

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

**In the Name of ALLAH, Ever
Beneficent, Infinitely Merciful**

Obesity

Pathophysiology & Classification

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Why are we so concerned about obesity?

- Obesity is common
- Obesity is serious
- Obesity is preventable

Obesity... a rising pandemic

Topics that I will not cover today.....

- **Dietary and nutritional recommendations**
- **Surgical options for weight loss**

The Epidemic of Obesity

The Obesity Epidemic

- **Most important public health problem**



For the first time in human history, in the year 2000 it was estimated that there were more **overweight** than **underweight** people.

Source: Mendex, Monteiro, & Popkin 2005

Prevalence of Obesity

775 million obese people in the World including adult, children, and adolescents.

- **650 million** adults are obese
- **125 million** children under the age of 5 years are obese

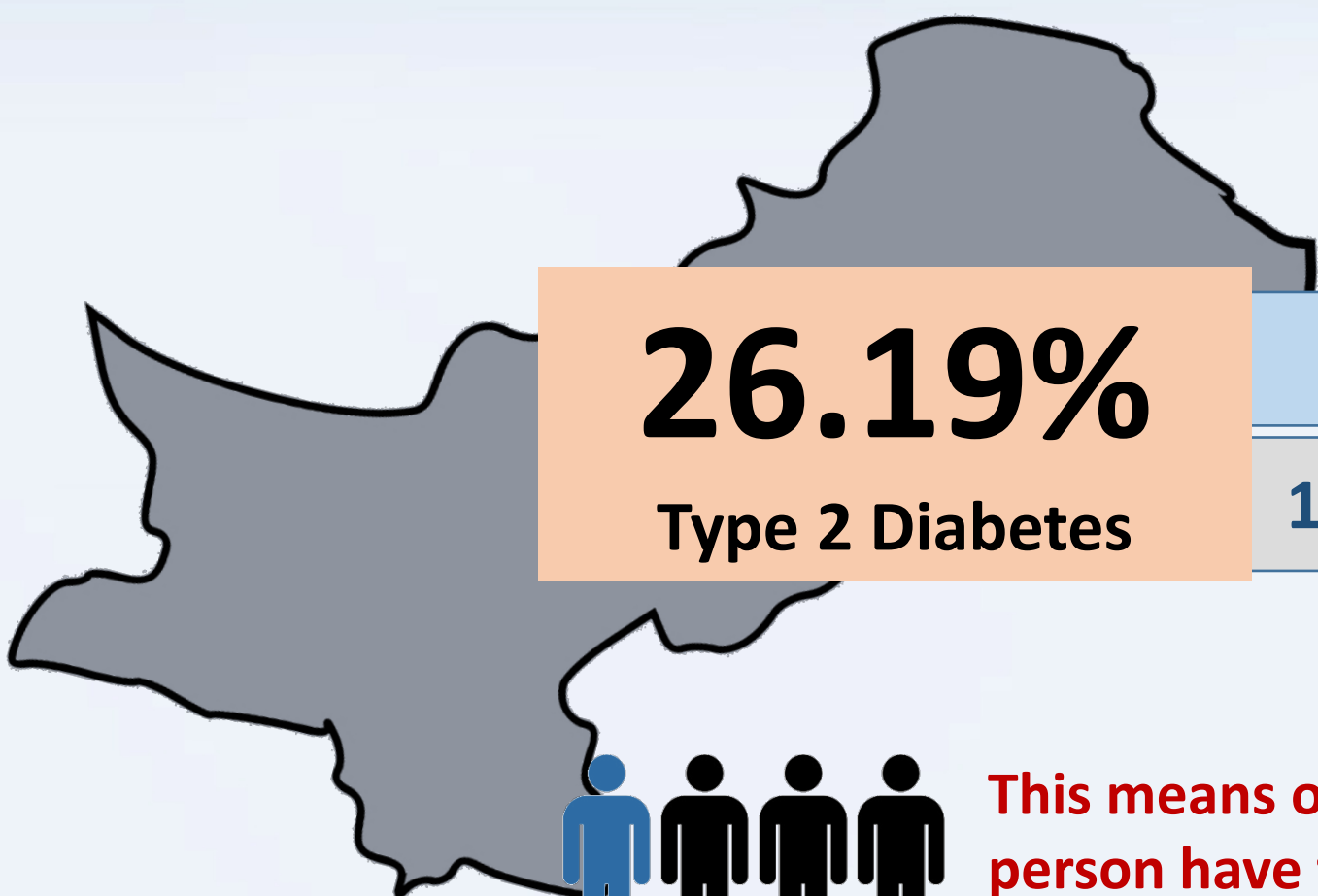


WHO (July
1st, 2017)



National Diabetes Survey Pakistan 2016- 2017

Prevalence of Diabetes in Pakistan

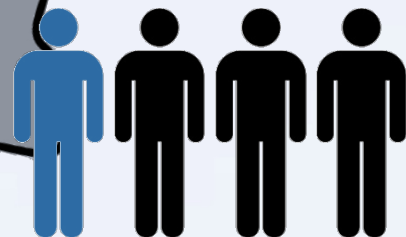
A grey silhouette map of Pakistan serves as a background for the central statistics.

26.19%

Type 2 Diabetes

7.14% new cases

19.05% known cases



This means on average, 1 in 4
person have type 2 diabetes
in Pakistan

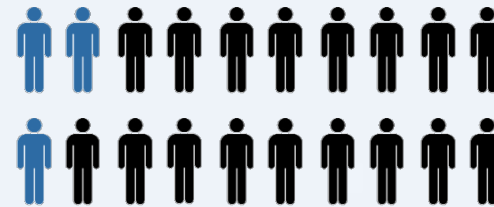
Diagnosis on the basis of 2-hours OGTT criteria



National Diabetes Survey Pakistan 2016- 2017

14.47%
Pre-Diabetes

**Prevalence of
Pre-Diabetes in
Pakistan**



This means on average, **3 in 20**
person is at risk of diabetes in
Pakistan

Diagnosis on the basis of 2-hours OGTT criteria

National Diabetes Survey Pakistan 2016- 2017

Prevalence of Obesity

62.1%

Diabetes Risk Factors

A study on 15-25 years old adolescents of Hub- Baluchistan

Obesity tripled
10.15% to 27.82%
(2002) (2009)

P<0.001



Smoking
4.06% to 21.3%
(2002) (2009)

P<0.001



Family history of DM doubled
7.61% to 16.52%
(2002) (2009)

