HME103-Principles of Nutrition

Nutrition in Diabetes

Lesson Code: HME103-Principles of Nutrition

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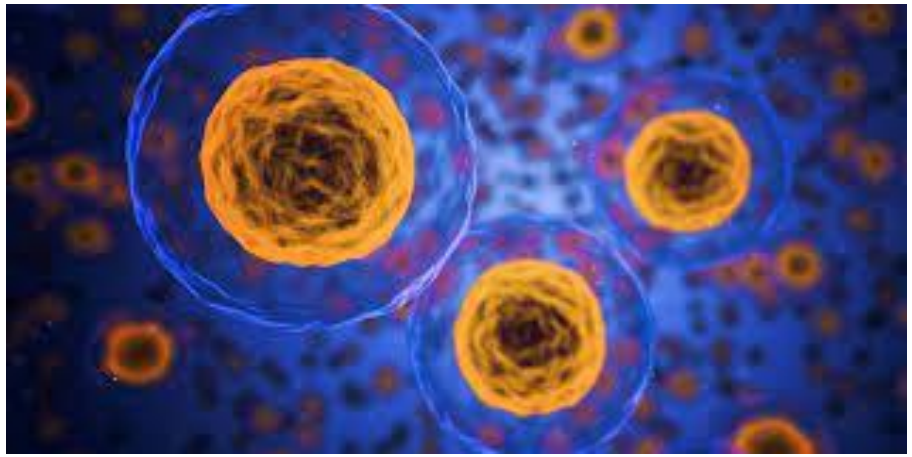
Sugar & Diabetes

Our cells depend on a single simple sugar, glucose, for most of their energy needs.

Regulation of blood sugar (glucose) in the body is achieved as a result of the complex interaction of many chemicals and hormones.

Nutrition in Diabetes

The most important hormone that plays a role in the regulation of sugar metabolism is the insulin hormone secreted from the beta cells of the pancreas.



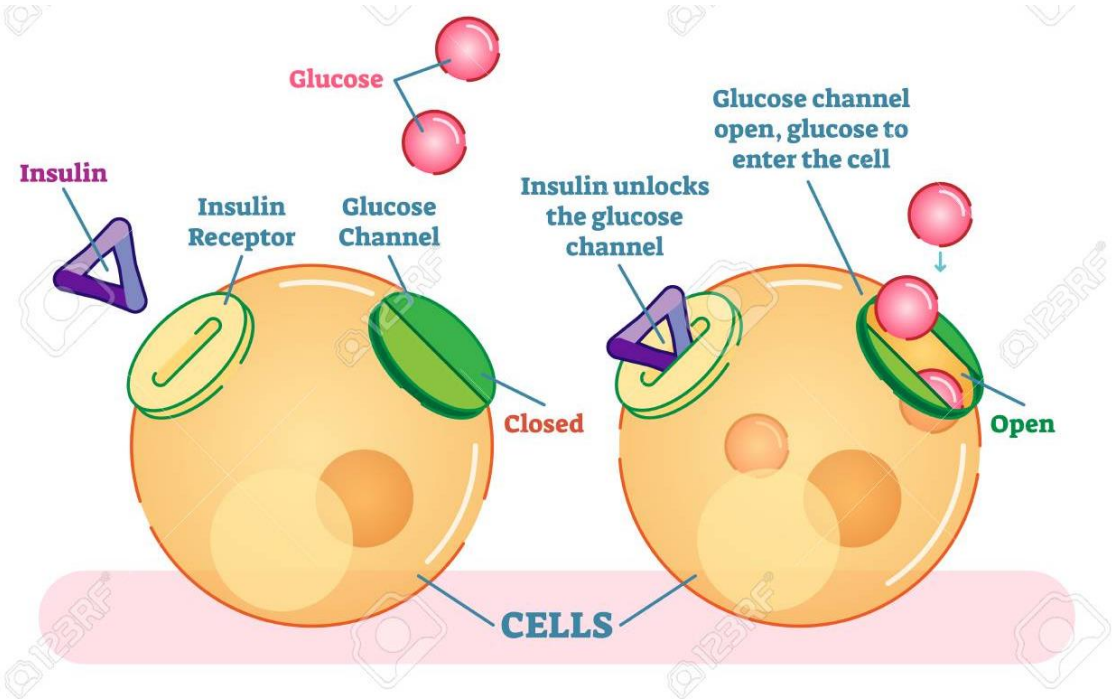
Diabetes

Diabetes or Diabetes mellitus, commonly called diabetes, is a common term used to describe several groups of diseases caused by high blood sugar, **which occurs as a result of either insufficiency in insulin secretion** or a **disorder in the effect of insulin or insulin response**, which is usually caused by a combination of hereditary and environmental factors.

The blood sugar level of a healthy individual does not exceed 120 mg/dl in the fasting state and 140 mg/dl in the satiety state (two hours after starting to eat). A blood sugar level measured during hunger or after satiety is above these values, indicating the presence of diabetes.

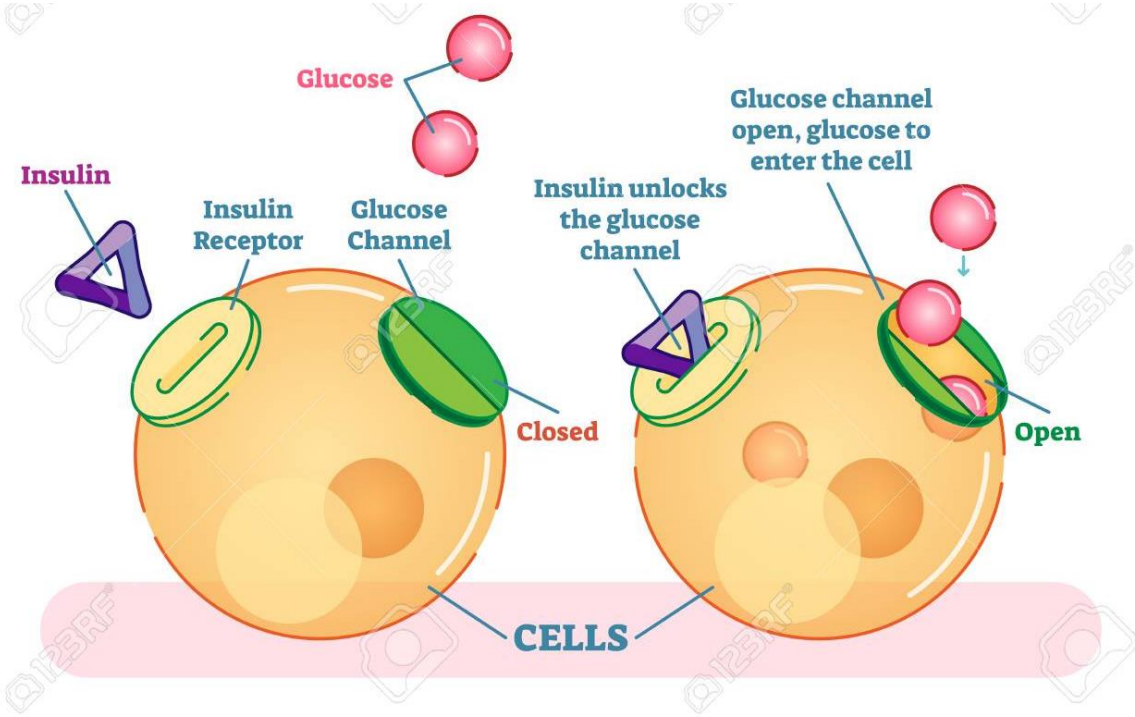
How Does Insulin Work?

