



5.4 Body Composition and Diabetes

Combination of percentage body fat and lean body tissue (muscle)

Essential Fat	Non-Essential Fat

Dangers of Being Overweight and Underweight

Underweight (not enough essential fat)	Overweight (too much non-essential fat)
 Barbie vs.	 Homer

The goal in weight management should be to achieve and maintain a healthy body composition that will be different for everyone.

Percentage of Fat Guidelines

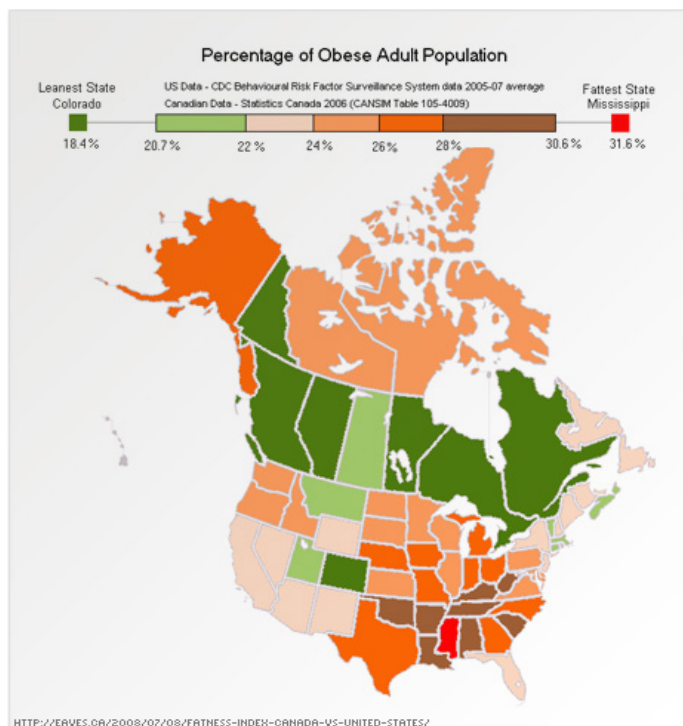
	Female	Male
Essential Fat		
Athletic		
Acceptable		
Obese		

Location of Fat

Upper body fat (abdominal and chest region) is considered to be a greater health risk than lower body fat (hips and legs).

Causes of Obesity

<p>1)</p>	<p>It is evident that some individuals gain fat easier than others do. There does appear to be a ‘natural fat level’ that genetics may establish. This can make it more difficult, but not impossible, for some individuals to achieve and maintain an acceptable body composition.</p>
<p>2)</p>	<p>A low number of individuals (1-2%) may have hormonal and glandular problems that contribute to increased fatness. For example, hyposecretion of the thyroid gland could lower the metabolic rate and lead to an increase in fat gain.</p>
<p>3)</p>	<p>Metabolic rate (MR) is highest during times of growth and activity. As individuals age, BMR decreases and unless MR is increased through activity, weight gain will result leading to ‘creeping obesity’.</p>
<p>4)</p>	<p>In young children, research suggests the number of fat cells can increase (hyperplasia) while in adults, fat cells just get a bigger ‘appetite’ and increase in size (hypertrophy). It is critical to establish an acceptable body composition early in life (during youth) to avoid a continuing weight battle as an adult.</p>



Did you know?
 Vancouver has the lowest rate of obesity of any city in North America

Assessment of Body Composition

Assessment of body composition first started many years ago with height and weight tables that simply stated a certain height should have a certain weight. No consideration was given to any other factors. Today there are a number of assessment tools available.

1) _____

This method estimates total body fat from measurements taken on a number of body sites with calipers

2) _____

Girth measures of each limb can be put into equations to produce a percentage of body fat or used as a visual guide of changing body shape and fat distribution.

3) _____

A measure of the waist-to-hip circumference ratio will give an indication of upper body/abdominal fat distribution and associated health risks. The waist is measured at the narrowest part of the torso. The hips are measured at the largest circumference below the belly button (umbilicus).