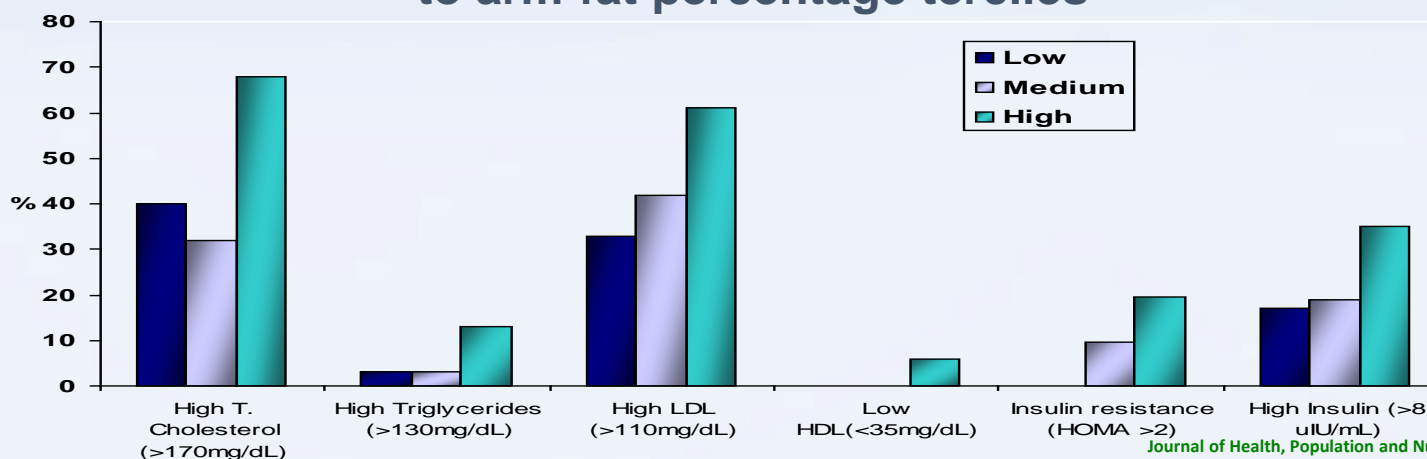
P<0.001





Metabolic Syndrome and Childhood Obesity

Proportion of dyslipidaemia and insulin resistance in children according to arm-fat percentage terciles

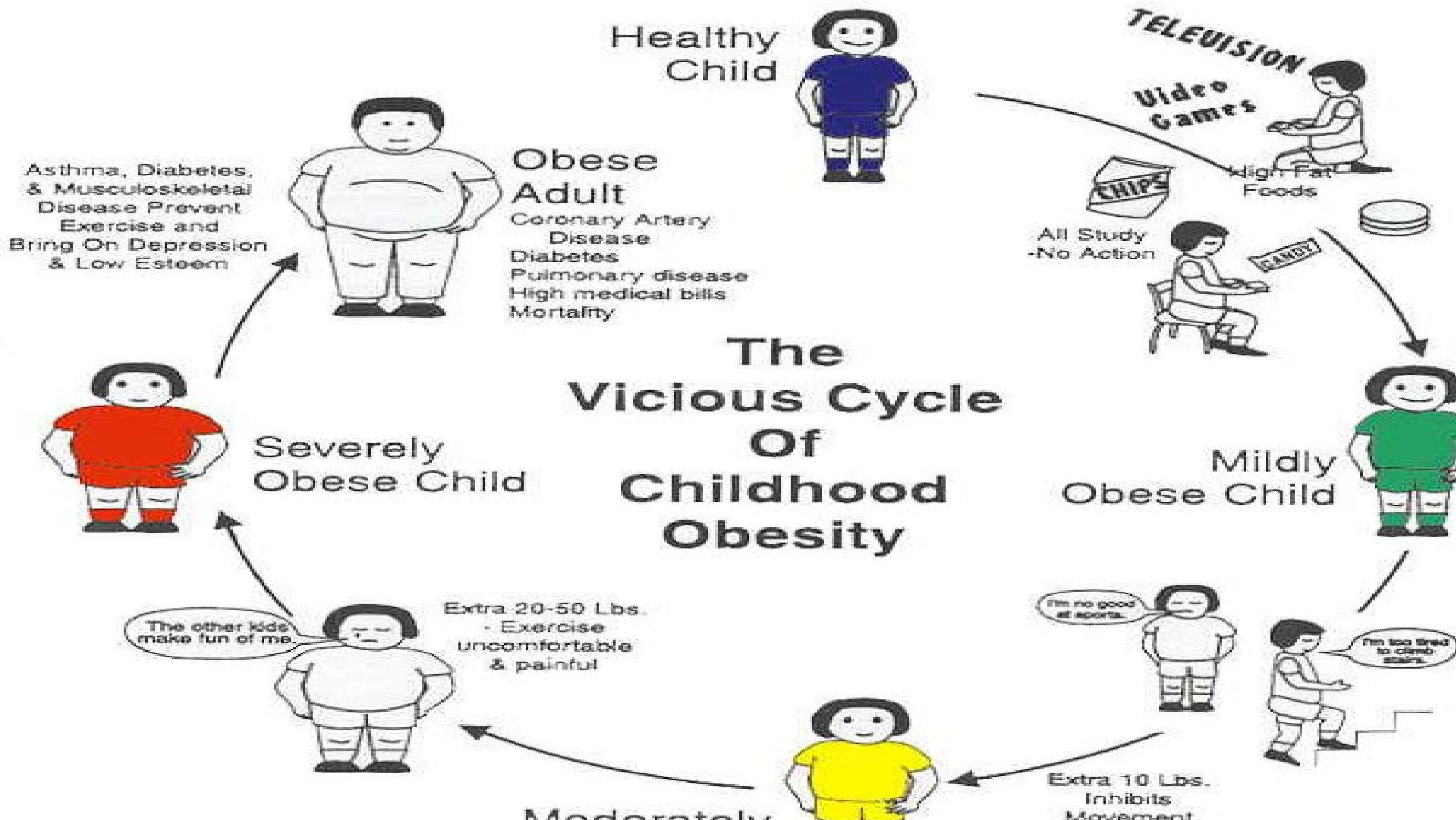


Journal of Health, Population and Nutrition March; 23(1); 34-43, 2005
 ; A. Basit, R. Hakeem, M.Z.I. Hydrie, M.Y. Ahmedani, Q. Masood

9.6 million children are OW and obese

A study on 8-10 Year old children of Karachi (Pakistan)