- When you eat food, your body converts the food into glucose and sends it into the blood.
- When a healthy person's blood sugar level rises after each food intake, the pancreas produces insulin to enable the food consumed to be converted into energy.
- Insulin helps move glucose from the blood into your cells. Cells do not allow blood sugar to enter without insulin.
- When glucose enters the cells, it is either immediately used as fuel for energy, or if it is more than the body's fuel needs, it is stored in the liver (sugar storage = glycogen) or fat tissue for later use.

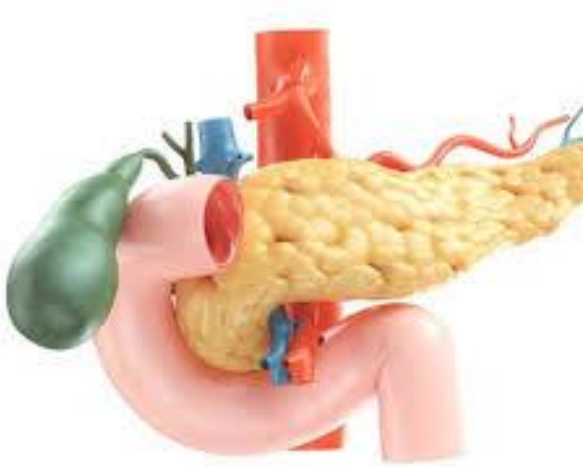


How Does Insulin Work?

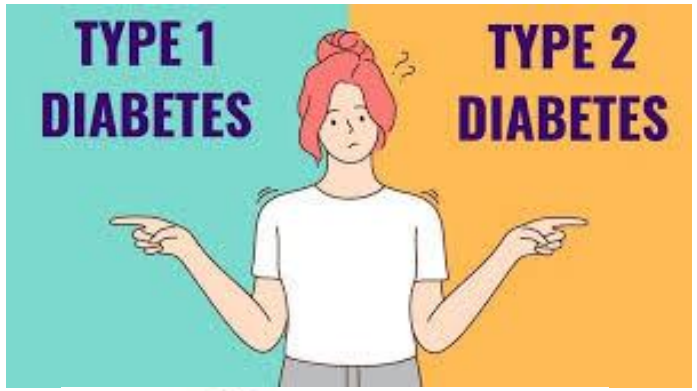
- If the insulin hormone cannot be produced or the produced hormone cannot be used effectively, the sugar that passes into the blood from the consumed foods, namely glucose, cannot be used and blood sugar rises (hyperglycemia).

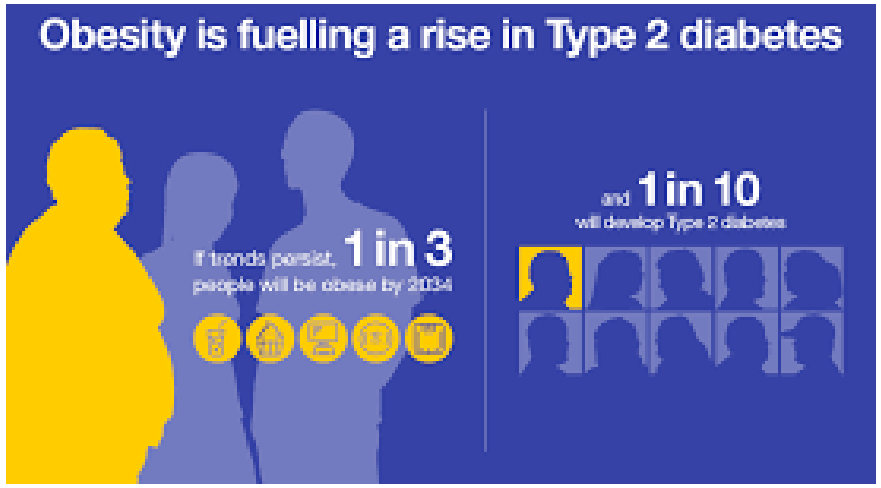


Why the body cannot produce insulin?



- ✓ In Type I diabetes, the immune system makes a big mistake! In this type, the immune system attacks and destroys beta cells (insulin-producing cells in the pancreas) !
- ✓ In Type II diabetes, the pancreas still produces insulin, but the insulin produced is either insufficient or the body has become resistant to insulin!





Types of Diabetes

- Type I diabetes: The body produces little or no insulin. 5-10% of individuals with diabetes are Type I.
- Type II diabetes: The body produces insulin but cannot use it enough. It is the most common form of diabetes. 70% of women and 50% of men diagnosed are obese.
- Secondary diabetes: a consequence of another disease. For example, pancreatitis or cystic fibrosis.
- Gestational Diabetes: Diabetes during pregnancy. Pregnant women have a higher insulin level. If a woman has hyperglycemia, her blood glucose crosses the placenta, but insulin does not. This can cause a high birth weight for the baby.

Sugar & Diabetes

Eating too much sugar causes diabetes.

NO!!

Diabetes is related to genetic factors and lifestyle…

What are the symptoms of diabetes?

- ✓ Excessive eating
- ✓ Excessive urination
- ✓ Excessive fluid intake
- ✓ Blurred vision
- ✓ Poor wound healing
- ✓ Irritability

Who's at Risk?

- Overweight people (Obesity)
- Those whose first degree relatives (mother, father, sibling) have diabetes
- Belonging to a high-risk ethnic group
- Women diagnosed with gestational diabetes or giving birth to a baby with a birth weight > 4.5 kg
- People living under stress

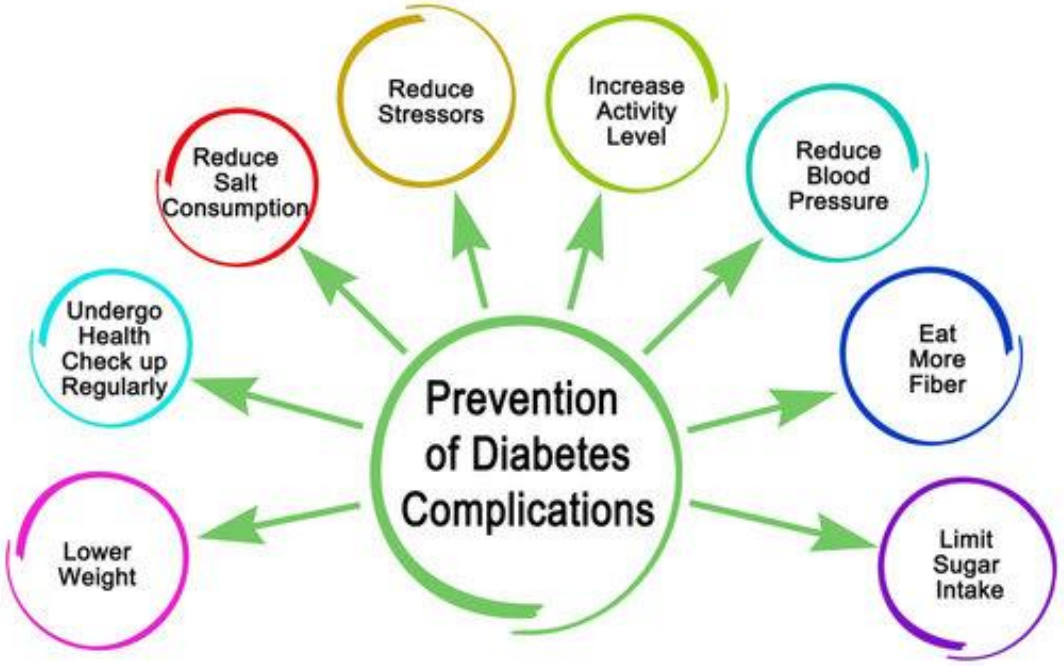
Diabetes inTurkiye?

