

## Carbohydrates

Carbohydrate

Aldose sugar:

Aldose Sugars:

- Glucose
- Galactose

ketose Sugar:

An important Ketose sugar is:

Ketone Body

When food enters the body, it is broken down by to methods:

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Hydrolysis

Enzyme

Hydrolysis

Condensation Reaction

hydrolytic enzymes:

## Carbohydrates

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Carbohydrate – a hydrate of carbon.

A monosaccharide with an aldehyde group is called an aldose sugar. There are two of these:

Glucose and Galactose

A monosaccharide with a ketone group is called a ketose sugar. An important Ketose sugar is fructose.

Ketone Body - when you burn fat, you get ketone bodies. (When you burn lipids as fuel) – don't confuse the two.

When food enters the body, it is broken down by to methods:

- Mastication – breaking big stuff into smaller stuff so enzymes can work on it.
- Digestion – small parts that are chemically broken down into small enough parts that can be absorbed.

Hydrolysis – the enzymatic process that breaks down all the macronutrients.

Enzyme - A protein molecule that catalyzes chemical reactions without being used p in the reaction.

Hydrolysis – an enzymatic reaction that breaks bonds, with a water molecule.

Condensation Reaction – take small molecules and reattached them, you get the water molecule back..

Enzymes that do their job via hydrolysis are called hydrolytic enzymes. Most the enzymes that break down the macronutrients into pieces small enough to be absorbed are hydrolytic enzymes. Unless otherwise noted, all digestive enzymes are hydrolytic.

## Carbohydrates (Cont)

Most of the carbs we eat are

Amylase –

Dextrin –

Locations of the digestive activity in the GI tract

What are the three major disaccharides in our food and the names of the enzymes that the pancreas produces to finish hydrolysis of these disaccharides on the SI

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Comments on the locations of absorption –

What happens to excess carbs not used for energy –

Total number of glucose calories found in our system is:

These include:

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## Carbohydrates (Cont)

Most of the carbs we eat are polysaccharides made of glucose molecules.

Amylase – the enzyme that works on glucose to glucose bonds in starch.

Dextrin – the pieces of a large starch molecule as it is being broken down.

Locations of the digestive activity in the GI tract – We start the digestion of carbs on the mouth (amylase), along with lipids (lipase), in the stomach, the acid turns off the amylase and lipase, and we start protein break down. In the duodenum, we get bile and start the break down of lipids.

What are the three major disaccharides in our food and the names of the enzymes that the pancreas produces to finish hydrolysis of these disaccharides on the SI

- Maltose (G+G) - maltase
- Sucrose (G+F) – sucrase
- Lactose (G+Galac) – Lactase

Comments on the locations of absorption – these monosaccharides are only are absorbed by special cells in certain locations with the GI tract.

What happens to excess carbs not used for energy – they are changed to fat. Small amounts may be stored as glycogen in muscles or in the liver.

Total number of glucose calories found in our system is: 1800Kcal

These include:

- Glycongen in the liver
- Glucose in the cells
- Glucose in circulation

## Carbohydrates (Cont)

A simple sugar -

As found in nature means –

Refined sugar –

½ cup of granulated sugar contains

½ cup of many plant foods contains

Complex carbs are defined as

Complex are not often refined because why? I

The only non-plant source of carbohydrates in the diet is milk. Why?

“traditional” western says that we need

Ketosis can result when

Diabetes is the most common condition –

IDDM –

NIDDM –

Syndrome X

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## Carbohydrates (Cont)

A simple sugar - A monosaccharide as found in nature (or disaccharide)

As found in nature means – that it is found along with everything else that is normally found with it. It hasn't been stripped of anything with it.

Refined sugar – any sugar that has been separated out from the rest of the nutritional material in the food.

Examples: cane sugar doesn't cause cavities. Simple sugars are not inherently bad for you.

½ cup of granulated sugar contains – 100 grams of carbohydrates

½ cup of many plant foods contains 10-20 grams of carbohydrates plus many other nutrients

Complex carbs are defined as polysaccharides.

