

Trans Proline Affect Secondary Structure

Proline

ending in proline; with the creation of proline-proline bonds slowest of all. The exceptional conformational rigidity of proline affects the secondary structure - Proline (symbol Pro or P) is an organic acid classed as a proteinogenic amino acid (used in the biosynthesis of proteins), although it does not contain the amino group $-NH_2$ but is rather a secondary amine. The secondary amine nitrogen is in the protonated form (NH_2^+) under biological conditions, while the carboxyl group is in the deprotonated COO^- form. The "side chain" from the α carbon connects to the nitrogen forming a pyrrolidine loop, classifying it as an aliphatic amino acid. It is non-essential in humans, meaning the body can synthesize it from the non-essential amino acid L-glutamate. It is encoded by all the codons starting with CC (CCU, CCC, CCA, and CCG).

Proline is the only proteinogenic amino acid which is a secondary amine, as the nitrogen atom is attached both to the α -carbon and to a chain of three carbons that together form a five-membered ring.

Protein primary structure

acids, which cannot be cleaved by most proteases. Additionally, proline can form stable trans-isomers at the peptide bond. Additionally, the protein can undergo - Protein primary structure is the linear sequence of amino acids in a peptide or protein. By convention, the primary structure of a protein is reported starting from the amino-terminal (N) end to the carboxyl-terminal (C) end. Protein biosynthesis is most commonly performed by ribosomes in cells. Peptides can also be synthesized in the laboratory. Protein primary structures can be directly sequenced, or inferred from DNA sequences.

Structure and genome of HIV

(14–15 kDa) binds to the bulged genomic RNA stem-loop secondary structure near the 5' LTR region forming the trans-activation response element (TAR). rev (regulator - The genome and proteins of HIV (human immunodeficiency virus) have been the subject of extensive research since the discovery of the virus in 1983. "In the search for the causative agent, it was initially believed that the virus was a form of the Human T-cell leukemia virus (HTLV), which was known at the time to affect the human immune system and cause certain leukemias. However, researchers at the Pasteur Institute in Paris isolated a previously unknown and genetically distinct retrovirus in patients with AIDS which was later named HIV." Each virion comprises a viral envelope and associated matrix enclosing a capsid, which itself encloses two copies of the single-stranded RNA genome and several enzymes. The discovery of the virus itself occurred two years following the report of the first major cases of AIDS-associated illnesses.

Biomolecule

and carboxylate functionalities are attached to the same carbon, plus proline which is not actually an amino acid). Modified amino acids are sometimes - A biomolecule or biological molecule is loosely defined as a molecule produced by a living organism and essential to one or more typically biological processes. Biomolecules include large macromolecules such as proteins, carbohydrates, lipids, and nucleic acids, as well as small molecules such as vitamins and hormones. A general name for this class of material is biological materials. Biomolecules are an important element of living organisms. They are often endogenous, i.e. produced within the organism, but organisms usually also need exogenous biomolecules, for example certain nutrients, to survive.

Biomolecules and their reactions are studied in biology and its subfields of biochemistry and molecular biology. Most biomolecules are organic compounds, and just four elements—oxygen, carbon, hydrogen, and nitrogen—make up 96% of the human body's mass. But many other elements, such as the various biometals, are also present in small amounts.

The uniformity of both specific types of molecules (the biomolecules) and of certain metabolic pathways are invariant features among the wide diversity of life forms; thus these biomolecules and metabolic pathways are referred to as "biochemical universals" or "theory of material unity of the living beings", a unifying concept in biology, along with cell theory and evolution theory.

Protein folding

of the protein. Secondary structure hierarchically gives way to tertiary structure formation. Once the protein's tertiary structure is formed and stabilized - Protein folding is the physical process by which a protein, after synthesis by a ribosome as a linear chain of amino acids, changes from an unstable random coil into a more ordered three-dimensional structure. This structure permits the protein to become biologically functional or active.

The folding of many proteins begins even during the translation of the polypeptide chain. The amino acids interact with each other to produce a well-defined three-dimensional structure, known as the protein's native state. This structure is determined by the amino-acid sequence or primary structure.

The correct three-dimensional structure is essential to function, although some parts of functional proteins may remain unfolded, indicating that protein dynamics are important. Failure to fold into a native structure generally produces inactive proteins, but in some instances, misfolded proteins have modified or toxic functionality. Several neurodegenerative and other diseases are believed to result from the accumulation of amyloid fibrils formed by misfolded proteins, the infectious varieties of which are known as prions. Many allergies are caused by the incorrect folding of some proteins because the immune system does not produce the antibodies for certain protein structures.

