Glycoscience
The New Frontier of Medicine

Glycobiology explains that cellular communication is the key to all life.
Glycoscience is an interdisciplinary science which aims to understand the structure and function of glycans and how they can be used. Glycobiology is a foundational branch of glycoscience that studies the essential sugars that are the building blocks of glycoforms.

Glycans are links of specific sugar molecules:
DNA and proteins are formed by template, while glycans are formed more from environmental influences. The cell's environmental factors contribute to each unique glycan design, as varied as fingerprints. These known and unknown factors provide each glycan with properties that are more complex. This makes them more difficult to study and duplicate than genes.

Glycoproteins are links of specific sugar and protein molecules:
Specific glycans are attached to specific proteins. Structure and function are influenced by the DNA and cell environmental needs.

Glycolipids are links of specific sugar and lipid molecules:
Glycolipids provide cellular recognition and energy to help maintain membrane stability which enables cells to attach to other cells to form tissue. Lipids contain hydrocarbons and are the cellular building blocks for structure and function. Glycolipids are composed mostly of non-protein cell membrane.
Using your DNA as the blueprint, a few trillion new cells are manufactured in the body every day. When the OS of your computer becomes corrupted, your computer becomes dysfunctional. Likewise, when the OS of your body becomes faulty, your DNA processes errors that produce corrupted unhealthy cells.

The Language of Life

Glycobiology has opened our understanding to the function of biological sugars that are used in the construction, maintenance and repair of your body’s operating system. Indeed, it is the highly functional biological sugars that are responsible for communication between all the cells of your body. This is in stark contrast to simple table sugars that hinder healthy cellular signals.

The study of these essential sugars is Glycobiology (glyco is Greek for sugar). Glycans formed by these special sugars give us life and intelligence. We call them “Smart Sugars.” Some 800,000 antenna-like sugar transceivers sugar coat each healthy human cell like fuzz on a peach. These transceivers are constructed from mannose, fucose, galactose, xylose, N-acetylglucosamine, glucose, and variations of other specific Smart Sugars.

Each transceiver is a glycan or glycoprotein. A glycan is a tiny tree-like structure of different sugars linked together. A glycoprotein is made of sugar and protein links. Without an abundance of healthy glycans, the cell cannot live or communicate properly.

You started communicating even before you were conceived and here’s proof. In the beginning, you were a cell; yes, you were two cells. The sperm from the father and egg from the mother were coated with a communication system. They came into agreement when the sperm impregnated the egg. The two cells became one. Signals from the egg were immediately switched to a new message proclaiming to other sperm, “Leave me alone. It’s too late - I’m taken.” The two cells became one... a stem cell. Your life began.

Your original stem cell began to divide and manufacture more stem cells and produce differential cells to create every organ and designated part of your body.

Operating System

The wonders of your first stem cell contained your complete blueprint from all your ancestors back to the first couple. The RNA confirms that one woman was the mother of the human race. The operating systems of super computers cannot compare to the complexity of design of the operating system (OS) of your body.
**Smart Sugars Abundant in Mother’s Breast Milk**

Smart Sugars are abundant in mother’s breast milk and are essential for a healthy start in life. These special sugars orchestrate the construction of every detail of new life. They are the building blocks for prenatal and postnatal development. The nursing mother provides colostrum and milk loaded with Smart Sugar nutrients to supply her baby with a balanced and modulated immune system. Smart Sugars directly affect the immune system, and immunology plays a major role in repairing, recovering and prevention. The quality of the baby’s immune system determines the quality of the health and natural mental and motor abilities throughout adult life.

Multiple studies verify that children who receive mother’s milk are smarter and healthier. Harvard University published a paper in 2013 that concludes that children who nurse for twelve months have a four point IQ advantage over children who nurse for only six months.

**Smart Sugars and Blood**

Life is in the blood and your blood is unique to you. There are four basic blood types: A, B, AB and O. Each blood type is determined by how precisely the Smart Sugars are arranged on the surface of the cells. Just one sugar differentiates the blood types. That one sugar has the power to determine life or death. If Type A blood is transfused into a Type B individual, the sugar structures on the surface of the immune cells identify that one sugar as different and signals that a foreign agent is in the blood. These Smart Sugar structures instruct the immune cells to destroy all the intruder blood cells which can result in the recipient’s death.