	MALE	FEMALE
HIGH RISK	>1.00	>0.85
MODERATE-HIGH RISK	0.90–1.00	0.80–0.85
LOW RISK	<0.90	<0.80

4) _____

Although better than height-weight charts, the BMI is not perfect since it still estimates

$$\text{BMI} = \text{weight (kg)} / \text{height (m)}$$

body fat from height and weight (mass). There is however, a relationship between increasing BMI and increasing risk for cardiovascular disease.

BMI does **NOT** give an accurate reflection of the body composition of **very FIT individuals** and often leads to a high BMI. For example, a body builder's BMI can classify him or her as obese because it only accounts for total weight, not amount of lean muscle mass.

	BMI
OBESSE (HIGH RISK)	>30
MARGINAL	25–30
GOOD	17–24.9
LOW	<17

Other Methods

5) Bioelectrical Impedance Analysis (BA)

BIA is a very quick and popular method of estimating body composition and is equal to skin fold measurements in terms of accuracy. It is easier to use by untrained individuals and works well on extremely overweight individuals. BIA is based upon the principle that electricity (low voltage) will pass faster through lean tissue than fat tissue. The impedance to current flow is used to estimate percentage of body fat. The subject needs to be well-hydrated (no alcohol) and no exercise for the previous 6 hours.

6) Near-Infrared Interactance (Niri)

NIRI involves irradiating the biceps brachii and measuring the reflection pattern and strength. This optical density reading is then used to determine percentage of body fat. In terms of accuracy, NIRI ranks with skin fold measures.

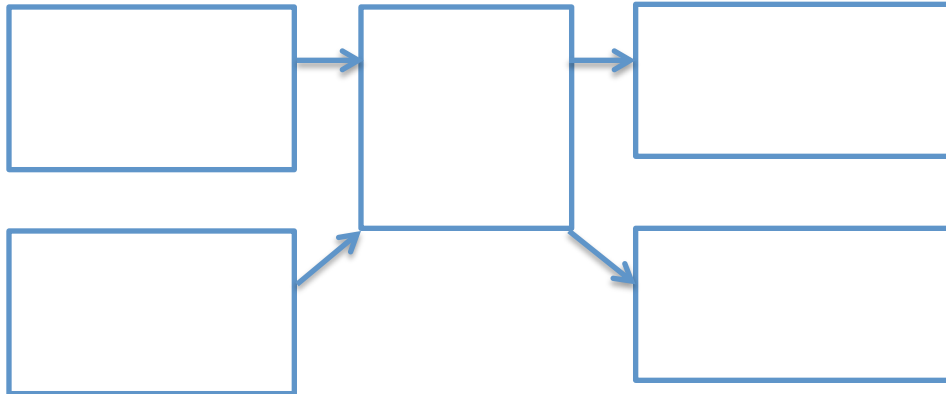
7) _____

This method is performed by resting a client on a suspended chair and submerged into water. Based on body density and the difference between weight out of the water and weight when submerged, the fat percentage can be determined. This method is the '**GOLD STANDARD**' in body composition assessment but is expensive, time consuming and needs elaborate equipment.



Quick “Dieting”

Quick dieting does not work for long-term healthy weight management.



_____ can increase metabolic rate and fat use. They are a source of great risk. Individuals with high blood pressure and thyroid problems are especially at risk.

If the amount and rate of fat loss sounds too good to be true, it probably is. Short of gastric stapling (surgically shrinking the stomach) or liposuction (sucking out fat cells) fat loss should be well-planned and a long-term process.

Healthy Weight Loss: Aim for _____

1 lb = _____. Therefore, to lose 1 lb/week, you need to lower caloric intake and increase calorie burn by 500 kcal/day.

