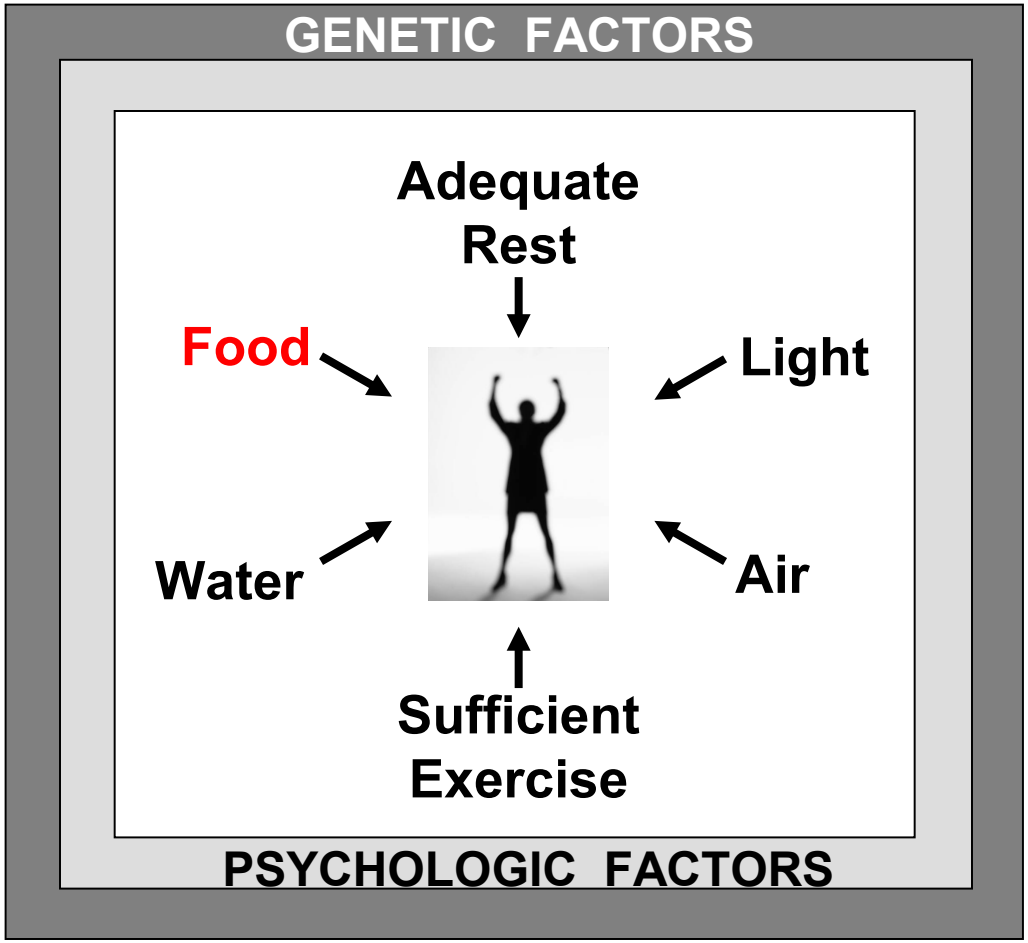
To Your Health

Today's Topic: CARBOHYDRATES

- Carbohydrate disorders
- How to have more energy
- Body burn rate
- The sugar fat connection
- Sweeteners (natural and artificial)

Foods are just one aspect of what contributes to our sense of well being:



Degeneration is caused by:

- **Malnutrition (Deficiencies)**
- **Excesses**
- **Internal Pollution**
  (altered or contaminated)

More controllable

- **Genetic Disorders**
- **Aging**

Less controllable

Understanding nutrition provides power to make informed decisions that can improve health and well being.

AAA Health

Activity
- Adequate Rest
- Adequate Exercise
- Eating (frequency)
- Breathing

Amount
- Avoid Deficiencies
- Avoid Excesses
- Portion Control

Absorption
- Rate of absorption – Glycemic Index
- Adequate enzymes
- Probiotics
- Chemical balance

Carbohydrates and Degeneration Factors

Most common **deficiencies** are the unrefined grains and raw fruits and vegetables which also supply an abundant amount of vitamins and minerals.

The most common **excesses** are the highly processed starches (e.g. white flour) and sugars which lack vitamins and minerals.

The most common **altered substances** associated with carbohydrates (but are non-nutritive) are the artificial sweeteners which have not been proven to be degenerative to the general population, but have been reported to manifest reactions in certain individuals. Hydrogenated starch hydrolysates and sugar alcohols are other 'manufactured and extracted' substances that are used in place of natural carbohydrates.