However, Type O blood, the universal blood donor, can often be safely transfused to all blood types because all four of its sugars are recognized by the defense cells and are accepted. Type AB blood is called the universal blood receiver because it has both the A and B sugar patterns which are recognized and deemed acceptable. [This simplistic explanation of blood type does not cover the + and – factors that involve an additional protein.]

**Blood Mobility**

Life is in the blood, nourishing all cells. When red blood cells have a high population of glycans they also have greater flow mobility. Glycans make the cells slippier and able to travel more easily though our ~100,000 miles of blood vessels. This lubricating factor alone improves health. Unrestricted mobility provides a healthier cardiovascular system that can deliver Smart Sugars and other nutrients to the cells. This lubrication is especially needed in the finest of capillaries where blood flow is restricted to the width of a single blood cell.

**Cell Regeneration**

You are a new person every seven to ten years. Glycobiology has taught us that stem cells orchestrate signaling for cell regeneration. As stem cells mature, glycan expressions are made ready to direct damage control of tissue and complete their designed tasks. The sugar Trehalose can be used in tissue engineering because it strengthens the cell membrane and assists in proper folding of the proteins. Other Smart Sugars aid in neural regeneration and repair.

The regeneration timeline for different parts of the human body varies depending on the immune system and apoptosis (genetically programmed cell death) for regeneration of various cells and organs. Bone marrow and sinew regenerate more rapidly than the bone. Oxygen, calcium and other minerals availability for bone matrix and cartilage also alter the speed of regeneration.

Red blood cells live for about four months. White blood cells normally live more than a year. Your skin cells live two to three weeks. Colon cells die off after about four days. Sperm cells have a short life span of about three days while brain cells typically last the
Early on in my studies, I was fascinated by a significant example of false communication that causes so much havoc in the human body: the virus. The virus is a key counterfeiter. A single virus is a tiny evil commando that appears dead. It does not eat, secrete, or propel itself. It is unable to reproduce without the aid of a living cell.

Both DNA and RNA viruses are intracellular parasites that implement their evil plans by communicating false information to the cell. The message is, “Don’t reproduce yourself; reproduce me, here is my code.”

Viruses seize key positions on the surface of cells. Some viruses attack and disable their victims with cruel speed, while other viruses take years to harm their host. A virus, as in guerrilla warfare, lies in wait for a more opportune time to attack when your immune defenses are lowered.

Faulty and False Communication

When our cells have an abundance of healthy glycans coating the cellular transceivers, things work more effectively in the body. Simply stated, when we don’t, things go awry. We now know from the study of Glycoscience that every ailment, every disease, all sickness is the result of faulty communication. Even a split second of non-communication or faulty communication during a baby’s nine month gestation period can cause spina bifida deformities.

Faulty signals can render your immune system dysfunctional. It may become weak and ineffective, or confused and attack your own body’s cells as an autoimmune disease. Autoimmune and degenerative diseases involve missing sugars on the cell’s surface.

The above graphic of glycans/glycoproteins indicate the folding of sugars and proteins. Proper folding provides the human body with good neurological function for mental and motor skills. Misfolding is the cause for neurological dysfunction. Research shows that the sugar Trehalose is beneficial in proper folding of proteins.
earlier times. This leaves us with missing or poor quality glycans. The concept that ingesting sugars from food has a role in cell communication, was once considered impossible. Sugars were once believed to provide energy only. As recently as the 1990s, the reality that health benefits could be obtained from consuming Smart Sugars was rejected by some scientists since no controlled clinical trials had been conducted. Health benefits of certain sugars have been confirmed in history for thousands of years without knowing they were Smart Sugars.

In 2011, Dr. John Axford, past president of the Royal Society of Medicine, conducted an open label study to increase the quality and quantity of the glycans on our cells called glycosylation.