2022 data published by the International Diabetes Federation (IDF) shows that there are approximately 7 million diabetic patients in the age range of 20-79 in Turkiye, and this figure corresponds to approximately 15% of the total adult population.

The incidence of diabetes in our country has been increasing steadily over the years, and it is predicted that it will increase further due to factors such as the aging population, urbanization and unhealthy lifestyle changes, and this figure will rise to 8.4 million by 2045.

Complications of Diabetes

If our body cannot control blood sugar, health problems occur in the short or long term.

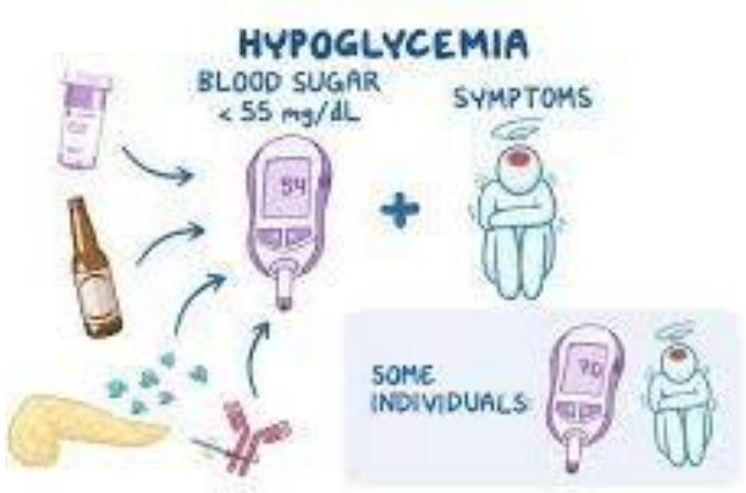


Diabetes can cause damage to small and large vessels as well as nerves.

These damages caused by diabetes are defined as acute and chronic complications.

Acute and chronic complications can occur in individuals with both Type I and Type II diabetes.

Acute complications



Hypoglycemia (Low blood sugar): It is a condition in which the blood sugar (glucose) value is normally low.

If blood sugar drops too much as a result of too much insulin secretion, too much exercise, or insufficient energy intake, the person becomes unable to function normally.

Hypoglycemia is quickly corrected by consuming sugary fruit juice, cubes or granulated sugar.

Acute complications

Ketoacidosis: It is a complication that occurs in diabetic patients when blood sugar rises and the body produces excessive blood acids called ketones.

It is a serious complication of diabetes and can be life-threatening, but it usually takes hours for it to become this serious.

- ✓ Ketoacidosis is caused by insulin deficiency; The body switches to fatty acid burning, which produces acidic ketone bodies to meet its energy needs.

It is mainly seen in people with Type 1 diabetes.

Initial Warning Signs of Ketoacidosis From Diabetes

Thirst

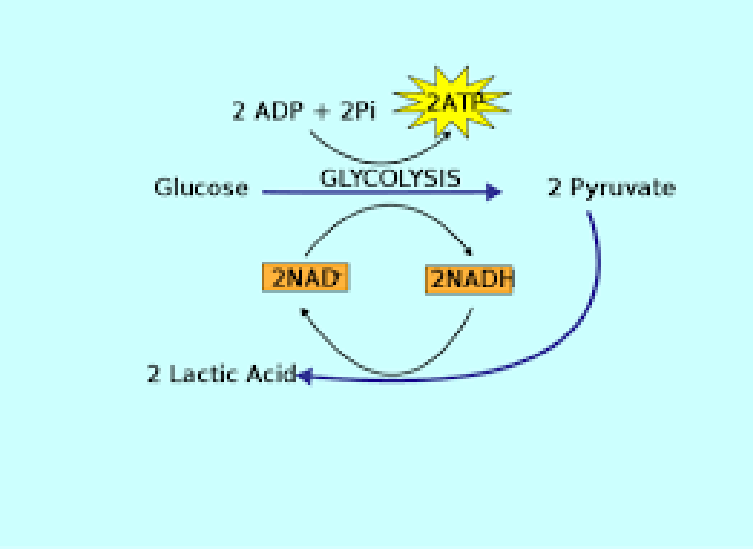
High ketone levels in urine

Very dry mouth

Frequent urination

Spiked blood sugar

Acute complications



Lactic acidosis: Cells produce lactic acid when they break down carbohydrates for energy. Lactic acidosis is the accumulation of lactic acid in the body.

If too much lactic acid accumulates in the body, the balance is disrupted and the person begins to feel uncomfortable.

Less common than other complications, Lactic acidosis mainly affects people with Type 2 diabetes.

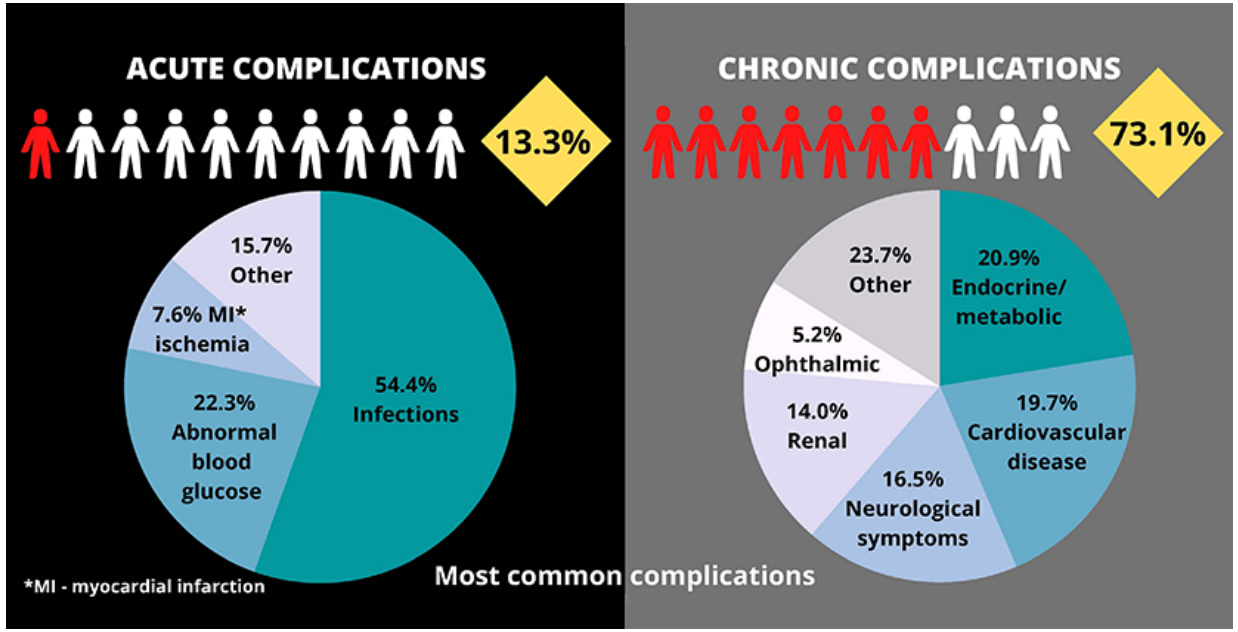
Acute complications

Bacterial/fungal infections : People with diabetes are more susceptible to bacterial and fungal infections in all organs, especially the skin and nails.

