



# Understanding the COVID-19 (SARS-CoV-2) Variants

## What Are Variants?

Viruses typically undergo genetic changes over time, leading to new versions known as 'variants.' Variants develop when there is a large amount of transmission thereby giving the virus multiple opportunities to develop genetic mutations. Each variant contains one or more genetic mutations that may or may not increase transmissibility and/or severity of disease. <sup>i</sup> When a variant contains a mutation that does lead to higher rates of transmission, increased severity, and/or impacts current treatment, this variant becomes a 'Variant of Concern' or VOC. <sup>ii</sup> When a variant is detected and is suspected to lead to greater transmission or severity, it becomes a 'Variant of Interest' or VOI. All new variants are genetically sequenced and named. In May 2021, the World Health Organization began assigning Greek alphabet names to VOCs and VOIs. <sup>iv</sup>

## Vaccines Work

All COVID-19 vaccines approved for use in Canada provide robust protection against COVID-19 infection, serious illness and hospitalization, including infections from variants. <sup>viii</sup> In addition to layers of protection such as the use of masks, physical distancing etc., the BC Centre for Disease Control, BC Public Health Office, and Public Health Agency of Canada all strongly recommend getting vaccinated with the full course of a COVID-19 vaccine approved for use in Canada. In BC, the majority of new COVID-19 cases and hospitalizations are among unvaccinated individuals. As of November 2021, unvaccinated individuals are 10 times more likely to develop COVID-19, 57 times more likely to become hospitalized, and 47 times more likely to die from COVID-19 than those with at least two doses of a COVID-19 vaccine (adjusted for age). <sup>ix</sup> This demonstrates clearly that COVID-19 vaccines are highly protective, even against the Delta variant, the most dominant strain in circulation at present.

### Understanding Variant Transmissibility

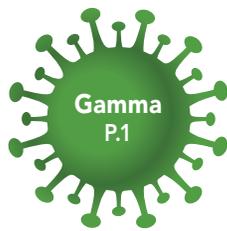
One means of monitoring transmissibility is by determining each variant's 'basic reproduction number' or R<sub>0</sub> (r-naught). R<sub>0</sub> is the average number of people that an infected person will spread the virus to in a given setting. <sup>v</sup> Some variants have a higher R<sub>0</sub> than others. For example, the original SARS-CoV-2 strain had an estimated R<sub>0</sub> of 2.6-3, while the Delta R<sub>0</sub> is estimated to be approximately 6.4. <sup>vi vii</sup> Understanding how easily transmissible a variant is key in understanding how to mitigate against its spread.



First detected in the UK in September 2020. Alpha remains a variant of concern in BC. Alpha comprised the majority of COVID-19 cases in BC in the first half of 2021 before being replaced by the even more highly transmissible Delta variant. <sup>x</sup> Alpha is approximately 50% more transmissible than the original SARS-CoV-2 strain. <sup>xi</sup> As of November 2021, Alpha has comprised approximately 15,000 COVID-19 cases in BC, and more than 260,000 nationwide. <sup>xii</sup>



First detected in South Africa in May 2020. Beta remains a variant of concern in BC. As of November 2021, Beta has comprised approximately 160 COVID-19 cases in BC, and just over 2000 nationwide. <sup>xiii</sup> Currently Beta has been fully replaced in BC by the highly transmissible Delta variant.



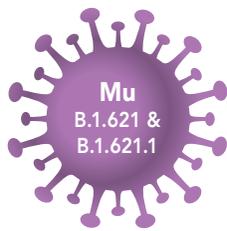
First detected in Brazil in November 2020. Gamma remains a variant of concern in BC. As of November 2021, Gamma has comprised approximately 11,000 COVID-19 cases in BC, and just over 21,000 cases nationwide. <sup>xiv</sup> Currently Gamma has been fully replaced in BC by the highly transmissible Delta variant.



First detected in India in October 2020. In addition to B.1.617.2, several other virus lineages fall under the Delta name. These include AY lineages, such as AY.4.2, known colloquially as Delta Plus, as well as the more recent AY.25.1 and AY.27 detected in the midwestern and western parts of Canada and the US. <sup>xv xvi</sup> Delta is a variant of concern in BC and currently comprises approximately 100% of COVID-19 cases in the province. <sup>xvii</sup> Current data shows that Delta is highly transmissible and may lead to more serious illness, especially for individuals who are unvaccinated, partially vaccinated and/or may have conditions which make them more susceptible to illness (e.g. cancer, recent organ transplant, severe primary immunodeficiency, HIV, multiple sclerosis, rheumatoid arthritis, lupus, among others). <sup>xviii xix xx</sup> Additionally, research shows that Delta has an increased 'viral load' (the density of viral particles in the body), suggesting that Delta may replicate much faster than other variants. <sup>xxi xxii</sup>



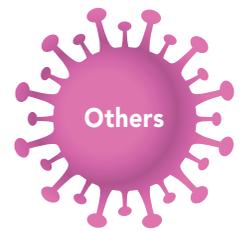
While many have heard of Delta Plus, this mutation has not yet been classified as a variant separate from Delta in Canada. Currently approximately 6% of COVID-19 cases in the UK are associated with the mutation known as Delta Plus, and as of October 2021, there have been nine confirmed cases in Canada. <sup>xxiii</sup> As of November 2021, Delta Plus is not considered to be different enough from the Delta variant to warrant a new variant classification by the Public Health Agency of Canada or the World Health Organization, but each organization will continue to monitor and assess the list of variants of interest and variants of concern as they develop.



