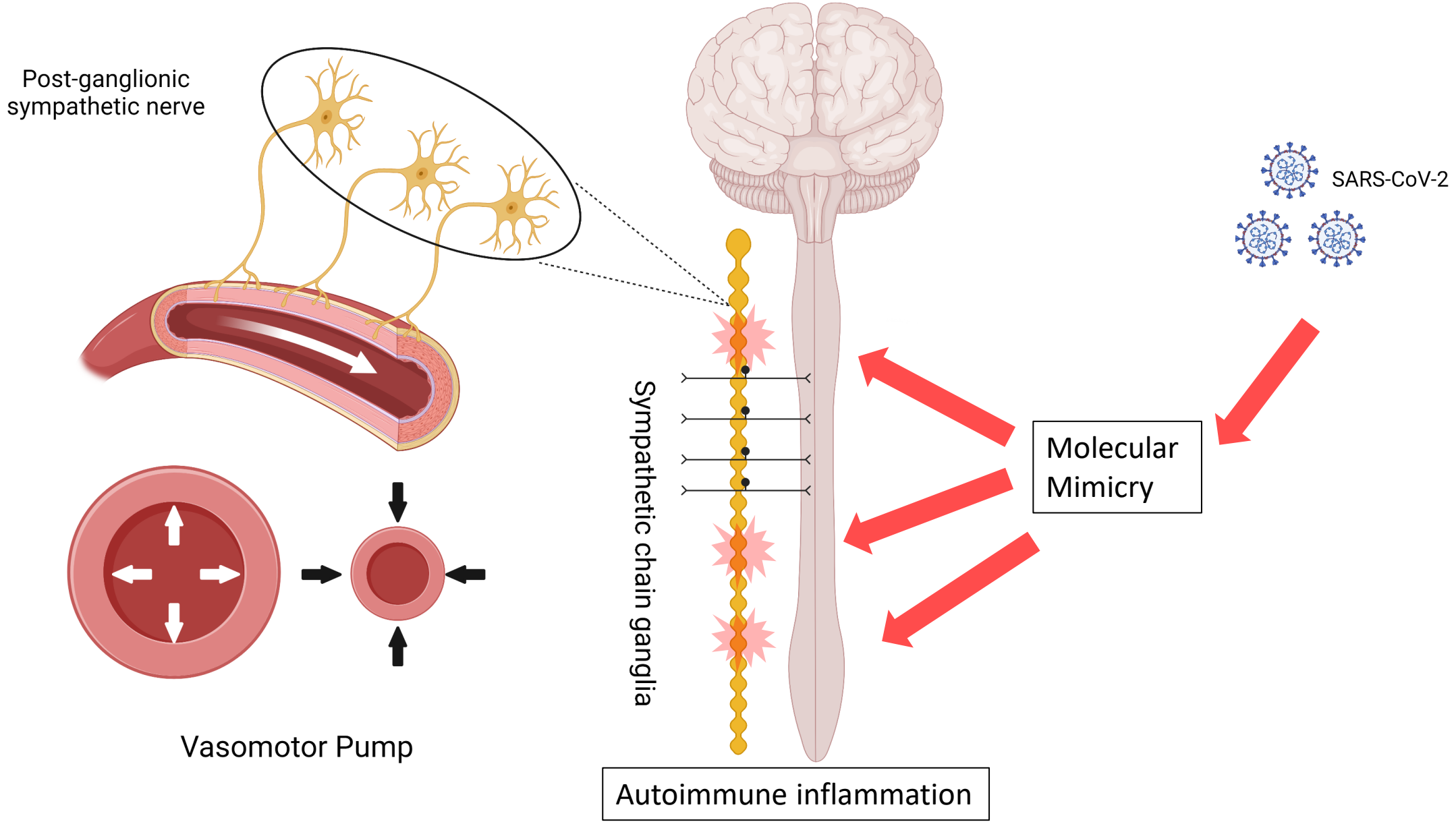
Unique aspects of long COVID impairments

- Multi-systemic
- Waxing and waning/relapsing and remitting
- Symptoms depend on activities or environment

Can this be explained by a single physiology?