Carbohydrates and Some Associated Disorders

Hyperglycemia and Hypoglycemia - can be managed and improved by consuming lower glycemic foods (along with any required medications). Diabetes and pre-diabetes are the number one carbohydrate disorders that affects over 65 million Americans.

Arthritis – for some arthritis sufferers, diet can affect flare ups. Carbohydrates from the night shade family are often involved. (tomatoes, potatoes, peppers, eggplant, etc)

Obesity – the carbohydrate cravings cycle can be broken with an understanding of how to improve diet.

Types of Carbohydrates

The **sources** of carbohydrates are sugars and starches in food.
They commonly referred to as either simple or complex:

Simple (sugars): e.g. Glucose, galactose, dextrose, fructose (fruit), sucrose (table sugar), lactose (milk), maltose (beer)

Complex (starches): Whole grains, vegetables, beans and lentils, cellulose (indigestible)

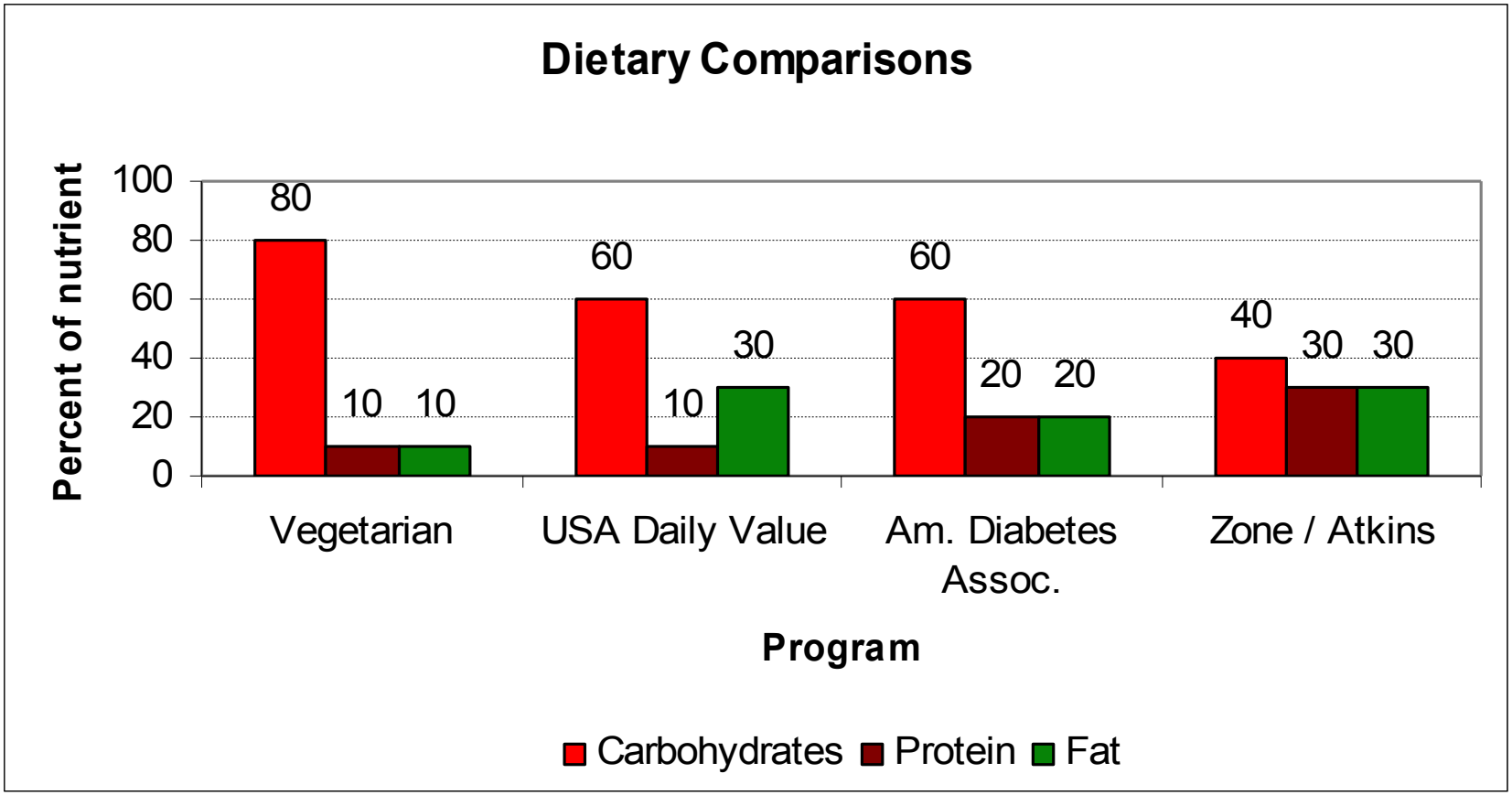
ALL carbohydrates are converted to glucose (blood sugar) for use in the body.

