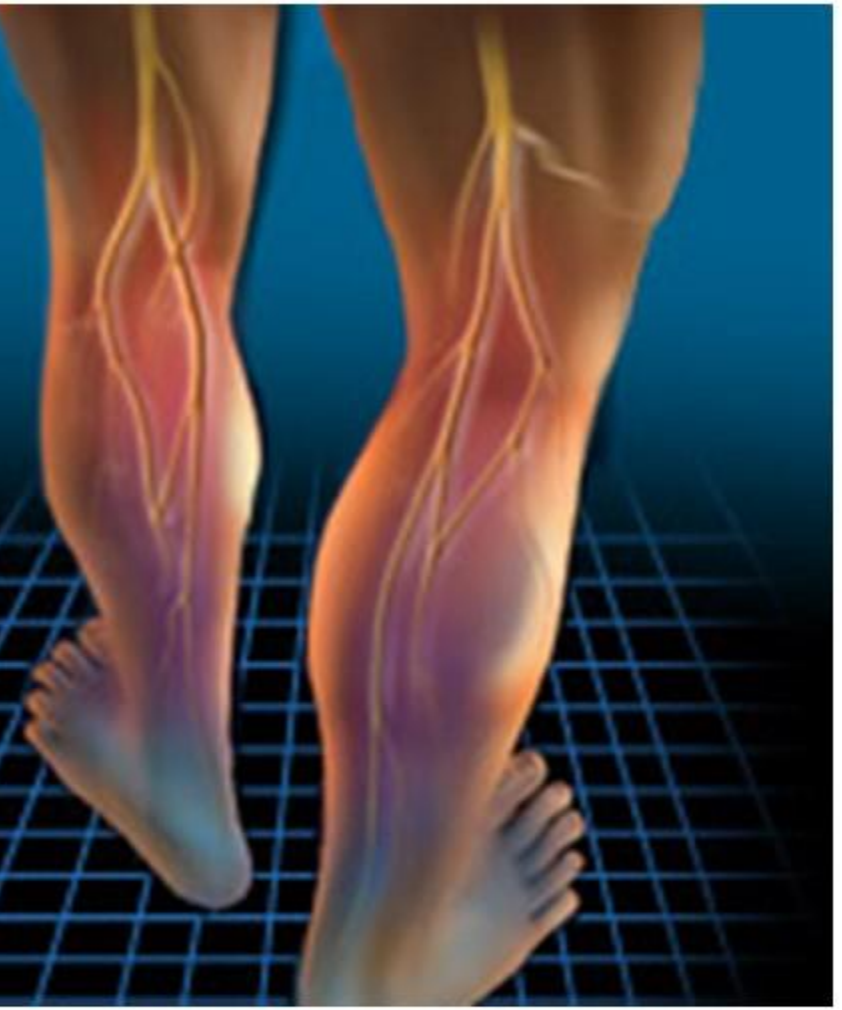
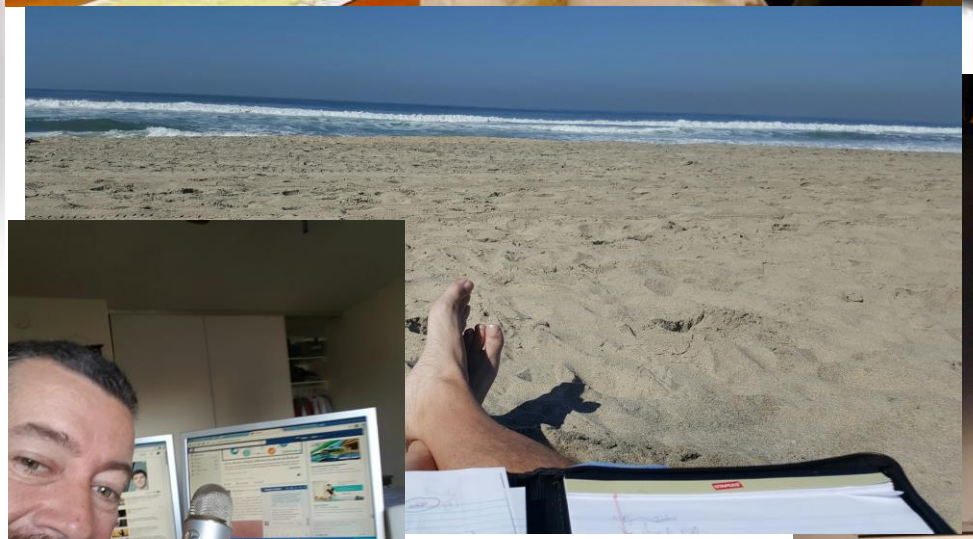
Diabetic Neuropathy

Medical Massage For The Diabetic Patient



Host: Dr Bryan Hawley DC

Who am I ?
How is this different?

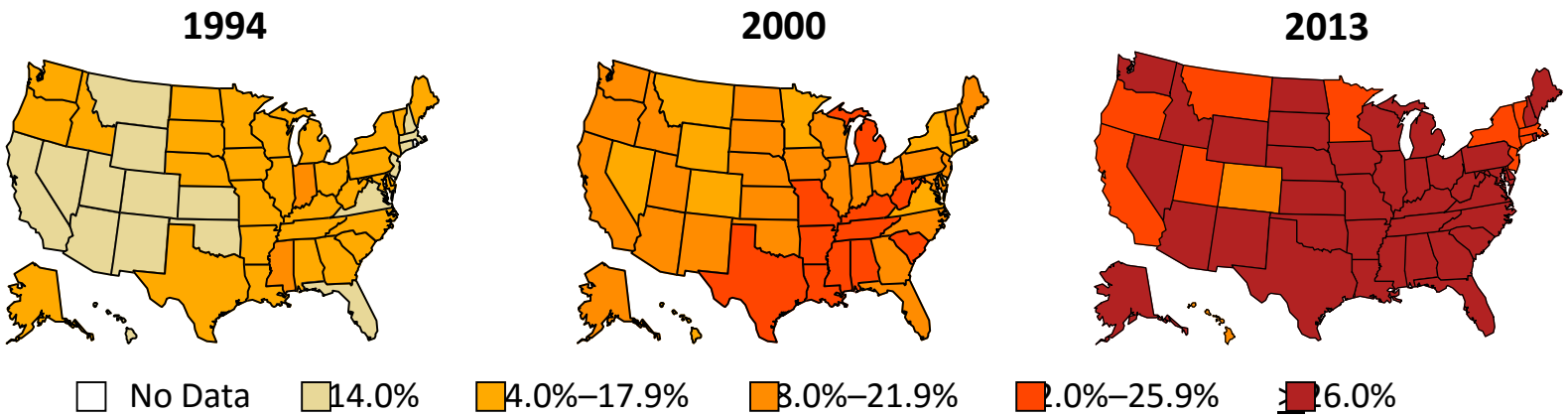


Housekeeping

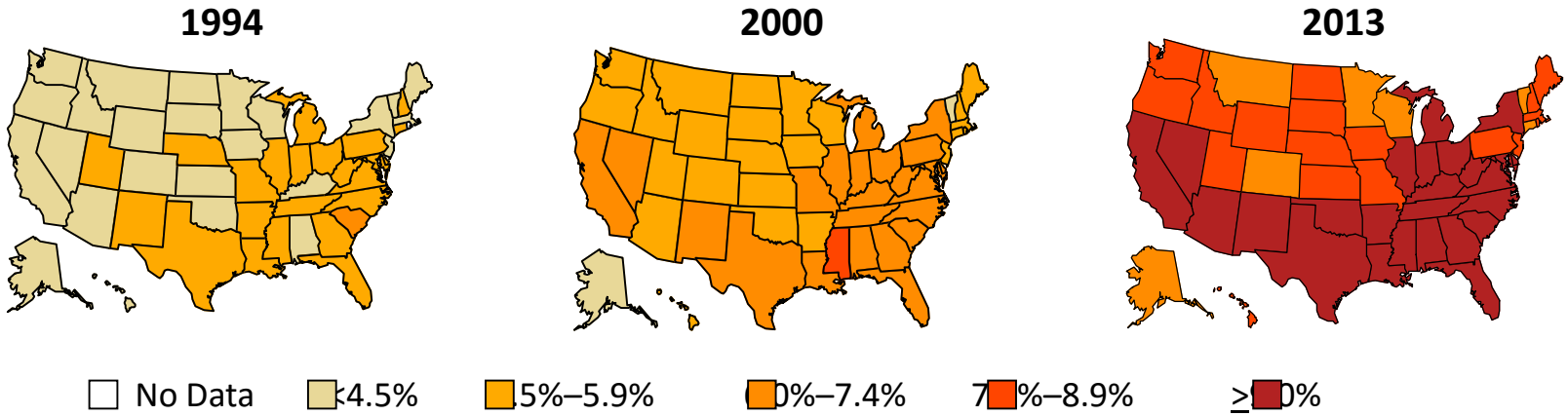
- Notes and recording will be sent out tomorrow
- Certificates will be emailed
- 1 week out
- Questions
- All presented tonight is based off OUR OWN CLINIC system
- Email (info@drbryanhawley.com)
- Lets begin