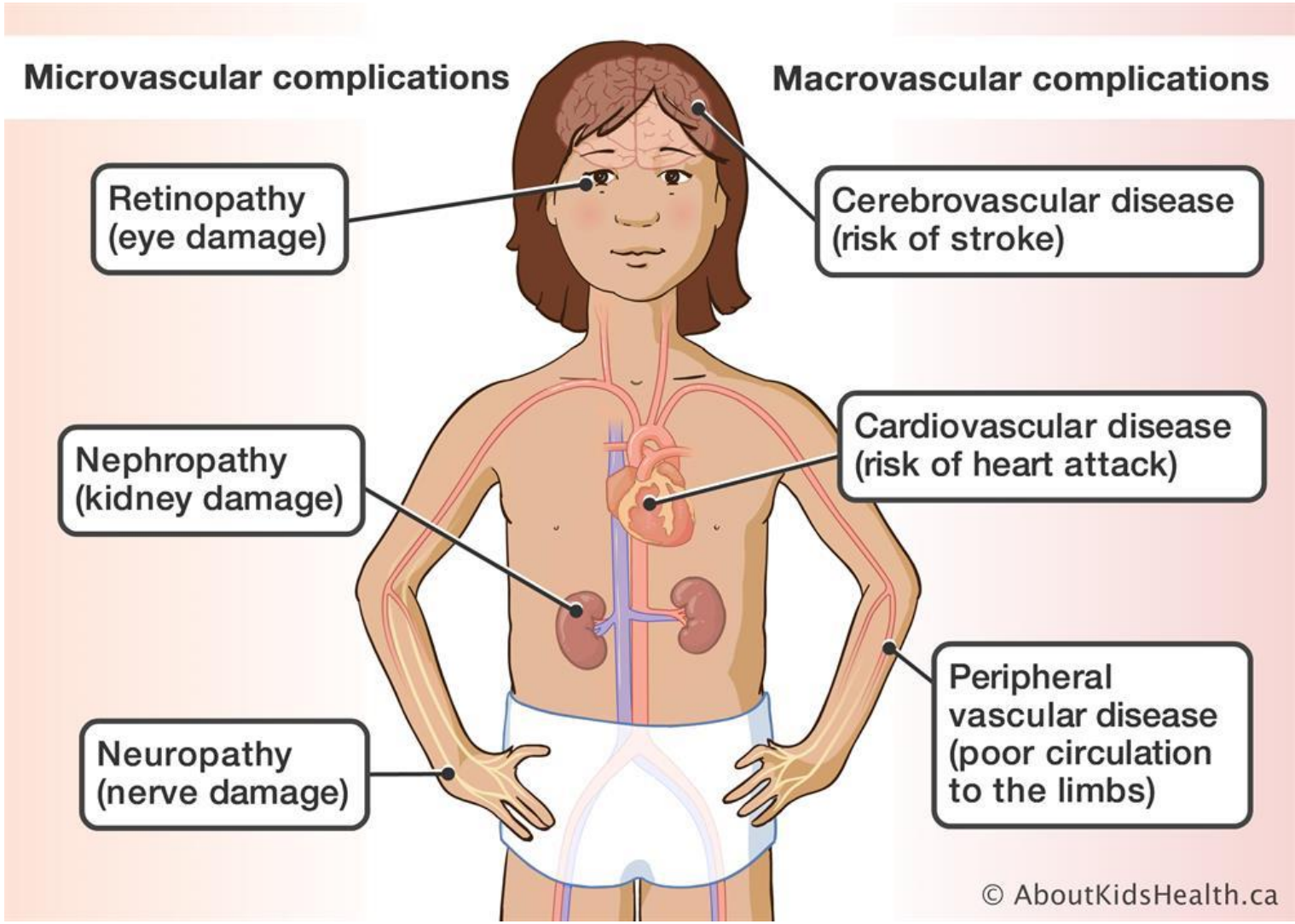
Chronic Complications of Diabetes

- High blood sugar for a long period of time causes damage to large and small vessels and nerves.

- Problems related to that organ are seen in whichever organ the damage occurred.



Chronic Complications of Diabetes



Chronic Complications of Diabetes

•**Cardiovascular disease**: In many countries, cardiovascular disease or circulatory system disease is the leading cause of death among people with diabetes.

The risk of heart disease or stroke is 2-5 times higher in people with diabetes.

•**Retinopathy :** It is an eye disease that occurs as a result of high blood sugar levels caused by diabetes damaging the retina of the eye. It is the leading cause of blindness and visual impairment in adults. Diabetic retinopathy is detected in approximately 75% of those with diabetes over 15 years, that is, 3 out of 4 patients.

Chronic Complications of Diabetes

•**Nephropathy (Damage to the kidneys)**: It is a great threat to people with diabetes. Up to 40% of people with uncontrolled Type I diabetes may develop severe kidney disease, which may require dialysis and/or kidney transplant, by the time they reach the age of 50.
•Kidney damage at the microvascular level in diabetic people as a result of not being able to control blood sugar is called nephropathy. It affects at least half of people with diabetes.