After digestion, the blood sugar level is normally 70-110 mg/100 ml blood

Carbohydrates – How Much is Right?

How much is the right amount? **(Not a simple answer)**

Here are some commonly cited recommendations – notice the big differences !



Atkins recommends 5-10% carbohydrates to begin, 20-25% interim, 30-40% long term

General Facts on Carbohydrates

Each gram of carbohydrate provides 4 calories of energy to the body.

To calculate your daily **maximum** carbohydrate limit use this **formula*:**
(Weight X Factor)/4 X .55 / 28 = maximum # ounces of carbohydrates per day
(for grams, just don't use the /28 in the formula)

You can use your actual or desired weight and multiply it by one of the following factors:
14 = sitting most of the day, 16 = light or occasional exercise, 18 = moderate exercise (daily)

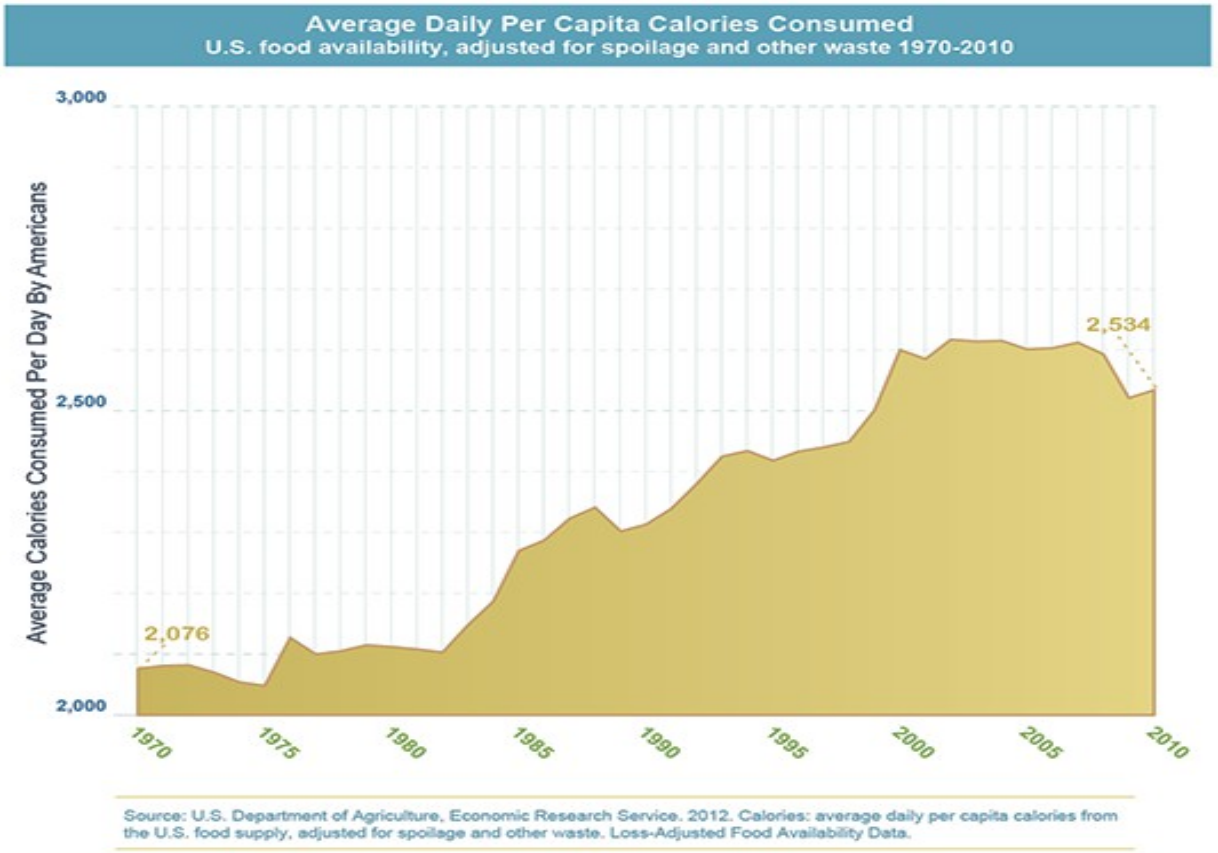
- **Based on 30% fat, 15% protein and 55% carbohydrate intake**

For the average 120 lb person on a 2000 calorie/day intake with minimal fat and protein portions, it is about 1250 calories (or 9 oz, or 265 grams) of carbohydrates.