First detected in Colombia in January 2021. Mu is a variant of interest in BC and was added to the World Health Organization's list of variants of interest at the end of August 2021. A number of mutations in Mu suggest that the variant may be resistant to current COVID-19 vaccines, but this is not yet substantiated by fulsome research and further investigation is required. <sup>xxiv</sup> COVID-19 cases associated with Mu were on the rise in parts of South America in January and February 2021, but have since decreased and are now only reported sporadically around the world. <sup>xxv</sup>



First detected in Peru in December 2020. Lambda is a variant of interest in BC. Lambda was the predominant variant of concern causing most COVID-19 cases in Peru and other parts of South America until September 2021 but has since been replaced by the Delta variant. <sup>xxvi xxvii</sup>



Other variants include Eta, Epsilon, Iota, Kappa, Theta, and Zeta. These variants were formerly designated as variants of interest but have been reclassified by the World Health Organization as they are no longer believed to pose a significant added risk to public health. <sup>xxviii</sup> However, the BC Centre for Disease Control and the Public Health Agency of Canada will continue monitoring and assessing these variants and new variants as they emerge in order to provide the most up-to-date information for public health.

<sup>i</sup> BC Centre for Disease Control (BCCDC). COVID-19 Variants. Updated Oct 26, 2021. <sup>ii</sup> Centres for Disease Control (CDC). SARS-CoV-2 Variant Classifications and Definitions. Oct 4, 2021. <sup>iii</sup> BCCDC. COVID-19 Variants. Oct 26, 2021. <sup>iv</sup> World Health Organization (WHO). WHO announces simple, easy-to-say labels for SARS-CoV-2 Variants of Interest and Concern. May 31, 2021. <sup>v</sup> NNPBC. Understanding the COVID-19 Delta Variant. 2021. <sup>vi</sup> Mallapaty, Smriti. Nature. Delta's rise is fuelled by rampant spread from people who feel fine. Aug 19, 2021. <sup>vii</sup> Mahase, Elisabeth. BMJ. Covid-19: What is the R number? May 12, 2020. <sup>viii</sup> BCCDC. COVID-19 Variants. Oct 26, 2021. <sup>ix</sup> BC Centre for Disease Control (BCCDC). BCCDC COVID-19 Data Summary: 11 November 2021. Nov 16, 2021. <sup>x</sup> BC Centre for Disease Control (BCCDC). Weekly Update on Variants of Concern (VOC) June 25, 2021. <sup>xi</sup> Duong, Diana. CMAJ News. Alpha, Beta, Delta, Gamma: What's important to know about SARS-CoV-2 variants of concern? June 18, 2021. <sup>xii</sup> Le, Toby. National Collaborating Centre for Infectious Diseases (NCCID). Updates on COVID-19 Variants of Concern. Sept 9, 2021. <sup>xiii</sup> Le, Toby. National Collaborating Centre for Infectious Diseases (NCCID). Updates on COVID-19 Variants of Concern. Sept 9, 2021. <sup>xiv</sup> United Nations (UN) in Western Europe. COVID-19: What is the Mu Variant? Sept 7, 2021. <sup>xv</sup> BCCDC. COVID-19 Variants. Oct 26, 2021. <sup>xvi</sup> Djuric, Mickey. Global. Subtype of COVID-19 Delta variant spreading in Western Canada: health officials. November 10, 2021. <sup>xvii</sup> BC Centre for Disease Control (BCCDC). Weekly Update on Variants of Concern (VOC) October 22, 2021. <sup>xviii</sup> United Nations (UN) News. COVID-19 Delta variant still 'most concerning', says WHO experts. Sept 7, 2021. <sup>xix</sup> UNICEF. What you need to know about the Delta variant. Sept 23, 2021. <sup>xx</sup> BCCDC. COVID-19 Variants. Oct 26, 2021. <sup>xxi</sup> Taylor, Paul. Healthy Debate. Patient Navigator: Just how contagious is the Delta variant? Aug 30, 2021. <sup>xxii</sup> Reardon, Sara. Nature. How the Delta variant achieves its ultrafast spread. July 21, 2021. <sup>xxiii</sup> Boynton, Sean. Global. What is the new COVID-19 mutation known as 'Delta Plus'? Here's what we know. Oct 20, 2021. <sup>xxiv</sup> UN News. COVID-19 Delta variant still 'most concerning', says WHO experts. Sept 7, 2021. <sup>xxv</sup> Ibid. <sup>xxvi</sup> Wamsley, Laurel. NPR. The Lambda Variant: What You Should Know And Why Experts Say Not To Panic. July 22, 2021. <sup>xxvii</sup> Andina: Agencia Peruana de Noticias. Delta confirmed as predominant COVID-19 variant in Peru. Sept 22, 2021. <sup>xxviii</sup> WHO. WHO announces simple, easy-to-say labels for SARS-CoV-2 Variants of Interest and Concern. May 31, 2021.