Denaturation of proteins is a process of transition from a folded to an unfolded state. It happens in cooking, burns, proteinopathies, and other contexts. Residual structure present, if any, in the supposedly unfolded state may form a folding initiation site and guide the subsequent folding reactions.

The duration of the folding process varies dramatically depending on the protein of interest. When studied outside the cell, the slowest folding proteins require many minutes or hours to fold, primarily due to proline isomerization, and must pass through a number of intermediate states, like checkpoints, before the process is complete. On the other hand, very small single-domain proteins with lengths of up to a hundred amino acids typically fold in a single step. Time scales of milliseconds are the norm, and the fastest known protein folding reactions are complete within a few microseconds. The folding time scale of a protein depends on its size, contact order, and circuit topology.

Understanding and simulating the protein folding process has been an important challenge for computational biology since the late 1960s.

Ketimine Mannich reaction

creation of a ketimine group. Typically, this is done with a reaction with proline or another nitrogen-containing heterocycle, which control chirality with - The ketimine Mannich reaction is an asymmetric synthetic technique using differences in starting material to push a Mannich reaction to create an enantiomeric product with steric and electronic effects, through the creation of a ketimine group. Typically, this is done with a reaction with proline or another nitrogen-containing heterocycle, which control chirality with that of the catalyst. This has been theorized to be caused by the restriction of undesired (E)-isomer by preventing the ketone from accessing non-reactive tautomers. Generally, a Mannich reaction is the combination of an amine, a ketone with a α -acidic proton and aldehyde to create a condensed product in a α -addition to the ketone. This occurs through an attack on the ketone with a suitable catalytic-amine onto its electron-starved carbon, from which an imine is created. This then undergoes electrophilic addition with a compound containing an acidic proton (which is an enol). It is theoretically possible for either of the carbonyl-containing molecules to create diastereomers, but with the addition of catalysts which restrict addition as of the enamine creation, it is possible to extract a single product with limited purification steps and in some cases as reported by List et al.; practical one-pot syntheses are possible. The process of selecting a carbonyl-group gives the reaction a direct versus indirect distinction, wherein the latter case represents pre-formed products restricting the reaction's pathway and the other does not. Ketimines selects a reaction group, and circumvent a requirement for indirect pathways.

Coeliac disease

coeliac disease are the prolamins. These are storage proteins rich in proline (prol-) and glutamine (-amin) that dissolve in alcohols and are resistant - Coeliac disease (British English) or celiac disease (American English) is a long-term autoimmune disorder, primarily affecting the small intestine. Patients develop intolerance to gluten, which is present in foods such as wheat, rye, spelt and barley. Classic symptoms include gastrointestinal problems such as chronic diarrhoea, abdominal distention, malabsorption, loss of appetite, and among children failure to grow normally.

Non-classic symptoms are more common, especially in people older than two years. There may be mild or absent gastrointestinal symptoms, a wide number of symptoms involving any part of the body, or no obvious symptoms. Due to the frequency of these symptoms, coeliac disease is often considered a systemic disease, rather than a gastrointestinal condition. Coeliac disease was first described as a disease which initially presents during childhood; however, it may develop at any age. It is associated with other autoimmune diseases, such as Type 1 diabetes mellitus and Hashimoto's thyroiditis, among others.

Coeliac disease is caused by a reaction to gluten, a group of various proteins found in wheat and in other grains such as barley and rye. Moderate quantities of oats, free of contamination with other gluten-containing grains, are usually tolerated. The occurrence of problems may depend on the variety of oat. It occurs more often in people who are genetically predisposed. Upon exposure to gluten, an abnormal immune response may lead to the production of several different autoantibodies that can affect a number of different organs. In the small bowel, this causes an inflammatory reaction and may produce shortening of the villi lining the small intestine (villous atrophy). This affects the absorption of nutrients, frequently leading to anaemia.

Diagnosis is typically made by a combination of blood antibody tests and intestinal biopsies, helped by specific genetic testing. Making the diagnosis is not always straightforward. About 10% of the time, the autoantibodies in the blood are negative, and many people have only minor intestinal changes with normal villi. People may have severe symptoms and they may be investigated for years before a diagnosis is achieved. As a result of screening, the diagnosis is increasingly being made in people who have no symptoms. Evidence regarding the effects of screening, however, is currently insufficient to determine its usefulness. While the disease is caused by a permanent intolerance to gluten proteins, it is distinct from wheat allergy, which is much more rare.

