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Mission is to provide accurate information to patients; increase awareness to the public and medical community about *Digestive Motility Diseases*; and facilitate the search for a cure.



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Diabetes & Gastroparesis

Neuropathy of the
Stomach ?

This pamphlet is one in a series discussing symptoms and symptom management for patients living with **Digestive Motility Diseases**.

**Food Suggestions and Tips for
People who have Gastroparesis and Diabetes Mellitus**

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Tables and recipes provided by: **University of Virginia Health System,
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Gastroparesis can be a very confusing, and frustrating digestive illness.

This booklet has been written to provide you and your family with more information regarding diet suggestions.

It is strongly recommended and advised that you obtain professional guidance to help tailor an approach which best meets your individual medical needs and dietary requirements.

For further information about Gastroparesis and motility disorder, visit:
< www.digestivedistress.com >

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Diabetic Gastroparesis

Gastroparesis, is characterized by “delayed gastric emptying” where food in the stomach is not properly processed and pumped out due to weakened or paralyzed muscular activity (motility). Consequently, food sits for hours in a distended stomach.

Gastroparesis, as a complication of diabetes, was first recognized in 1945 and by 1958 the term “Gastroparesis diabeticorum” came into common use to describe the disorder. The primary cause for diabetic Gastroparesis is thought to be related to “autonomic neuropathy.”

Diabetic Neuropathies can cause Gastroparesis

Neuropathy means ‘nerve damage’ and many diabetics are familiar with the numbness, tingling, and burning pain, or weakness in their hands, arms, feet and legs which is the hallmark of “**peripheral**” neuropathy. But there is another form of neuropathy that can be more difficult to identify because it attacks the nerves which control organ and glandular systems; short-circuiting bodily functions, rather than causing an overt focal pain. This neuropathy is called: “**autonomic neuropathy**” and is believed to be the main cause of diabetic Gastroparesis. Autonomic is used to describe a branch of the nervous system that functions automatically without our conscious awareness or control. Examples are; sweating, blood pressure regulation, bladder function and digestion. Chronic blood sugar fluctuations are believed to cause this nerve damage.

In the autonomic nervous system, the ‘master’ nerve of the gut is the vagus nerve. The vagus nerve helps to control the movement of food throughout the digestive tract.

If the vagus nerve becomes damaged from diabetes, then the muscles of the stomach and intestines receive disordered communication, resulting in erratic or sluggish movement of food through the digestive tract.

Autonomic neuropathy can occur in 20-40% of Type I diabetics and approximately 26% of Type II diabetics. Many diabetics are not familiar with this type of neuropathy. Maintaining safe blood glucose levels helps protect nerves and the progression of neuropathies.

Autonomic Neuropathy

In addition to affecting the stomach (Gastroparesis), autonomic neuropathy can cause disorders in other systems, such as:

- ~**Digestive tract**, nerve damage in the esophagus resulting in difficult swallowing, and problems in the colon causing constipation alternating with diarrhea, especially in the night resulting in fecal incontinence.
- ~**Urinary system**, leading to difficulty with fully emptying the bladder or loss of sensation that the bladder is ‘full.’ This can lead to bladder infections.
- ~**Sweating** abnormalities are also a problem causing profuse night sweats or profuse sweating while eating.
- ~**Heart rate and Blood pressure regulation** -- damage to this system can create a heart rate that stays high and blood pressure that can drop dramatically with position changes leading to light-headedness or fainting.
- ~**Sex organs**, problems with erection and or ejaculation can result for men, and women may experience difficulty with: sexual response, lubrication, as well as orgasm.
- ~**Vision** -- the autonomic nerves of the eye that control pupil dilation may be affected, resulting in visual disturbances with sudden changes in light, or difficulty with night driving.

Autonomic Nervous System abnormalities are also found in association with “Idiopathic” Gastroparesis. Idiopathic is a medical term meaning ‘unknown cause.’

⇒ **Tight control of blood glucose levels can halt the progression of autonomic neuropathy, and perhaps even reverse the damage.**

Loss of hypoglycemic (low blood sugar) awareness.

