Your Gut Has Its Own Brain (And It Talks to Yours) Transcript

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Digestive System Overview

Hey everybody, I want to talk to you about the remarkable engineering of your digestive system. Every time you eat a meal, an extraordinary series of coordinated events takes place inside your body.

As you know, your teeth break food down into smaller pieces. Your salivary glands release some specialized enzymes as well as fluid. Muscles move the food from your esophagus towards your stomach where acid and enzymes help process it.

Your pancreas, liver, and gallbladder supply substances needed for next stages of digestion and then your intestines absorb the nutrients and prepare waste products for elimination.

Each part has a specialized role and each must communicate and cooperate with the others. The right substances must be released into the right locations.

Muscles must move food at an appropriate pace. and protective barriers must keep digestive secretions from damaging your tissues. Also, communication systems must adjust these activities to the meal you have just consumed.

This is the remarkable engineering of your digestive system. In my book, Ultimate Healing, I explore the engineering in the human body and explain how our understanding of these systems can help support health and healing.

I get into detail on the digestive system with a whole chapter on digestive health. You can get excerpts from the book at ultimatehealthandhealing.net.

Looking at how the body was designed or engineered is helpful for you as you learn from experts in this leaky gut and whole body health summit. The natural healing techniques given by experts in the summit work with the engineered healing systems of the body.

Cells, DNA, and Biological Information

After more than 30 years in clinical practice, I continue to be amazed by the organization of digestive tract, something we must do every day, eat food and digest and absorb it.

It depends on layers of activity that most people never consider. Again, your stomach must produce acid and enzymes while protecting its own lining. Your small intestine must absorb nutrients while maintaining a protective barrier.

Digestive muscles must mix and move food while nerves and chemical messengers coordinate the timing. These systems balance several requirements at once.

processing, protection, transport, and control. But to appreciate this engineering, we need to look more closely. Every digestive organ is made of tissues, And those tissues are made up of specialized cells.

For example, some stomach cells produce hydrochloric acid. Others produce protective mucus. Pancreatic cells manufacture digestive enzymes. Intestinal cells must absorb nutrients.

Other cells release chemical messengers that coordinate digestion and appetite. Inside each of these cells is another remarkable level of organization.

A living cell takes in raw materials, converts energy into usable forms, manufactures proteins, transports substances, communicates with neighboring cells, and manages waste.

For example, a pancreatic cell must manufacture digestive enzymes, process and package them, release them in response to appropriate signals. An intestinal cell must move nutrients across a living barrier while maintaining its own structure and its connections with surrounding cells.

These activities require energy, specialized machinery, and continuous regulation. Now let's look deeper still at DNA. DNA stores genetic instructions that cells use to manufacture proteins and regulate your activities.

It's information encoded in the sequence of four chemical building blocks, represented by the letters A, T, C, and G. The order of these building block matters, it really is a language system, so the order matters.

Much of the Order of Letters determines the meaning of a sentence. This sequence DNA helps to determine the biological instructions available to a cell.

But storing instructions is only the beginning. A cell must access and use them. When a cell makes a protein, for example, information from a gene is copied into messenger RNA.

Molecular structures or machines called ribosomes read that message and assemble amino acids into a proteins. That protein might become a digestive enzyme, a transporter that moves nutrients, or a receptor that detects a chemical signal.

The cell needs instructions and the machinery to read them, to build materials, use energy and have a regulatory effect.

Mouth, Swallowing, and the Stomach

Most of your nucleated cells contain essentially the same DNA, yet a stomach cell and an intestinal cell perform different jobs because they use different combinations of those instructions.

DNA is also carefully packaged and access to its information is regulated. Specialized enzymes help correct many copying errors, while other mechanisms repair certain types of DNA damage.

So the engineering extends across multiple levels, genetic information, molecular machines, specialized cells, organized tissues and cooperating organs.

Let's see how these levels work together beginning with your mouth. Your teeth have different shapes that allow them to bite, tear and grind food. your jaw muscles supply the force while your tongue positions the food and mixes it with saliva.

Breaking food into smaller pieces increases the surface area available to digestive enzymes. Your salivary glands release fluid that moistens and lubricates the food.

Saliva also contains amylase, an enzyme that begins breaking down starch. Even before you take a bite, the sight, smell, or anticipation of food can help activate brain pathways to help you prepare your digestive system.

Your brain is already communicating with your digestive organs. Then comes swallowing. Swallow requires a carefully timed sequence of muscular movements that directs food into the esophagus while protecting your airway.

Once food enters the oesophagus, coordinated waves of muscle contraction move it toward the stomach. These waves are called peristalsis. Muscular sphincters help control passage between the regions.

