# Neutrophil-to-Lymphocyte Ratio (NLR) to Monitor Neuroinflammation Status During Long COVID.

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## Background/Objective:

480 million people have been infected with COVID-19 worldwide. Roughly 10-15% of these patients will develop Long COVID which causes an array of symptoms including fatigue and “brain fog”. Currently, a reliable marker to monitor Long-COVID has not been established. NLR (neutrophil/lymphocyte ratio) has been shown to be an economical, reliable, and easily obtainable blood biomarker to monitor systemic inflammation. Our study aimed to use NLR to monitor Long COVID patients across pre-COVID to 24 months after acute COVID.

## Methods:

A retrospective patient chart review of 831 patients from a tertiary community hospital Post-COVID Clinic was completed to assess the changes in NLR. Symptoms and demographic information were collected.

## Results:

Our studies showed that at the time of acute COVID, NLR was elevated to 5.22+/-0.50 from the baseline pre-COVID NLR of 2.67+/-0.14. 4 to 6 months after the acute phase of COVID, the NLR was normalized to 2.61+/-0.20 which gradually re-elevated to 3.58+/-0.39 from 16-24 months after the acute COVID ($p < .01$) indicating a re-activation of systemic inflammation. At 16-24 months after the acute COVID, 66% of patients with elevated NLR were hospitalized during acute COVID, while 33% of patient with normal NLR were hospitalized (Chi Square=3.90; $p<0.05$)

## Conclusion:

Our findings support the potential connection between the sustained Long COVID symptoms with sustained elevation of NLR, a marker of systemic inflammation reactivation. Currently we are building a non-COVID control

group with the expansion into a prospective study phase. If our findings can be validated with further studies, NLR may be a useful biomarker for future monitoring of disease progression and marker for treatment development.