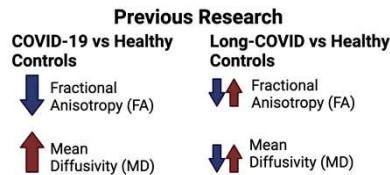
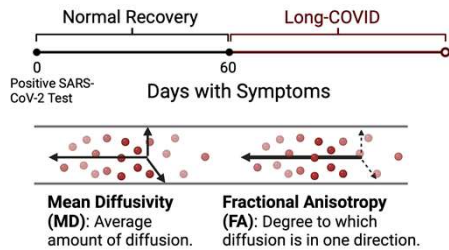


Baseline Characteristics, Structural Brain Differences, and Cognitive Performance between Patients with Long-COVID and those with Normal Recovery

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Background



- Inconsistent diffusion imaging (DTI) findings in long-COVID compared to normal recovery.
- No neuroimaging studies have compared long-COVID to a normal course of recovery from COVID-19.

Objectives

- Compare long-COVID and normal recovery on:
- White matter microstructure of the brain
 - Objective cognitive performance

Methods



- Participants were recruited from hospitals and ICUs ($n=25$) or the community ($n=66$).
- Long-COVID ($n=56$) and normal recovery ($n=35$) group comparison on DTI metrics using tract-based spatial statistics with 2000 permutations, covarying for age and sex.
- Cognitive analyses compared age-adjusted fluid composite score, covarying for crystallized composite score and education.

Results

Sample Characteristics:

- Long-COVID (LC) had a higher number of neurologic symptoms during acute illness than normal recovery (NR).
- Common long-COVID symptoms include fatigue, cognitive and memory problems, and body aches.

DTI Results: LC had significantly lower mean diffusivity (MD) than the NR group in widespread white matter regions (Figure 1). Significant white matter tracts included the corpus callosum, corona radiata, internal capsule, external capsule, and posterior thalamic radiation. There were no significant differences between groups for fractional anisotropy or radial diffusivity.

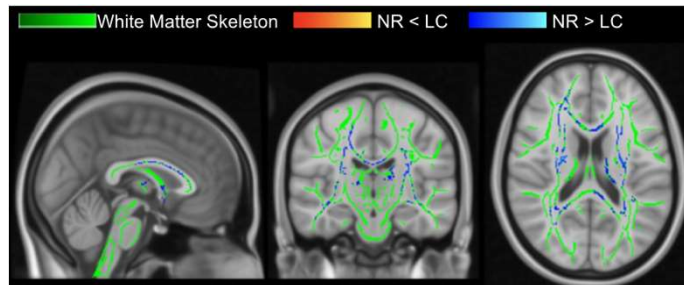
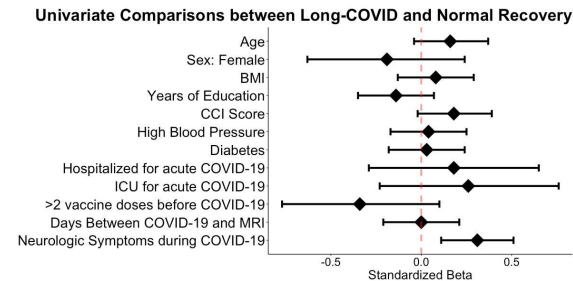


Figure 1. Tract-based spatial statistics results for LC and NR comparison. Green regions are the white matter skeleton and represent all regions that were compared. Blue regions are the voxels where LC had significantly lower MD than NR.

Cognitive Performance Results:

- No group differences in age-adjusted fluid cognition scores when adjusting for crystallized cognition and education ($p=.28$ $\beta=-0.22$ [-0.6, 0.2]).
- Exploratory analyses examining the cognition sub-scores showed a lower picture sequence memory score in the long-COVID group ($p=.07$ $\beta=-0.4$ [-0.8, 0.03]).



Conclusions

- The long-COVID group showed diffusion imaging differences that may suggest persistent gliosis or edema.
- Despite the prevalence of neuropsychiatric long-COVID symptoms, there was no difference in objective cognitive performance, between long-COVID and normal recovery.
- The lack of cognitive performance differences may indicate symptom-specific or domain-specific deficits.
- Future studies will focus on whether specific symptoms are differentially associated with structural neuroimaging metrics and cognitive performance.

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