Caution #1 - Fasting

Fasting to lose fat is nothing more than starvation leading to water loss and muscle tissue breakdown—not a healthy approach to fat loss. Excessively low carbohydrate and high protein diets can change blood chemistry and increase health risks

Caution #2 – Steam Treatment

Exercising suits (rubber-lined) and living in a steam bath or sauna only results in water loss and increased health risks.

Caution #3 – Spot Reducing

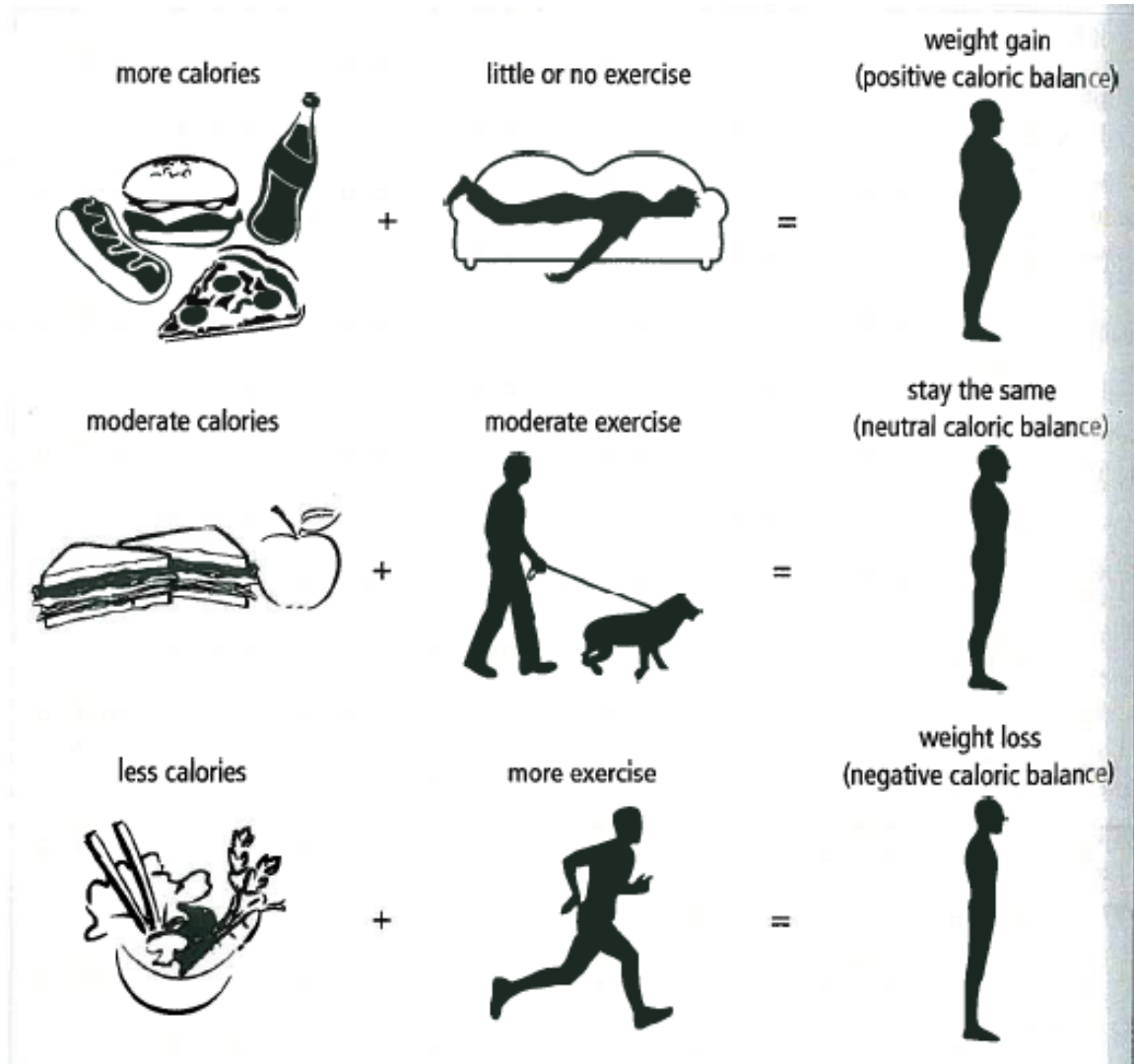
Rubbing cream on your hips or performing an endless number of lateral leg raises will not selectively cause a loss of fat from that region. You can certainly strengthen a specific muscle group, but unfortunately, ‘spot reducing’ just does not happen. Exercise plus a good diet offers the best opportunity for overall body loss of fat.