The lower esophageal sphincter allows swallowed material into the stomach and helps prevent stomach contents from flowing backward. This is an important engineering feature, controlled boundaries between compartments.

Your stomach is expandable muscular chamber that stores food, mixes it, and begins important stages of chemical digestion. Its muscular walls churn the meal and combine with gastric secretions.

Specialized cells produce hypochoric acid. Other cells release pepsinogen, which is converted into the protein digestive enzyme Pepsin in the acidic environment.

The acid helps unfold proteins and supports Pepsin's activity. It also helps to defend against many myphoorganisms that enter with food. But how does your stomach protect itself?

While a mucus layer covers its surface, bicarbonate also helps to maintain a less acidic environment immediately next to the lining. Connections between cells and adequate blood supply and tissue repair must provide additional protection.

The stomach must maintain conditions that support digestion while protecting its own tissue. It also produces intrinsic factor, a protein needed for efficient vitamin B12 absorption farther along in the small intestine.

A substance made in one organ supports nutrient absorption later, at another location. The stomach then gradually releases its contents into the duodenum, the first part of the small intestine.

Now this is where communication between digestive organs becomes especially impressive. When acidic contents arrive in the Duodenium, specialized intestinal cells release a hormone called secretive.

Hormonal Control of Digestion

Secretin signals the pancreas to release bicarbonate-rich fluid. The bcarbonate helps neutralize the incoming acid. This is how the sequence goes, the intestine detects a change, releases a signal, and another organ responds with the substance needed to correct the conditions.

That is a biological feedback system, highly engineered. Fat and protein entering the small intestine also stimulate the release of a hormone called CCK.

Now Cck helps stimulate pancreatic enzyme secretion and causes the gallbladder to contract, delivering bile into the intestine. It also participates in slowing stomach emption helping prevent the intestine from receiving more material than it can effectively handle.

Hey, one second. If you're looking for help with any type of health issue, I've put together a line of doctor grade supplements that I formulated myself.

They're the same formulas I use with my patients. Click the link below to check them out. Okay, back to the video. The intestine is therefore helping coordinate the stomach, pancreas and gallbladder.

For example, the pancreates supplies different enzymes for different foods. Amylase helps to digest starch, proteases help digest proteins, and lipase help to digests fats.

Many pancreatic protein digestive enzymes are produced in an inactive form and then are activated after reaching the intestine, helping to protect the tissues that produce them.

The liver produces bile and the gallbladder stores and concentrates it. Bile helps disperse dietary fats into smaller droplets and supports fat absorption.

It also helps your body absorb the fat soluble nutrients, vitamins A, D, E, and K. Successful digestion requires the right chemical tools delivered at the time under suitable conditions.

Consider the size and structure of your small intestine. Despite its name, it's the longest part of the digestive tract. Often adult length is about 20 to 22 feet in length, although the actual measurement varies between different

people.

It's called small because of its narrow diameter compared with the large intestine. Its inner surface contains folds covered with tiny finger-like projections called villi.

The cells covering those villii even have smaller projections, called microvilli.

Small Intestine Absorption and Barrier Function

These structures greatly increase the surface available for digestion and absorption. Amazingly, the small intestine surface area is about one and a half to two tennis courts in size.

This large surface is packed into the body through an extraordinary arrangement of loops, folds, and microscopic projections. But surface the area alone is not enough.

The intestine must regulate what crosses it. glucose, amino acid minerals and other nutrients use specialized transport pathways. Most absorbed sugars amino acids enter blood vessels and travel first to the liver through the portal circulation.

The liver then helps process, store and distribute those nutrients. Much of the absorbed dietary fat follows a different route entering the lymphatic system before reaching the bloodstream.

Different nutrients require different handling. At the same time, the intestinal lining must maintain a protective barrier. Connections between neighboring cells help regulate passage between them.

And this working surface requires continual renewal. Stem cells within intestinial crypts generate replacement cells that replenish the lining as older cells are shed.

Your body maintains or renews a surface exposed to food, microorganisms, digestive secretions, and mechanical forces all while digestion continues. Now let's examine communication between your digestive organs and your brain.

Your digestive tract contains its own extensive network of nerves called the enteric nervous system. This network coordinates many local activities including muscular movement and secretions.

It can organize important digestive responses without requiring a conscious instruction from your mind, but also communicates with the brain and spinal cord.

The vagus nerve is one major pathway. Other nerve pathways contribute as well. Signals from the gut provide information about stretching, nutrients, and the condition of digestive tissues.