Overweight	9.8%
Obesity	4.3%
Poor intake of fruits and vegetables	80%
Consumption of aerated sweetened drinks and fast food daily	40%



Low and Middle Income Countries

Double Burden of Disease

According to WHO there is a “double burden” of disease

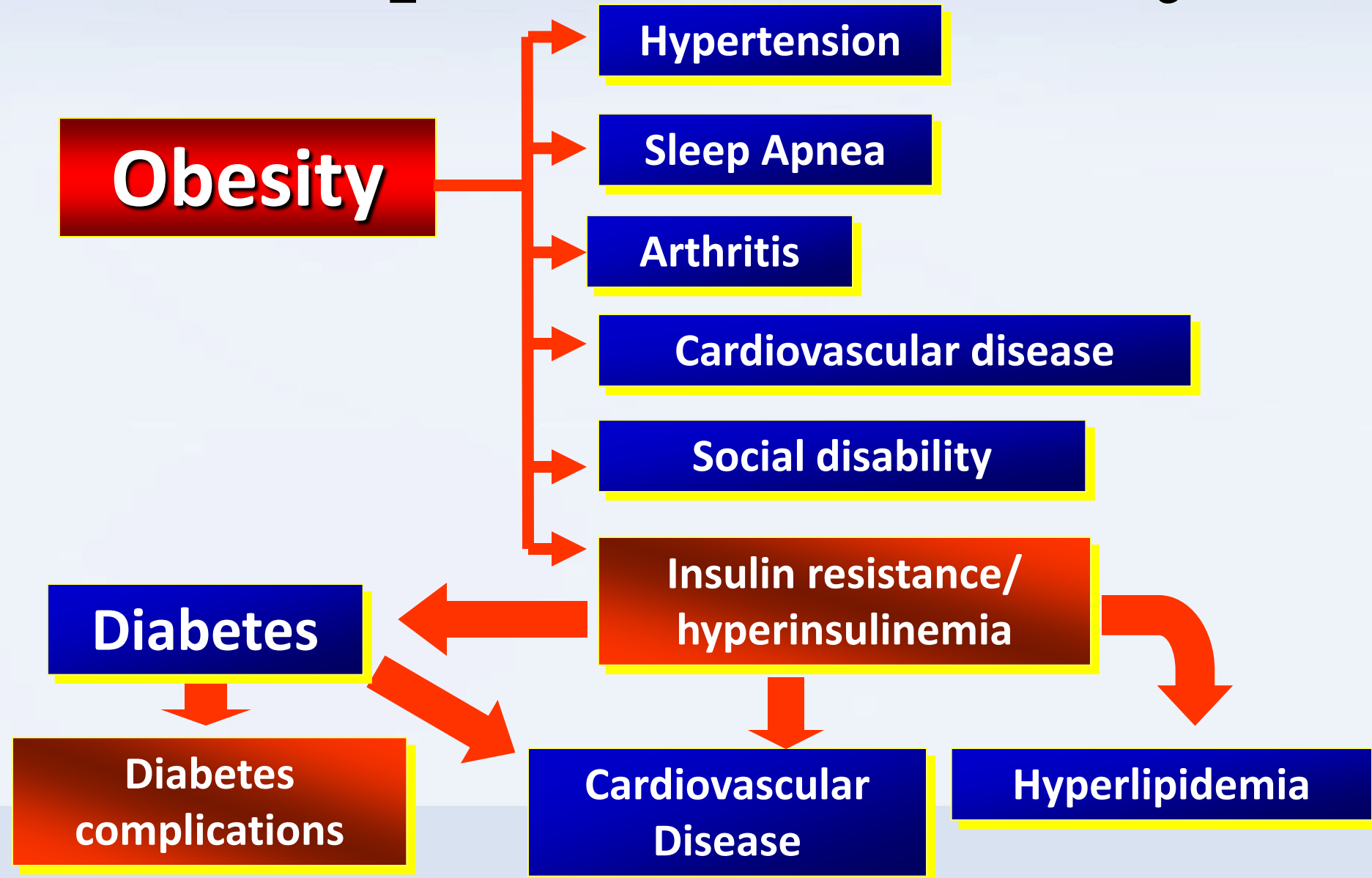
- infectious disease and under-nutrition
- chronic disease related to obesity...especially in urban settings

Why Treat Obesity?

Obesity is more than just a cosmetic problem

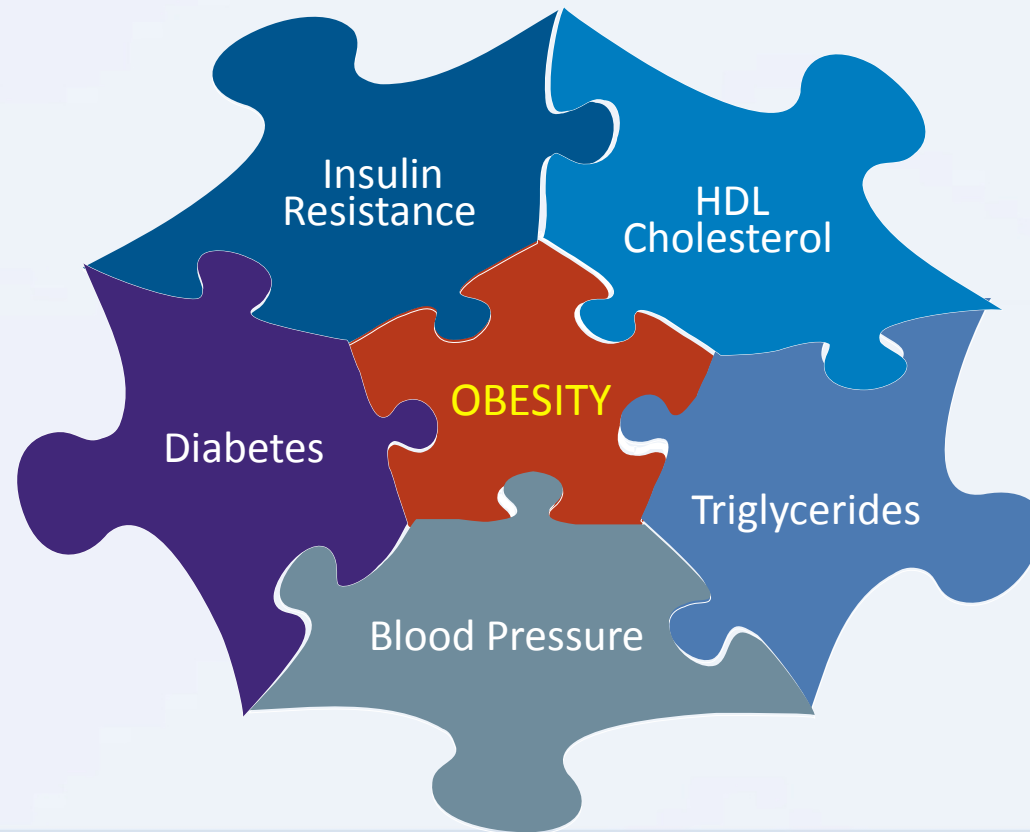
Why Treat Obesity?

