



Glycoscience: A New Perspective on Life Processes

Glycoscience—scientific research on glycoconjugates—and the study of the human genome are converging in a new synergy that is accelerating understanding of life processes and diseases. Seikagaku is applying this knowledge to the development of novel clinical applications.

Glycoconjugates perform vital functions in biological processes

When we think about life processes, there is tendency to focus solely on genes and proteins. Yet, as we learn more about DNA, the “blueprint” of life, our attention is increasingly drawn to sugar chains, which were previously seen just as supporting actors in the life drama.

Proteins are synthesized according to information encoded in our DNA blueprints. Sugar chains, which are added to about one-half of the proteins synthesized in animal cells, help to enhance and diversify the functions of those proteins. Sugar chains are also linked to lipids to form glycolipids. These are widely distributed over the surface of cells and are thought to play roles in the exchange of information between cells.

Recent advances in glycoscience have shown that glycoconjugates perform specific functions at all stages of biological development, including the creation of life, fetal development and the generation and restoration of internal organ functions. It is generally accepted that many of the glycoconjugates produced throughout the body help to organize life processes through the exchange of information and substances.

There is definite interest in the role of glycoconjugates in diseases. It is thought that these sugar chains are directly involved in many conditions, including viral and bacterial infections, immunological diseases, and

lifestyle-related diseases, as well as the onset and metastasis of cancer. For example, some pathogens such as influenza virus and a pathogenic strain of *E. coli*, O157, invade the body by binding to specific sugar chains on the cell surface. Furthermore, sugar-chain structures change when cells become cancerous, facilitating the growth and metastasis of cancers.

Because sugar chains determine the blood group of every human being, they are also profoundly involved in compatibility issues relating to blood transfusion and organ transplantation.

By studying the structures and functions of sugar chains involved in diseases, we can increase our understanding of their roles and effects. Such work is expected to lead to the development of revolutionary therapies and diagnostic methods based on applications of sugar chains and the genetics of sugar chains.

From birth to aging, glycoconjugates are profoundly involved in fundamental biological processes, including both normal and the abnormal disease conditions. A fundamental understanding of glycoconjugates is vital to the future development of the health industry.

As a pioneer in glycoscience research, Seikagaku continues to contribute to improvement in the quality of life by developing new drugs in this field. The outcome of these efforts will provide the key to our future growth and success.

Social Contribution through Glycoscience Research Support

Glycoforum is a non-profit website through which we distribute our latest research findings on glycoscience developments by publishing original papers and commentary by key researchers in the field. Established by Seikagaku in 1997, Glycoforum has attracted the interest of researchers throughout the world, receiving about 1 million visitors in 2007. Visit www.glycoforum.gr.jp

The Mizutani Foundation for Glycoscience was endowed by Masakane Mizutani, founder and Honorary Chairman of Seikagaku Corp. The foundation promotes original glycoscience research in Japan and overseas through an active grant program, supports international exchange and hosts glycoscience conferences. Seikagaku strongly backs the foundation’s efforts to advance glycoscience in all its efforts. See www.mizutanifdn.or.jp