Persistence of SARS-CoV-2 spike 1 in circulating CD66b⁺ monocyte subpopulations in individuals with post-COVID-19 conditions up to 24 months post-infection

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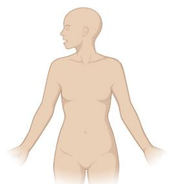
INTRODUCTION

Post-COVID-19 Conditions (PCC)

Nearly 15% of Canadians reported having symptoms beyond 12 weeks post infection



Associated > 200 symptoms caused by inflammation, immune dysregulation, …

The mechanisms underlying the therapeutic potential of vaccination are not completely understood …

Persistently elevated serum levels of cytokines/chemokines (IL-1β, IL-6 and TNF-α)

We have demonstrated that COVID-19 vaccination may decrease PCC symptoms and/or severity

Viral proteins and/or RNA detected in stool and many other tissues up to 180 days post-infection

Vaccination protects against severe COVID-19 while reducing the chances of developing PCC

SARS-CoV-2 spike (S)1 fragment has been shown to persist in monocytes from patients with PCC up to 15 months post-infection

HYPOTHESIS

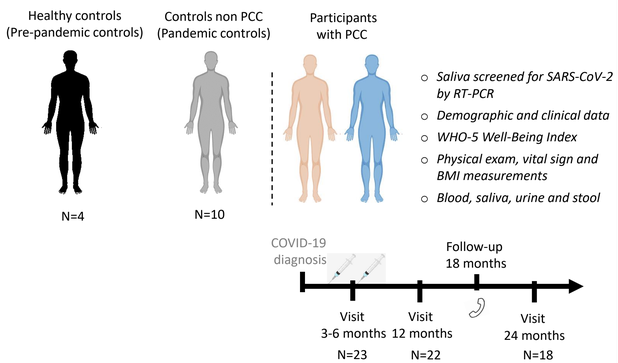
We hypothesize that sustained inflammation in PCC could be partly caused by SARS-CoV2 viral persistence in some immune cells.

AIMS

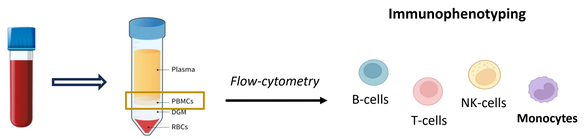
1) To characterize PBMC populations and assess whether they contain intracellular levels of SARS-CoV-2 S1 antigen in individuals with PCC evaluated before and after vaccination .
2) To characterize monocyte populations and S1 persistence in patient with PCC up to 24 months post-infection.

METHODOLOGY

STUDY MODEL



METHODS



RESULTS

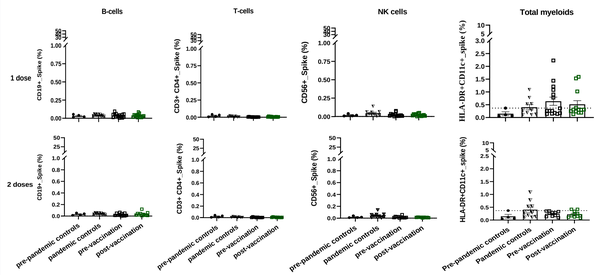


Figure 1 - Intracellular SARS-CoV-2 Spike S1 protein in lymphocytes and total myeloid populations from the blood of participants with PCC evaluated pre-vaccination and post-vaccination (1 or 2 doses).

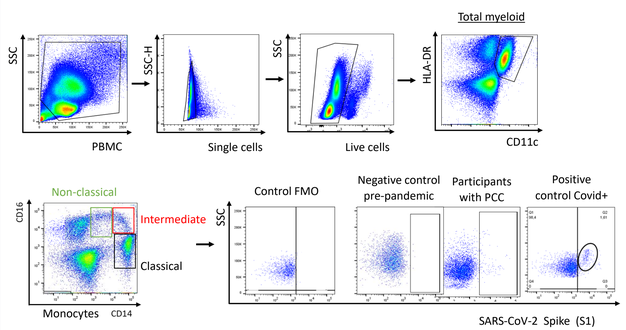


Figure 2 - Gating strategy for detection of intracellular SARS-CoV-2 spike S1 protein in monocytes subpopulations by flow-cytometry.

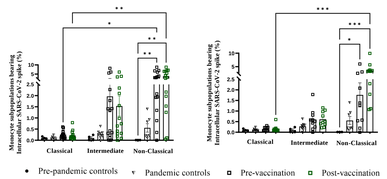


Figure 3 - Intracellular SARS-CoV-2 Spike S1 protein monocytes subpopulations from the blood of participants with PCC evaluated pre-vaccination and post-vaccination (1 or 2 doses).

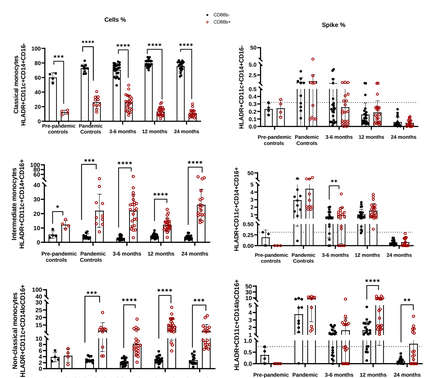


Figure 4 - Intracellular SARS-CoV-2 Spike S1 protein in monocyte subpopulations up to 24 months from the blood of participants with PCC.

CONCLUSION

In the blood of all pandemic participants :

- We found the vaccination did not impact intracellular SARS-CoV-2 S1 protein levels.
- We detected intracellular SARS-CoV-2 S1 protein in a small percentage of total myeloid cells and in monocytes subpopulations, but not in lymphoid populations.
- We identified a monocyte population expressing *CD66b⁺* which contain the SARS-CoV-2 S1 protein. These cells are significantly higher in intermediate and non-classical monocytes compared those that not express *CD66b⁺*.
- Interestingly, that relative percentages of *CD66b⁺* non-classical monocytes bearing intracellular SARS-CoV-2 S1 protein are significantly higher compared non-classical monocytes *CD66b⁻* at 24 months post-infection.

⇒ These data suggest that **viral persistence in *CD66b⁺* monocyte subpopulations may sustain inflammation and/or immune dysregulation underlying PCC symptoms**.

ACKNOWLEDGMENTS

- All patients who participated in this study.
- IRCM flow-cytometry platform.
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