Some typical carbohydrate values:

1 cup milk - 12 grams
1 cup sweet condensed milk – 166 grams
1 cup soy milk – 4 grams
1 cup grapes – 30 , 1 cup grape juice - 38
3 oz chicken, tuna, bacon or steak - 0
Pasta cooked 2 cup - 78 grams
Beans – 1 cup cooked – 40 grams
1 cup green beans – 8 grams
1 cup potato – 25.7 grams
1 slice bread – 13 grams

Calorie Consumption in the USA



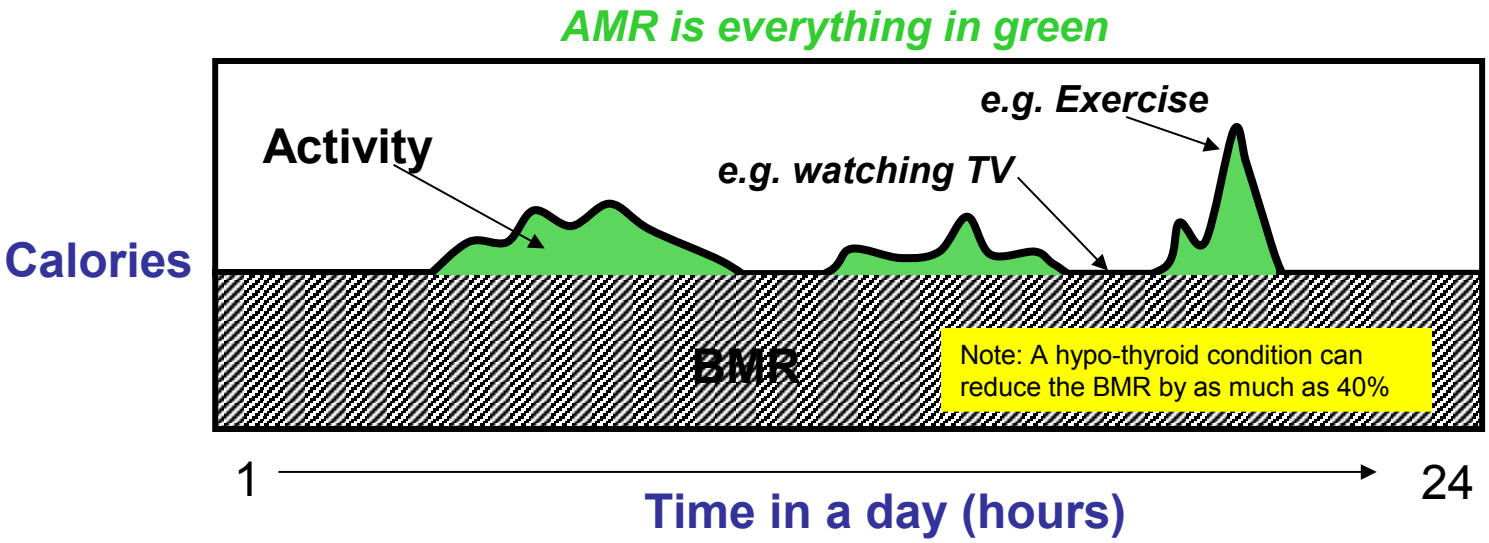
The United States Department of Agriculture (USDA) reported that calories in American's diet increased from 2,076 per day in 1970 to 2,534 per day in 2010 – an additional 458 calories. About half of that increase is from fats and the other half from carbohydrates.

Carbohydrates - Metabolism

BMR – Basal Metabolic Rate – the number of calories you will burn in a 24 hour period while at rest, (e.g. while watching TV).

AMR – Active Metabolic Rate – the number of calories you will burn in a 24 hour period adding the caloric cost of all active physical exertion you engage in throughout the day to your BMR

