CHEORL-HO KIM

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Biography

Dr. Cheorl-Ho Kim obtained Bachelor of Science, Biochemistry from Chung-ang University,

Master Degree obtained in Laboratory of Biochemistry, Department of Agricultural Chemistry from The University of Tokyo and

Ph.D. in Laboratory of Biochemistry, Department of Agricultural Chemistry, The University of Tokyo, Japan. Prof. Y.Maruyama (Asssistant: H. Tanigichi)

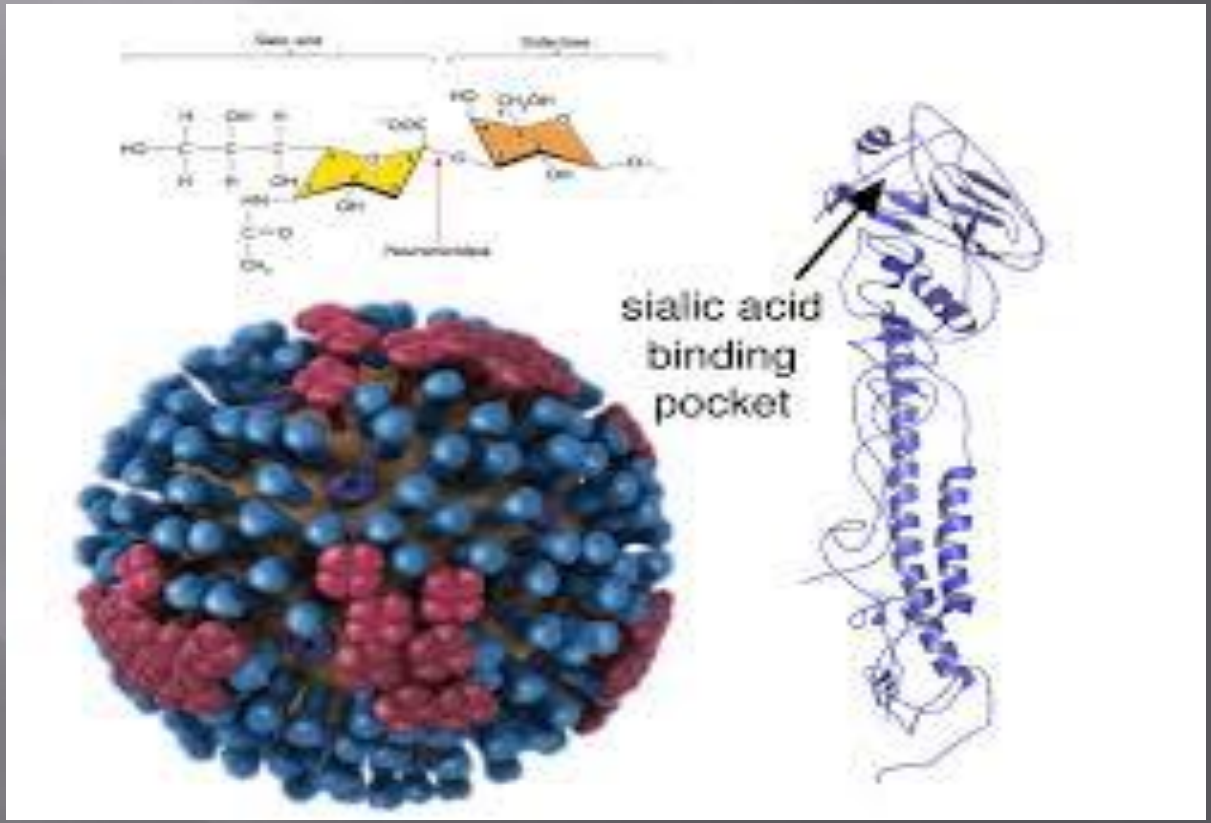
Reaseach Interest

- Sialic acid biosynthesis
- Ganglioside-Receptor interaction
- Sialyl regulation in human diseases.

