



# 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.’<sup>i</sup> 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>ii</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>iii</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>ix</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 staying up to date with COVID-19 vaccinations, including booster doses. This demonstrates clearly that COVID-19 vaccines are highly protective, even against the Delta and Omicron variants, the prevalent strains in circulation at present.

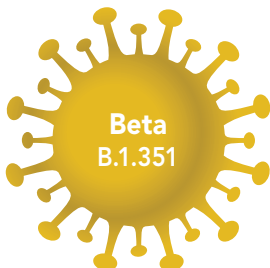
## Understanding Variant Transmissibility

One means of monitoring transmissibility is by determining each variant’s ‘basic reproduction number’ or  $R_0$  (r-naught).  $R_0$  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  $R_0$  than others. For example, the original SARS-CoV-2 strain had an estimated  $R_0$  of 2.6-3, while the Delta  $R_0$  is estimated to be approximately 6.4.<sup>vi, vii</sup>

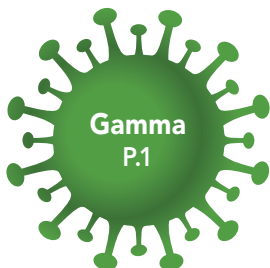
Additionally, Omicron’s average  $R_0$  is believed to be several times higher than that of Delta, estimated to be approximately 9.5.<sup>viii</sup> Understanding how easily transmissible a variant is key in understanding how to mitigate against its spread.



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 was deemed to be approximately 50% more transmissible than the original SARS-CoV-2 strain.<sup>xi</sup> Alpha led to approximately 15,000 COVID-19 cases in BC, and more than 260,000 nationwide.<sup>xii</sup>



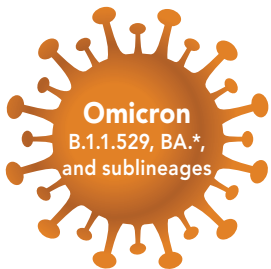
First detected in South Africa in May 2020. Beta remains a variant of concern in BC. The Beta variant led to approximately 160 COVID-19 cases in BC, and just over 2000 nationwide.<sup>xiii</sup> Currently Beta has been fully replaced in BC by the highly transmissible Omicron variant.



First detected in Brazil in November 2020. Gamma remains a variant of concern in BC. The Gamma variant led to 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 Omicron 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> The highly contagious Delta variant showed significantly increased transmissibility over earlier variants and led to more serious illness, especially for those who were unvaccinated, only partially vaccinated, or who had underlying conditions which made them more susceptible to illness (e.g. cancer, recent organ transplant, severe primary immunodeficiency, HIV, multiple sclerosis, among others).<sup>xvii, xviii, xix</sup> While Delta has been fully replaced by Omicron, it remains a variant of concern in BC.<sup>xx</sup>



First detected in South Africa in November 2021, the Omicron variant was named a variant of concern by the World Health Organization on November 26, 2021.<sup>xxi</sup> In addition to B.1.1.529, Omicron includes BA lineages (BA.1, BA.2, BA.4, BA.5, etc.) as well as additional sublineages (BC, BD, BE, etc.).<sup>xxii</sup> This variant is unique in that it has a very large number of genetic mutations, and mutations continue to occur within the variant’s sublineages.<sup>xxiii</sup> Real-world evidence shows that Omicron is highly transmissible and may lead to a greater risk of reinfection in those who have previously been infected with COVID-19. As of September 2022, Omicron is the most prevalent COVID-19 variant circulating in BC, and to provide more robust protection, an adapted vaccine targeting Omicron is now available.<sup>xxiv</sup> The best resource for up-to-date information regarding Omicron in BC is the BC Centre for Disease Control.



Other variants include Epsilon, Zeta, Eta, Theta, Iota, Kappa, Lambda, and Mu. 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>xxv</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 Nov 30, 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](#). Nov 30, 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> Liu, Ying and Rocklöv, Joacim. [JTM](#). [The effective reproduction number of the Omicron variant of SARS-CoV-2 is several times relative to Delta](#). Feb 18, 2022.

<sup>ix</sup> BC Centre for Disease Control (BCCDC). [BCCDC COVID-19 Data Summary: 9 Dec 2021](#). Dec 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](#). Nov 30, 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> United Nations (UN) News. [COVID-19 Delta variant still 'most concerning', says WHO experts](#). Sept 7, 2021.

<sup>xviii</sup> UNICEF. [What you need to know about the Delta variant](#). Sept 23, 2021.

<sup>xix</sup> BCCDC. [COVID-19 Variants](#). Nov 30, 2021.

<sup>xx</sup> BC Centre for Disease Control. [COVID-19 Variants](#). Jul 15, 2022.

<sup>xxi</sup> Meredith, Sam, Towey, Robert and Smith, Elliott. [CNBC](#). [WHO labels new Covid strain, named Omicron, a 'variant of concern', citing possible increased reinfection risk](#). Nov 26, 2021

<sup>xxii</sup> BC Centre for Disease Control (BCCDC). [Weekly update on Variants of Concern \(VOC\)](#). Sept 29, 2022

<sup>xxiii</sup> Judd, Amy and Zussman, Richard. [Global](#). [Worst-case scenario: 2,000 COVID cases a day as Omicron spreads in community, B.C. officials say](#). Dec 14, 2021

<sup>xxiv</sup> BC Centre for Disease Control (BCCDC). [Weekly update on Variants of Concern \(VOC\)](#). Sept 29, 2022

<sup>xxv</sup> WHO. WHO announces simple, easy-to-say labels for SARS-CoV-2 Variants of Interest and Concern. May 31, 2021.