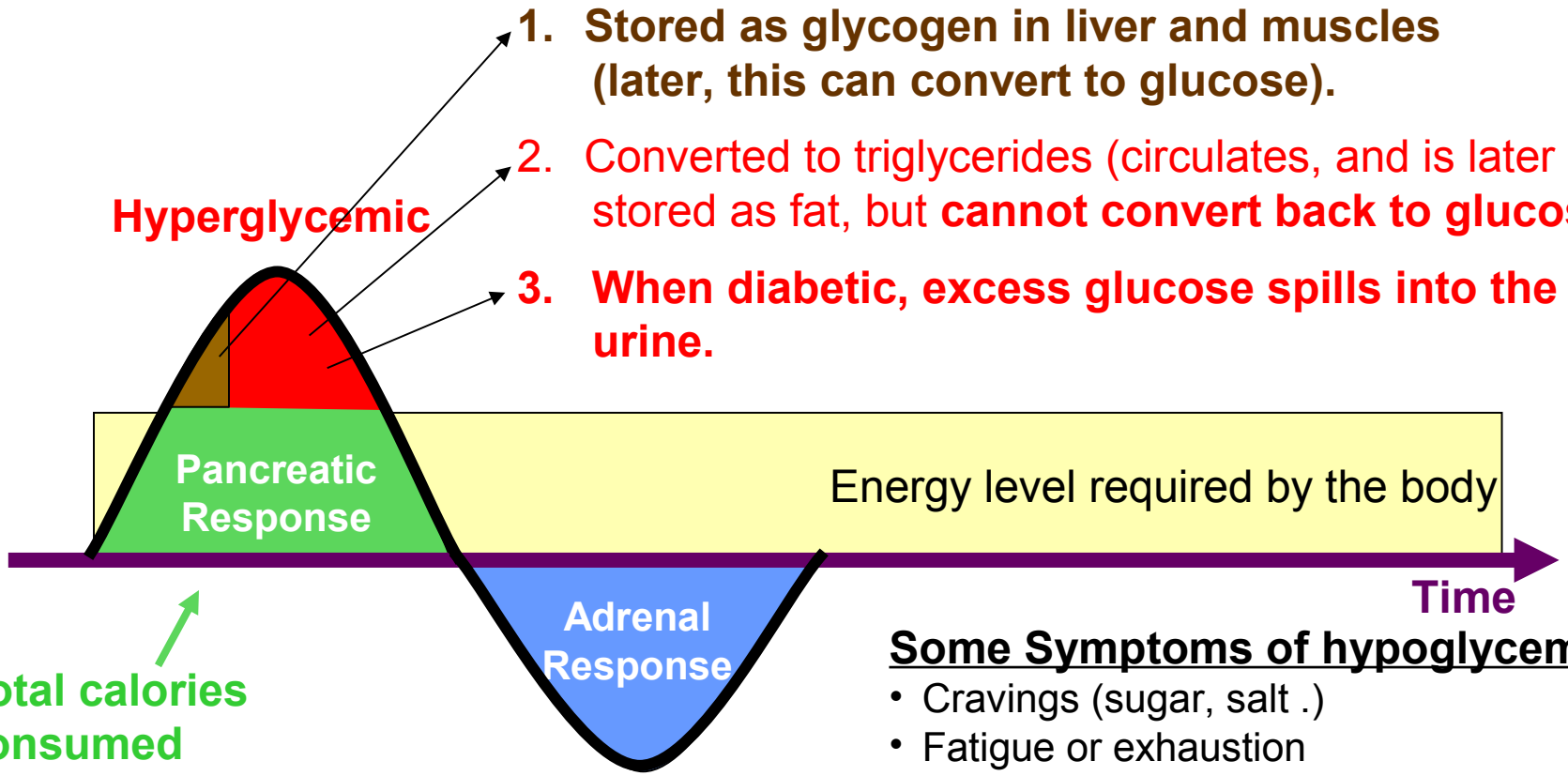
Site for BMR/AMR calculation: http://www.preventdisease.com/healthtools/articles/bmr.html (it makes adjustments based on age, activity, height, etc)



BMI – Body Mass Index - the number that represents the percentage of your body weight that is related to fat (19-25% healthy, 25-29% moderate >29% severe)
BMI calculator site: http://www.halls.md/body-mass-index/bmi.htm

Carbohydrates - Metabolism

So what happens when more carbohydrates (calories) are consumed than the body can burn?



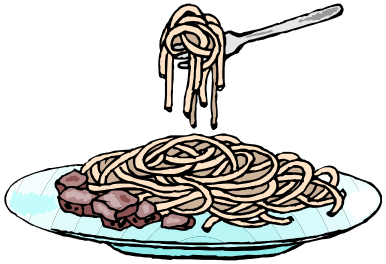
Some Symptoms of hypoglycemia:

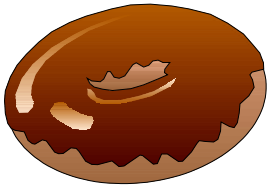
- Cravings (sugar, salt .)
- Fatigue or exhaustion
- Headaches
- Insomnia
- Mood swings
- Mental confusion