Glycosylation, Once Scoffed - Now Proven
The food supply of earlier generations naturally contained enough of the Smart Sugars that our bodies could manufacture the important sugars that were missing. Sadly, the farming methods of today, depletion of the soil, green harvesting of fruits and vegetables, and over processing food, have resulted in food sources with little nutrition of earlier times. This leaves us with missing or poor quality glycans. The concept that ingesting sugars from food has a role in cell communication, was once considered impossible. Sugars were once believed to provide energy only. As recently as the 1990s, the reality that health benefits could be obtained from consuming Smart Sugars was rejected by some scientists since no controlled clinical trials had been conducted. Health benefits of certain sugars have been confirmed in history for thousands of years without knowing they were Smart Sugars.

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The Good NEWS
The good news is that understanding and then implementing what Glycoscience is teaching us, will give us better cellular communication and therefore improved health and quality of life. To increase the quality and quantity of the glycans on our cells is called glycosylation.

Improving Glycosylation
Optimal glycosylation provides excellent communication which can prevent harmful bacteria and viruses from having a docking station on the surface of the cell. Furthermore, identification of the foreign foe is transmitted to the immune cells which attack, disable and carry them out of the body as trash. In addition, instructions are given to produce specific stem cells to protect, maintain and repair specific organs. We have discovered that integrating natural specific sugar supplementation into daily consumption of food will increase glycosylation of cells.

Quality and quantity of Smart Sugars in the blood can be evaluated.
Glycoscience Is The Road Map for the Future
The top scientific governmental body in Washington, DC, the National Academy of Sciences, is made up of Nobel Prize winners or those nominated by Nobel Prize winners. This distinguished community appointed a panel to publish the 200 page report Transforming Glycoscience - A Road Map for the Future. Here, they went on record in 2012 stating that: “Glycans impact the structure/function of every living cell in humans, animals, and plants.” The Academy expanded on the importance of the sugars saying: “Glycans play roles in almost every biological process and are involved in every major disease” and “Elimination of any single class of glycans from an organism results in death.”

To bring Glycoscience from the recently little known into the mainstream, Transforming Glycoscience recommends that all university and high school science departments teach Glycoscience. The National Academies - National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council - consider this science so important that their 10 year goal includes, “integrating Glycoscience into relevant disciplines in high school, undergraduate and graduate education, and developing curricula and standardized testing for science competency which would increase public as well as professional awareness.”

Glycoscience's disruptive technology will forever change our medical system. The future of medicine will include cell regeneration, neurodegenerative repair, development and proliferation of stem cells, and tissue regeneration.

Traditional vs. Functional Medicine
Pharmaceutical companies realize there are big profits to be made utilizing the science of Glycobiology to develop new drugs. They are spending billions of dollars to synthesize the sugars believing the drugs will work better. In the future, in the traditional mode, most medical professionals will be educated by the drug companies on why they should be prescribing these drugs for their patients. Functional medicine is the medical practice or treatments that focus on optimal function of the body and its organs, treating the whole system, not just symptoms, usually involving natural complementary approaches.

GlycoScience Institute foresees Functional Medical physicians will use advanced Glycoscience Diagnostics, to evaluate a patient's glycans that forecast what the patient's health will be years in advance. These diagnostics will guide clinics to understand what Smart Sugars are needed.

GlycoScience Institute teaches that Glycobiology helps people of all ages be healthier by improving the quality of the body's cellular communication system by increasing the number of glycans naturally.
“Let food be thy medicine and medicine be thy food” and
“Primum non nocerum.” (First, do no harm) c. 460 BC - c. 375 BC

Sources, References and Class Schedules
http://GlycoScienceInstitute.com
View and purchase the Glycoscience Whitepaper Revised
@ http://glycosciencewhitepaper.com
Workbook with completion certificate, also available.

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GlycoScience Institute
17150 Butte Creek Road • Suite 125 • Houston, Texas 77090
Phone: (281) 587-2020

GlycoScience Institute promotes the values of the Father of Medicine, Hippocrates.

The mission of the GlycoScience Institute is to offer health-care professionals and the general public certified education via classroom and/or on-line training in Glycoscience.

For more information contact: