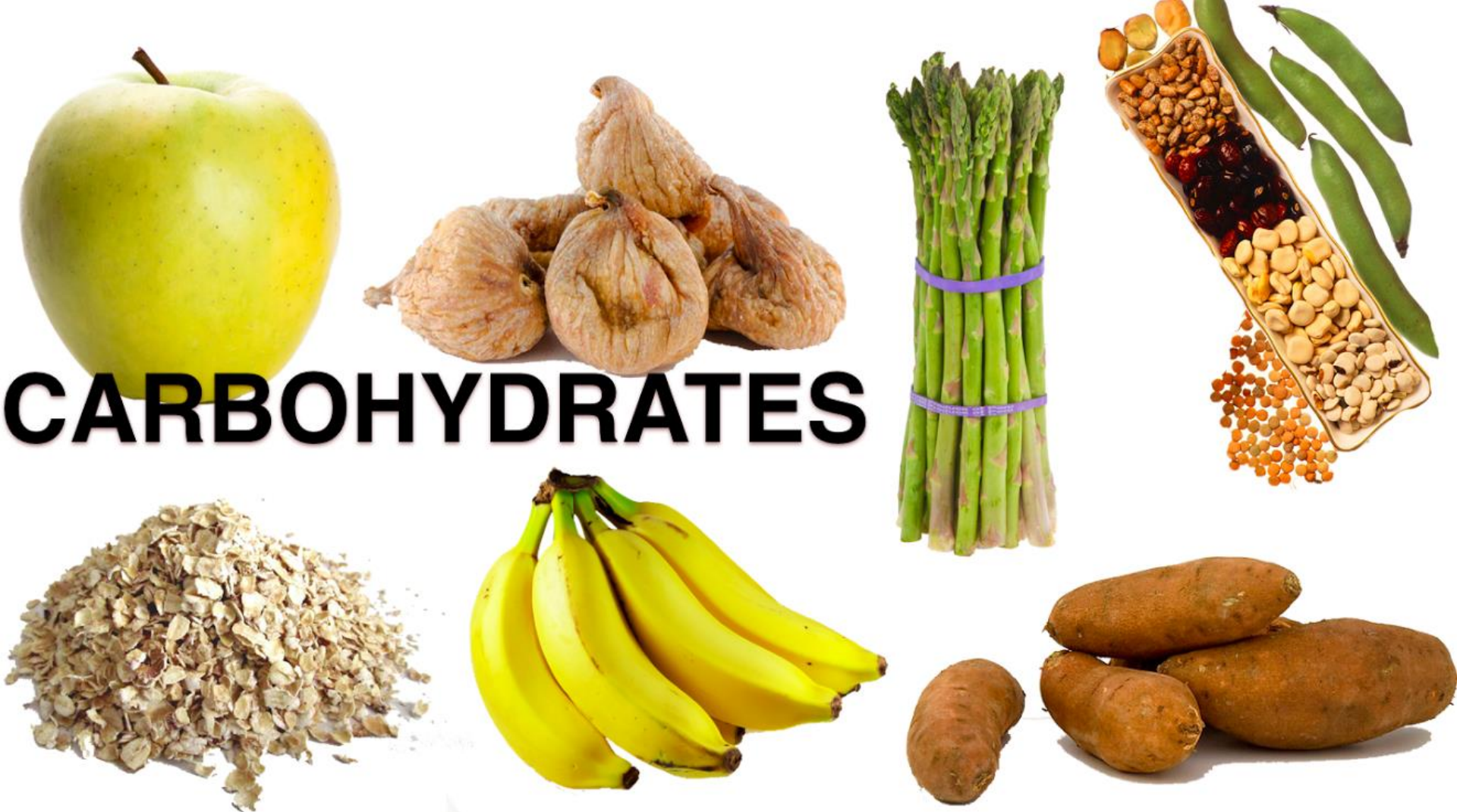


CARBOHYDRATES



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L-2

All carbohydrates are organic compounds of carbon, hydrogen, and oxygen in the form of simple carbohydrates or sugar. When linked together, these simple sugars form three sizes of CHO: monosaccharide, disaccharide, & polysaccharide.

The three sizes of CHO are divided into two classifications: simple carbohydrates (Monosaccharide & disaccharides) and complex carbohydrates (polysaccharides).

Both are valuable sources of CHO energy.

There are differences between the health values of simple & complex CHO found in foods we consume, as complex CHO may also provide fiber in addition to glucose.

✓ COMPLEX CARBS



✗ SIMPLE CARBS





Starch is the storage form of glucose found in plants. whereas glycogen is storage form in the liver & muscle.

The simple sugar's are found in confectionery, muesli bars, cakes and biscuits, cereals, puddings, soft drinks and juices and jam and honey but they also contain fat.

Starchy carbohydrates are found in potatoes, rice, bread, wholegrain cereals, semi skimmed milk, yoghurt, fruit, vegetables, beans and pulses.

The starchy carbohydrates are the ones that have all the vitamins and minerals in them as well as protein.


They are also low in fat.

Both types effectively replace muscle glycogen.

The starchy foods are much more bulky so there can be a problem in actually eating that amount of food so supplementing with simple sugar alternatives is necessary.

Our digestive system converts the carbohydrates in food into Glucose.

Any glucose not used by the cells is converted into glycogen - another form of carbohydrate that is stored in the muscles and liver.



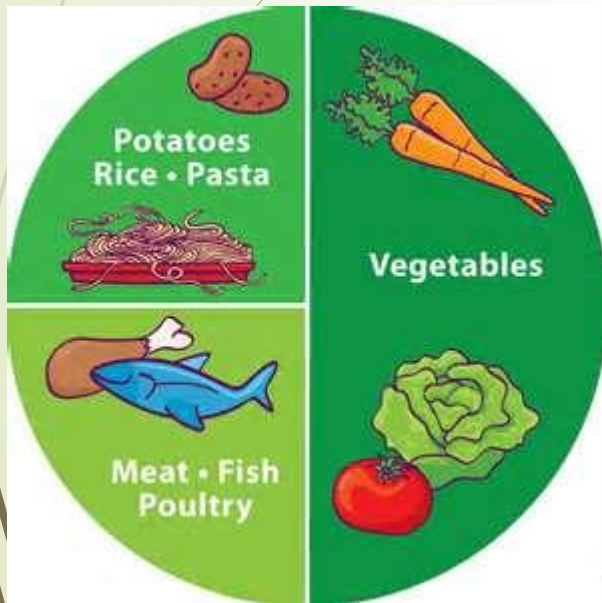
However, the body's glycogen capacity is limited to about 350 grams; once this maximum has been reached, any excess glucose is quickly converted into fat.

Glycogen stores will last for approximately 10 to 12 hours when at rest (sleeping) so this is why breakfast is essential.

Eating 5-6 meals or snacks a day, will help maximize glycogen stores **and energy levels, minimize fat storage and stabilize blood glucose and insulin levels.**

Base the main meal with the bulk on plate filled with carbohydrates and small amounts of protein such as meat, poultry **and fish.**

The extra protein & vitamins may require will be in the starchy carbohydrates.



Carbohydrates – what is a portion?

- what is a portion?

-1 medium slice of bread

-Pasta (boiled) 2-3 tablespoons

-Rice (boiled) 2-3 tablespoons

-2 egg sized new potatoes (boiled)

-1 medium baked potato (with skin)*

-Breakfast cereal: 3 tablespoons

In general CHO are the most important source of energy in the diet, approximately 50% of the total calories of American diet are CHO, and this may reach up to 80% in many developing countries.

There are practical reasons for such large quantities of CHO in diet all over the world:

- 1- CHO are widely available, because are easily grown in such plants as grains, vegetables, & fruits.**
- 2- CHO are relatively low in cost.**
- 3- CHO foods can be kept in dry storage for relatively long periods without spoilage.**

Why is carbohydrate essential nutrient?

CHO is essential primarily because of high energy requirements of central nervous system tissues [brain] .

The brain has limited ability to use non-carbohydrate energy sources.

In human, the brain requires an estimated (100 grams) of glucose per day which is one third to one half of CHO present in the average diet.

Other tissues, such as hematopoietic tissues & white blood cells are also obligate glucose users

The carbohydrates fuel factor is [4], it should provide approximately [50- 60%] of the total calories of a healthy person's well balanced diet.


Increased levels of complex carbohydrates appear to reduce risk factors of chronic diet- related disorders such as heart disease, diabetes, and some cancers.

It is recommends that we consume at least 55% of our total caloric intake [about 300 to 375 grams a day] as primarily complex CHO.

The five to six servings of fruits & vegetables and six to eleven servings of bread, cereal, rice, and pasta provide adequate amounts of complex CHO.

The minimum daily requirement of CHO is [100 grams] {400 Cal}, this equivalent to 2 liters of 5% dextrose in water.

If this minimum requirement is not covered, the result will be the extensive breakdown of body protein, as well as significant salt and water loss.



A diet low in carbohydrates may also lead to bone mineral loss, hyper cholesterolaemia, and mainly in keto genesis and ketone-body production in the mitochondria of liver cells.

Ketogenesis is the natural response of the body to a low-carbohydrate diet, owing to the exhaustion of cellular carbohydrate stores, such as glycogen and energy production through fatty acids.

For this reason, professional associations such as the British and the American Dietetic Association do not recommend low-carbohydrate diets, which usually are especially high in fat and protein.

Low-carbohydrate diets restrict caloric intake by reducing the consumption of carbohydrates to 20–60 g per day (typically less than 20% of the recommended daily caloric intake).

The maximum daily amount of glucose tolerated by an average person is about 400 g.

Health Effects:


The health concerns regarding sugar consumption include nutrient displacement, dental caries, and related issues of obesity and diabetes.

Displacement occurs when whole foods, which are minimally processed, are not eaten and are replaced by foods containing added sugars.

Carbohydrate Restriction & Regulation:

There are two types of dietary CHO restriction

- 1-General**: the total amounts of CHO consumed per day and possibly per meal, have to be either restricted [type IV hyperlipidemia] or regulated [DM].
- 2-Specific**: the intake of one or more types of CHO must be either severely restricted or eliminated from the diet as a result of specific intolerance.



Sucrose Avoidance : many sources of dietary sucrose are readily apparent like table sugar & obviously sweetened foods, most fruits, many vegetables must also eliminate from diet.

Infants will require a milk formula in which sucrose is replaced by glucose.

Lactose Intolerance



Lactose intolerance results when the mucosal cells of the small intestine fail to produce lactase that is essential for the digestion of lactose.

Symptoms include diarrhoea, bloating, and abdominal cramps following consumption of milk or dairy products.



Lactose Avoidance:

lactose is contained in human milk, cow, sheep & goats milk, in milk products and manufactured foods containing milk.

It is also present in some medications & artificial sweeteners.

Lactose intolerance infants will require low lactose milk based on Soya.

Such children may require extra protein from meat, fish and egg, and calcium supplements may also be needed.



- ▶ **Galactose Avoidance:** avoidance similar to lactose intolerance, all milk and its products.



- ▶ **Starch Avoidance:** primary starch intolerance is due to isomaltose deficiency and usually associated with sucrose intolerance. This will require exclusion of sucrose containing foods, in addition to flour and food containing flour (bread, cake), breakfast cereals, rice, potatoes, and many manufactured meat products [sausages].





FIBER

The edible parts of plants or analogous carbohydrates that are resistant to digestion and absorption in the human small intestine, with complete or partial fermentation in the large intestine.

Dietary fiber, like starch are polysaccharides in plant foods, that can not be digested by humans, so fiber' pass through' our bodies without providing calories or nutrients.

Its texture provides bulk that thickens chyme and eases the work of (GI) muscles that regulate the movement of the food mass. Although human digestive juices can not digest fiber , micro flora that normally reside in the colon utilize fiber as a medium for microbial fermentation, resulting in the synthesis of vitamins and the formation of short chain fatty acids [SCFA].

Several vitamins including K, biotin, B12, folate & thiamin are synthesized by the bacteria in the colon.

Dietary fibers are divided into two categories based on their solubility in fluids:

1. Soluble dietary fiber → apples, pears, bananas, grapes, citrus fruits [orange & grape fruits], carrots and corn.

It has a beneficial effect on body chemistry, such as lowering blood cholesterol and blood sugar levels.

2-Insoluble dietary fiber → whole grains, whole wheat flour, pop corn, nuts, peanuts butter, leafy green vegetables.

It has a good laxative action.

Sources of dietary fiber

Soluble Fiber

beans

oat bran

fruits

vegetables

Insoluble Fiber

whole grains
vegetables

beans

Bulgur or whole grain
cereals

Brown rice

SOLUBLE FIBER FOODS



HEALTH EFFECTS OF FIBER



All the health benefits of fiber improve the physical functioning of the human body.

The benefits are not directly nutritional, but instead allow the body to function at more efficient level.

Getting enough fiber in the diet can lower the risk of developing certain conditions

Heart disease. Evidence is now growing to support the idea that foods containing soluble fiber (such as oats, and beans) can have a positive influence on cholesterol, triglycerides, and other particles in the blood that affect the development of heart disease. Some fruits and vegetables (such as citrus fruits and carrots) have been shown to have the same effect

CANCER

The passage of food through the body is speeded up when fiber is eaten. Some experts believe this may prevent harmful substances found in some foods from affecting the colon and may protect against colon cancer. (However, a study conducted by Harvard University concluded that eating high-fiber food did not appear to protect people from colon cancer)

Other types of cancer that are linked with over nutrition and may be prevented by a fiber-rich diet include breast cancer, ovarian cancer, and uterine cancer

DIABETES: Adding fiber to the diet helps regulate blood sugar levels, which is important in avoiding diabetes.

In addition, some people with diabetes can achieve a significant reduction in their blood sugar levels and may find they can reduce their medication.

DIVERTICULAR DISEASE:

Diverticular disease is a condition in which small pouches, called diverticula, develop in the wall of the colon.

In a small percentage of people, these diverticula become inflamed or infected, a condition known as diverticulitis.

Diverticular disease can cause pain, diarrhea, constipation, and other problems.

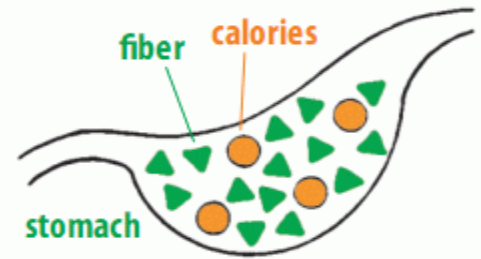
GALLSTONES AND KIDNEY STONES: Rapid digestion leads to a rapid release of glucose (sugar) into the bloodstream.

To cope with this, the body has to release large amounts of insulin into the bloodstream, and this can make a person more likely to develop gallstones and kidney to diabetes and high cholesterolstones (in addition to diabetes and high cholesterol

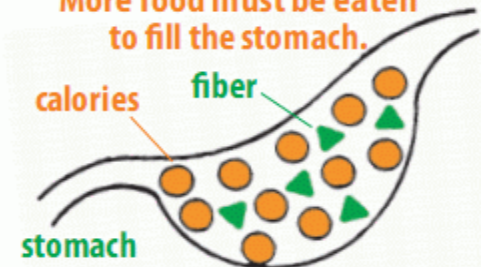
Keeping Weight Under Control

Foods containing plenty of fiber have more bulk than low-fiber foods. If taken in the right form at the right time and at sufficient quantities, fiber can sometimes slow the onset of hunger.