The only known effective treatment is a strict lifelong gluten-free diet, which leads to recovery of the intestinal lining (mucous membrane), improves symptoms, and reduces the risk of developing complications in most people. If untreated, it may result in cancers such as intestinal lymphoma, and a slightly increased risk of early death. Rates vary between different regions of the world, from as few as 1 in 300 to as many as 1 in 40, with an average of between 1 in 100 and 1 in 170 people. It is estimated that 80% of cases remain undiagnosed, usually because of minimal or absent gastrointestinal complaints and lack of knowledge of symptoms and diagnostic criteria. Coeliac disease is slightly more common in women than in men.

Steroid

terminal "e" in the parent structure name should be elided before the vowel (the presence or absence of a number does not affect such elision). This means - A steroid is an organic compound with four fused rings (designated A, B, C, and D) arranged in a specific molecular configuration.

Steroids have two principal biological functions: as important components of cell membranes that alter membrane fluidity; and as signaling molecules. Examples include the lipid cholesterol, sex hormones estradiol and testosterone, anabolic steroids, and the anti-inflammatory corticosteroid drug dexamethasone. Hundreds of steroids are found in fungi, plants, and animals. All steroids are manufactured in cells from a sterol: cholesterol (animals), lanosterol (opisthokonts), or cycloartenol (plants). All three of these molecules are produced via cyclization of the triterpene squalene.

HIV

the introduction of an intersubunit disulphide bond and an isoleucine to proline mutation (radical replacement of an amino acid) in gp41. The so-called - The human immunodeficiency viruses (HIV) are two species of Lentivirus (a subgroup of retrovirus) that infect humans. Over time, they cause acquired immunodeficiency syndrome (AIDS), a condition in which progressive failure of the immune system allows life-threatening opportunistic infections and cancers to thrive. Without treatment, the average survival time after infection with HIV is estimated to be 9 to 11 years, depending on the HIV subtype.

In most cases, HIV is a sexually transmitted infection and occurs by contact with or transfer of blood, pre-ejaculate, semen, and vaginal fluids. Non-sexual transmission can occur from an infected mother to her infant during pregnancy, during childbirth by exposure to her blood or vaginal fluid, and through breast milk. Within these bodily fluids, HIV is present as both free virus particles and virus within infected immune cells.

Research has shown (for both same-sex and opposite-sex couples) that HIV is not contagious during sexual intercourse without a condom if the HIV-positive partner has a consistently undetectable viral load.

HIV infects vital cells in the human immune system, such as helper T cells (specifically CD4⁺ T cells), macrophages, and dendritic cells. HIV infection leads to low levels of CD4⁺ T cells through a number of mechanisms, including pyroptosis of abortively infected T cells, apoptosis of uninfected bystander cells, direct viral killing of infected cells, and killing of infected CD4⁺ T cells by CD8⁺ cytotoxic lymphocytes that recognize infected cells. When CD4⁺ T cell numbers decline below a critical level, cell-mediated immunity is lost, and the body becomes progressively more susceptible to opportunistic infections, leading to the development of AIDS.

S-Adenosyl methionine

known, to various substrates such as nucleic acids, proteins, lipids and secondary metabolites. It is made from adenosine triphosphate (ATP) and methionine - S-Adenosyl methionine (SAM), also known under the commercial names of SAME, SAM-e, or AdoMet, is a common cosubstrate involved in methyl group transfers, transsulfuration, and aminopropylation. Although these anabolic reactions occur throughout the body, most SAM is produced and consumed in the liver. More than 40 methyl transfers from SAM are known, to various substrates such as nucleic acids, proteins, lipids and secondary metabolites. It is made from adenosine triphosphate (ATP) and methionine by methionine adenosyltransferase. SAM was first discovered by Giulio Cantoni in 1952.

In bacteria, SAM is bound by the SAM riboswitch, which regulates genes involved in methionine or cysteine biosynthesis. In eukaryotic cells, SAM serves as a regulator of a variety of processes including DNA, tRNA, and rRNA methylation; immune response; amino acid metabolism; transsulfuration; and more. In plants, SAM is crucial to the biosynthesis of ethylene, an important plant hormone and signaling molecule.

SAME has been studied for depression, osteoarthritis, and liver diseases with inconclusive results, and while generally considered safe short-term, its long-term safety, use during pregnancy, and risks for people with bipolar disorder or compromised immune systems remain unclear.

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