Nucleotide variation refers to any type of variation or difference in the DNA sequence of an organism that involves a change in one or more nucleotides. A nucleotide is a building block of DNA that consists of a sugar molecule, a phosphate group, and one of four nitrogenous bases: adenine (A), thymine (T), guanine (G), or cytosine (C).

There are several types of nucleotide variations that can occur in DNA, including single nucleotide variations (SNVs), which involve the substitution of a single nucleotide, and insertions and deletions (indels), which involve the insertion or deletion of one or more nucleotides.

Nucleotide variations can have different effects on an organism's health and susceptibility to disease. Some nucleotide variations may be benign and have no effect on health, while others can cause genetic disorders or increase the risk of certain diseases. For example, mutations in the BRCA1 and BRCA2 genes, which are involved in DNA repair, have been linked to an increased risk of breast and ovarian cancer.

Genetic testing can be used to detect nucleotide variations and provide valuable information about an individual's genetic predisposition to certain health conditions. This information can help inform medical decisions and treatment options.