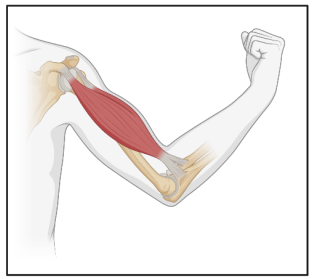
- Yes

- Blood flow dysregulation (=vasomotor dysfunction)

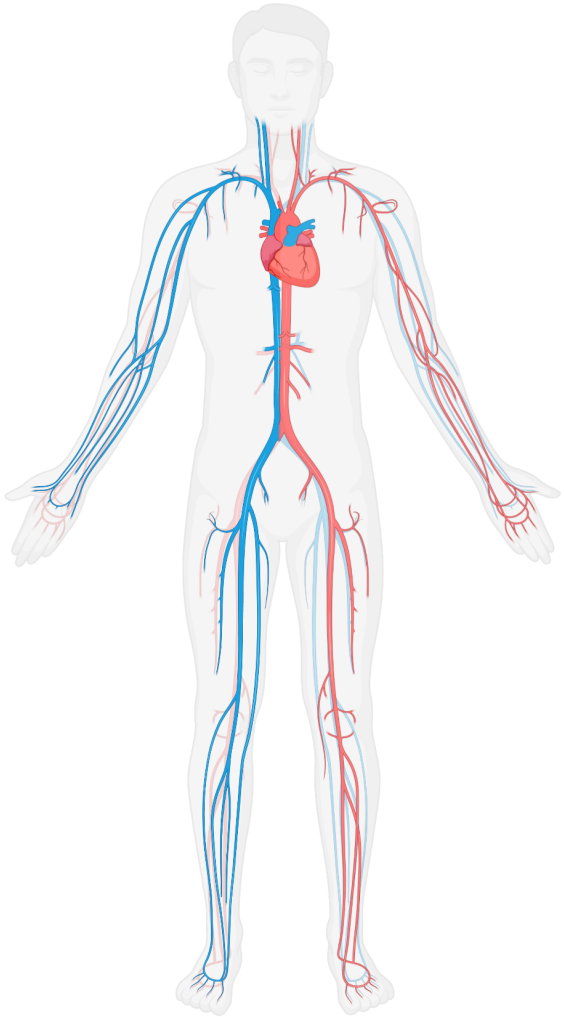

Post-ganglionic
sympathetic nerve
Vasomotor Pump
Sympathetic chain ganglia
SARS-CoV-2
Molecular
Mimicry
Autoimmune inflammation

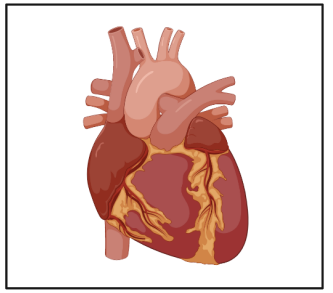
Vasomotor Symptoms

Reduced cerebral blood flow
Brain fog
Migraine
Lack of Concentration
Forgetfulness

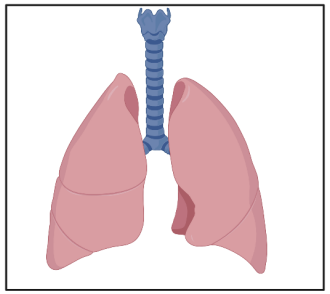


Skeletal Muscles
Post-exercise malaise (PEM)
Post-exertional flares
Delayed-onset muscle soreness (DOM)
Exercise intolerance





Reduced preload
Fatigue
Dizziness
Lightheadedness



Reduced pulmonary perfusion
Exertional dyspnea
Air hunger

Vasomotor dysfunction explains the impairments of long COVID

- Multi-systemic -> blood flow to various organs
- Waxing and waning/relapsing and remitting -> likely inflammatory (autoimmune)
- Symptoms depend on activities or environment -> blood flow regulation

Why are the symptoms so debilitating?

- Limited energy
- Difficulty with upright position (sitting and standing)
- Difficulty with concentration
- Difficulty with repetitive motions/increased activities
- Many other symptoms (GI, pain, pulmonary, etc.) come and go

Populations at risk

- Mostly young female
- Mostly white caucasian?
- Joint hypermobility (= Ehlers Danlos Syndrome)
- Family history with autoimmune diseases

Strategies

- Adapting to low energy -> “pacing”
- Environmental control -> allow sitting/resting, access to hydration, avoid stress, etc.
- Prevent triggering factors -> dehydration, infection or systemic inflammation, or over-exertion (both mental and physical)
- Early intervention with aggressive volume expansion and rehab therapy

Summary

- Many debilitating symptoms of Long COVID are due to vasomotor dysfunction, affecting multiple organ systems.
- Preferentially affects young female with hypermobile joints and autoimmune family history.
- Targeted rehab therapy towards vasomotor/autonomic dysfunctions can be effective.