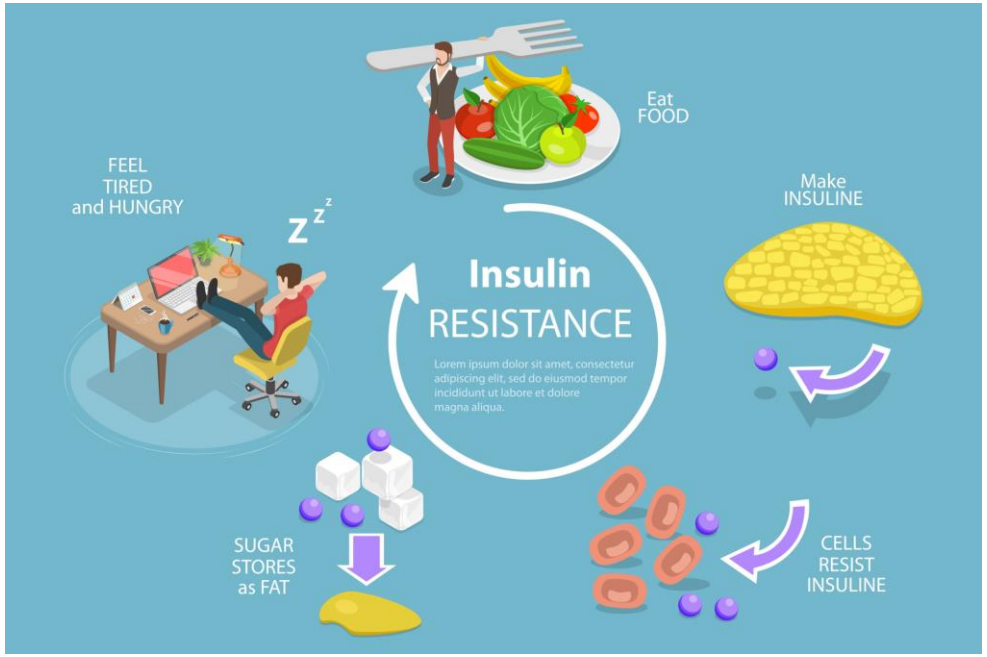
•**Neuropathy (Damage to the nerves):** Neuropathy is one of the long-term complications of diabetes. Over time, high blood glucose (sugar) levels can damage the small blood vessels that supply the nerves in your body. This prevents essential nutrients from reaching the nerves. As a result, nerve fibers may become damaged and destroyed. Neuropathy is injury or damage to the nerves in areas reached by the peripheral nervous system, such as hands, arms, feet, legs, and face.
•**Foot complications**

Why is Healthy Nutrition Important?

Thanks to healthy nutrition;

- Ensuring that the necessary food ingredients are taken,
- Being able to control blood sugar levels,
- Prevention of long and short term complications,
- Providing the energy necessary for life,
- Preventing fat accumulation and insulin resistance in the body,
- Reducing the risk of other diet-related diseases

Note:



- Insulin resistance: A condition in which cells in the muscle, fat and liver of the human body do not respond properly to insulin and therefore cannot use glucose in the blood for energy.

- Consuming monosaccharides and high glycemic index foods through nutrition causes insulin resistance.

Nutrition in Diabetes

Today, the principles of healthy nutrition recommended for individuals with and without diabetes are no different!!

Diabetes does not affect an individual's requirement levels for essential nutrients!!

With a nutrition plan; The energy and nutrient needs, which vary according to individual characteristics, are met from a variety of foods to ensure adequate and balanced nutrition.

Nutrition in Diabetes

- The most important change you will make in your lifestyle is to change your current eating habits to ensure a healthy diet.
- The basis of initiating these changes is a conscious food selection and kitchen shopping.
- Because if the foods you take home or choose when eating out are not suitable for a healthy diet, it becomes difficult to control blood sugar.

Nutrition in Diabetes

It is important to gain healthy eating habits to control blood sugar in diabetes treatment.

- ✓ As is the case with non-diabetic individuals, learning about adequate and balanced nutrition for individuals with diabetes and applying what they have learned in daily life forms the basis of a healthy life..

Nutrition in Diabetes

Maintaining good blood sugar control is the primary goal in diabetes treatment!!

Keeping blood sugar levels as close to normal as possible can reduce the risk of developing diabetes-related complications such as heart disease, stroke, kidney and eye disease, and nerve damage.

Diet Myths – True or False ?

- **People with diabetes should:**
  - Use diabetic products
  - Always snack between meals
  - Follow a 'special' or 'diabetic' diet

What is the dietary advice for diabetes?

Nutrition in Diabetes

People with diabetes should eat special 'diabetic' or 'dietetic' foods?

A healthy meal plan for people with diabetes is the same as for everyone:

- ✓ Low fat, salt and sugar
- ✓ Meals based on whole grains, vegetables and fruits

Diabetic and dietetic versions of sugar-containing foods offer no special benefit. They:

- ❖ Raise blood glucose levels
- ❖ Usually more expensive
- ❖ Can also have a laxative effect if they contain sugar alcohols

Nutrition in Diabetes

For a healthy diet, foods containing the following nutrients should be taken in sufficient quantities and in a balanced manner within the meal.

- Food fiber (vegetables, fruits, whole grains)
- Vitamins and Minerals (all foods, especially vegetables and fruits)
- Protein (meat, eggs, cheese, milk, yogurt)
- Fat (with oil and fat-containing foods such as meat, eggs, cheese, milk, yoghurt)
- Carbohydrates (cereals, legumes, potatoes, vegetables and fruits, milk, yoghurt)

Which Foods Should Be Consumed for Healthy Nutrition?

The **'Diabetes Nutrition Pyramid'** is a visual method that makes it easier to plan meals.

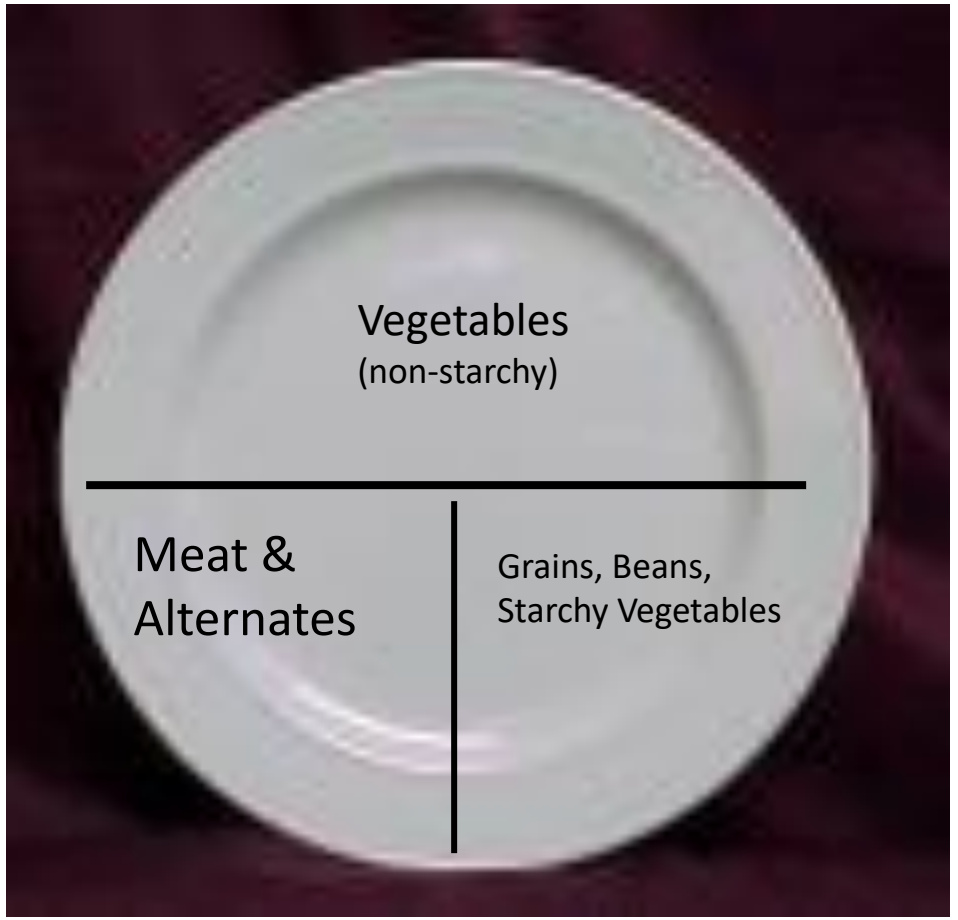
The foods in this pyramid are grouped into 6 groups.