Consequences of Obesity



OBESITY

center piece of jig-saw puzzle of metabolic syndrome

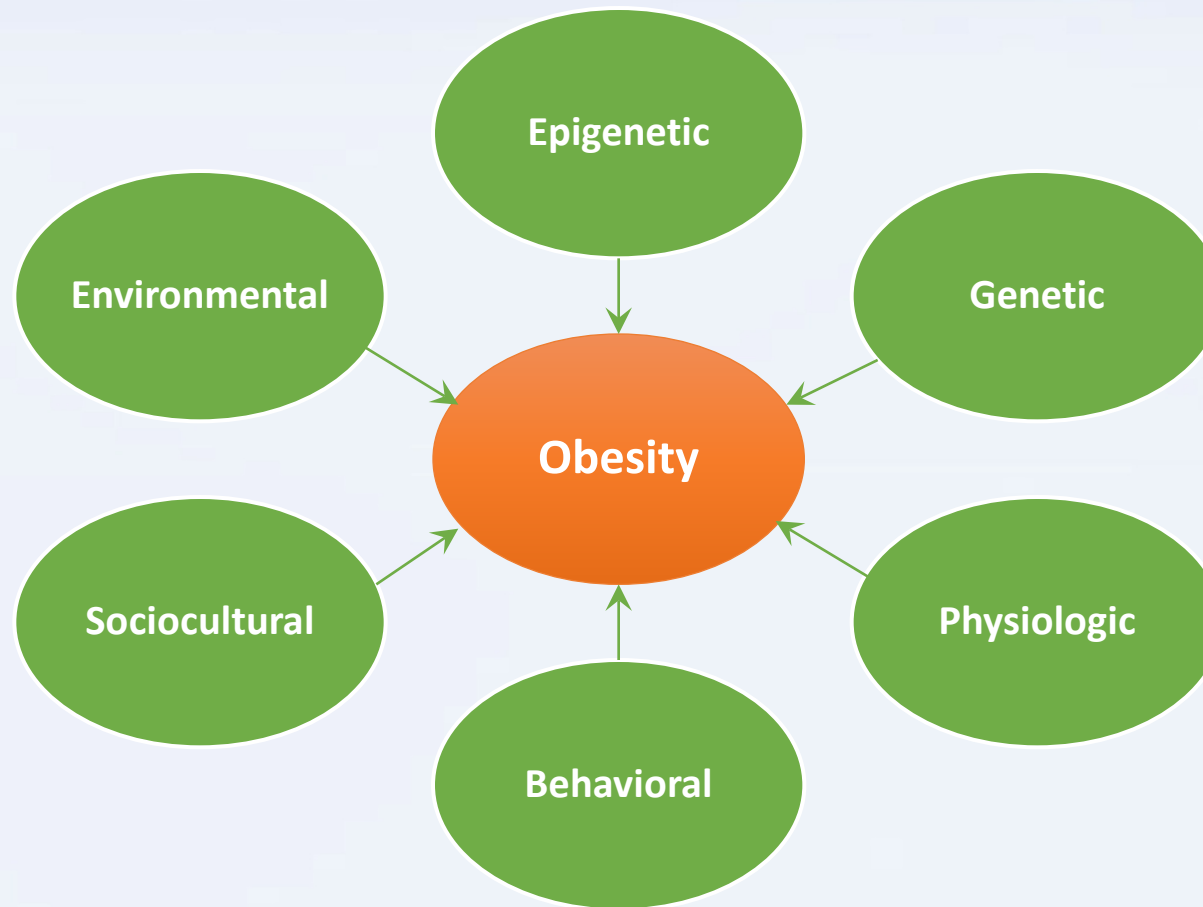


Pathophysiology of Obesity

What Causes Obesity ???

- Genetic predisposition
- Disruption in energy balance
- Environmental and social factors

Obesity Has Multiple Pathophysiologic Origins

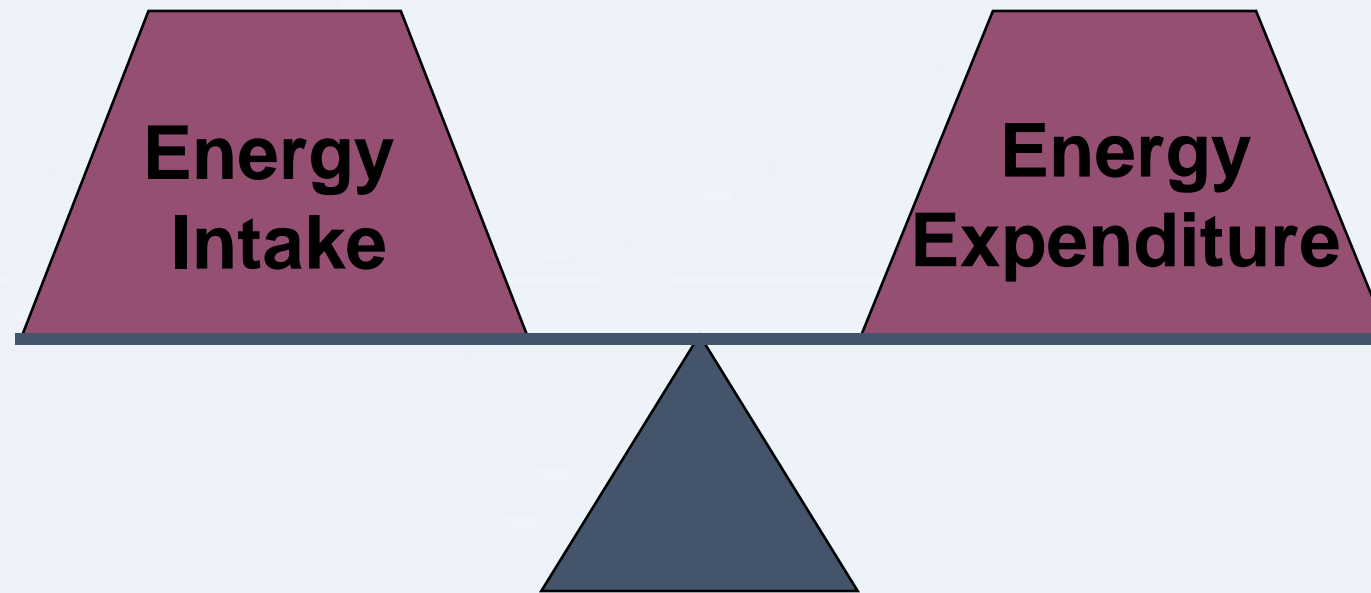


What Causes Obesity ???