Complex are not often refined because why? It's too costly to refine complex carbohydrates.

The only non-plant source of carbohydrates in the diet is milk. Why? Because kids need carbohydrates.

“traditional” western says that we need a minimum of 40% of our calories in the form of carbohydrates.

Ketosis can result when our carbohydrate intake drops below 40% of our caloric intake.

Diabetes is the most common condition – associated with carbohydrate metabolism.

IDDM – Insulin dependent diabetes mellitus – juvenile onset diabetes, or type 1.

NIDDM – non insulin dependent diabetes mellitus, adult onset, or type 2. (Some type 2's may need insulin)

Syndrome X – first described in 1988. Insulin Resistant Syndrome.

## Carbohydrates (Cont)

Reactive Hypoglycemia –

Carbohydrate addiction and it's parallel to alcohol addiction –

Grains are

Since we as a species

### Typical grain

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The carbohydrate content of a food is dependent on three variables:

- 1.
- 2.
- 3.

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## Carbohydrates (Cont)

Reactive Hypoglycemia – when you take a large carbohydrate meal, the over reacts, and makes too much insulin and drops the blood sugar level too low.

Carbohydrate addiction and it's parallel to alcohol addiction – There's a gene that's close to the alcohol addiction gene. There is a theoretical connection between the two.

Grains are the primary source of carbohydrates in the world's diet.

Since we as a species have been eating grains in large quantities only for the last 10000 years. We have not developed the ability to handle a large carbohydrate intake.

### Typical grain

- Bran Layer – the outer cover, the fiber
- Endosperm – the majority, has carbs (Starch), and not much else
- Germ – where all the nutritional value of grain is found (other than carbs)

The carbohydrate content of a food is dependent on three variables:

1. Sugar content – the higher, the higher the carbohydrate content
2. Water content – the higher, the lower the carbohydrate content
3. Density – the denser, the higher carbohydrate content

## Carbohydrates (Cont)

As a rule of thumb, you get about

Most veggies give you

Potatoes are dry meaning

Sweet potatoes are

Watermelon

Veggies as a group:

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Just remember that things like

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Are either high in sugar or very dry and thus have:

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## Carbohydrates (Cont)

As a rule of thumb, you get about 15 grams of carbs in – ½ cup of most fruit

Most veggies give you 5 grams per – 1/c cup.

Potatoes are dry meaning they are more concentrated carbohydrates

Sweet potatoes are both dry and full of sugar so they have an even higher carbohydrate level

Watermelon – usually about half the carbohydrate level of other fruits since they contain so much water.

Veggies as a group:

- generally lower in sugar
- have a fairly decent water content which will generally give them a lower carbohydrate per gram value.

Just remember that things like

- potatoes
- legumes (beans)
- sweet corn
- sweet peas

Are either high in sugar or very dry and thus have higher carbohydrate values.

## Fiber

Six types of fiber

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Of the above three are water soluble:

Non Soluble –

Major function of non-soluble fibers:

The uses of soluble fibers are

Two claims that the FDA allows food manufacturers to put on labels:

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Average percentage of fibers in plat foods:

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## Fiber

Six types of fiber

- Pectin – fruits
- Betaglucan – oats and barley
- Gums – in beans, seeds, and found in oats and barley
- Cellulose – leaves (cabbage, etc...), roots (carrots and beans)
- Hemicellulose – seed cover
- Lignin – plant stems, fruit & veggie skins

Of the above three are water soluble: Pectin, Betaglucan, Gums

Non Soluble – cellulose, hemicellulose, lignan

Major function of non-soluble fibers: the natural laxitives in our diet. They don't dissolve, but absorb water and speeds up the passage of material through the body.

The uses of soluble fibers are used predominately commercially to make thickening agents. They tend to decrease the cholesterol levels in the blood.