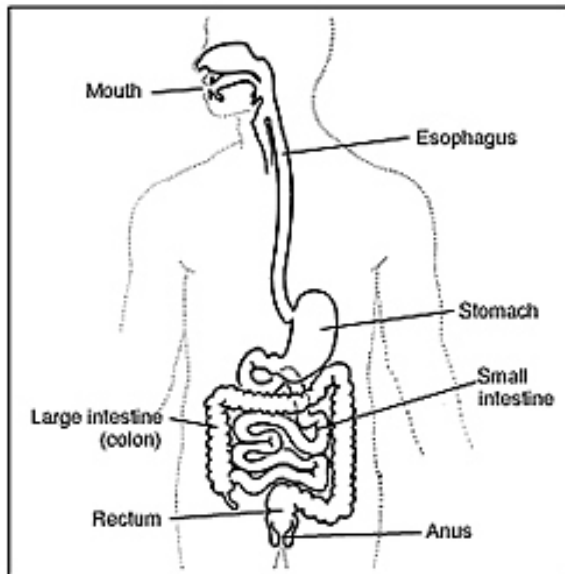
Autonomic neuropathy can impair the early signals that normally help alert patients to a hypoglycemia crisis. The signals of sweating, heart palpitations, shakiness, and tingling that gets triggered when blood sugar levels drop below 70mg/dL may be lost. This can make hypoglycemia difficult for the sufferer to recognize. Instead, mental symptoms of hypoglycemia: confusion, irritability, or loss of consciousness; may be the only signs of a dropping blood sugar problem. People who know the patient, need to recognize these symptoms and act quickly on the patient’s behalf to avert the impending crisis. Treatment consists of giving “sugar”. To learn more, ask your doctor.

Gastroparesis is an old term that does not adequately encompass all the abnormalities that can be found in the poorly functioning stomach. Many doctors now are using the term: diabetic gastropathy (gastro = stomach, and pathy = disease). More research is needed to better understand the complex mechanisms that make the digestive system function and malfunction.

Signs and Symptoms of diabetic gastroparesis:

- Wild swings in blood sugar levels, usually low at night and very high in the morning,
- Vomiting of undigested food, many hours after eating,
- An early feeling of fullness when eating,
- Nausea,
- Abdominal bloating,
- Constipation,
- Difficulty swallowing,
- Weight loss,
- Heartburn/Esoophageal reflux.

Image from the National Institutes of Health



Diabetic Gastroparesis reflects a diverse set of problems in the stomach

- ~ Failure in the top portion of the stomach to relax when ‘filling-up’ as food is eaten,
- ~ Abnormal sensitivities to the normal stretching from food and air entering the stomach causing pain and a feeling of ‘fullness,’
- ~ Weakened muscular contractions within the lower part of the stomach resulting in failure to pump food out,
- ~ Pylorus valve (the valve between the stomach and small intestine) can be in spasm impeding the stomach’s ability to push food through this valve,
- ~ Abnormal muscular tone or spasms in the small intestine can hinder the stomach’s ability to overcome the abnormally high pressures downstream resulting in food and secretions backing up,
- ~ Abnormal rhythms in the stomach caused by depleted ‘pace-maker’ cells. These abnormal rhythms can be communicated back to the brain leading to symptoms of chronic nausea. **Nausea of Gastroparesis is very difficult to manage.**

Treatments are aimed at correcting these problems. Often though, treatments are only partially effective at relieving symptoms and even with your ‘best effort,’ symptom flare-ups will occur leading to bouts of intense, uncontrolled symptoms that may end up in hospitalization. These symptom flare-ups are unpredictable and very frustrating.

Gastroparesis and blood glucose,

Diabetes is controlled by a delicate balance between medications (either oral or insulin), diet and exercise. But when this balance is interrupted by a motility disorder, like Gastroparesis, the impact it has on glucose (sugar) levels can be chaotic. The unpredictable nature of the functioning and emptying of the stomach can make blood sugar management very difficult.

I

ntermittent problems & Silent Symptoms

The medical community is baffled by a group of diabetic Gastroparesis patients who can have profound delayed gastric emptying but who do not suffer with ‘dyspepsia.’ These patients have silent symptoms.

Some medical experts believe that the autonomic neuropathy, interferes with the relay of nervous signals from the gut to the brain. Therefore, these patients are spared the persistent “dyspeptic symptoms.” For some of these patients however, periodic reflux and regurgitation of food as well as tough to control blood sugar levels may be their only hint of an underlying back-up of food in their stomachs.