High-fiber foods fill the stomach.
Fewer calories are consumed.



Low-fiber foods are more concentrated in calories.
More food must be eaten to fill the stomach.



AVOIDING AND RELIEVING CONSTIPATION

Fiber can absorb large amounts of water in the bowels, and this makes stools softer and easier to pass. Anyone starting a higher-fiber diet will notice the difference in stool bulk.

In almost all cases, increasing fiber in the diet will relieve constipation within hours or days.

Because stools are easier to pass, less straining is necessary, and this can help relieve hemorrhoids.

Some medical conditions do not benefit from a high-fiber diet.

Raw bran increases the excretion into the stools of calcium, iron, and zinc. For most people eating a good balanced diet, this is of no consequence.

But theoretically, it might lead to depletion of these minerals in pregnant and breast-feeding women, and in people with small appetites.

Such people should take calcium supplements or extra milk or cheese if they are taking bran regularly.

RDA

Fiber recommended intake levels of 20-35 gram per day.

About 2g/ serving: apricot, banana, carrot, cauliflower, grapefruit, whole wheat bread.

About 3g/ serving: apple with skin, orange, peas, pear.





THE FIBRE CHALLENGE

Download



5.0g



3 Apricots

2.5g



10 Blackberries

6.0g



2 dried or fresh Figs

4.5g



3 Prunes

1.5g



2 Kiwi Fruit

1.5g



1 tablespoon of Raisins

2.0g



2 slices of Mango

2.0g



1 Pear

1.0g



1 medium Banana

1.5g



1 Orange

Fibre Foods

1 slice Pineapple - 1.0 g

1 handful of Grapes - 0.5 g

1/2 an Avocado - 2.5 g

1 Peach - 1.0 g

1 medium Apple - 1.5 g

10 Cherries - 0.5 g

Fruit

Fibre Content (grams)

This is not an exclusive list of high fibre foods

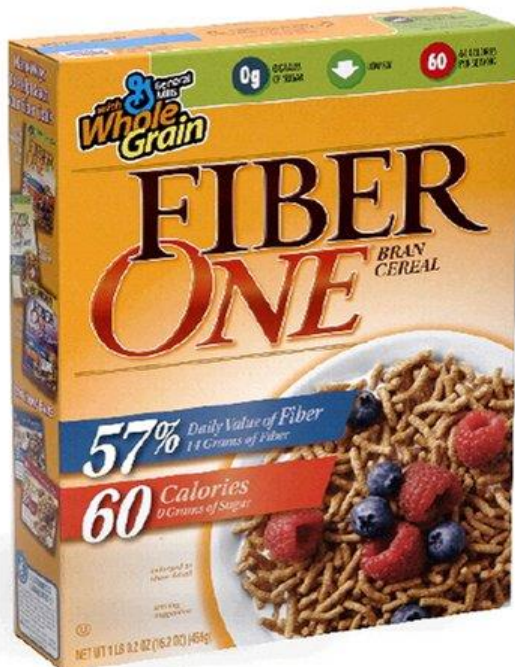
Household Measure

Some tips to startup intake of dietary fiber

- 1- Use whole fruits more often than fruit juice.
Fresh, frozen, or canned**
- 2- Eat two vegetables with evening meal**
- 3- Carrots, cucumbers for a quick snack**
- 4- Make a meal around dried beans or peas (also called legumes) instead of meat**
- 5- Choose whole grain foods more often**
- 6- Start day with a whole grain breakfast cereal low in added sugar or whole grain bread**

7-A dietary supplement of fiber products such as *Citrucel* or Metamucil, which are mixed with water and provide about 4 to 6 grams of fiber in each 8-ounce glass

8-Drink plenty of water - at least eight glasses a day



Easy

Dietary

Fiber

Estimator

**Daily calorie
needs**

**Daily dietary
fiber needs/Grams**

1000

14

1200

17

1400

20

1600

22

1800

25

2000

28

2200

31

2400

34

2600

36

2800

39

3000

42