Age-adjusted Prevalence of Obesity and Diagnosed Diabetes Among US Adults

Obesity (BMI ≥30



Diabetes



Cardiovascular disease is the leading cause of early death among people with diabetes. Adults with diabetes are two to four times more likely than people without diabetes to die of heart disease or experience a stroke. Also, about 70% of people with diabetes have high blood pressure, a risk factor for cardiovascular disease.

Diabetes mellitus and obesity

Diabetes mellitus and obesity have a complex relationship. There is a strong association of type 2 diabetes with obesity. Obesity is one of the major risk factors for type 2 diabetes. Further obesity is a precursor of type 2 diabetes with insulin resistance. Insulin is a hormone produced by the pancreas in the body to regulate and bring down the blood sugar levels.

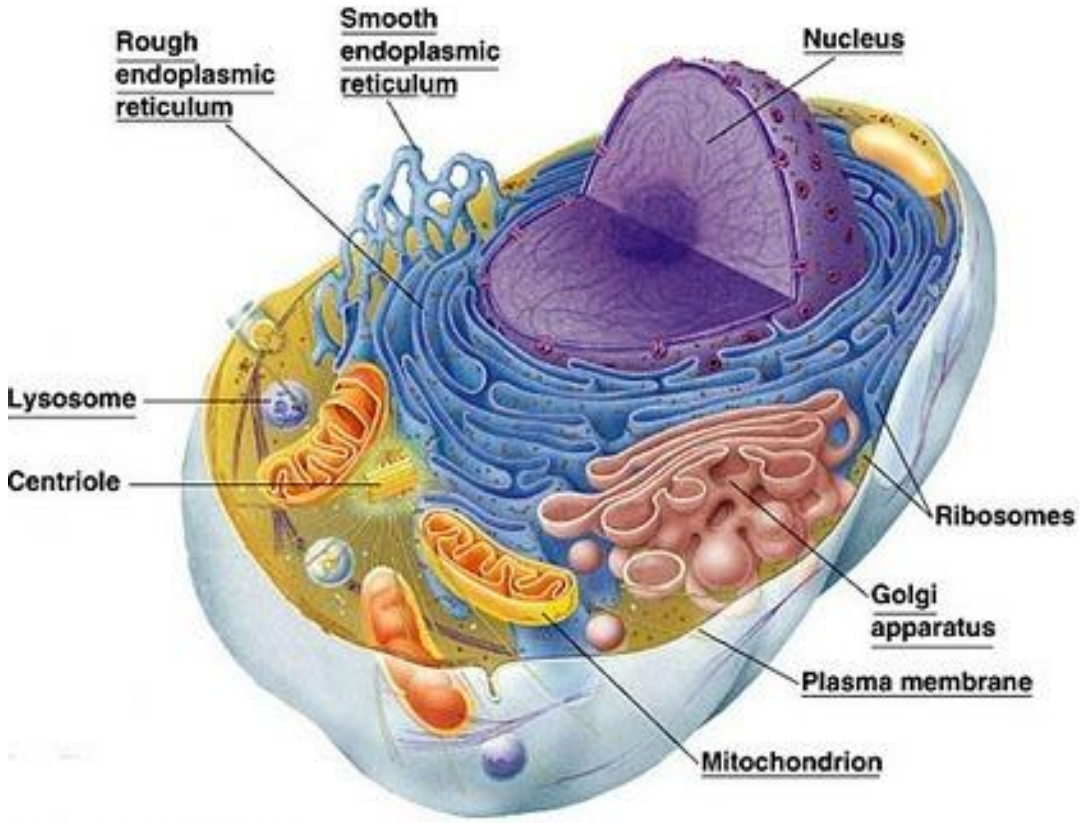
In obese individuals with type 2 diabetes, the amount of insulin produced in the body may be normal but this may not meet the requirements of the body. Thus the blood sugar remains elevated. This is termed insulin resistance.

Incidence of obesity and type 2 diabetes

As the incidence of obesity rises rapidly, so does that of Type 2 diabetes. In 2000 for example the incidence of diabetes worldwide was 171 million. Studies estimate that these numbers are set to rise to 366 million by 2030 according to the World Health Organization.

Being overweight increases the chances of developing the common type of diabetes, type 2 diabetes. In this disease, the body makes enough insulin but the cells in the body have become resistant to the salutary action of insulin.

Why does this happen?
New Research: proposes that being overweight stresses the insides of individual cells. Specifically, overeating stresses the membranous network inside of cells called endoplasmic reticulum(ER). When the ER has more nutrients to process than it can handle, it sends out an alarm signal telling the cell to dampen down the insulin receptors on the cell surface. Repetition of this translates to insulin resistance and to persistently high concentrations of the sugar glucose in the blood -- one of the sure signs of diabetes.



Obesity and hormones

Further obesity changes the hormones secreted by adipose tissue or fat tissues. The major hormones that are affected are the adipokines. In the obese state, adipose tissue secretes proportionally more adipokines that cause insulin resistance.

Furthermore, obesity is associated with an increase in secretion of chemokines by the adipose tissues. This leads to activation of inflammatory cells like macrophages. Activated macrophages produce cytokines that can decrease insulin sensitivity and increase insulin resistance.