Carbohydrates – The Vicious Cycle of Excess & Cravings

Excess Carbohydrates

Pancreatic Response

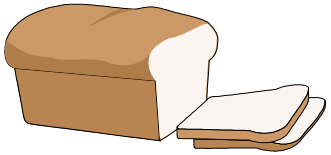




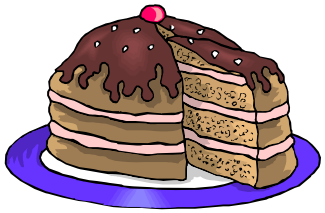
Food Cravings

Release of cortisone suppresses immune system

Hyperglycemia (shakiness, insomnia, hyperactivity)



Adrenal Response (weakness, exhaustion, depression)



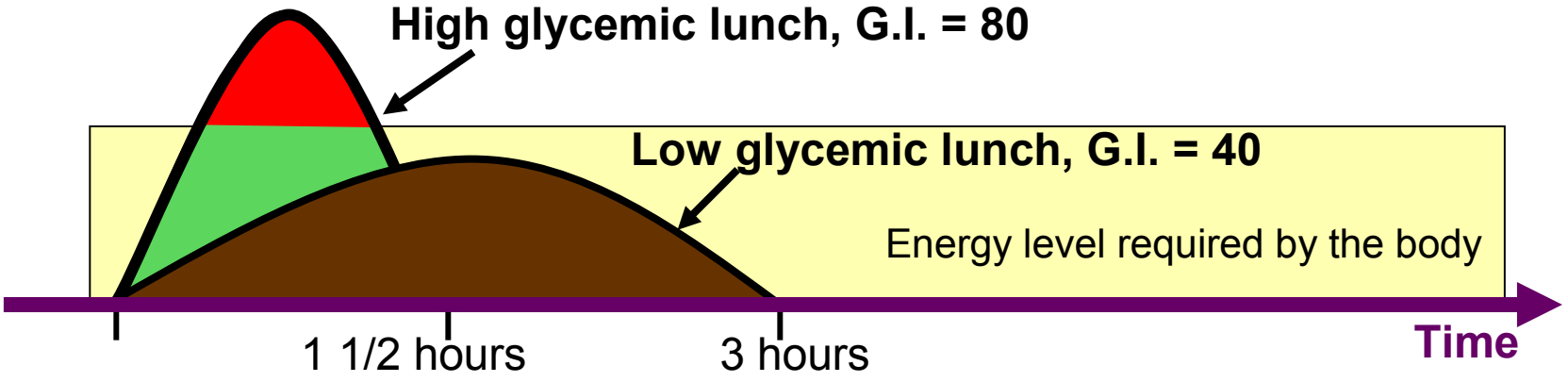
Insulin reaction

Hypoglycemia

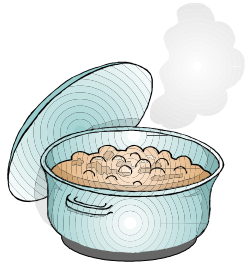
Triglycerides (Fat)

Carbohydrates – The Glycemic Index

Glycemic Index is a measure of how quickly foods turns into blood sugar (based on time and absorption, 100 is the highest rate)



Glycemic Index Range		
HIGH	100	Glucose
	90	Most processed cereals, potatoes, carrots
	80	Rice
	70	White flour products, brown rice, bananas, raisins, choc bars
MED	60	Pasta, corn, sucrose, potato chips
	50	Navy beans, sweet potatoes
LOW	40	Oatmeal, golden delicious apples, ice cream, yogurt
	30	Tomato soup, kidney beans, lentils, fructose
	20	Soybeans, peanuts
	10	
	0	



For more on the glycemic Index go to this URL (use the GI database button on the left for GI on specific foods) :
www.glycemicindex.com

Carbohydrates – The Glycemic Index vs. Glycemic Load

Glycemic Index (GI) focuses on rate of absorption. Foods with carbohydrates that break down quickly during digestion and release glucose rapidly into the bloodstream tend to have a high GI; foods with carbohydrates that break down more slowly, releasing glucose more gradually into the bloodstream, tend to have a low GI. A practical limitation of the glycemic index is that it does not take into account the amount of carbohydrate actually consumed.

Glycemic Index of 0-50 is low, 50-70 is medium, 70-100 is high

Glycemic Load (GL), a related measure, focuses the blood-sugar-raising power **per serving** of food. The formula is:

$$\text{Glycemic Load} = \frac{\text{Glycemic Index of the food} \times \text{grams of carbohydrate per serving}}{100}$$

Glycemic Load of 0-10 is low, 11-19 is medium and 20 or more is high.
The total Glycemic Load per day should not be more than 120

Carbohydrates – Blockers and Retardants to Absorption

Fiber – slows down digestion. Raw fruits and vegetables and beans naturally contain fiber. (hint: taking a fiber supplement 15 minutes before eating foods with high Glycemic Index will also slow down absorption)

Acid foods – like lemon or vinegar, slow down the digestion of carbohydrates (e.g. sweet and sour).