Simple equation...when you eat more than you use..it is stored in your body as “fat” .

- Global shift in how we eat
- Western diet of processed food
- Higher sugar, fat and calories in what we eat
- Less nutrients
- Reduced intake of vitamins and minerals

What Causes Obesity ???



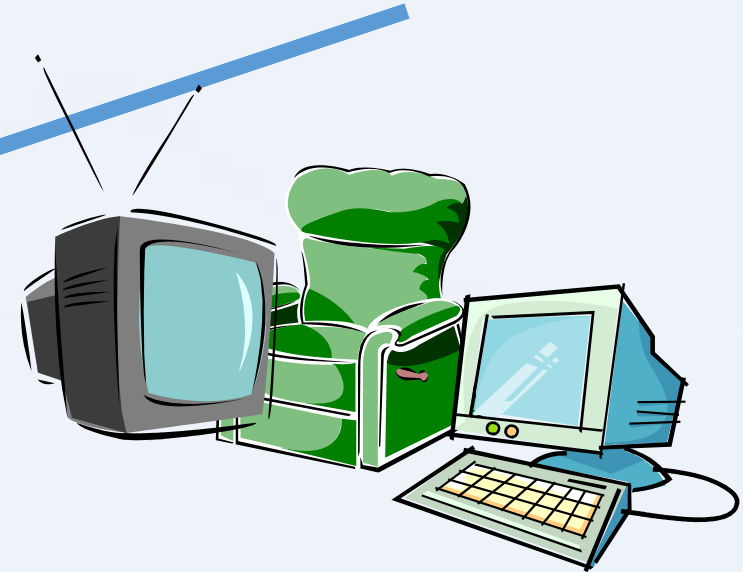
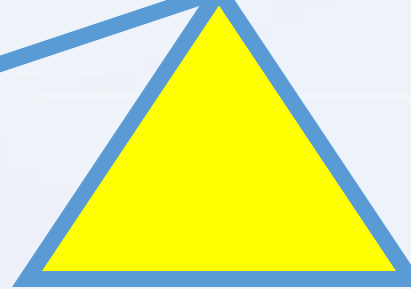
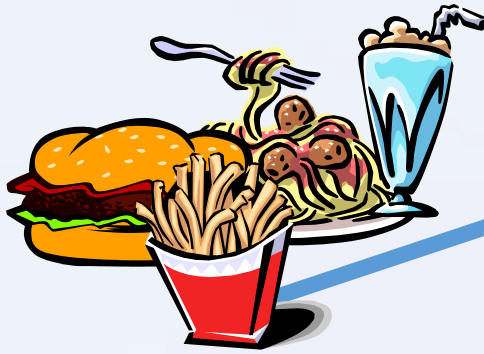
nutritional, activity levels, endocrine,
genetic, drugs

Obesity

Weight gain:

Energy Out

Energy In



Physical Activity Patterns & Trends

- Walking has declined significantly
- Activity at work continue to decline
- Activity at home & leisure decline