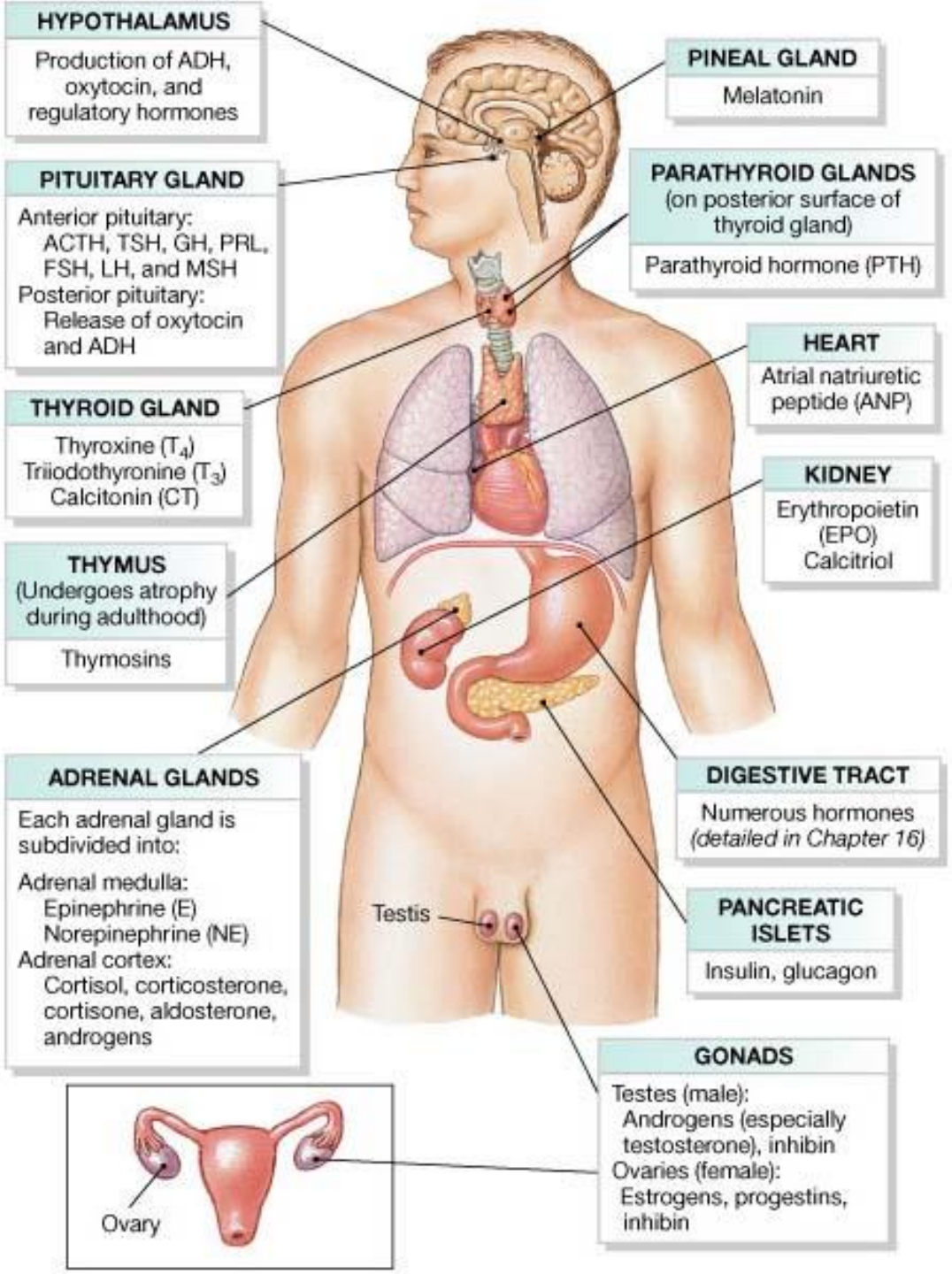
Nearly every pregnant woman is tested for gestational diabetes (GD) (or gestational glucose intolerance - GGI) at some point during her second trimester. But what constitutes a "normal" blood glucose level during pregnancy and when maternal or fetal morbidity occurs is controversial.

During pregnancy, the pancreas usually produces adequate amounts of insulin to regulate blood sugar levels. However, the hormone HPL (human placental lactogen) inhibits the maternal body's ability to transport the insulin properly out of the bloodstream and into cells, where it is used as fuel, resulting in elevated levels of glucose in the blood - or GD.

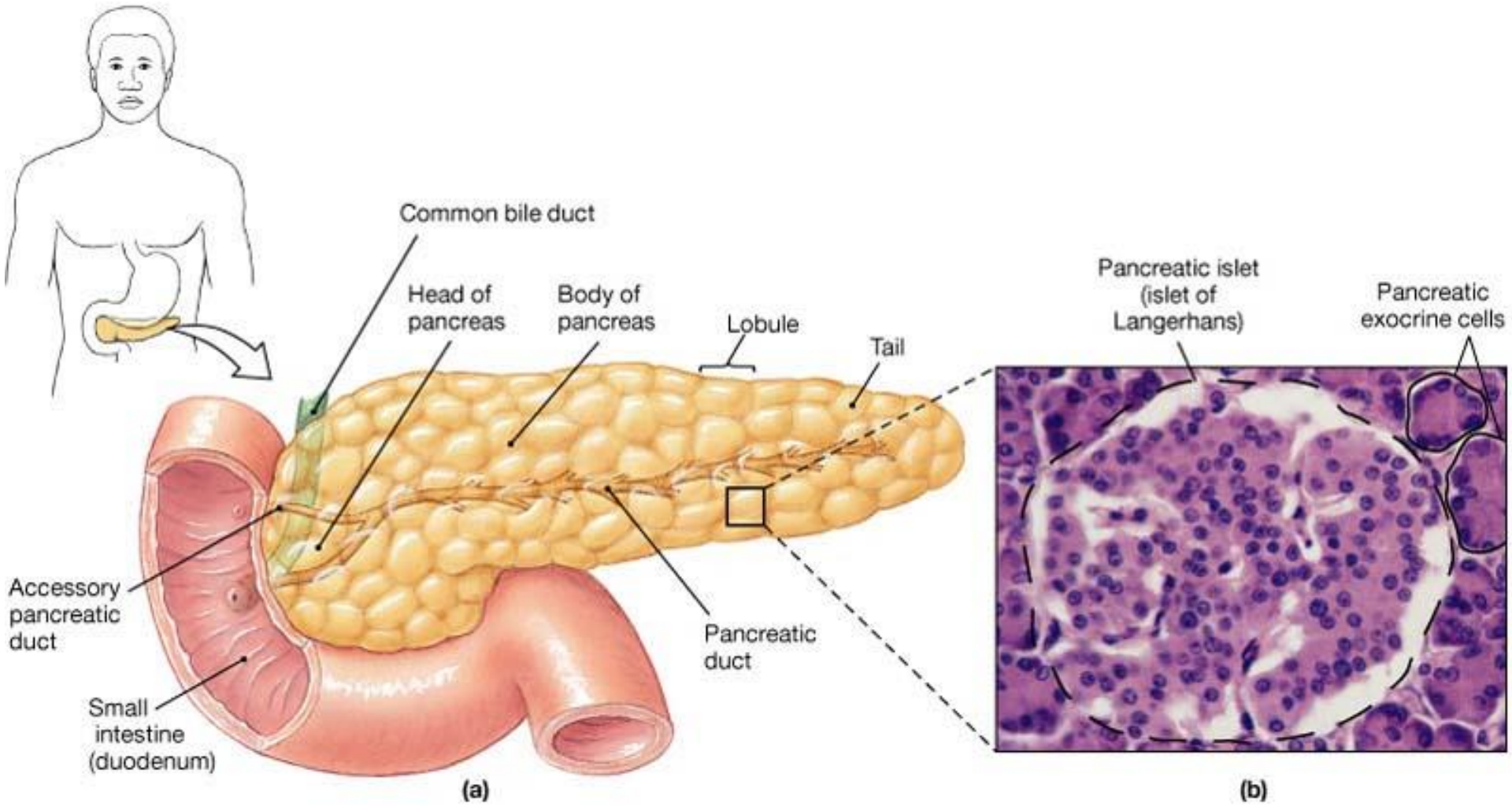
Clients with GD can still enjoy the benefits of massage. However, it is important to remember that massage, in general, lowers glucose levels. So you have to make sure your client's blood sugar level doesn't get too low, which can lead to impaired judgment and potential accidents. By providing your clients with a nourishing snack, it will raise their blood glucose level enough to get home safely where they can enjoy a healthful, wholesome meal.

Introduction:

a general overview of the endocrine system



The Endocrine Pancreas



The gross anatomy of the pancreas

A pancreatic islet surrounded by exocrine-secreting cells

The Pancreas Secretes Insulin And Glucagon

- The endocrine cells of the pancreas are contained in the pancreatic islets or islets of Langerhans.
- These make up only 1-2% of the mass of the pancreas.
- They are scattered throughout the pancreas.

Pancreatic Islets

- Alpha cells produce glucagon (a 51 amino acid peptide hormone)
- Beta cells produce insulin (a 29 amino acid peptide hormone)
- Islets heavily invested with capillaries
- Islets innervated by both sympathetic and parasympathetic neurons

The Insulin-glucagon Ratio Regulates Metabolism

- Insulin and glucagon act in an antagonistic fashion to keep plasma glucose concentrations within an acceptable range (70-110 mg/dL).
- Both are present in the blood most of the time.
- The ratio of the two hormones determines which hormone dominates.