Caution #4 – Cellulite Cream

Cellulite is simply fat tissue pushing through the connective tissue lying on top of it. Even ‘slim’ people can get cellulite. Rubbing on fancy creams will not get rid of the cellulite.

Summary

Proper eating and exercise on a regular basis is the healthiest and most successful approach to take.



Diabetic Emergencies

_____ is a _____ excreted by the _____ into the bloodstream, and it enables the body cells to absorb _____ (sugar). Without insulin, the body cells cannot get absorb the nourishment that they need, and the body will start to shut down.

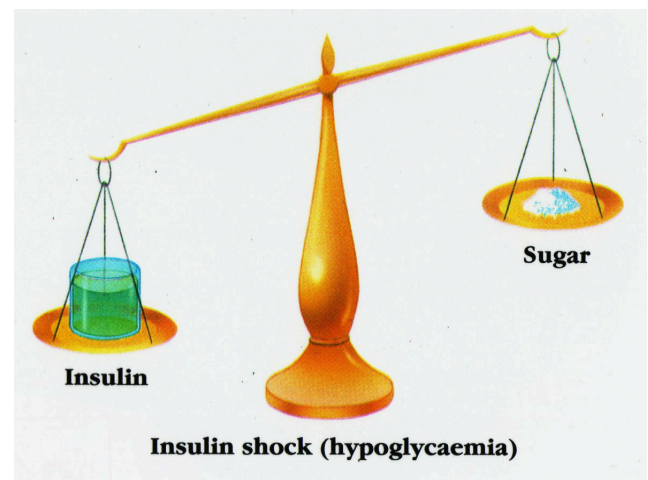
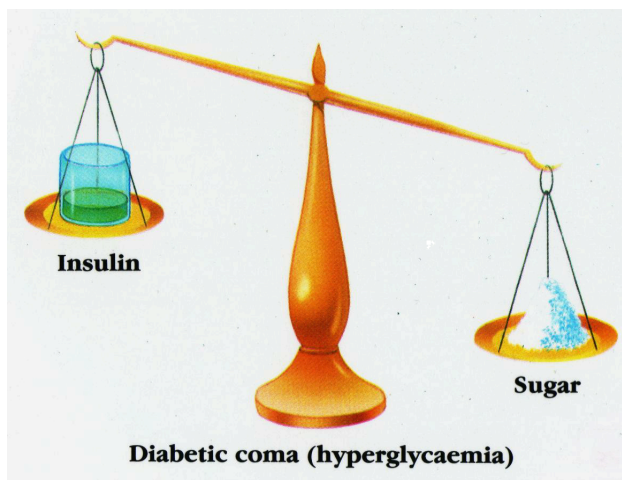
If the body does not produce the correct amount of insulin, it results in a diabetic condition. You can be born with this condition (_____ Diabetes) or it can develop later (_____ Diabetes). It can usually be quite easily controlled through _____ and medication, however if either of these are not carefully done, two possible diabetic emergencies can occur:

_____ - Hyperglycemia
("too much sugar")

_____ - Hypoglycemia
("too little sugar")

Signs and Symptoms

Signs and Symptoms



Treatment



Unit 3: Fitness Theory

3.8 Body Composition

Combination of percentage body fat and lean body tissue (muscle)

Essential Fat	Non-Essential Fat
Minimal level of fat necessary for good health	The fat that is stored when calories taken in exceed calories expended.