High-Tech increases Body Weight



**Cellular phones and remote controls
deprive us from walking!**

20 times daily x 20 m = 400 m

**Walking distance lost/year
 $400 \times 365 = 146,000 \text{ m}$**

146 km = 25 h of walking

1 h of walking = 113-226 kcal

Energy saved = 2800-6000 kcal



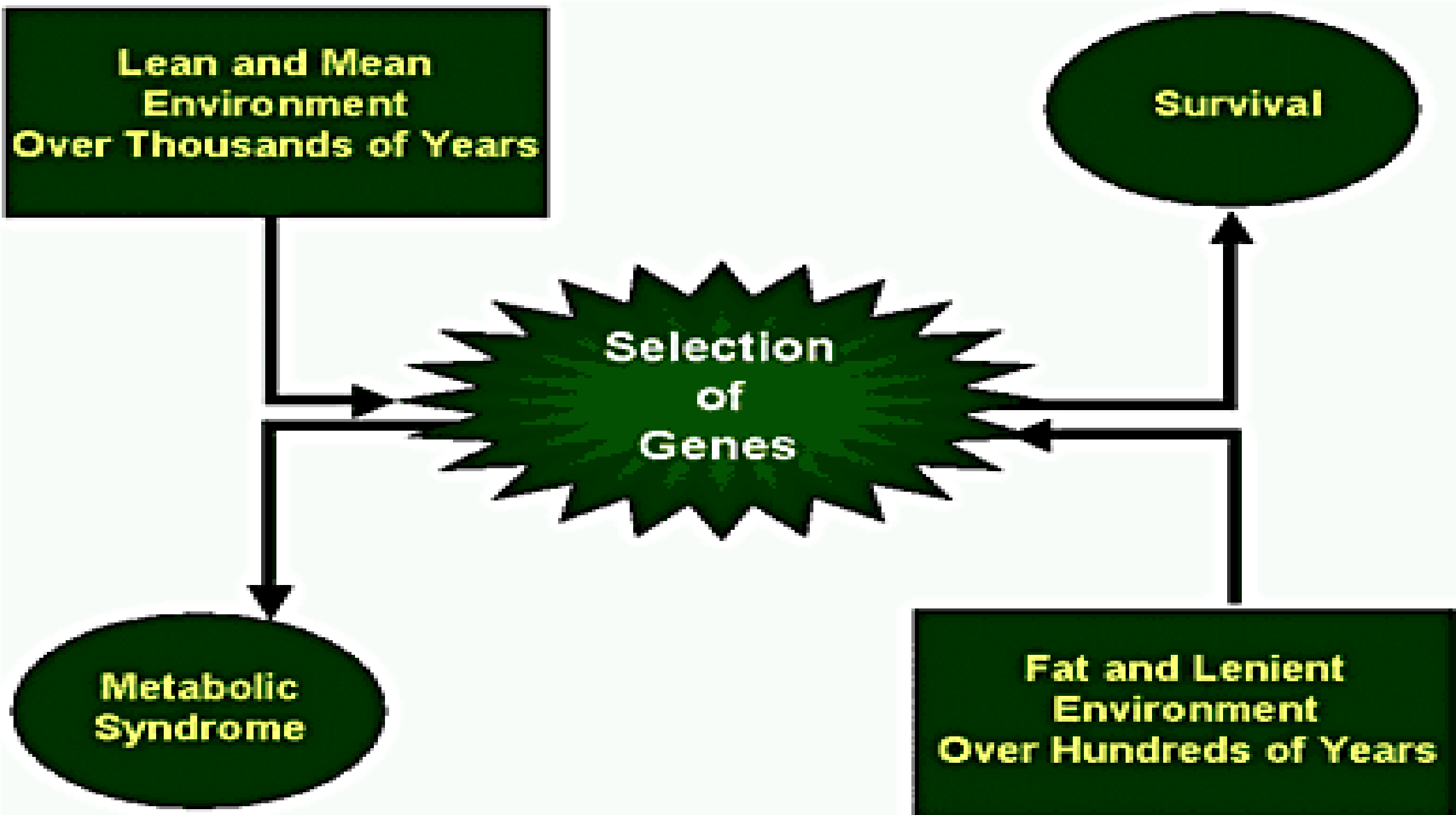
0.4 - 0.8 kg adipose tissue

OBESITY AND GENETICS

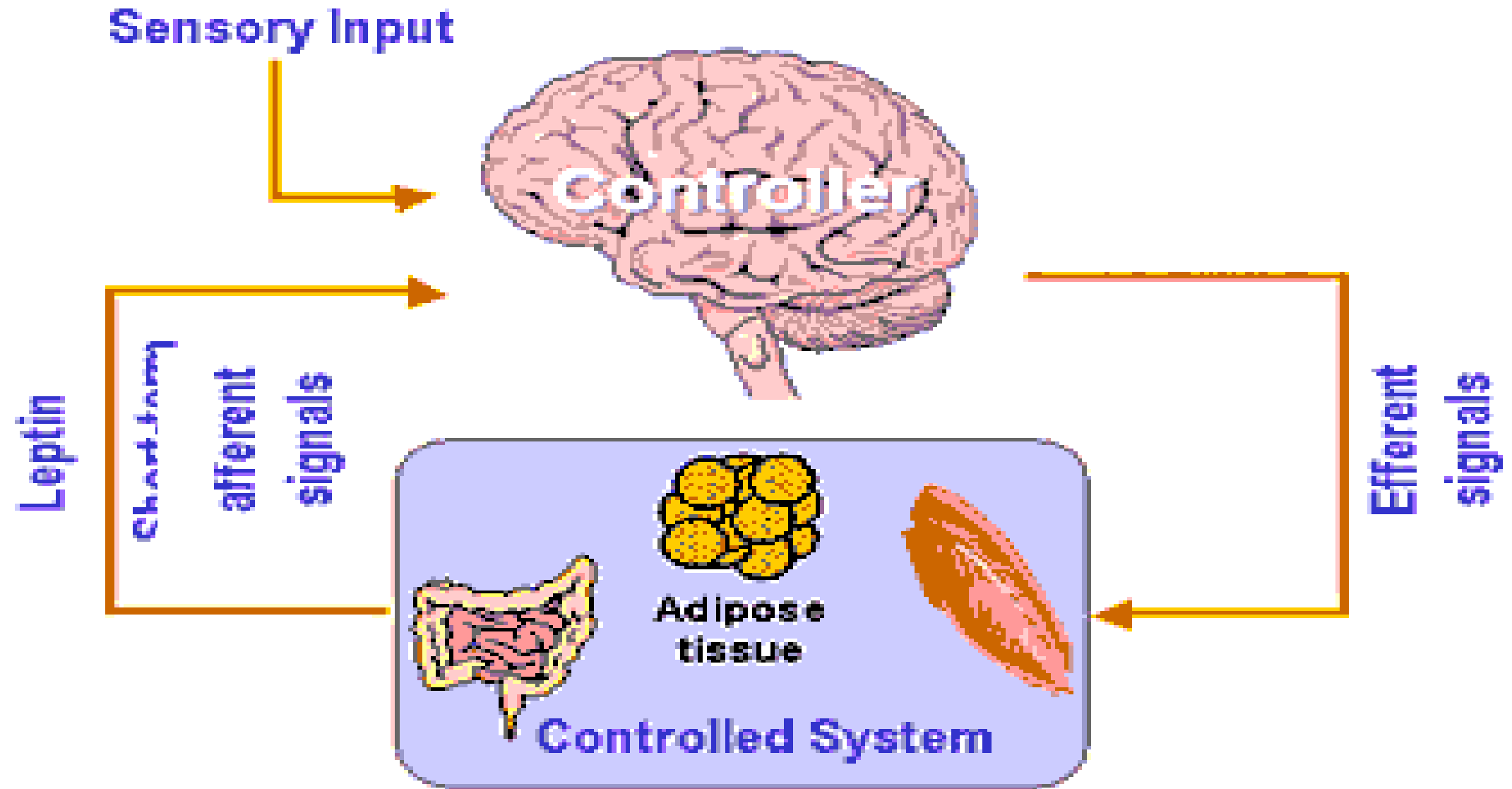
How genes contribute to obesity???

One/ more abnormality of pathway regulating feeding center

Abnormality of energy expenditure and fat storage

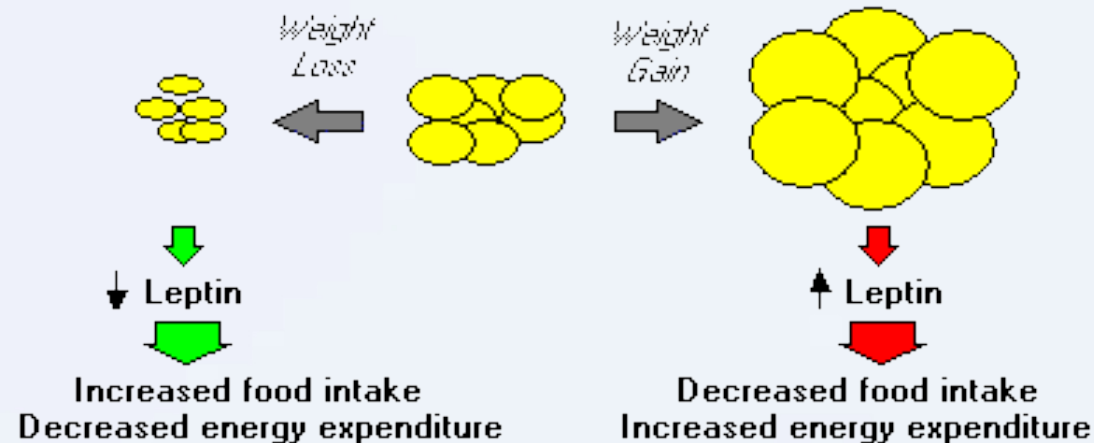


Body-Weight Regulation



Leptin

- Naturally occurring Protein hormone secreted by adipocytes
- Levels correlate with lipid content of cells
- Leptin acts on the hypothalamus to reduce hunger and to stimulate energy expenditure