- Blood sugar homeostasis is the goal

Insulin Is The Dominant Hormone Of The Fed State

Secretion of insulin is affected by the following factors:

1. Increased glucose concentrations
2. Increased amino acid concentrations
3. Feedforward effects of GI hormones
4. Parasympathetic activity
5. Sympathetic activity

Insulin Promotes Anabolism

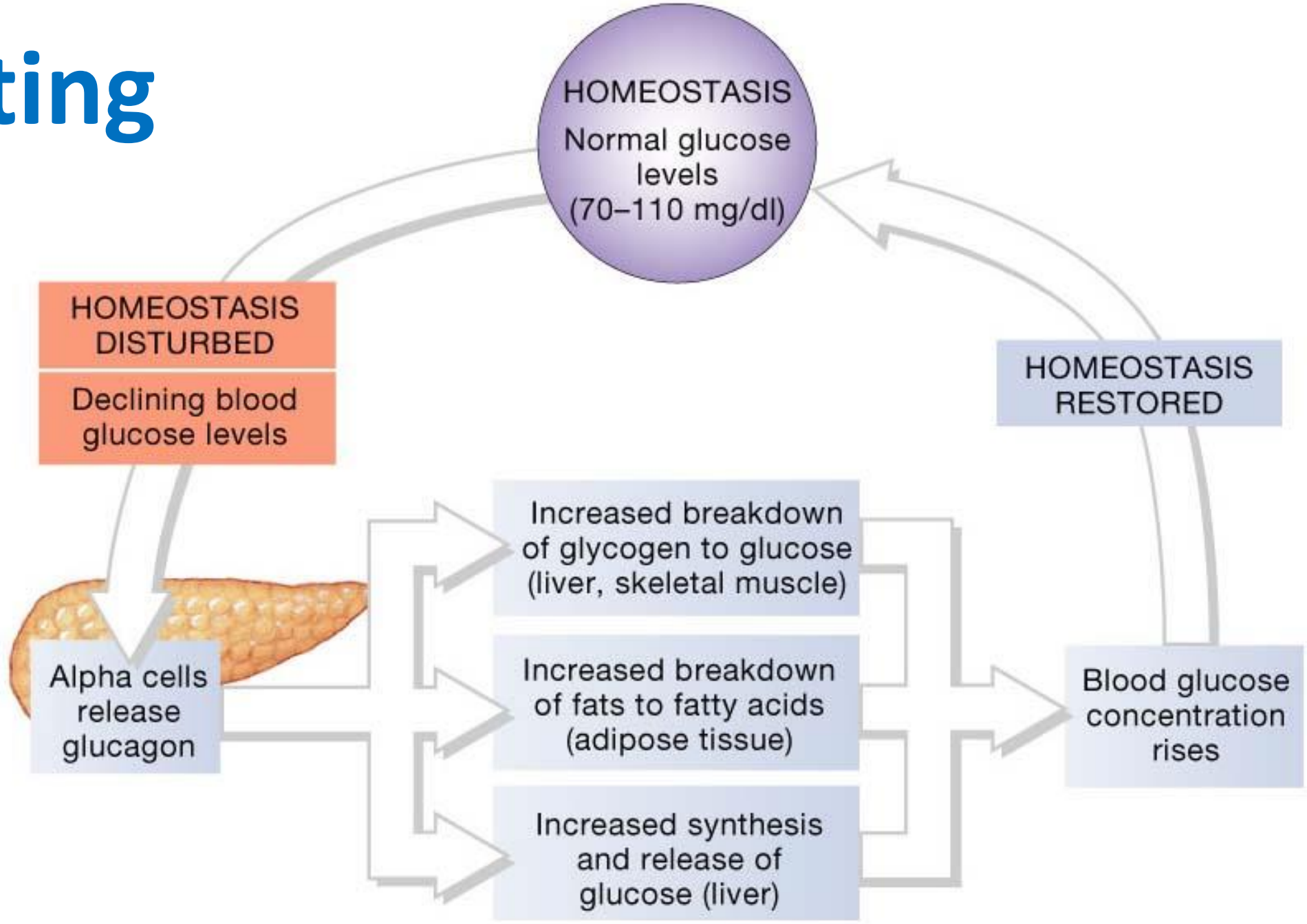
Insulin lowers plasma glucose by:

1. Increasing glucose transport into most insulin sensitive cells (post workout)
2. Enhancing cellular utilization and storage of glucose
3. Enhancing utilization of amino acids
4. Promoting fat synthesis

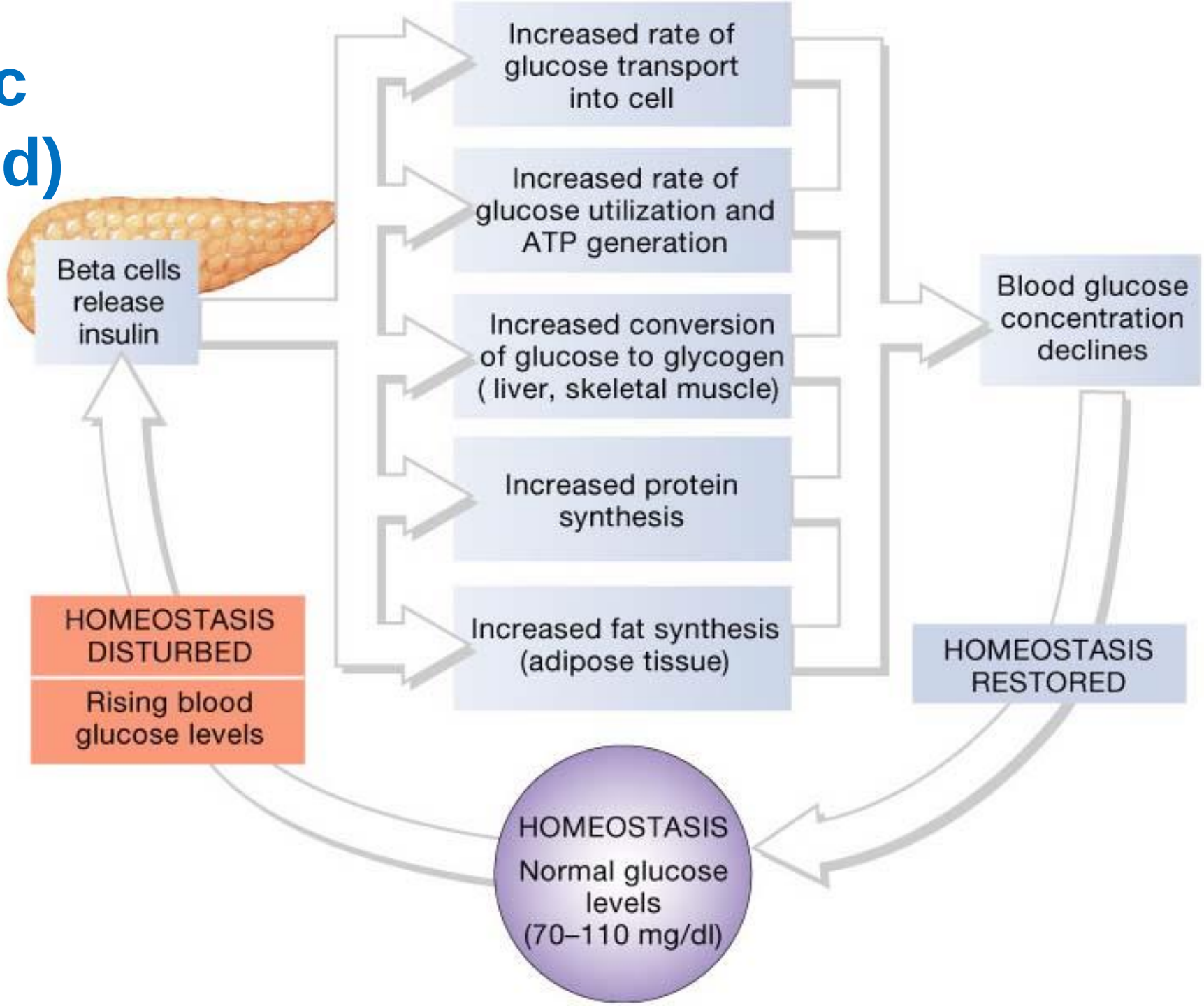
Glucagon Is Dominant In The Fasted State

- Glucagon prevents hypoglycemia.
- Glucagon is secreted when plasma glucose levels fall below 100 mg/dL.
- The liver is the primary target of glucagon.
- Glucagon stimulates glycogenolysis and gluconeogenesis to increase glucose output by the liver.
- Glucagon release is also stimulated by plasma amino acids.

