**Oligopeptides**

**Synthetic aspartem**

Aspartame is a dipeptide obtained by formal condensation of the alpha-carboxy group of [L-aspartic acid](https://pubchem.ncbi.nlm.nih.gov/compound/L-aspartic%20acid) with the amino group of [methyl L-phenylalaninate](https://pubchem.ncbi.nlm.nih.gov/compound/methyl%20L-phenylalaninate). Commonly used as an artificial sweetener. It has a role as a sweetening agent, a nutraceutical, a micronutrient, a xenobiotic, an environmental contaminant, an apoptosis inhibitor and alkaline phosphatase inhibitor. It is a dipeptide, a carboxylic acid and a methyl ester. It derives from a [L-aspartic acid](https://pubchem.ncbi.nlm.nih.gov/compound/L-aspartic%20acid) and a [methyl L-phenylalaninate](https://pubchem.ncbi.nlm.nih.gov/compound/methyl%20L-phenylalaninate).

Aspartame is the name for an artificial, non-carbohydrate sweetener, [aspartyl-phenylalanine-1-methyl ester](https://pubchem.ncbi.nlm.nih.gov/compound/aspartyl-phenylalanine-1-methyl%20ester); i. e. , the methyl ester of the dipeptide of the amino acids [aspartic acid](https://pubchem.ncbi.nlm.nih.gov/compound/aspartic%20acid) and [phenylalanine](https://pubchem.ncbi.nlm.nih.gov/compound/phenylalanine). It is marketed under a number of trademark names, such as Equal, and [Canderel](https://pubchem.ncbi.nlm.nih.gov/compound/Canderel), and is an ingredient of approximately 6, 000 consumer foods and beverages sold worldwide. It is commonly used in diet soft drinks, and is often provided as a table condiment. It is also used in some brands of chewable vitamin supplements. Aspartame is also one of the sugar substitutes used by diabetics. Upon ingestion, aspartame breaks down into several constituent chemicals, including the naturally-occurring essential amino acid [phenylalanine](https://pubchem.ncbi.nlm.nih.gov/compound/phenylalanine) which is a health hazard to the few people born with phenylketonuria, a congenital inability to process [phenylalanine](https://pubchem.ncbi.nlm.nih.gov/compound/phenylalanine). [Aspartic acid](https://pubchem.ncbi.nlm.nih.gov/compound/Aspartic%20acid) is an amino acid commonly found in foods. Approximately 40% of aspartame(by mass) is broken down into [aspartic acid](https://pubchem.ncbi.nlm.nih.gov/compound/aspartic%20acid). Because aspartame is metabolized and absorbed very quickly (unlike [aspartic acid](https://pubchem.ncbi.nlm.nih.gov/compound/aspartic%20acid)-containing proteins in foods), it is known that aspartame could spike blood plasma levels of [aspartate](https://pubchem.ncbi.nlm.nih.gov/compound/aspartate). [Aspartic acid](https://pubchem.ncbi.nlm.nih.gov/compound/Aspartic%20acid) is in a class of chemicals known as excitotoxins. Abnormally high levels of excitotoxins have been shown in hundreds of animals studies to cause damage to areas of the brain unprotected by the blood-brain barrier and a variety of chronic diseases arising out of this neurotoxicity.



**Gramicidin**

Gramicidin is a heterogeneous mixture of six antibiotic peptides obtained from the soil bacterium *Bacillus brevis*. Gramicidin is active against most Gram-positive bacteria and against select Gram-negative organisms. Gramicidin C or S is a cyclic, ten-amino acid polypeptide and gramicidins A, B, D are linear.

Gramcidin D is a heterogeneous mixture of three antibiotic compounds, gramicidins A, B and C, making up 80%, 6%, and 14% respectively all of which are obtained from the soil bacterial species *Bacillus brevis* and called collectively gramicidin D. Gramcidins are 15 residue peptides with alternating D and L amino acids. The peptides assemble inside of the hydrophobic interior of the cellular lipid bilayer to form a β-helix. The helix itself is not long enough to span the membrane but it dimerizes to form the elongated channel needed to span the whole membrane. Gramicidin D is used primarily as a topical antibiotic and is one of the three constituents of consumer antibiotic polysporin ophthalmic solution.

Gramicidin is particularly effective against gram-positive bacteria. Because the drug is highly hemolytic, it cannot be administered internally and so is used only on the skin as a lotion or ointment. It is used primarily in the treatment of infected surface wounds, and in eye, nose, and throat infections. It is normally given with two other antibiotics (neomycin and polymixin B) as an ophthalmic solution.

Mechanism of action

Gramicidin D binds to and inserts itself into bacterial membranes (with a strong preference to gram-positive cell membranes). This results in membrane disruption and permeabilization (it acts as a channel). This leads to (i) loss of intracellular solutes (e.g., K+ and amino acids); (ii) dissipation of the transmembrane potential; (iii) inhibition of respiration; (iv) a reduction in ATP pools; and (v) inhibition of DNA, RNA, and protein synthesis, which leads to cell death.