Increase energy
intake and
decrease
expenditure

Maintain energy
intake and
expenditure
at setpoint

LEPTIN

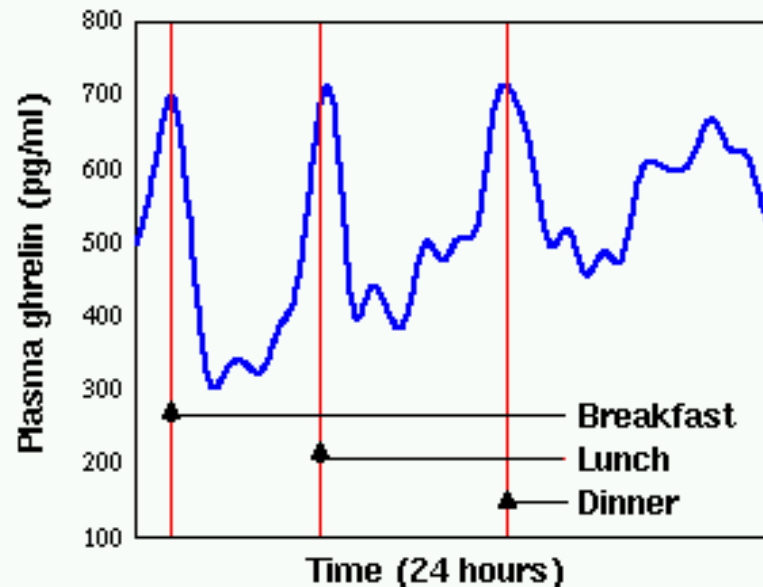
Fasting
↓ insulin
↓ glucose

Normal/steady
food intake

Adipose tissue

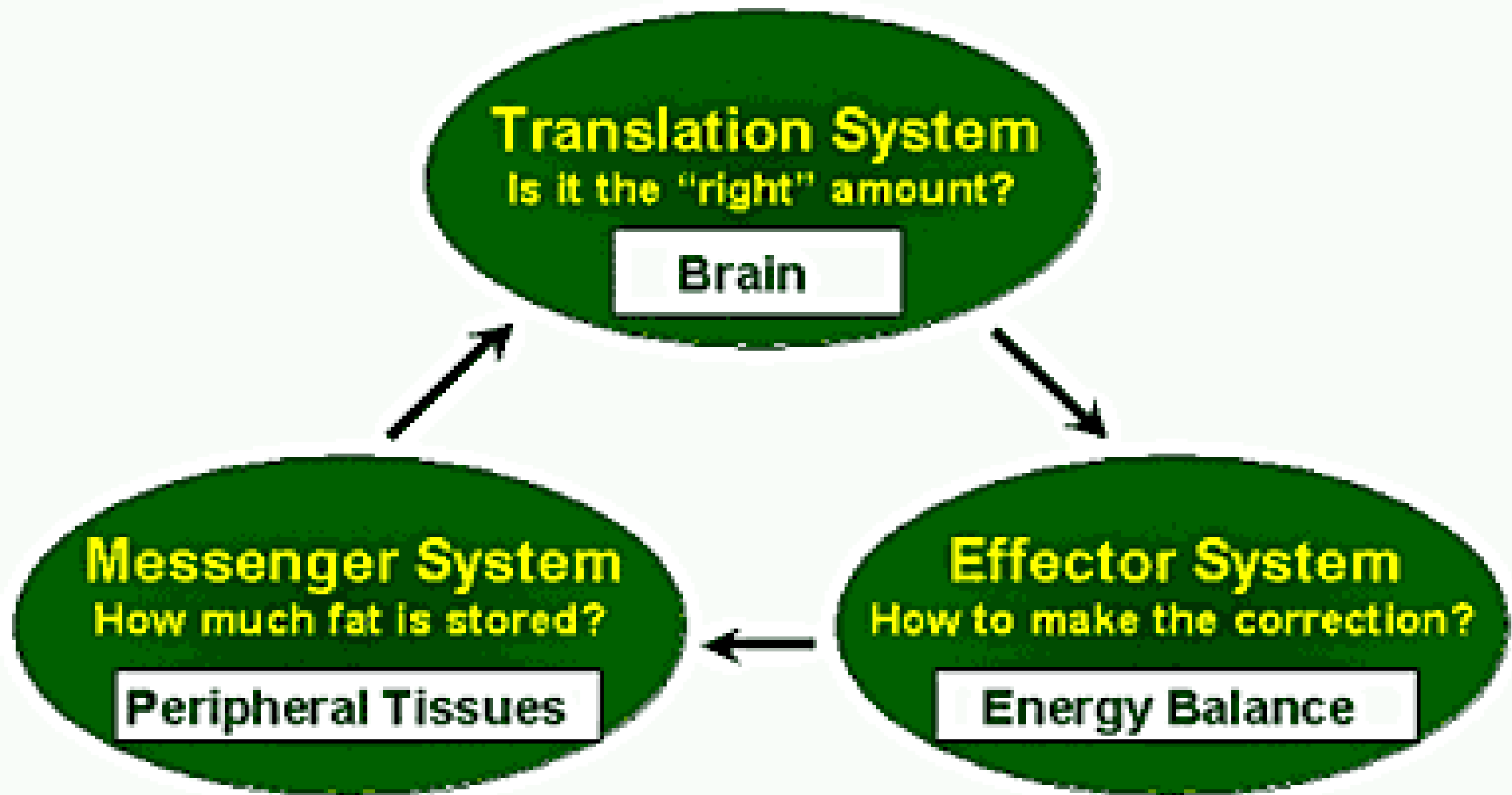
Ghrelin

- Hormone secreted in the stomach
- Acts on the hypothalamus to stimulate appetite
- Levels peak just before meals and drop afterward



Adapted from Cummings et al. *Diabetes* 50:1714, 2001.