Fasting


HOMEOSTASIS
Normal glucose levels (70–110 mg/dl)
HOMEOSTASIS DISTURBED
Declining blood glucose levels
HOMEOSTASIS RESTORED
Alpha cells release glucagon
Increased breakdown of glycogen to glucose (liver, skeletal muscle)
Increased breakdown of fats to fatty acids (adipose tissue)
Increased synthesis and release of glucose (liver)
Blood glucose concentration rises

Anabolic (Well Fed)



Diabetes Mellitus

Disease in which the body doesn’t produce or properly use insulin, leading to hyperglycemia.

Diabetes is a chronic disease in which the body does not make or properly use insulin, a hormone that is needed to convert sugar, starches, and other food into energy by moving glucose from blood into the cells.

People with diabetes have increased blood glucose (sugar) levels for one or more of the following three reasons: Either

1. No insulin is being produced,
2. Insulin production is insufficient, and/or
3. The body is resistant to the effects of insulin.

As a result, high levels of glucose build up in the blood, and spill into the urine and out of the body. So what does this make the body Crave? More sugar!

The body loses its main source of fuel and cells are deprived of glucose, a needed source of energy. High blood glucose levels may result in short and long term complications over time.

Question: How did they test for sugar in urine years ago before instruments were available?

Type 1 Diabetes

Type 1 diabetes is a disease of the immune system, which is the body's system for fighting infection.

In people with type 1 diabetes, the immune system attacks the beta cells, the insulin-producing cells of the pancreas, and destroys them.

The pancreas can no longer produce insulin, so people with type 1 diabetes need to take insulin daily to live.

Type 1 diabetes can occur at any age, but the disease develops most often in children and young adults.

Type 1 diabetes accounts for about 5 to 10 percent of diagnosed diabetes in the United States.

Type 2 Diabetes

The first step in the development of type 2 diabetes is often a problem with the body's response to insulin, called insulin resistance. This means that the body needs increasing amounts of insulin to control blood glucose. The pancreas tries to make more insulin, but after several years, insulin production may drop off.

Type 2 diabetes used to be found mainly in adults who were overweight and over age 40.
Now, as more children and adolescents in the United States become overweight and inactive, type 2 diabetes occurs more often in young people. Many people with type 2 diabetes are overweight.

Onset in children: variable timeframe. Some children develop type 2 diabetes rather quickly, other more slowly.
Some symptoms similar to type 1:

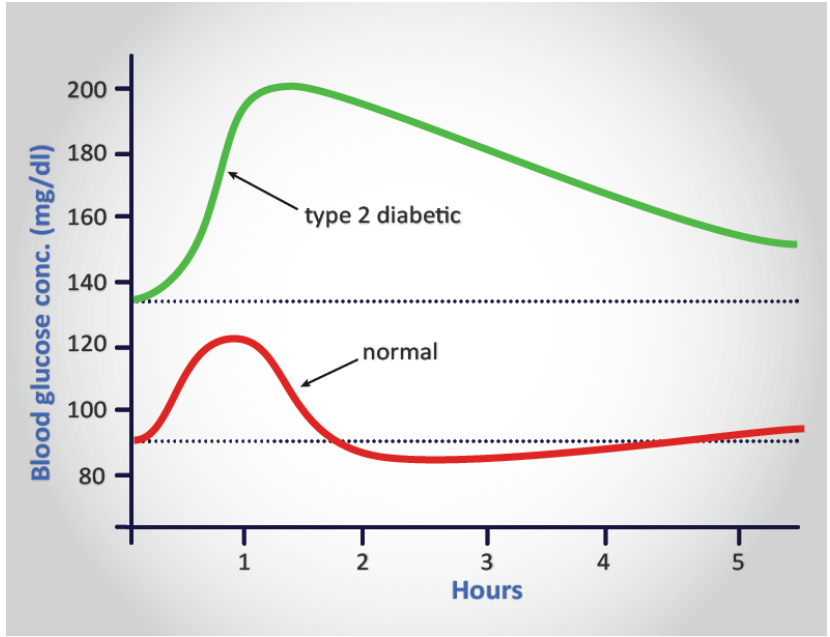
Tired, thirsty, hunger, increased urination

Some children show no symptoms at diagnosis.

Whether we are dealing with type 1 or type 2 diabetes, the goal of effective diabetes management is to control blood glucose levels by keeping them within a target range that is individually determined for each person.
Optimal blood glucose control helps to promote normal growth and development and allows for optimal learning. It is also needed to prevent the immediate dangers of blood glucose levels that are either too high or too low. Research has shown that maintaining blood glucose levels within the target range can prevent or delay the long-term complications of diabetes such as heart attack, stroke, blindness, kidney failure, nerve disease, and amputations of the foot or leg.

When insulin is no longer made, it must be obtained from another source--insulin shots or an insulin pump.
:All people with type 1 diabetes must take insulin.
:People with type 2 diabetes use diet and exercise, and oral medications, and/or insulin to manage their disease.

Neither insulin nor other medications, however, are cures for diabetes: they only help control the disease.

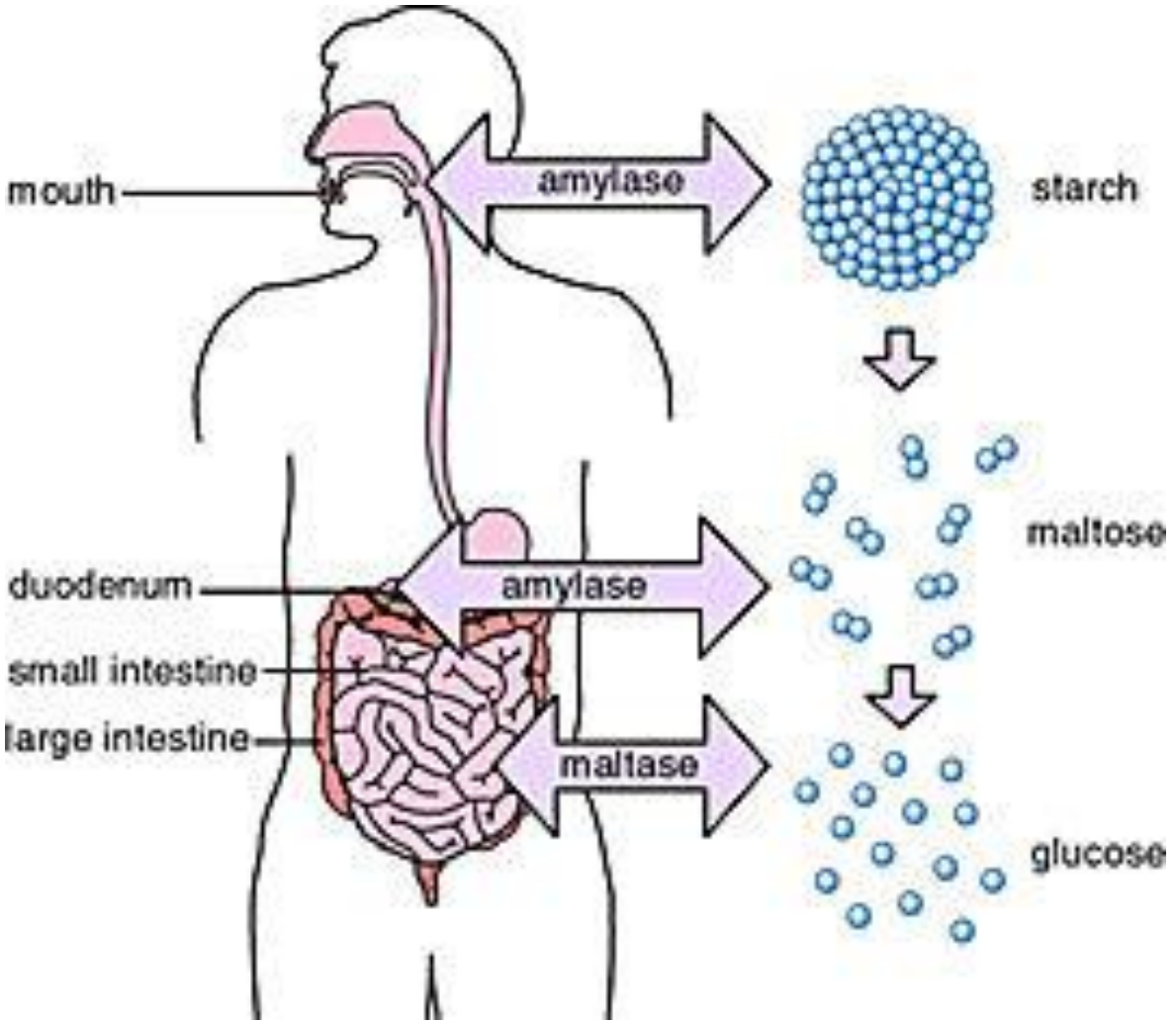


Maintaining good blood glucose control is a constant juggling act, 24 hours a day, 7 days a week.