Combine with fat/protein – just as eating will reduce the effects of alcohol, so will eating other food types affect the digestion of carbohydrates. For example, putting sour cream on a baked potato will increase the amount of time it takes to absorb the potato. (notice how having fat with potato i.e. potato chip reduces the glycemic index). However, keep in mind that adding fat increases calorie intake.

Carbohydrates – The Glycemic Index

Eating foods that have a lower glycemic index:

- reduces hunger and keeps a fuller feeling for longer between meals
- helps people lose and control weight
- increase the body's sensitivity to insulin (reduces insulin resistance)
- improve diabetes control
- reduce the risk of heart disease
- reduce blood cholesterol levels
- can help you manage the symptoms of PCOS (Polycystic Ovarian Syndrome)
- prolong physical endurance
- help re-fuel carbohydrate stores after exercise

Some simple guidelines for switching to a low-glycemic diet:

1. Eat oats, barley or brans for breakfast
2. Switch to whole grains (breads, crackers, etc)
3. Eat more fruit and vegetables for snacks
4. Eat more salads
5. Reduce amount of potatoes in your meals.

Carbohydrates – Glucose Tolerance Factor

*** Glucose Tolerance Factor** – an organic complex of chromium with dinicotino-glutathione linked with the maintenance of glucose tolerance and augments the action of insulin and can reduce insulin requirements in diabetics.

A trace element – chromium- is essential in producing a substance called glucose tolerance factor **(GTF*)** which is important in the utilization of insulin. Eating refined sugar can cause depletion of body chromium as it lacks sufficient amounts of the mineral for its own digestion. Molasses has ten times as much chromium as table sugar. Most of the chromium in people's diet comes from processing or storing food in pans and cans made of stainless steel, which can contain up to 18% chromium. The amount of chromium in the body can be decreased as a result of a diet high in simple sugars, which increases the excretion of the metal through urine.

Chromium does not cause fat to be lost, but does increase lean body mass (muscle). It also can lower cholesterol and triglyceride levels.

Carbohydrates – Types of Diabetes

Nearly 21 million Americans have diabetes, and at least 54 million people over age 20 have pre-diabetes (insulin resistance).

Type I Diabetes

- Children and young adults are born with or develop this type when they cannot make enough insulin (need injections).

- 5 – 10% of people with diabetes have this type.

Type II Diabetes

- Usually develops after age 40 – but is being found in younger people (even 10 year olds).
- Insulin does not work properly, **body develops insulin resistance**.
- Anyone can develop Type II Diabetes.

- 95% of people with diabetes have this type.

¼ tsp of cinnamon/day has been shown to make cells more responsive to insulin
(Cinnamon itself has insulin-like activity and also can potentiate the activity of insulin)
http://www.eurekalert.org/pub_releases/2004-04/uoc--cmh041304.php

Diabetes

What is diabetes?

Diabetes means your blood glucose (often called blood sugar) is too high. The pancreas releases insulin into the blood. Insulin helps the glucose from food get into your cells. If your body doesn't make enough insulin, or if the cells do not respond to the insulin that is produced, then the glucose stays in your blood instead. Your blood glucose level then gets too high, causing pre-diabetes or diabetes.

What are the signs of diabetes?

- being very thirsty
- urinating often
- feeling very hungry or tired
- losing weight without trying
- having sores that heal slowly
- having dry, itchy skin
- losing the feeling in your feet or having tingling in your feet
- having blurry eyesight

One or more of these signs is reason to have a blood test to check glucose levels to show if there is pre-diabetes or diabetes.