Other patients can cycle with symptoms, showing an intermittent and unpredictable pattern to their Gastroparesis. This too may be reflected, or caused by, unexplained wide swings of their blood sugar levels.

Hyperglycemia by itself can create ‘delayed gastric emptying,’ so tightening-up blood glucose control will help to prevent episodes of nausea and vomiting. Good blood glucose control may actually help to reverse autonomic neuropathies.

Other complications

~Motility in the stomach can be so weakened as to create congealed balls of retained food elements that cannot exit the stomach. Called “bezoars” these ‘masses’ can cause a complete blockage. Fibrous foods promote the development of bezoars.

~Slowed motility can also lead to the development of bacterial overgrowth in the stomach causing foods to ferment resulting in increased gas production and bloating. This condition is called, Small Bowel Bacterial Overgrowth (SBBO), and for some diabetics, may also be the cause of their diarrhea.

~Sluggish motility can cause severe constipation.

~Finally, the resulting back-up of food and secretions in the stomach can result in severe reflux / regurgitation, (especially at night), which can wash-up into the lungs causing pneumonia.

D

iagnosing Gastroparesis

~ **Gastric emptying test (GET)** is the primary test used to diagnose Gastroparesis. A designated meal, usually scrambled eggs, mixed with a radioisotope (a slightly radioactive substance that will show up on a scan) is consumed. After eating, a machine will detect the radioisotope, show an image of the food and how quickly it leaves the stomach. The test takes 4 hours to complete and is evaluated based upon how quickly the meal empties from your stomach. The unpredictable nature of the diabetic Gastroparetic stomach may mean that the stomach empties normally at times. A GET test may need to be repeated, especially when symptoms and erratic blood sugar levels suggest Gastroparesis.

~ **Antro-duodenal manometry** or “**Motility Study.**” This test, only done at a few specialized centers, measures muscular activity in the stomach and upper portion of the small intestine. The a thin tube is passed down your nose and into your stomach. In one method, the tube contains a wire that takes measurements of your stomach’s muscular contractions. The patient is able to walk around. Measurements are taken continuously. Recordings are started on an empty stomach, and continued for several hours to include a ‘test’ meal. This motility test can also include a study of the pylorus valve and the esophagus to record muscular activity from these sites.

~**Electro-gastrogram (EGG)**, similar to the ‘electro-cardiogram’ it has the ability to measure stomach electrical rhythms. Small, electrically sensitive pads are placed on the skin surface, just above the stomach, and recordings are taken. It is believed that stomach ‘dysrhythms’ play a role in producing symptoms of nausea and vomiting. This test alone cannot diagnose Gastroparesis.

~ **Autonomic Function tests, (RR interval study)**, is one simple test which looks for heart rate variation in response to deep breathing and reflects the health of the autonomic nervous system. This is a valuable test to sort out the findings of a normal GET test, yet symptoms suggest Gastroparesis is a problem.

Your doctor may also want to perform other tests to ‘rule-out’ any other digestive diseases that can produce similar symptoms to Gastroparesis. Some of these tests are:

- ~ Barium swallow,
- ~ Upper endoscopy,
- ~ Abdominal ultrasound,
- ~ Tests for gall bladder function,
- ~ Stool samples.

Treatment

Since a gastroparetic stomach empties in an unpredictable fashion, your blood glucose levels can be erratic and difficult to control. **This unpredictability presents a major obstacle to blood glucose management.** However, the fine-tuning of blood glucose control after a meal has proven to be a critical point in the focus of diabetic care. Learning to monitor and record blood glucose levels frequently throughout the day will help your diabetic specialist or primary care physician to tailor the best approach for your personal insulin requirements in the face of delayed gastric emptying.

Further, manipulation of diet, by switching to liquid nutrition, or blenderized foods during times of erratic glucose patterns, as well, combined with the use of medications that help improve the stomach's emptying power – provides better overall control.

Promotility drugs

Also called 'Prokinetic' medications, are medications that help move food through the digestive tract. A number of these have been tested on diabetic patients and found to help empty the stomach and improve blood sugar levels. These drugs are:

~**Domperidone** or Motilium™, available from some US compounding pharmacies, or your gastroenterologist may apply to the Food and Drug Administration for access – to prescribe and dispense this medication. With the loss of Propulsid from the US market, Domperidone has now become the first choice by many gastroenterologists who specialize in "Motility" diseases.