The key to optimal diabetes control is a careful balance or juggling of food, exercise, and insulin and/or oral medication.

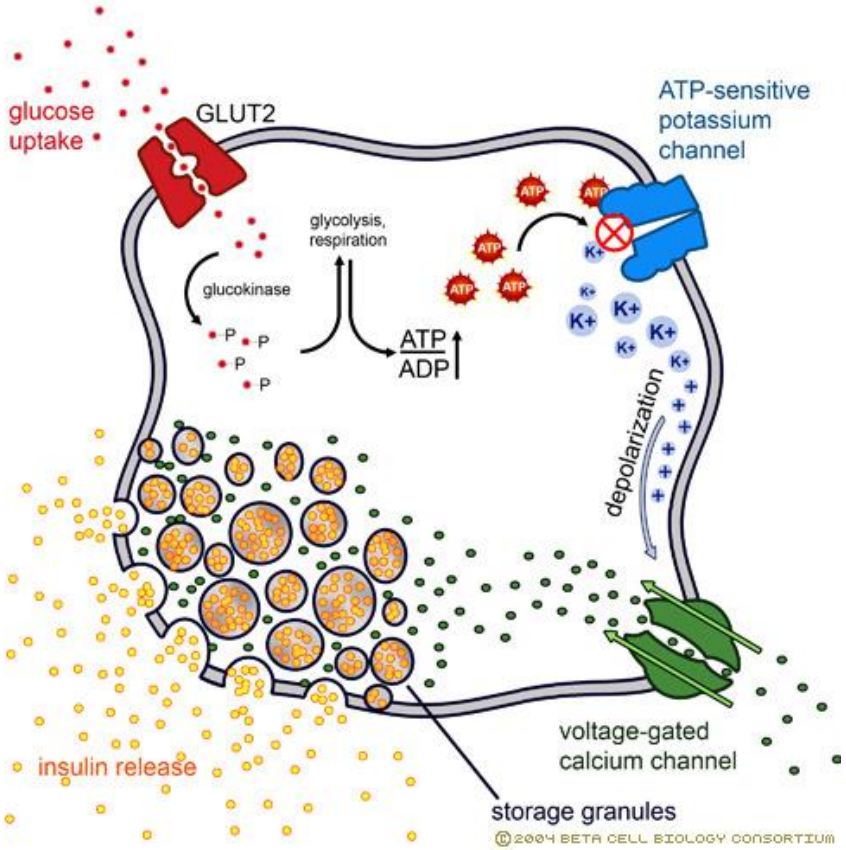
- As a general rule, insulin/oral medication and exercise/activity makes blood glucose levels go down.
- Food makes blood glucose levels go up.
- Several other factors, such as stress, illness or injury, also can affect blood glucose levels.

Carbohydrates are not sugar right?



Insulin Secretion

Insulin secretion - Insulin secretion in beta cells is triggered by rising blood glucose levels. Starting with the uptake of glucose by the GLUT2 transporter, the glycolytic phosphorylation of glucose causes a rise in the ATP:ADP ratio. This rise inactivates the potassium channel that depolarizes the membrane, causing the calcium channel to open up allowing calcium ions to flow inward. The ensuing rise in levels of calcium leads to the exocytotic release of insulin from their storage granule.



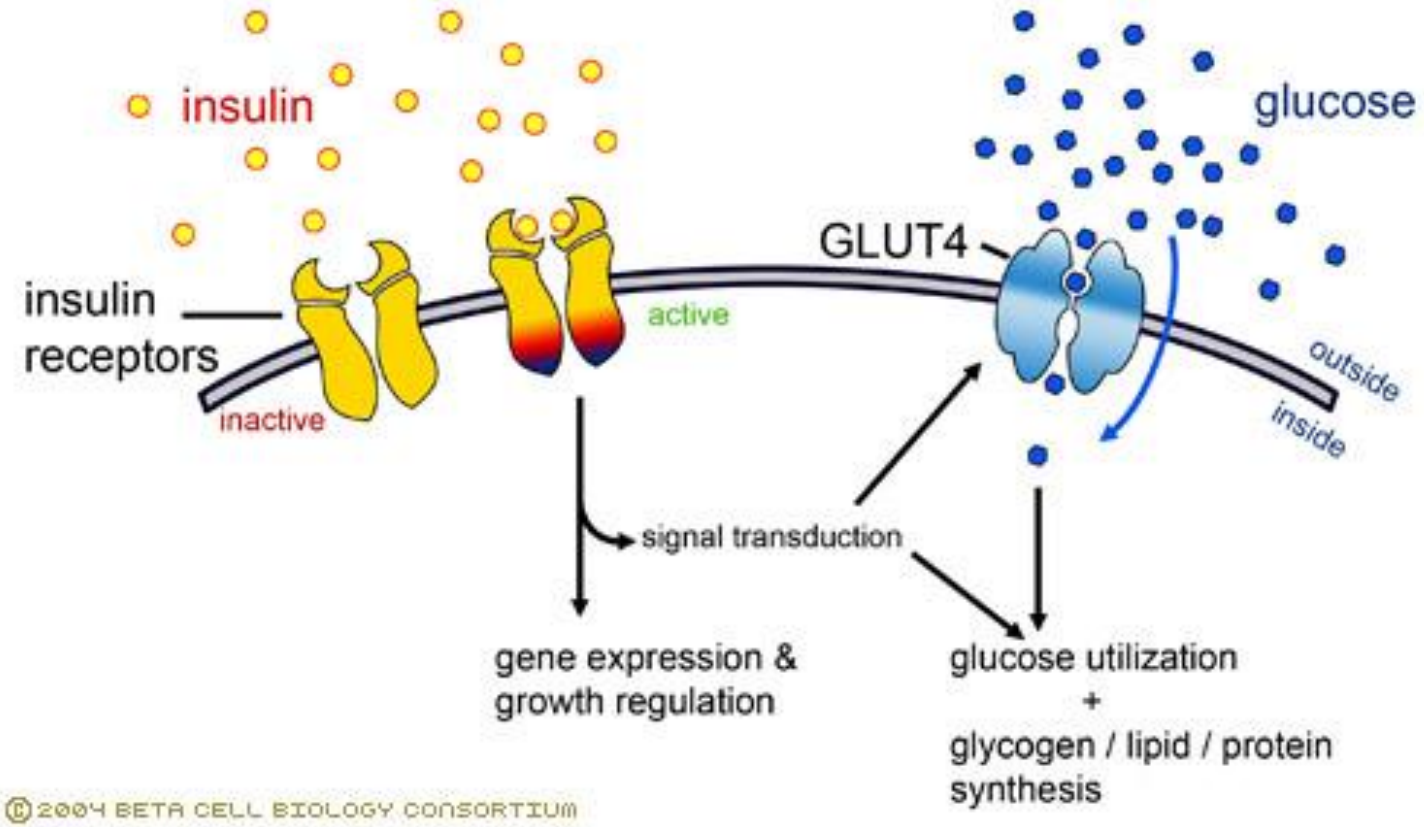
How insulin works

Panel 3. Insulin binding to the insulin receptor induces a signal transduction cascade which allows the glucose transporter (GLUT4) to transport glucose into the cell.