Two claims that the FDA allows food manufacturers to put on labels:

- Helps prevent cancer
- Will lower the risk of a heart attack

Average percentage of fibers in plat foods:

- 45% soluble
- 35% insoluble
- 20% other stuff that is unclassified.

## Fiber (Cont)

Daily recommendations for fiber:

What we tend to get in our diets

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Fiber supplements

- Psyllium

Commercially:

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Flea seeds:

- Servings:

If you increase the fiber in your diet:

Type 1 and Type 2 diabetics

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## Fiber (Cont)

Daily recommendations for fiber: 20-30 grams per day

What we tend to get in our diets

- women 12g fiber
- males 17g fiber

Fiber supplements

- Psyllium – the husk of the planto plant.

Commercially: in Metamucil. In a health food store it can be purchased in powder form. 7G per rounded teaspoon. Also in the form of a chewable wafer.

- Calcium polycarbophil
- Methycellulose

Flea seeds: buy them and grind them down yourself. Or go and pick them yourself.

- Servings: one teaspoon in 8oz of water, mixed rapidly and swig quickly or it will turn into gunk. ;-P  
Twice a day.

If you increase the fiber in your diet: Observe the following: Do it slowly and with plenty of water, if not it can sit in your stomach and block you up.

Type 1 and Type 2 diabetics need to increase fiber because ti tends to slow the carbohydrate absorption.

## Sugar Substitutes

Sugar substitute:

Non-nutritive sweetener:

Nutra Sweet –

The problem –

Sugar Alcohols – \_\_\_\_\_. Found in diabetic foods because \_\_\_\_\_ ---

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They are alcohols

In large quantities

There are two major non-nutritive sweeteners

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Commonly found:

- Pink –
- Blue –

Glycemic Index –

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## Sugar Substitutes

Sugar substitute – a “legitimate” food that has a very high sweet index. (Based on table sugar at 100.)

Non-nutritive sweetener - a non-food (chemical) that has a sweet taste.

Nutra Sweet – aspartame – a combination of phenolalanine and aspartic acid.

The problem – it breaks down into embalming fluid.

Sugar Alcohols – same number of calories as sugars. Found in diabetic foods because they absorb more slowly.

- Sorbitol
- Manitol
- Xylitol

They are alcohols because they end in Ol's

In large quantities they cause diarrhea.

There are two major non-nutritive sweeteners

- Saccharin – banned in 1974, showed to cause cancer in lab animals
- Cyclamate – banned in 1969, showed to cause cancer in label animals.

Commonly found:

- Pink – saccharin
- Blue – aspartame

Glycemic Index – a measure of how quickly the sugars are absorbed into the system (high means fast)

## Alcohol

Relationship between carbs and alcohol –

Ethyl alcohol –

Methyl alcohol –

Isopropyl Alcohol –

Denatured alcohol –

Two ways to make booze:

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The term proof

Newer term: ABV

10 ounce beer that is 1 ounce of alcohol is ABV: \_\_\_\_\_% of or \_\_\_\_\_ proof

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## Alcohol

Relationship between carbs and alcohol – yeast will digest sugars in carbs to ethyl alcohol, and carbon dioxide.

Ethyl alcohol – ethanol, from fruits and veggies. It's in liquor

Methyl alcohol – methanol, wood alcohol, comes from wood sources and is poison.

Isopropyl Alcohol – (propanol) is a petroleum derivative and is also poison.

Denatured alcohol – you have taken alcohol and added a substance to it to make it taste or smell bad, so you tend not to drink it.

Two ways to make booze:

- Fermentation for an alcohol content of up to 20%. Yeast will produce something up to 20%, after that the alcohol level is too high, and you destroy the yeast.
- Distillation for alcohol content above 20%. Ferment, but boil off the alcohol so you keep the content of the fermentation under 20%.

The term proof is an old, but still used system for alcohol content. One proof equals .5%

Newer term: ABV – alcohol by volume.

10 ounce beer that is 1 ounce of alcohol is ABV: 10% of or 20 proof