The eatwell plate

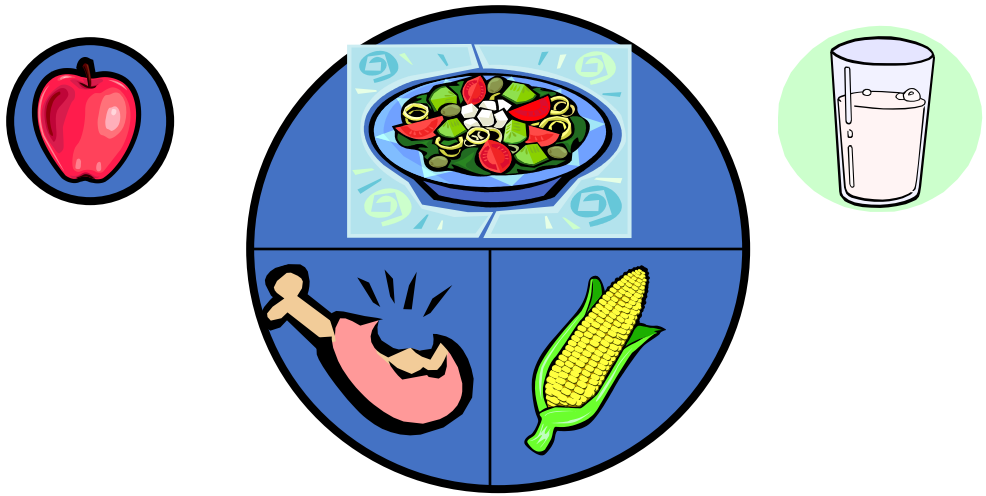
Use the eatwell plate to help you get the balance right. It shows how much of what you eat should come from each food group.

Public Health England in association with the Welsh Government, the Scottish Government and the Food Standards Agency in Northern Ireland

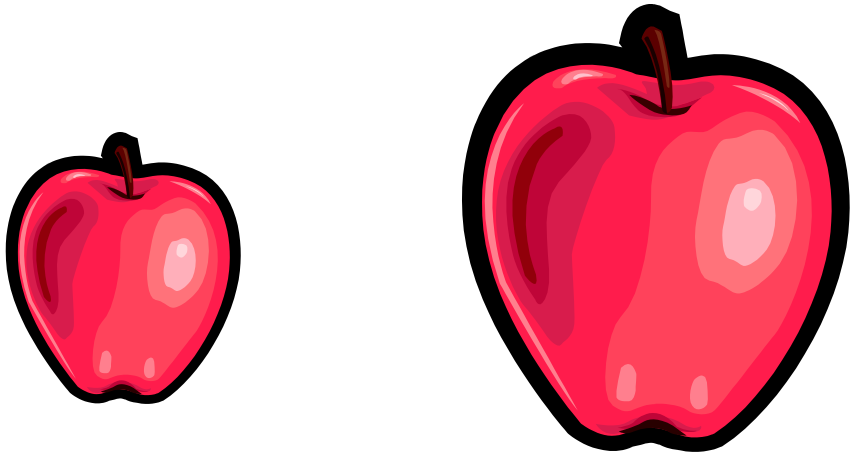
Plate Method Explained



The Plate Method



Serving Size Makes a Difference

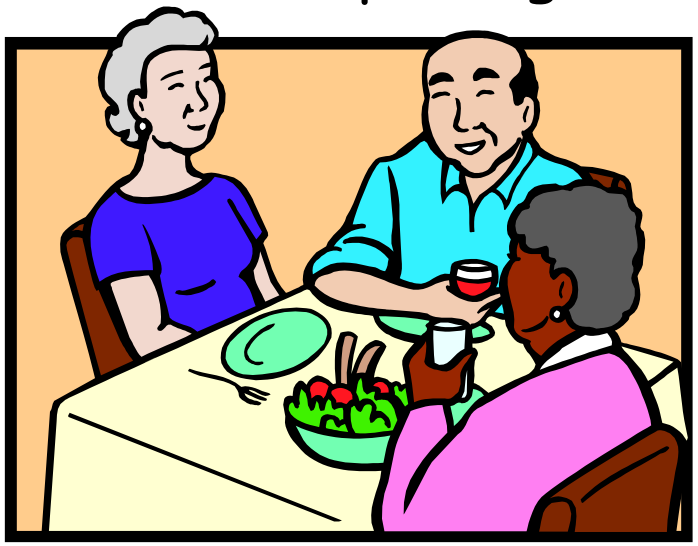


Which apple has the greatest effect on blood sugar ?

Which Nutrient Affects Blood Glucose?

Carbohydrates

- The carbohydrates that you eat and drink directly affect your blood glucose level.
- All digestible carbohydrates are eventually converted to glucose, a simple sugar that your body uses for energy



Total carbohydrate eaten determines how much sugar reaches your blood.

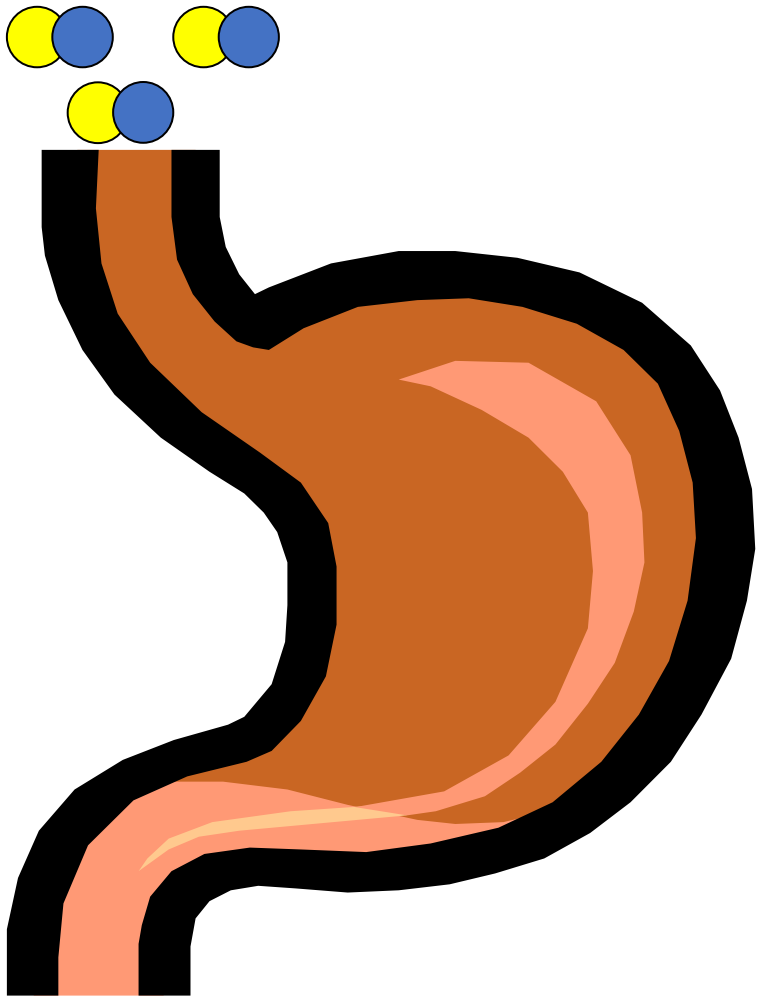
Which Nutrient Affects Blood Glucose?