[magnify] Insulin molecules circulate throughout the blood stream until they bind to their associated (insulin) receptors. The insulin receptors promote the uptake of glucose into various tissues that contain type 4 glucose transporters (GLUT4). Such tissues include skeletal muscles (which burn glucose for energy) and fat tissues (which convert glucose to triglycerides for storage). The initial binding of insulin to its receptor initiates a signal transduction cascade that communicates the message delivered by insulin: remove glucose from blood plasma (see panel 3). Among the wide array of cellular responses resulting from insulin 'activation,' the key step in glucose metabolism is the immediate activation and increased levels of GLUT4 glucose transporters. By the facilitative transport of glucose into the cells, the glucose transporters effectively remove glucose from the blood stream. Insulin binding results in changes in the activities and concentrations of intracellular enzymes such as GLUT4. These changes can last from minutes to hours.

Panel 3. Insulin-mediated glucose uptake - Insulin binding to the insulin receptor induces a signal transduction cascade which allows the glucose transporter (GLUT4) to transport glucose into the cell.

As important as insulin is to preventing too high of a blood glucose level, it is just as important that there not be too much insulin and hypoglycemia. As one step in monitoring insulin levels, the enzyme insulinase (found in the liver and kidneys) breaks down blood-circulating insulin resulting in a half-life of about six minutes for the hormone. This degradative process ensures that levels of circulating insulin are modulated and that blood glucose levels do not get dangerously low



TESTING BLOOD SUGARS

Diabetics used to depend only on urine tests or daily finger sticks to measure their blood sugars. These tests were accurate, but only in the moment. As an overall measurement of blood sugar control, they were very limited, as blood sugar can vary wildly depending on the time of day, activity levels, even hormone changes.

Some people may have high blood sugars at 3 a.m. and be totally unaware of it.

Once A1C tests became available in the 1980s, they became an important tool in controlling diabetes. A1C tests measure average blood glucose over the past two to three months. So even if you have a high fasting blood sugar, your overall blood sugars may be normal, or vice versa. A normal fasting blood sugar may not eliminate the possibility of type 2 diabetes. This is why A1C tests are now being used for diagnosis and screening of prediabetes. Because they don't require fasting, the test can be given as part of an overall blood screening.

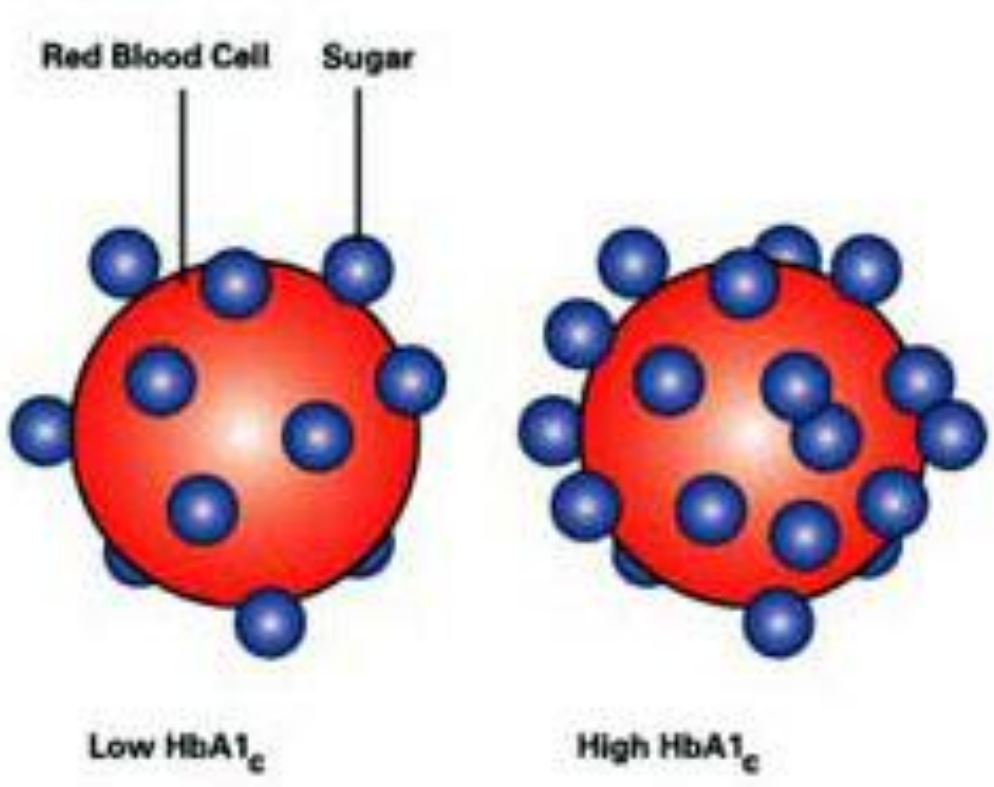
What exactly does A1C measure?

A1C measures the amount of hemoglobin in the blood that has glucose attached to it.

Hemoglobin is a protein found inside red blood cells that carry oxygen to the body. Hemoglobin cells are constantly dying and regenerating, but they have a lifespan of approximately three months.

Glucose attaches (glycates) to hemoglobin, so the record of how much glucose is attached to your hemoglobin also lasts for about three months.

If there is too much glucose attached to the hemoglobin cells, you will have a high A1C. If the amount of glucose is normal, your A1C will be normal.



If you have diabetes, you should have an A1C test at least twice each year to find out your long-term blood glucose control.

The A1C test measures your average blood glucose during the previous 2-3 months, but especially during the previous month.

For people without diabetes, the normal A1C range is 4-6%. For people with diabetes, the lower the A1C value, the better the diabetes control and the lower the risk of developing complications such as eye, heart, and kidney disease.

Your goal should be to have A1C values less than 7%. That may be a hard target to hit, but it is important to try because the lower your A1C, the lower your health risk.

A1C results say about your blood glucose control during the past few months. Some people are surprised when they have a high A1C result because when they check their blood glucose with their meter, they have relatively low numbers.

But remember that checking your blood glucose gives you only a momentary sample of your blood glucose control. The A1C test measures your blood glucose control *at all times* during the previous 2-3 months, even times such as after meals or when you are asleep, when you don't usually check your blood glucose.

A1C

VS

What do the numbers mean?
Someone who is not diabetic will have about five percent of their hemoglobin glycated.

This means that if your A1C is below 5.7, you don't have to worry.

A normal A1C level is below 5.7 percent; 6.5 percent or above indicates diabetes;

5.7 to 6.4 percent is prediabetes.

To monitor your overall glucose control, diabetics should have an A1C at least twice a year.

So what role does Insulin Have on the Foods we eat

Action of Insulin on Carbohydrates, Protein and Fat Metabolism

- **Carbohydrates**
- Facilitates the transport of glucose into muscle and adipose cells
- Facilitates the conversion of glucose to glycogen for storage in the liver and muscle.
- Decreases the breakdown and release of glucose from glycogen by the liver

Action of Insulin on Carbohydrate, Protein and Fat Metabolism

- **Protein**
- Stimulates protein synthesis (anabolism)
- Inhibits protein breakdown; diminishes gluconeogenesis

Action of Insulin on Carbohydrate, Protein and Fat Metabolism

- **Fat**
- Stimulates lipogenesis- the transport of triglycerides to adipose tissue
- Inhibits lipolysis – prevents excessive production of ketones or ketoacidosis

Management of Diabetes

- Nutrition
- Blood glucose
- Medications
- Physical activity/exercise
- Behavior modification

Nutritional Management for Type I Diabetes

- Consistency and timing of meals
- Timing of insulin
- Monitor blood glucose regularly

Nutritional Management for Type II Diabetes

- Weight loss
- Smaller meals and snacks
- Physical activity
- Monitor blood glucose and medications

With appropriate medical treatment and careful attention to maintaining a healthy lifestyle, the person with diabetes can live a long, productive life. Massage therapy can be a useful and enjoyable aspect of overall care.

Just what are the specific benefits of massage for the diabetic?

What does the massage therapist need to know to successfully and safely treat the person with diabetes?

Before beginning a massage therapy, the diabetic patient should always consult their primary care physician. A person who has diabetes in control can have a massage done only if their blood pressure is under control and also on the condition that they have no damage from diabetes.