Recent Publication

- Sialic Acid (N-Acetylneuraminic Acid) as the Functional Molecule for Differentiation between Animal and Plant Kingdom

Sialic Acid

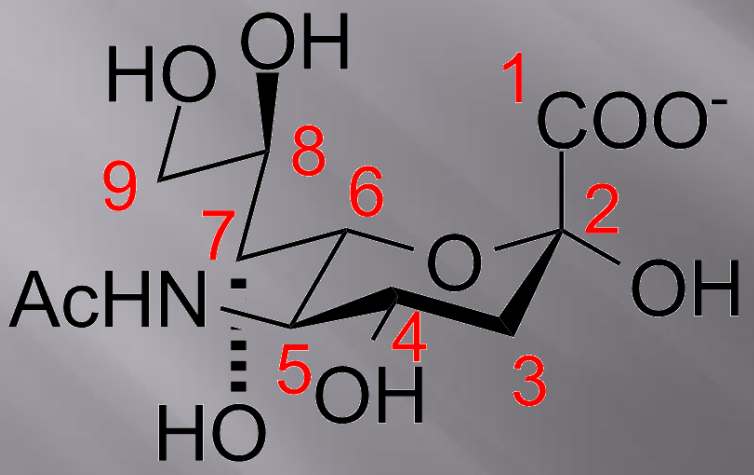


INTRODUCTION

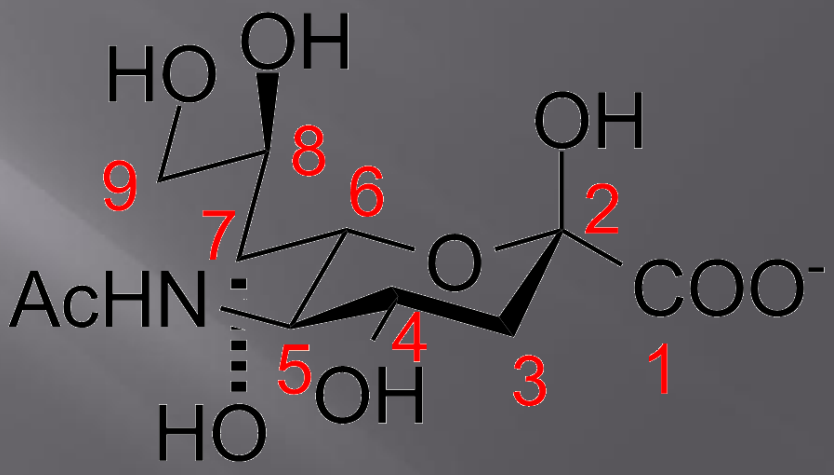
Sialic acid is a generic term for the N- or O-substituted derivatives of neuraminic acid, a monosaccharide with a nine-carbon backbone.

Sialic acids are found widely distributed in animal tissues and to a lesser extent in other organisms, ranging from plants and fungi to yeasts and bacteria, mostly in glycoproteins and gangliosides

