

Current Evidence R/T COVID-19 Vaccines & Variants of Concern
February 26, 2021

- Variant of concern (VOC): A mutated pathogen that is considered to have concerning epidemiological, immunological or pathogenic properties as a result of the mutation(s).⁷
- A VOC may have increased transmissibility, more severe clinical presentation, higher false-negative diagnostic test results, and/or reduced neutralization by convalescent sera or vaccine.⁷
- VOCs identified globally and in Ontario include: B.1.1.7 (variant first identified the UK); B1351 (variant first identified in South Africa); P1 (variant first identified in Brazil).²
- There is no evidence that there is any difference in the mode(s) of transmission of these VOC different from what is seen for NVSC2 (non-variant SARS-CoV-2/original strain).⁷

Central Question (now being asked at SMDHU vaccination clinics):

Does vaccine-induced immunity to NVSC2 (non-variant SARS-CoV-2) protect against infection from the COVID-19 VOCs (variants of concern)?

Key Messages (in response to the central question):

- At present, there is incomplete data available to conclusively answer whether or not current COVID-19 vaccines will protect against the dominant variants of concern. Researchers are currently looking into this.^{1,4,5,6,7,8,9} PHO (Public Health Ontario) is actively monitoring, reviewing and assessing international research on COVID-19 variants.²
- Certain vaccines (e.g., Pfizer and Moderna)⁹ may provide some protection against specific variants but more research is needed.^{5,6,9}
- Of the three main variants in Ontario (UK, South Africa, Brazil) we have the most data on the UK B117 variant^{7,8,9} which is likely to become the dominant variant in Ontario and currently circulating in Simcoe Muskoka.³
- COVID-19 variants are more contagious (with the UK B117 appearing to be the most contagious) so it's even more important now that public health safety measures are followed.^{8,9}

Evidence Points (Supporting Key Messages):

- There is no conclusive evidence on the protection of either one or two doses of currently authorized vaccines against potential new variants of the virus.¹
- PHO is actively monitoring, reviewing and assessing international research on COVID-19 variants.²
- The data are clear that the prevalence of B.1.1.7 is increasing rapidly. B.1.1.7 is estimated to be the dominant variant in Ontario by the end of February.³

- While researchers are still investigating the effectiveness of vaccines against the P.1 variant Brazil, two pre-prints (not yet peer-reviewed) have tested plasma from recipients of both authorized mRNA vaccines against SARS-CoV-2 viruses with various spike mutations (i.e., variants of concern).⁴
- Vaccinated individuals may be less protected against P.1.⁴
- Since SARS-CoV-2 variants with the E484K mutation might be better at evading antibodies from the plasma of recovered COVID-19 patients infected with earlier strains, the P.1 variant, containing this mutation, could increase the risk of re-infection or infection in vaccinated individuals. Some reports support the possibility of reinfection with P.1.⁴
- Studies have shown that vaccine-induced neutralizing antibodies had diminished neutralizing ability against B.1.351 mutations; vaccine manufacturers are developing and evaluating updates to mRNA vaccines that incorporate B.1.351 mutations.⁵
- Several preprint articles have tested plasma from recipients of both authorized mRNA vaccines (Moderna and Pfizer-BioNTech) against SARS-CoV-2 viruses with various spike mutations (i.e., VOCs). These in vitro studies have found that vaccine-induced neutralizing antibodies had diminished neutralizing ability against B.1.351 mutations; however, reduction magnitude varied by study.⁵
- The mRNA vaccines prevent infection through both humoral and cell-mediated immunity, so it is difficult to know with certainty whether the diminished neutralizing antibody response to B.1.351 mutations observed in in vitro studies will result in reduced protection.⁵
- Moderna has publicly announced that it plans to develop and evaluate in preclinical studies a new mRNA vaccine candidate that incorporates B.1.351 mutations. Moderna is also initiating a Phase 1 study to evaluate whether immunological boosting with an additional dose of its current vaccine can improve protection against VOCs. Antibodies induced by the vaccine appeared less potent against B.1.351, compared to the original strain. Pfizer has also issued public statements that it is possible to update their vaccine with a new variant sequence, if needed.⁵
- Epidemiological findings and modelling data suggest that this strain may be more transmissible. Contact tracing and genomic sequencing data in the UK suggests that the secondary attack rate may be higher for cases with VOC-202012/01 compared to cases with other variants (15.1% vs 9.8%). Further laboratory-based investigations are underway to determine the impact of this strain on virulence and transmissibility.⁶
- To date, there is no indication that the vaccines will be less effective against this variant, although studies are ongoing.⁶
- Given the very recent emergence of this new variant and relatively restricted circulation, there is currently limited data on its impact on human health, laboratory testing, and vaccination.⁶
- How the various mutations in the UK variant impact the ability of the human immune system to recognize and develop antibodies to the virus (i.e. antigenicity) is currently being explored.⁶
- COVID-19 vaccines that are currently available in Canada are based on the spike protein. There is not yet any information to determine whether vaccine-induced antibodies have a reduced ability to neutralize the UK variant.⁶
- Ongoing vaccine effectiveness data coupled with genome sequencing will be important for assessing vaccine failure and breakthrough infections by the UK variant.⁶
- Estimates suggest that B.1.1.7 VOC is 36% to 75% more transmissible than NVSC2.⁷
- Based on preliminary evidence from the UK, B.1.1.7 may be associated with an increase in disease severity but further data are required to confirm this. There is no evidence at present that either reinfection or vaccine failure are more common due to B.1.1.7.⁷