People with diabetes should take some precautionary measures before taking a massage.
They should inform the massage practitioner in advance about the specific areas of concern and make sure that the blood sugar levels are within control.
The effects of massage may last for longer duration hence the diabetic patient should check their blood sugar levels at regular intervals. A common complication in diabetes is neuropathy hence in such cases neuromuscular massage with gentle strokes and applying pressure, as in acupressure, or compression in effected areas is a safer option

Bene’s

Circulation -- There is no getting around the fact that massage can increase circulation, thereby encouraging the efficient transport of oxygen and nutrients throughout the body. Improved circulation, in turn, improves the cells' insulin uptake.




Relaxation -- The benefits of relaxation should not be underestimated, especially within the diabetic community.

Consider the physical and psychological stresses of living with a debilitating disease and the need to self-medicate and monitor on a daily basis, as well as the burden diabetes puts on the body and its systems.

That said, it's easy to see the therapeutic correlation between massage and diabetes.

With the release of endorphins, the nervous system calms, there is a reduction of stress hormones and the diabetic client can find a homeostasis with their blood sugar levels.

Myofascial Effects -- For the client with diabetes, you may likely find a thickening of their connective tissue caused by increased blood sugars.

Massage will help to increase mobility and tissue elasticity that has been hindered by that thickening effect.

Of course, a good exercise program -- with an efficient stretching regimen -- will also benefit your client.

Naturally, people tend to be relaxed and sometimes a little disoriented after receiving a massage. It is imperative that the possibility of a serious low blood sugar be ruled out before a client is allowed to leave the premises.

When people with diabetes receive repeated sessions, they can begin to understand their own patterns of response to massage, and plan accordingly.

For example, clients blood sugar can drop up to 40 points during a relaxing session of massage.

So if someone is at 100 points or less before the session, drink a small glass of juice beforehand, or maybe have it in the room to drink during the session.

If they have a reading ranging from 140 to 160 points, eat nothing, knowing they will drop into a more desirable range during the session.

If higher than 160 points, they may consider taking an extra injection of insulin, or rescheduling, being careful to account for the likely drop due to massage.

Sometimes the blood glucose lowering effect of the massage lasts for several hours. It is wise to continue with regular testing.

Safety Concerns

As noted previously, changes in blood glucose levels can and do occur when people with diabetes receive massage.
These changes may happen, regardless of style of massage. But because of the relaxing nature of massage, and the somewhat altered state of awareness that can occur, a drop in blood sugar can be difficult to notice.

Some diabetics can tell when their sugar level is dropping. Others experience what is called hypoglycemic unawareness, in which they are not aware of a serious drop in blood sugar.

Even people who usually are aware can occasionally experience hypoglycemic unawareness. Hypoglycemia (low blood sugar) can be a serious condition and can lead to unconsciousness and, rarely, death.

In our practice

Start off by doing

Initial case assessment

Ask for blood sugar levels and put in notes

2-3 30 min sessions

Combo stretching w massage

Progress as client adapts

Do no more than 60 min sessions

Due to the frequent unpredictable nature of the disease, it is important for the massage therapist to recognize the signs and symptoms of hypoglycemia. Any one or more of these symptoms may occur:

•Excessive sweating (skin may feel clammy);

•Faintness or headache;

•Unable to awaken;

•Certain spaced-out tendencies--the person may talk or move very slowly, or not be able to speak coherently;

•Irritability;

•Change in personality;

•Rapid heartbeat

So we always kept juice and crackers on premise

The therapist should always ask the person how they feel.

Does he seem fully cognizant when questioned?
If there is any doubt, be prepared to treat the client.

Have them sit upright for a minute before standing

Treatment is simple. If blood sugar is low, the diabetic needs sugar fast!

(Many diabetics carry glucose tablets with them.) These forms of sugar all act quickly to raise the blood glucose levels.
A cup of juice or sweet drink, or the equivalent of 15 to 20 grams of carbohydrate (read the jar or can), will be sufficient to raise the blood glucose to a safe level.

Changes will be noted in the diabetic within minutes. It is wise, then, to make sure the diabetic is feeling better before leaving. He may need to eat more, or to test blood sugar again after awhile.

With awareness of these precautions, massage can be safely enjoyed by the person with diabetes.

If a diabetic has peripheral neuropathy (damage to the small nerves of the hands and feet), he or she may be very sensitive to touch, or may experience numbness in the extremities.

It is best to use techniques of comfort touch, a nurturing form of acupressure, or compression technique.

In this approach to massage, broad, direct pressure is applied to the part of the body being touched.

Where there is impaired circulation, this is less likely to cause further discomfort or damage than strokes, such as petrissage, deep effleurage or friction.

Two specific types:
Diabetic peripheral neuropathy (DPN) and
Chemotherapy-induced peripheral neuropathy (CIPN).

Both involve damaged and painful distal sensory and motor nerves.

In DPN, the cause is uncontrolled blood glucose, while CIPN is a side effect of chemotherapy.

Causes of peripheral neuropathy

There are over 20 known causes of this condition. Some of more common causes are:

- Diabetes
- Chemotherapy drugs for cancer treatment
- Some prescription medications such as “statin” drugs for high cholesterol or prolonged antibiotic therapy for infections
- Exposure to environmental toxins such as lead or mercury
- Heredity factors
- Excessive alcohol intake
- Infections including HIV

In about 40% of the cases the exact cause of the neuropathy is not known and this is called idiopathic neuropathy.

Approximately 30–50 percent of all diabetics will eventually have symptoms of DPN.

The most serious comorbidities include foot ulceration and lower-extremity amputation.

DPN is characterized by uncontrolled (high) blood glucose, vascular insufficiency, and degeneration of nerve fibers due to lack of oxygen.

It presents with mild onset, usually initial discomfort, and later progresses to acute pain, open wounds, and ulcers. If the decline is not controlled, amputation is a risk.

DPN is prevalent in people who smoke, drink alcohol heavily, are hypertensive, or who have a long or uncontrolled history of diabetes mellitus.

Deep tissue massage (not all massage) may be contraindicated for people with neuropathy. If you are not able to feel pressures, you cannot give feedback to the therapist (you may not be aware if pressures are excessive).
Other types of massage such as hot stone massage may be harmful for a person with diabetes due to the heat applied to the skin.

Do not massage the area if an injection was recently given. The medication may be absorbed faster if this happens.

Gently examine both feet for cold patches, open sores, and reddened or purple blotches, while simultaneously applying experimental pressure to determine the client's pain tolerance.

Check blanching of toenails

(Cold spots are cause for concern and the patient should be referred to a doctor, but it's not an emergency situation. Open sores are always a massage contraindication.
Bluish skin, grey skin, or little black dots are cause for an immediate referral to a doctor.)

Palpation of the Posterior Tibial Artery

Palpation of the Dorsalis Pedis Artery

Sensory nerve damage may be the most common presentation of PN. When the affected neurons are large-diameter fibers, the senses of vibration and proprioception may be interrupted.

The consequences of this include muffled sensations and a numb feeling, as if a thick blanket is covering the affected areas. Proprioceptive damage may present as a loss of tendon reflexes.
If smaller-diameter nerves are targeted, then the sensations of pain and temperature are predominant.

Often, both large- and small-diameter neurons are affected, resulting in numbness, paresthesia, and burning pain.

When motor neurons are affected, symptoms might include painful cramps, fasciculations (small areas of involuntary twitching), muscle wasting, and progressive weakness.

Treating Peripheral Neuropathy

In most instances, neuropathy can not be cured as nerve damage is difficult to reverse. Treatments are aimed at making the neuropathy sufferer more comfortable so they can experience a better quality of life. Oral medications and topical products along with therapy treatments are used to treat peripheral neuropathy. Laser and infrared therapy has been helpful in reducing the discomfort of neuropathy.

How massage works in treating peripheral neuropathy

The technical definition of massage is the use of pressure on targeted body structures such as muscles, tendons, nerves, ligaments, joints or lymphatic vessels. Massage can be administered by the human hand or by an electrical massage unit. Massage therapy offers a wide range of benefits which include:

- Pain relief
- Increased circulation to the area being massaged
- Easing of tension and stiffness
- Relaxation
- Promoting of healing

Housekeeping

- Notes and recording will be sent out tomorrow
- Certificates will be emailed
- No later than 1 week out
- Email (info@clublmt.com)

How can we Tell our community about this?

BONUS !!!!

Special BONUS section on how to Target market working with diabetics and neuropathy section using Instagram and Facebook!!