Carbohydrate

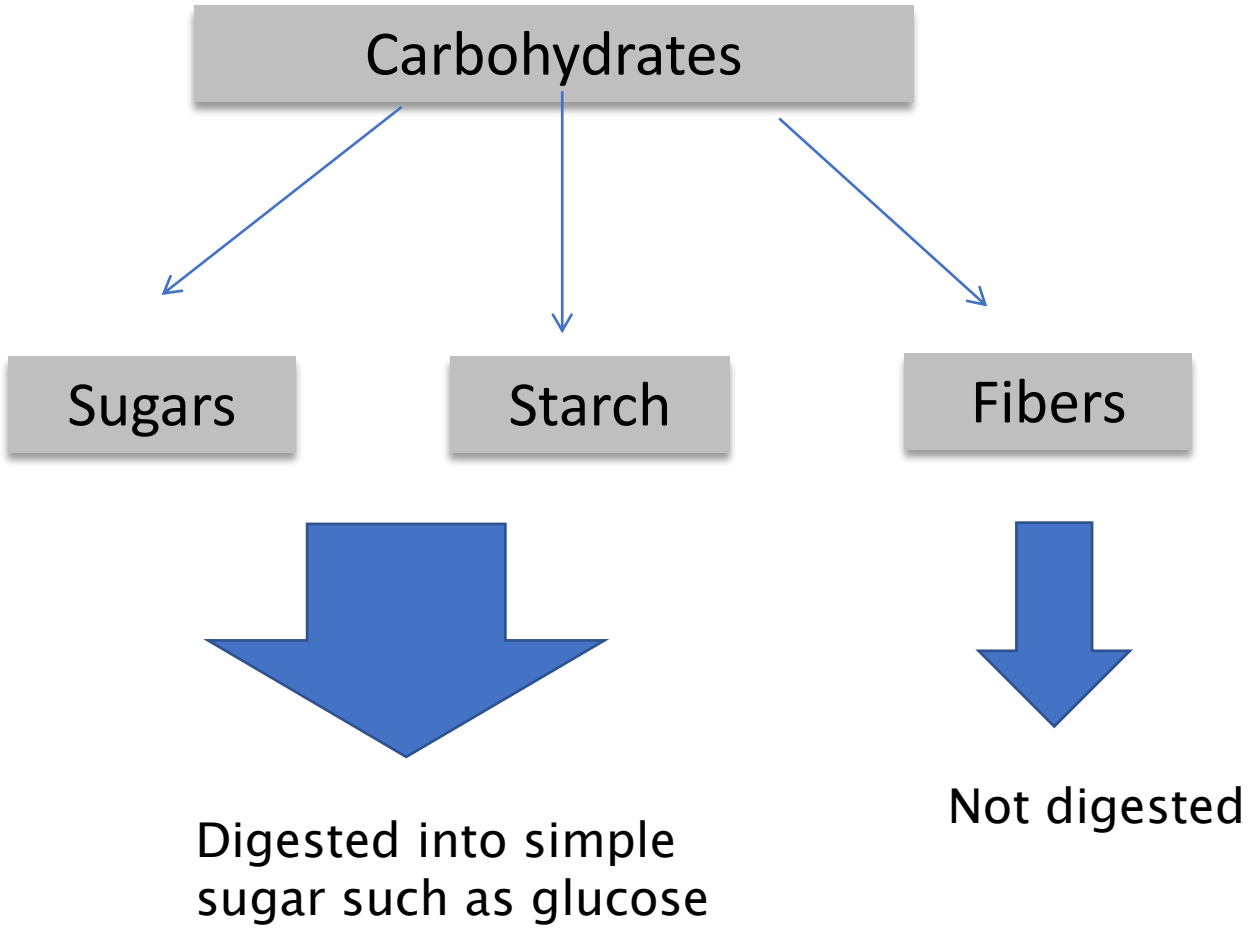
Natural Sugars | Starches | Added Sugars

All affect blood glucose!

Which Nutrient Affects Blood Glucose?



- Food is chewed to start breaking it down
- Food is broken down further in the stomach
- Carbohydrate is broken down into glucose
- Shortly after eating carbohydrate blood glucose starts to rise
- Body cells use the glucose for fuel or store it for later


Carbohydrates
Sugars
Starch
Fibers
Digested into simple sugar such as glucose
Not digested

Carbohydrates

- Starch
  - Food examples: bread, pasta, potatoes, corn, rice, crackers, cereal
- Sugar
  - Food examples: candy, cookies, cakes
- Fiber
  - Food examples: Whole grains, vegetables, fruit, beans, lentils

- Activity:
  - **Which foods can affect blood glucose?**

1. Egg ? NO
2. Broccoli? NO
3. Bread? YES
4. Cheese? NO
5. Apple? YES
6. Cheese sandwich? YES
7. Pie ? YES

Nutrition in Diabetes

Foods containing carbohydrates:

- Table sugar,sugary foods (such as honey, jam, molasses, marmalade, sugary fruit juices, soft drinks, chocolate, ice cream and desserts),
- flour and foods made from flour (such as bread, phyllo, noodles, pasta),
- rice, bulgur, legumes, potatoes, vegetables, fruits, yoghurt and milk.

Nutrition in Diabetes

The speed at which carbohydrates in foods affect blood sugar is different from each other.

For this reason, foods are divided into two groups: **simple carbohydrate foods**, which raise blood sugar rapidly, and **complex carbohydrate foods**, which raise blood sugar later and slower.

Simple Carbohydrate

- It mixes quickly with the blood
- Raises blood sugar rapidly
- Makes you hungry quickly
- Increases fat storage

Example: candy and candies, honey, jam, fruit juice, chocolate, wafers..