- There is less information available with respect to 501Y.V2 and P.1. but their emergence in South Africa and Brazil, respectively, has been associated with replacement of NVSC219 and rapid increases in COVID19 incidence.⁷
- There is concern about the level of neutralizing antibody titres targeting 501Y.V2 generated by natural immunity following infection with NVSV2 or vaccination with currently available vaccines.⁷
- Reports from some vaccine trials suggest a possible reduction in vaccine efficacy in South Africa following the emergence of 501Y.V2 but the data are preliminary and have not been fully released.⁷
- Additionally, some of these vaccine trials, as well as data from Brazil, suggest that reinfection with 501Y.V2 or P.1. may occur in individuals previously infected with NVSC2.⁷
- There is no evidence that there is any difference in the mode(s) of transmission of these VOC different from what is seen for NVSC2.⁷
- There is already community transmission of B.1.1.7 in Ontario. The burden of disease due to the other known VOCs appears to be low. As long as the pandemic continues, however, additional VOCs are likely to emerge, especially in areas where COVID-19 incidence is high.⁷
- Three notable VOCs currently circulating include the B.1.1.7 (501Y.V1) (first identified in the United Kingdom (UK)), which has been identified in Ontario and for which the most data exists; the 501Y.V2 variant first identified in South Africa; and the P.1 variant first identified in Brazil. Information on these variants is rapidly evolving, particularly for B.1.1.7.⁸
- There is growing international evidence of increased transmissibility for all three VOCs, emerging evidence of an increased risk of death from B.1.1.7, and increased risk of vaccine escape and reinfection with the E484 mutation found in 501Y.V2 and P.1.⁸
- The Ontario laboratory network is currently working to increase screening for VOCs in SARS-CoV-2 positive specimens and conducting further analysis on all VOC screen-positive specimens.⁸
- Both travel-related and community transmission cases exist in Ontario, and province-wide strict adherence to all public health measures is necessary. Rapid vaccine roll-out continues for priority populations.⁸
- As COVID-19 vaccines cannot be used for post-exposure prophylaxis, the identification of cases and outbreaks of VOCs does not alter current vaccine delivery plans.⁸
- Variants of COVID-19 are more contagious which means it will take more intensive efforts of the same public health practices to prevent transmitting infection to each other.⁹
- Experts are studying how the virus is changing by understanding the genetic make-up of the virus. This will help us understand how changes to the virus might affect how it spreads and what happens to people who are infected with it.⁹
- The UK variant appears to spread more easily and quickly than other variants.⁹
- At this time both Pfizer and Moderna have said their COVID-19 vaccines are thought to be effective against the B.1.1.7 variant. This is likely because the part of the virus that has changed doesn't impact upon how the vaccines works.⁹
- It is even more important that public health safety measures to stop the spread are followed because this variant appears to spread more easily and quickly.⁹

Safety Measures (relevant to vaccination clinics):

- All public health measures to reduce transmission of the SARS-CoV-2 virus continue to apply to the new variants but require more rigorous application due to the increased

transmission risk. It is important that every effort is made to implement effective mitigation measures in all settings where people interact.⁸

- There is no recommended change in PPE practices related to the emergence of the B.1.1.7 VOC or other VOCs in Ontario.⁷
- Ensure that basic measures to prevent nosocomial COVID-19 are in place including universal masking, physical distancing, and hand hygiene.⁷
- Ensure that health care providers have sufficient break space where they can safely eat and drink and that protocols are in place to avoid crowding and ensure appropriate physical distancing and masking in these areas.⁷
- Health care settings should ensure that patients are masked (unless there is a contraindication to masking or the patient is unable to mask) in all of the following situations except when the mask must be removed briefly for clinical purposes (e.g., for an oral exam or nasopharyngeal swab). The health care setting should provide patients with a medical mask.⁷
- No changes in environmental cleaning protocols are required specific to patients with known VOC infection as compared to patients with NVSC2.⁷

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2. Public Health Ontario – COVID-19 Variants of Concern (VOCs). <https://www.publichealthontario.ca/en/diseases-and-conditions/infectious-diseases/respiratory-diseases/novel-coronavirus/variants>
3. Public Health Ontario – Evidence Brief. Evidence on Public Health Measures Required for Rapid Control of Variants of Concern. February 16, 2021. <https://www.publichealthontario.ca/-/media/documents/ncov/phm/2021/02/eb-public-health-measures-for-voc.pdf?la=en>
4. Public Health Ontario – Synthesis. COVID-19 P.1 Variant of Concern – What We Know So Far. February 3, 2021. <https://www.publichealthontario.ca/-/media/documents/ncov/covid-wwksf/2021/02/wwksf-covid-19-p1-variant-of-concern.pdf?la=en>
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6. Public Health Ontario – Synthesis. COVID-19 UK Variant VOC-202012/01 – What We Know So Far. December 29, 2020. <https://www.publichealthontario.ca/-/media/documents/ncov/covid-wwksf/2020/12/what-we-know-uk-variant.pdf?la=en>
7. Public Health Ontario. Provincial Infectious Diseases Advisory Committee. Interim guidance for infection prevention and control of SARS-CoV-2 variants of concern for health care settings. 2021. <https://www.publichealthontario.ca/-/media/documents/ncov/voc/2021/02/pidac-interim-guidance-sars-cov-2-variants.pdf?la=en>
8. Ontario Ministry of Health. COVID-19 Variant of Concern: Case, Contact and Outbreak Management Interim Guidance. Version 2.0 February 26, 2021. http://www.health.gov.on.ca/en/pro/programs/publichealth/coronavirus/docs/VOC_guidance.pdf
9. Simcoe Muskoka District Health Unit. COVID-19. COVID-19 variants within the region. February 26, 2021. <https://www.simcoemuskokahealth.org/Topics/COVID-19#df185ccb-92f8-4460-ba4e-ef22d017d228>