Dangers of Being Overweight and Underweight

Underweight (not enough essential fat)	Overweight (too much non-essential fat)
health hazards including amenorrhea (cessation of menstrual cycle), osteoporosis, vitamin deficiency, hormonal alteration and eating disorders.	health concerns including diabetes, coronary heart disease, hypertension, arthritis and stroke.
 <p>Barbie vs.</p>	 <p>Homer</p>

The goal in weight management should be to achieve and maintain a healthy body composition that will be different for everyone.

Percentage of Fat Guidelines

	Female	Male
Essential Fat	Not less than 10%	Not less than 5%
Athletic	10-15%	6-10%

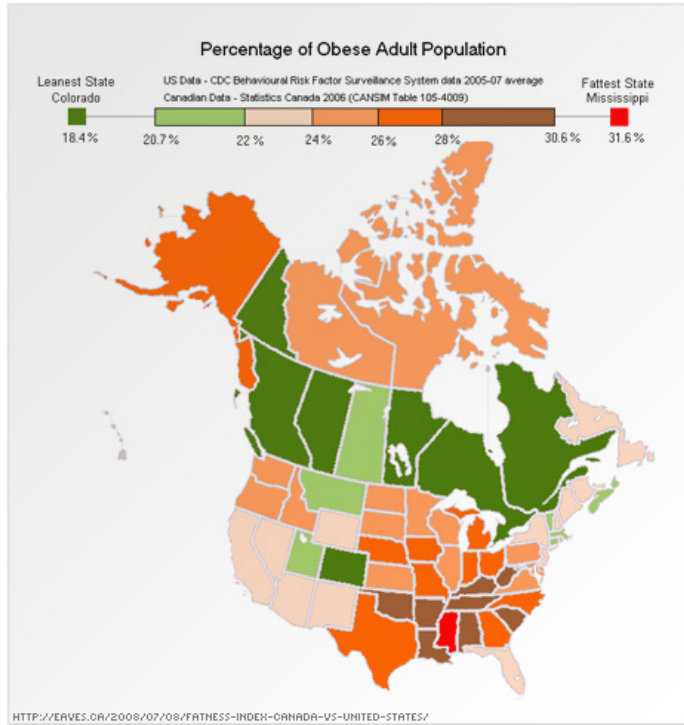
Acceptable	18-24%	12-18%
Obese	30% or greater	20% or greater

Location of Fat

Upper body fat (abdominal and chest region) is considered to be a greater health risk than lower body fat (hips and legs).

Causes of Obesity

1) Genetics	It is evident that some individuals gain fat easier than others do. There does appear to be a 'natural fat level' that genetics may establish. This can make it more difficult, but not impossible, for some individuals to achieve and maintain an acceptable body composition.
2) Gland Malfunction	A low number of individuals (1-2%) may have hormonal and glandular problems that contribute to increased fatness. For example, hyposecretion of the thyroid gland could lower the metabolic rate and lead to an increase in fat gain.
3) Metabolic Rate	Metabolic rate (MR) is highest during times of growth and activity. As individuals age, BMR decreases and unless MR is increased through activity, weight gain will result leading to 'creeping obesity'.
4) Increased Fat Cell Size	In young children, research suggests the number of fat cells can increase (hyperplasia) while in adults, fat cells just get a bigger 'appetite' and increase in size (hypertrophy). It is critical to establish an acceptable body composition early in life (during youth) to avoid a continuing weight battle as an adult.



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1) Skin Fold Measurements

This method estimates total body fat from measurements taken on a number of body sites.

2) Girth Measures

Girth measures can be put into equations to produce a percentage of body fat or used as a visual guide of changing body shape and fat distribution.

3) Waist to Hip Ratio

A measure of the waist-to-hip circumference will give an indication of upper body/abdominal fat distribution and associated health risks. The waist is measured the narrowest part of the torso. The hips are measured at the largest circumference below belly button (umbilicus).