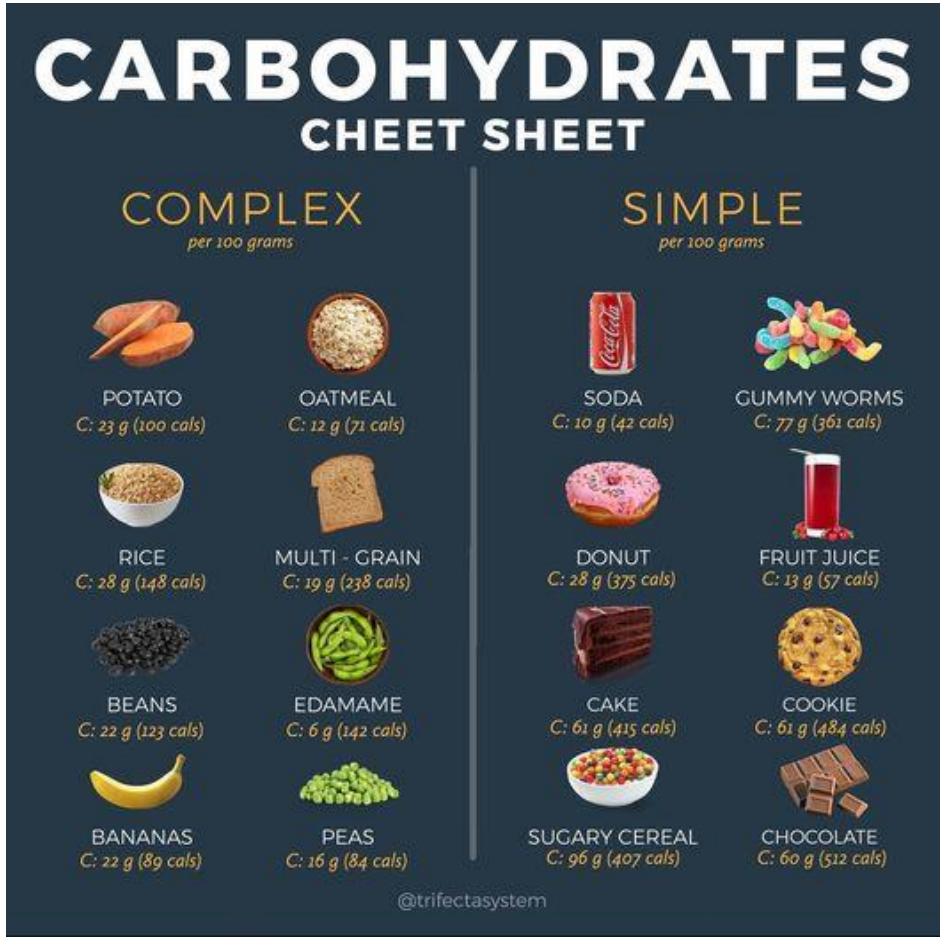
Complex Carbohydrate

- It mixes slowly with the blood
- Provides long-term satiety
- High fiber content

Example: Vegetables, whole grain breads, bulgur, oats, pasta and legumes

Nutrition in Diabetes

Complex Carbohydrates are rich in fiber and have a low glycemic index.
White bread, rice, sweets and sugary foods are **simple carbohydrates**. They increases blood sugar quickly due to their low fiber level and high glycemic index.
Complex carbohydrates should be preferred instead of simple carbohydrates!!



Glycemic Index (GI)

- What is it?
  - A scale that ranks carbohydrate-containing food or drink by how much it raises blood sugar levels after it is eaten or drank
  - Foods with **high** GI increase blood sugar higher and faster than foods with **low** GI
  - The glycemic index is the concept that expresses the rate at which a carbohydrate food raises blood sugar after a certain period of time after it is eaten. Foods with high index values raise blood sugar rapidly and lower it rapidly.

- When foods with a high glycemic index value are eaten, blood sugar rises quickly. It is one of the most important symptoms of excess weight. When foods with a low index are preferred, blood sugar rises slowly.

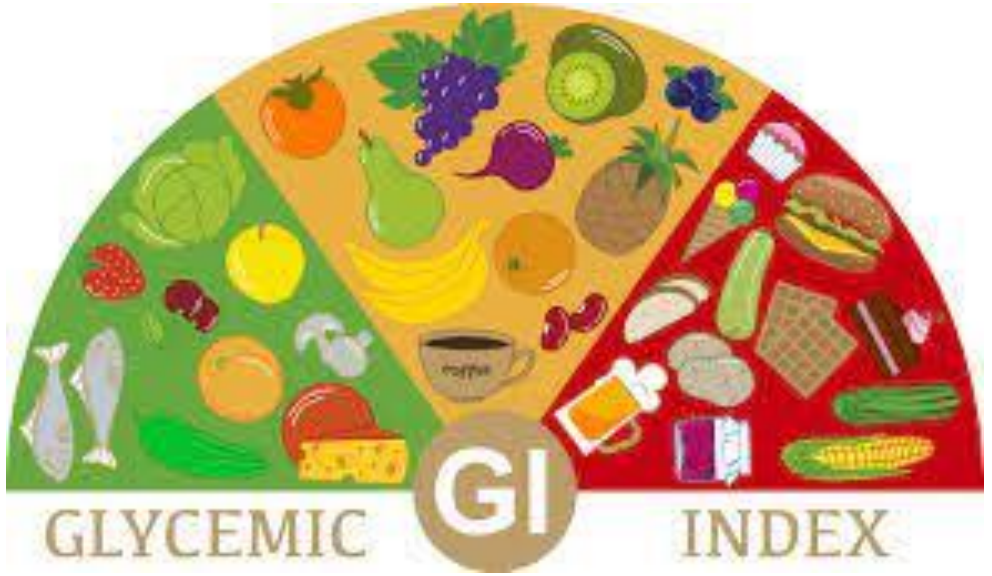
- The glycemic index is determined by measuring the blood sugar of people who eat this food and making calculations at the end of 90 minutes after consuming the food.

- Evaluation is made between 0 and 100.

✓ Below 55 is low

✓ 56-69 is medium

✓ 70 and above is high (carbohydrate class)



Many studies and studies have shown that a low glycemic index value;

- positively affects the risk of chronic diseases such as diabetes, cardiovascular disease and obesity. Especially the use of foods with low index values in the diet of diabetic patients provides significant benefits.
- Foods with a lower index are generally considered healthier because they keep you feeling full for longer.

- Benefits of consuming low GI foods:
  - Helps to control blood glucose
  - Decreased risk of obesity, heart disease and stroke and
  - Feel fuller longer

- Foods with low glycemic index include cream-free yoghurt, skim milk, whole wheat bread, fresh fruits and legumes.
- Fresh potatoes, bananas, bulgur, popcorn and wheat bread are in the medium value food group.
- Melon, watermelon, carrots, mashed potatoes, sweet corn, rice and french fries are foods with a high glycemic index.

In conclusion;

- Prevention of diabetes mellitus and nutrition in case of disease are important.
- To prevent Type II diabetes, obesity should be avoided and physical activity should be increased.
- Individuals should take care to stay within ideal weight limits.
- Under the supervision of a physician and dietician, daily food intake should be divided into three main meals and three snacks, and basic food groups should be included in the nutrition.
- If Type I diabetic patients are in the growth and development period, these characteristics should be taken into consideration and their diets should be adjusted accordingly. Height, weight and body development should be monitored

- Pure sugary foods that rapidly increase blood sugar levels should be avoided.

  Fibrous foods and fruit sugars should be preferred

  Artificial sweeteners should be used in appropriate amounts if necessary.
- Whole wheat bread should be preferred instead of white bread, bulgur and vegetable proteins should be preferred instead of rice.
- Adequate amounts of vitamins and minerals should be included in the daily nutrition plan.
- Unsaturated fats should be mainly preferred in meals.
- To increase the quality of life, general healthy living principles should be followed.

Diabetes Prevention Education

- The patient and his/her family receiving insulin therapy should be educated.
- From fried foods; Sucuk, salami, sausages, creams and ready-made foods should be avoided.
- Sugary foods, drinks and alcoholic beverages should not be consumed.
- There should be enough fiber in the diet and fiber foods should be given.
- While preparing the diet, the patient; socioeconomic and cultural situation and nutritional habits should be taken into consideration.

Physical Activity Helps

- Regular physical activity lowers blood sugar AND improves the way insulin works.
- For most people, this means finding ways to move around for at least 30 minutes more nearly every day.