Carbohydrates – Insulin Resistance (Pre-diabetes)

When someone is insulin resistant:

- The body no longer makes full use of the insulin, leaving blood sugar levels high and causing the body to increase it's insulin production.
- Excess insulin is detrimental in the body causing the retention of water and fat.
- Leads to the pancreas becoming overloaded and unable to produce insulin – hence the development of Type II diabetes

Some Symptoms of Insulin Resistance:

- High Triglyceride levels in the blood (low HDL, high LDL)
- High blood pressure
- Inability to lose weight when following a low fat diet
- Chronic fatigue
- Mental fogginess
- Cravings for sugar-filled foods, binge eating
- Depression, irritability and/or anxiety

It is estimated that nearly 20% of the USA population is insulin resistant. *This condition has only been identified since 1989.*

Carbohydrates – SWEETENERS)

Decisions,
decisions !!! …

Carbohydrates – Natural Sweeteners That Have Calories

	Calories /gram	Glycemic Index	Comment	Sweetness relative to Sucrose	Source and Brand Names
Natural Sweeteners					
White Sugar (sucrose)	4.0	65	refined	1.0	cane or beet sugar
Brown Sugar (sucrose)	4.0	60	refined	1.0	cane or beet sugar
Unrefined Sugar (sucrose)	4.0	60	unrefined	1.0	cane or beet sugar Florida Crystals, Sucanat, etc
Maltodextrin (dextrose=glucose)	4.0	100	refined	0.3	Corn starch hydrolysis
Maple Syrup	4.0	54	unrefined	0.8	Maple trees
Sourgum	4.0	55	unrefined	0.8	grain source
Molasses	4.0	55	unrefined	0.8	cane or beet sugar
Honey	4.0	50	unrefined	2.0	nectar
Agave	3.0	25	unrefined	1.5	agave plant
Fructose crystals	4.0	20	refined	1.2	Corn
High Fructose Corn Syrup	4.0	73	refined	0.8	Corn (fructose and glucose)

Sugars

Agave

Carbohydrates – Non-Calorie Natural Sweeteners

	Calories /gram	Glycemic Index	Comment	Sweetness relative to Sucrose	Source and Brand Names
Natural Non-calorie Sweeteners					
Stevia	0.0	0	after taste	250-300	steviol glycoside from the herb PureVia, Sun Crystals and Truvia
Monk fruit/Luo han guo	0.0	0		150-300	Lo Han fruit Nectresse

Monk Fruit or Luo Han Guo

Stevia

Carbohydrates – Sugar Alcohols

	Calories /gram	Glycemic Index	Comment	Sweetness relative to Sucrose	Source and Brand Names
Sugar Alcohols			Laxative effect		
Arabitol	0.2	1	Med	14.0	isolated from gum arabic
Erythritol	0.2	1	High	15.0	yeast fermented glucose
Glycerol	4.3	5	Med	0.6	from triglycerides in soap making
Isomalt	2.0	2	Med	1.0	hydrogenated beet sugar
Lactitol	2.0	3	Low-Med	0.8	hydrogenated lactose
Maltitol	2.1	3	Med-High	1.7	hydrogenated starch (corn)
Mannitol	1.6	2	Low	1.2	hydrogenated fructose
Sorbitol	2.6	4	Med	0.9	reduction of glucose
Xylitol	2.4	12	Med-High	1.6	hardwoods and corncobs

Laxative effect

Although preferable to sugar for low-carb dieters, polyols have been reported by some people to be "trigger foods," causing carb cravings or binges.

Carbohydrates – Non-Calorie Artificial Sweeteners

	Calories /gram	Glycemic Index	Comment	Sweetness relative to Sucrose	Source and Brand Names
Artificial Non-calorie Sweeteners					
Acesulfame-K (not heat stable)	0.0	0	(bitter)	200.0	organic acid and potassium Ace-K, Sunett and Sweet One
Aspartame	4.0	0		160-220	aspartic acid and phenylalanine Equal and NutraSweet
Neotame	0.0	0		7,000-13,000	aspartic acid and phenylalanine and Methanol (wood alcohol):
Saccharin (not heat stable)	0.0	0	(bitter)	200-700	benzoic sulfilimine Necta Sweet, Sugar Twin, Sweet 'N Low
Sucralose	0.0	0		600.0	sucrose and chlorine Splenda
Cyclamates	0.0	0		60.0	banned in the US - causes bladder cancer

Many reactions (about 90) have been reported from use of aspartame; some are: headaches, cognitive impairment, memory loss, insomnia, anxiety attacks, depression, etc.

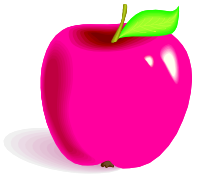
Artificial sweeteners may disrupt the body's natural ability to "count" calories based on foods' sweetness and perhaps lead to a higher consumption of other carbohydrates.

Carbohydrates – Simple Principles

- Eat more complex carbohydrates (lower glycemic index foods) and fewer refined, processed foods.

- Reduce portion size of carbohydrate per meal.

- Avert hypoglycemia and cravings by eating a small amount of complex carbohydrate BEFORE a craving develops.



- Exercise regularly.

- Use Artificial sweeteners and sugar alcohols with discretion (avoid them if possible).