Waist to Hip Ratio (Health Risks)		
	MALE	FEMALE
HIGH RISK	>1.00	>0.85
MODERATE-HIGH RISK	0.90-1.00	0.80-0.85
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ratio
at
the

4) Body Mass Index (BMI)

Although better than height-weight charts, the BMI is not perfect since it still estimates body fat from height and weight (mass). There is however, a relationship between increasing BMI and increasing risk for cardiovascular disease.

Cardiac Output = Heart Rate x Stroke volume

Health Services: Unit 2 – First Aid

Sardis Secondary

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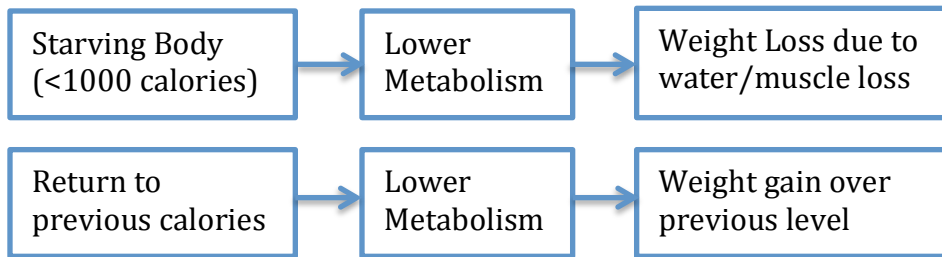
7) Hydrostatic Weighing

This method is performed by resting a client on a suspended chair and submerged into water. Based on body density and the difference between weight out of the water and weight when submerged, the fat percentage can be determined. This method is the 'gold standard' in body composition assessment but is expensive, time consuming and needs elaborate equipment.



Quick “Dieting”

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Caffeine, Ephedra and other diet pills are stimulants designed to increase metabolic rate and fat use. They are a source of great risk. Individuals with high blood pressure and thyroid problems are especially at risk.

If the amount and rate of fat loss sounds too good to be true, it probably is. Short of gastric stapling (surgically shrinking the stomach) or liposuction (sucking out fat cells) fat loss should be well-planned and a long-term process. Fasting to lose fat is nothing more than starvation leading to water loss and muscle tissue breakdown—not a healthy approach to fat loss. Excessively low carbohydrate and high protein diets can change blood chemistry and increase health risks.

Healthy Weight Loss

Aim for 1 pound per week.

1 lb = 3500 calories

Therefore, to lose 1 lb/week, you need to lower caloric intake and increase calorie burn by 500 kcal/day.