This is an engineered two-way conversation. For example, when your stomach expands after a meal, sensory pathways help communicate that information to the brain.

Intestinal hormones also contribute to signals about fullness and incoming nutrients. GLP-1 is one of those hormones that you've heard about. It participates in regulating insulin release, appetite, and stomach emptying.

Now many people recognize GLp- 1 because certain medications used for weight act on the same receptor system.

Gut-Brain Communication and the Microbiome

But the underlying communication pathway is part of your body's own physiology. The brain also affects the gut. Stress can change the digestive movement, secretions, and the way intestinal sensations are experienced.

This helps explain why some people may feel nauseated before a stressful event or develop an urgent need for

bowel movement. There are physical responses involving nerves and chemical signals.

Now the same communication network also helps coordinate ordinary digestion when you're relaxed at eating. Your digestive tract also contains substantial immune tissue.

It must respond appropriately to harmful organisms while maintaining tolerance toward food and the microbes that normally live there. That brings us to the microbiome and another fascinating layer of communication.

Trillions of microorganisms inhabit your digestive tract, especially the large intestine. Many help process food components that your own enzymes cannot fully digest.

For example, certain microbes ferment dietary fiber and produce short-chain fatty acids. These compounds can support intestinal cells and participate in signaling.

Researchers use the term microbiota, gut, brain access to describe the interactions amongst these microorganisms, the gut and the brain. How can microbes living in your intestine influence something happening in the your brain?

Well, there are several routes. Microbial products can interact with intestinal cells that release hormones or activate nearby nerve pathways. Microbes also influence immune activity.

Immune signals can, in turn, affect communication between the body and the brain. Now some microbial metabolites enter the circulation, providing another potential route through which activity in the gut can influence distant tissues.

Again, the vagus nerve is one important part of this network, but it's not the only pathway. More recent research has identified additional ways that microbio products can trigger signals from intestinal sensory cells to the brain.

Now communication also runs in the other direction. Brain driven changes in gut movement secretions and stress responses can change the environment in which microbes live.

So the brain influences the gut environment and activity within that environment can contribute to signals returning to the This helps us appreciate why digestive health and nervous system function are so highly connected, while recognizing that researchers are still determining which microbiome interventions reliably benefit people.

Now let's move on to the large intestine. The adult large intestines is approximately 5 feet long. It's shorter than the small intestine, but much wider.

Its internal mucosal surface area has been estimated at about 22 square feet.

Large Intestine and Elimination

Unlike the small intestine, the colon does not have billite. Its lining has other microscopic structures, including crypts and microbillite, that contribute to its working surface.

Here in the large intestine it recovers remaining water and electrolytes and forms stool as major functions. Most fluid absorption has already occurred in the small intestine, but the colon is designed so that it provides an important final stage of water conservation.

It also houses much of the intestinal microbial community where fermentation of remaining food components continues. The appendix contains immune tissue and may help provide a protected reservoir for beneficial flora.

Meanwhile, circular and longitudinal muscle layers coordinate movements that mix and propel intestinal contents. Finally, the rectum stores stool and signals when elimination is needed.

Involuntary and voluntary sphincter muscles with nerves and pelvic floor muscles control the passage of stool. Even this final stage requires precise communication and coordination.

Now consider everything your digestive system has accomplished. It has broken down food, adjusted chemical conditions, delivered enzymes and bile, absorbed nutrients, conserved water and eliminated waste.

it also has maintained protective barriers, renewed its own tissues, coordinated immune defenses and exchanged information with the brain. and the microorganisms living within it have contributed their own metabolic activity and signals.

This is why I encourage people to think about digestive health as a function of an interconnected system. When symptoms develop, we need to ask which functions are affected and what is interfering with them.

Digestive Health Takeaways

For example, bloating does not identify a single cause. Reflux requires us to consider why stomach contents are moving backwards. Constipation can involve stool consistency, intestinal movement, or the coordination of elimination.

In my practice, I want to understand the underlying contributors so we can choose an appropriate approach for the individual. And that's what the experts in this summit are providing for you.

The body's regulatory and repair systems are remarkable, but they have limits. Disease and other stressors can sometimes overwhelm them and medical treatment may be necessary.

Understanding normal function gives us a better foundation for supporting health. The next time you eat, consider how much coordination is required for that meal to nourish you.

From DNA inside a cell to signals passing between organs, the brain and the micro-wild, digestion depends on an extraordinary level of organization. Now I explore these connections throughout my new book, Ultimate Health and Healing, and you can get excerpts at ultimatehealthandhealing.net for free.

Well, thank you for joining me as we explore the remarkable engineering of your digestive system.