STRUCTURE



α-anomer

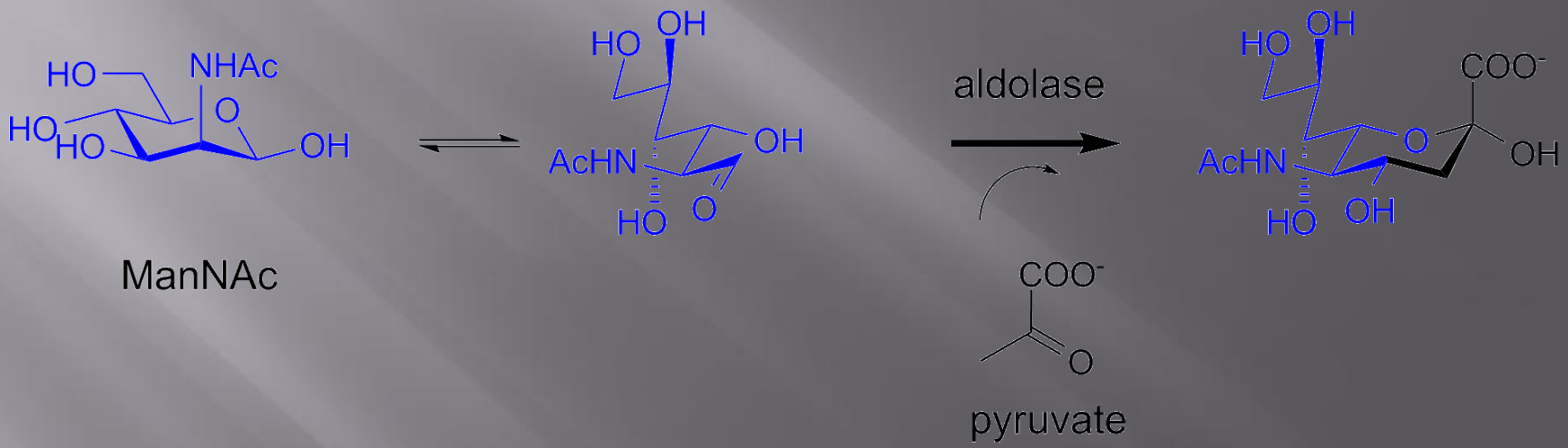


β-anomer

SIGNIFICANCE

- Fertilization (egg – sperm interaction)
- Development
- Learning / Cognitive Functions
- Immune Regulation
- Acquired Disease
  - Cancer
- Infectious Diseases
  - Viral
    - Flu
- Bacterial
  - Meningitis

BIOSYNTHESIS



METABOLISM

The synthesis and degradation of sialic acid are distributed in different compartments of the cell. The synthesis starts in the cytosol, where N-acetylmannosamine 6 phosphate and phosphoenolpyruvate give rise to sialic acid. Later on, Neu5Ac 9 phosphate is activated in the nucleus by a cytidine monophosphate (CMP) residue through CMP-Neu5Ac synthase. Although the linkage between sialic acid and other compounds tends to be a α binding, this specific one is the only one that is a β linkage.

CMP-Neu5Ac is then transported to the endoplasmic reticulum or the Golgi apparatus, where it can be transferred to an oligosaccharide chain, becoming a new glycoconjugate. This bond can be modified by O-acetylation or O-methylation. When the glycoconjugate is mature it is transported to the cell surface.

The sialidase is one of the most important enzymes of the sialic acid catabolism. It can cause the removal of sialic acid residues from the cell surface or serum sialoglycoconjugates.

Usually, in higher animals, the glycoconjugates that are prone to be degraded are captured by endocytosis. After the fusion of the late endosome with the lysosome, lysosomal sialidases remove sialic acid residues. The activity of these sialidases is based on the removal of O-acetyl groups.

Free sialic acid molecules are transported to the cytosol through the membrane of the lysosome. There, they can be recycled and activated again to form another nascent glycoconjugate molecule in the Golgi apparatus.

Sialic acids can also be degraded to acylmannosamine and pyruvate with the cytosolic enzyme acylneuraminate lyase.

Some severe diseases can depend on the presence or absence of some enzymes related to the sialic acid metabolism. Sialidosis would be an example of this type of disorder

DISEASES

- Sialic acids are related to some diseases observed in humans.

Salla disease:

- Salla disease is an extremely rare illness which is considered the mildest form of the free sialic acid accumulation disorders though its childhood form is considered an aggressive variant and people who suffer from it have mental retardation.

Sialic acid and influenza virus:

When a certain influenza A virus is recognized by a sialic acid receptor the cell tends to endocytose the virus so the cell become infected.

SIALIC ACID AND IMMUNITY

Sialic acids are found at all cell surfaces of vertebrates and some invertebrates, and also at certain bacteria that interact with vertebrates.

Many viruses and some bacteria use host-sialylated structures as targets for binding and recognition. Viruses that bind Sia via a hemagglutinin, usually express a sialidase (neuraminidase) that catalyzes the hydrolysis of the terminal sialic acids of host cell receptors and confers virulence for the newly formed virions

Glycobiology Related Journals

- Journal of Glycomics and Lipidomics
- Pharmacogenomics & Pharmacoproteomics
- Fungal Genomics & Biology

Related Conference

- *3rd International Conference on Functional and Comparative Genomics & Pharmacogenomics*

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