~**Erythromycin**, this antibiotic given at low dosages, helps to enhance the emptying of the stomach and improve blood sugar control. A liquid form of the drug is easier to absorb.

~**Cisapride** (formerly-Propulsid™) is still readily available in many countries, and in the United States under a compassionate release program. It is still considered a very good choice for patients who are not having problems controlling blood *electrolyte* levels from severe vomiting, or who do not have underlying heart rhythm abnormalities.

~**Tegaserod** or Zelnorm™ is undergoing research to determine its effectiveness in diabetic Gastroparesis.

~**Metoclopramide** or Reglan™/Maxeran™, is an older drug with a number of bothersome side effects, however it still is widely used.

Other treatment options.

More challenging symptoms such as an **early feeling of fullness** or a persistent feeling of fullness and discomfort after eating may be related to the inability of the upper stomach to relax when food enters it. A number of novel medical treatments have been used to help this group of symptoms. Furthermore, some of these medications are believed to help the pylorus valve to relax and allow food to empty. But care must be taken; these medications, too, have been demonstrated to slow gastric emptying.

- Catapres TTS (clonidine), skin patch*
- Viagra (sildenafil), and
- Imitrex (sumatriptan).

Other medications have also been employed for the benefit of decreasing abnormal "sensitivities" thought to cause symptoms of fullness and abdominal discomfort after eating. As well, these medications may also help to control nausea. This class of drugs, called the Tricyclic Antidepressants (TCA), are prescribed at much lower dosages than that which is utilized in the treatment of psychiatric disorders. Some examples are:

- Amitriptyline (Elavil, Endep)
- Desipramine (Norpramin)
- Nortriptyline (Aventyl, Pamelor)

Dyspepsia or gastroparesis?

Dyspepsia, is a term derived from Latin which means: "bad digestion." It is used to describe symptoms that are generated in the upper digestive tract.

Both of these terms describe a problem of disrupted motility in the upper gut. Sorting out the terms can be difficult since they are subjective and describe the same collection of symptoms listed on pag 3. Some doctors reserve the term – dyspepsia – for less severe symptoms, while gastroparesis is used to describe more profound symptom intensity, with pronounced delayed emptying of the stomach. Regardless, when structural problems and inflammation are not found in the upper gut, the driver for the symptoms is a motor disturbance (motility problem) due to disrupted nerve function within the stomach and small bowel. Some individuals may have dyspeptic symptoms, but no delay in emptying of their stomach. Stomach dysrhythms may be at fault, or; in other circumstances, a rapid emptying of stomach contents can occur.

Other treatment options, cont.

Botox injections into the pylorus

Your doctor may have determined that the valve between your stomach and the small intestine is in spasm making it difficult for food to exit the stomach. Centers have conducted research on the use of ‘botox’ injections into the pylorus. The pylorus is a small circular muscle (sphincter) that normally permits small broken down food particles to enter into the small intestine. Botox has been used in numerous applications and proven to be safe. Botox allows the muscle that is injected to ‘relax.’ It works for some patients, providing relief from 6 to 9 months before another injection into the pylorus is needed.

Gastric Electrical Stimulation (GES), Enterra™ therapy, manufactured by Medtronic

This is a surgically implanted device, similar in appearance to a heart ‘pacemaker.’ The device has two insulated wire leads with an exposed end, called the electrode. The electrodes are sutured into the first, outside layer (serosal side) of the stomach, while the device (pulse generator) is secured just under the surface of the skin. The system delivers an intermittent weak electrical impulse to the stomach.

This device has been in use for many years to treat the severe nausea and vomiting of Gastroparesis in patients who are not responding to other treatment options. For many patients, GES has been highly effective in controlling these symptoms. Some research has shown that besides providing effective long term relief from nausea and vomiting, it helps some patients to eat more normally, allowing many who were dependent upon “feeding tubes” to have their tubes removed.

Enterra Therapy is available in Canada, and fully approved for marketing. In the US, the device is approved by the Federal Drug Administration under the Humanitarian Use Device (HUD). Due to this specialized category, many health insurance providers do not cover the cost for this device. Patients often need to go through several appeal processes in seeking approval. Medtronic is able to provide guidance on navigating the insurance approval process.