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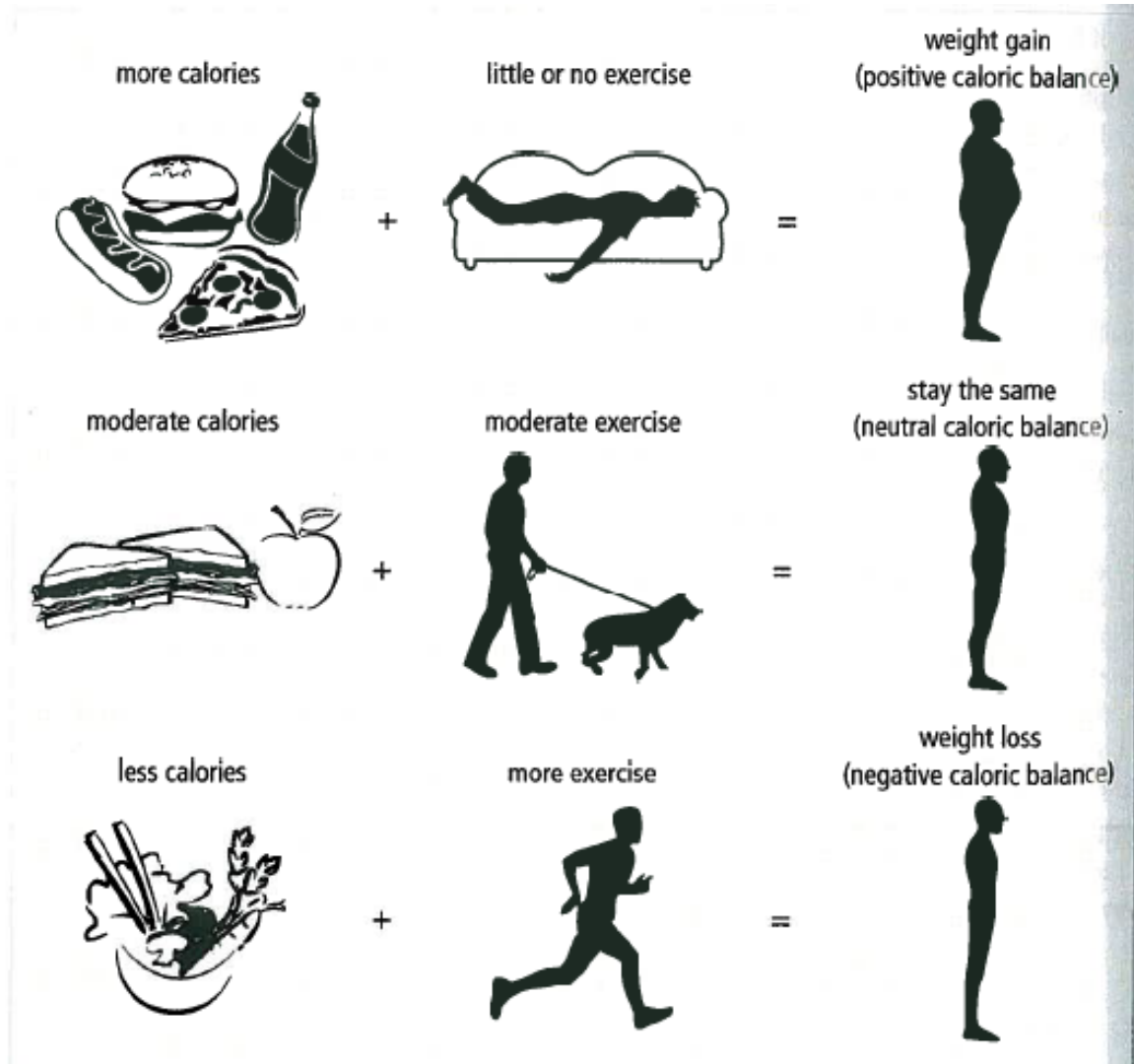
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Diabetic Emergencies

<http://www.youtube.com/watch?v=jHRfDTqPzj4>

Insulin is a hormone excreted by the pancreas into the bloodstream, and it enables the body cells to absorb glucose (sugar). Without insulin, the body cells cannot get absorb the nourishment that they need, and the body will start to shut down.

If the body does not produce the correct amount of insulin, it results in a diabetic condition. You can be born with this condition (Juvenile Diabetes) or it can develop later (Adult Onset Diabetes). It can usually be quite easily controlled through diet and medication, however if either of these are not carefully done, two possible diabetic emergencies can occur:

Diabetic Coma - Hyperglycemia
("too much sugar")

Signs and Symptoms

- fruity breath – acetone smell
- ‘drunken’ behaviour
- flushed, warm & dry skin
- thirst and frequent urination
- slow decrease in LOC, eventually life-threatening

Treatment

- medication
- EMS
- ABC's

Insulin Shock - Hypoglycemia
("too little sugar")

Signs and Symptoms

- dizziness and weakness
- pale, cool, and clammy
- rapid & weak pulse
- hunger
- fast decrease in LOC, immediately life-threatening

Treatment

- glucose (real sugar) + starch
- EMS
- ABC's