Diet

Diabetics are well aware of the role that diet plays in managing their blood sugar, but diet is equally important in managing symptoms of Gastroparesis. Generally a diet low in fat and fiber helps to decrease symptoms. Avoidance of foods that are overly ‘gaseous’ is also helpful to reduce abdominal bloating (please see our pamphlet titled: “Gas, Bloating and Belching”). During times of symptom flair-ups, or very erratic blood glucose control, a liquid meal substitute may be helpful. In Gastroparesis, liquids usually are not delayed in leaving the stomach, therefore liquid meal substitutes can help to stabilize blood sugar levels while maintaining proper nutrition.

**For comprehensive diet information, please see:
www.digestivedistress.com**

Diabetics and patients with Digestive Motility Diseases are particularly prone to Small Bowel Bacterial Overgrowth. For more information, please see our pamphlet on this topic.

Once you have been diagnosed with Gastroparesis, then the timing of insulin, type of insulin and insulin delivery methods will need to be reviewed with your diabetologist. He or she may recommend:

- ~Take insulin more often,
- ~Take your insulin after your meal instead of before,
- ~Administering fast acting insulin as needed to counter the effects of blood sugar peaks that can occur many hours after your meal.

Above all, check your blood glucose levels frequently and record the time and readings. Providing an accurate record to your doctor along with diet information can help to optimize your personal management plan. If you continue to experience wide fluctuations, then communicate often with your doctor to make adjustments to your insulin regimen. **Non-insulin dependent diabetics (type II diabetics)**, who rely on oral medications for controlling blood sugars levels, may need to review their medication regimen with their doctor. Delayed gastric emptying can delay the absorption of medications disrupting good blood sugar control.

Feeding tubes, may be needed for the more severe cases of Gastroparesis. Also called a ‘jejunostomy tube,’ it is a tube surgically implanted through the abdomen into the small intestine to by-pass the poorly working stomach and provide liquid nourishment. This treatment can help to greatly improve blood sugar control and reverse malnourishment. **Total Parenteral Nutrition** is a type of feeding given directly into a large blood vessel. It is used only if other feeding methods fail.

B

ehavioral treatments

Is another method, originally developed by NASA for controlling nausea and vomiting of motion sickness. These techniques are now applied to patients with chronic nausea and vomiting from digestive disorders like Gastroparesis, and also used for postural hypotension (a dropping blood pressure resulting from position changes). Utilizing Autonomic Training and imagery, (a form of guided bio-feedback) this method helps facilitate symptom reduction.

Social and psychological impact

Living with a chronic illness like Gastroparesis can be challenging; impacting all family members, social interactions, financial status and mental well being.

Gastroparesis, as with any chronic illness, can be managed. Discouraging flare-ups may occur; therefore, it is important to have a supportive team!

Your team should consist of a diabetologist, primary care physician, gastroenterologist, diabetic educator and /or nurse specialist, dietitian and a supportive psychologist.

As well, family and friends need to be able to provide emotional support and positive encouragement to help you to cope.

In addition, here are some strategies to help you cope:

- ~Try to limit the stress in your life. Stress is not the cause of your symptoms, but it certainly can intensify symptoms.
- ~Educate those around you about your illness. More information is available on the internet at: <www.digestivedistress.com>
- ~Seek and accept help from others, especially those who have a positive attitude.
- ~Explore spirituality or seek to strengthen your religious ties.
- ~Work with your doctor and nurse, they can be a strong advocate for you.
- ~Seek diversions; a funny movie; a friend with a good sense of humor; or crafts.
- ~Explore alternative medicine practitioners. Alternative treatments such as acupuncture can bring a measure of relief.
- ~Your family too needs to understand your illness. They need to ask for help and support.
- ~Find support and information from 'on-line' forums. GPDA has an on-line forum at: www.digestivedistress.com.

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esources

On-line information regarding diets for diabetic gastroparesis, visit: www.digestivedistress.com

The National Institute of Diabetes, and Digestive and Kidney Diseases (NIDDK), has a library of 'on-line' patient education information: <http://digestive.niddk.nih.gov/>

Information is available regarding Enterra Therapy from Medtronic by calling: 1-800-664-5111, ext: 4000 (in the US) Or visiting their web site: www.medtronic.com/neuro/enterra/

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