Regulation of Body Weight

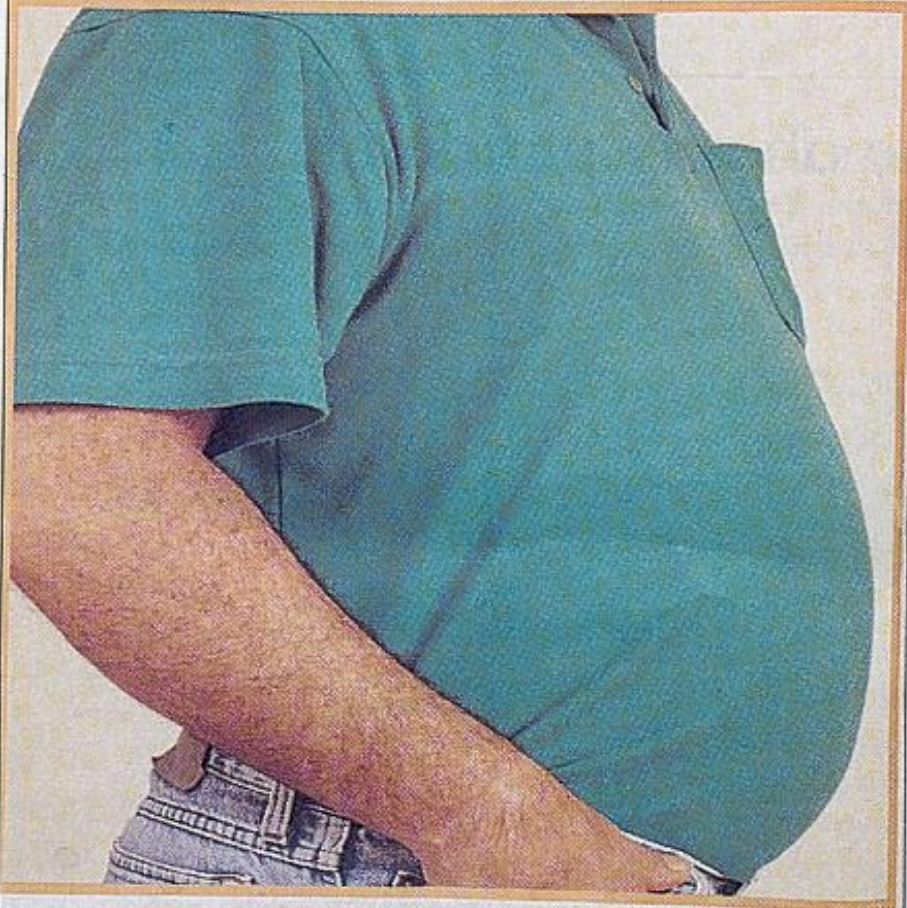


Measuring Obesity

$$\text{Body Mass Index} = \frac{\text{weight (kg)}}{\text{Height (m)}^2}$$

- Surrogate marker for body fat content.
- BMI not a direct estimate of adiposity; large muscle mass.

CAUTION: HAZARDOUS WAIST



A hazardous substance is stored nearby. It's the excess fat packed around your middle. Fat that increases your risk of heart disease and other serious illnesses, such as diabetes. Good reason to start a **waist disposal** program today.

Waist circumference

independent of BMI/weight, confers additional health risk with:

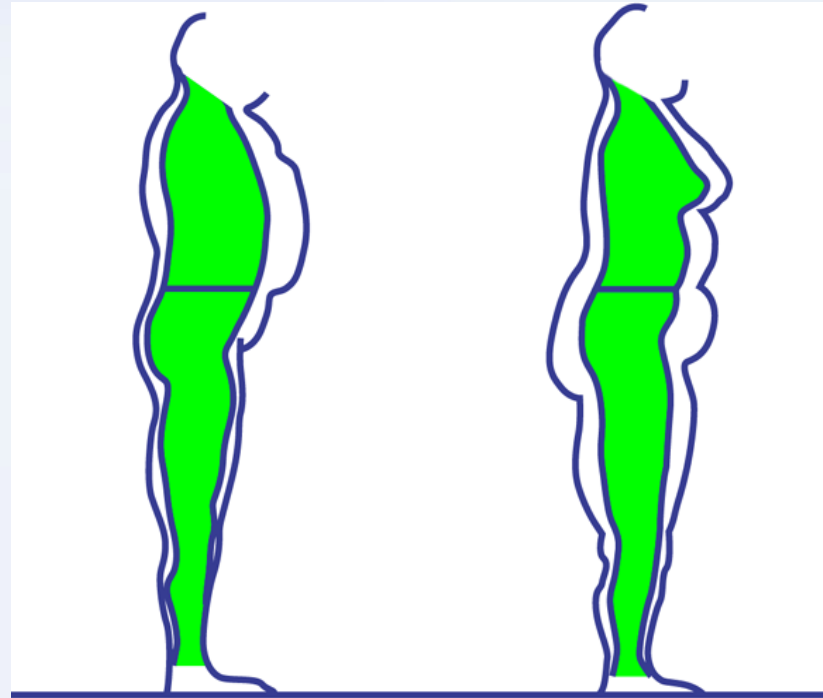
- Glucose intolerance/Diabetes Mellitus
- Hypertension
- Dyslipidemia

WC in any weight category confers similar risk

Men = Greater than 40 inches
Women = Greater than 35 inches

Android and Gynoid Fat Distribution

Central obesity
(apple-shaped)
mainly due to
visceral fat



Lower body
obesity **(pear
shaped)** mainly
due to
subcutaneous
fat

Android fat distribution
(apple-shaped)

Gynoid fat distribution
(pear shaped)

Waist Circumference & BMI

And Disease Risk

Disease Risk * Relative to Normal Weight
and Waist Circumference

	BMI (kg/m ²)	Obesity Class	Men ≤ 102 cm (≤ 40 in) Women ≤ 88 cm (≤ 35 in)	> 102 cm (> 40 in) > 88 cm (> 35 in)
Underweight	< 18.5		-----	-----
Normal	18.5 – 24.9		-----	-----
Overweight	25.0 – 29.9		Increased	High
Obesity	30.0 – 34.9	I	High	Very High
	35.0 – 39.9	II	Very High	Very High
Extreme Obesity	≥ 40	III	Extremely High	Extremely High

* Disease risk for type 2 diabetes, hypertension, and cardiovascular disease

Adapted from:

Clinical guidelines on the identification, evaluation,
and treatment of overweight and obesity in adults

WHO Asia Pacific Guidelines for Obesity

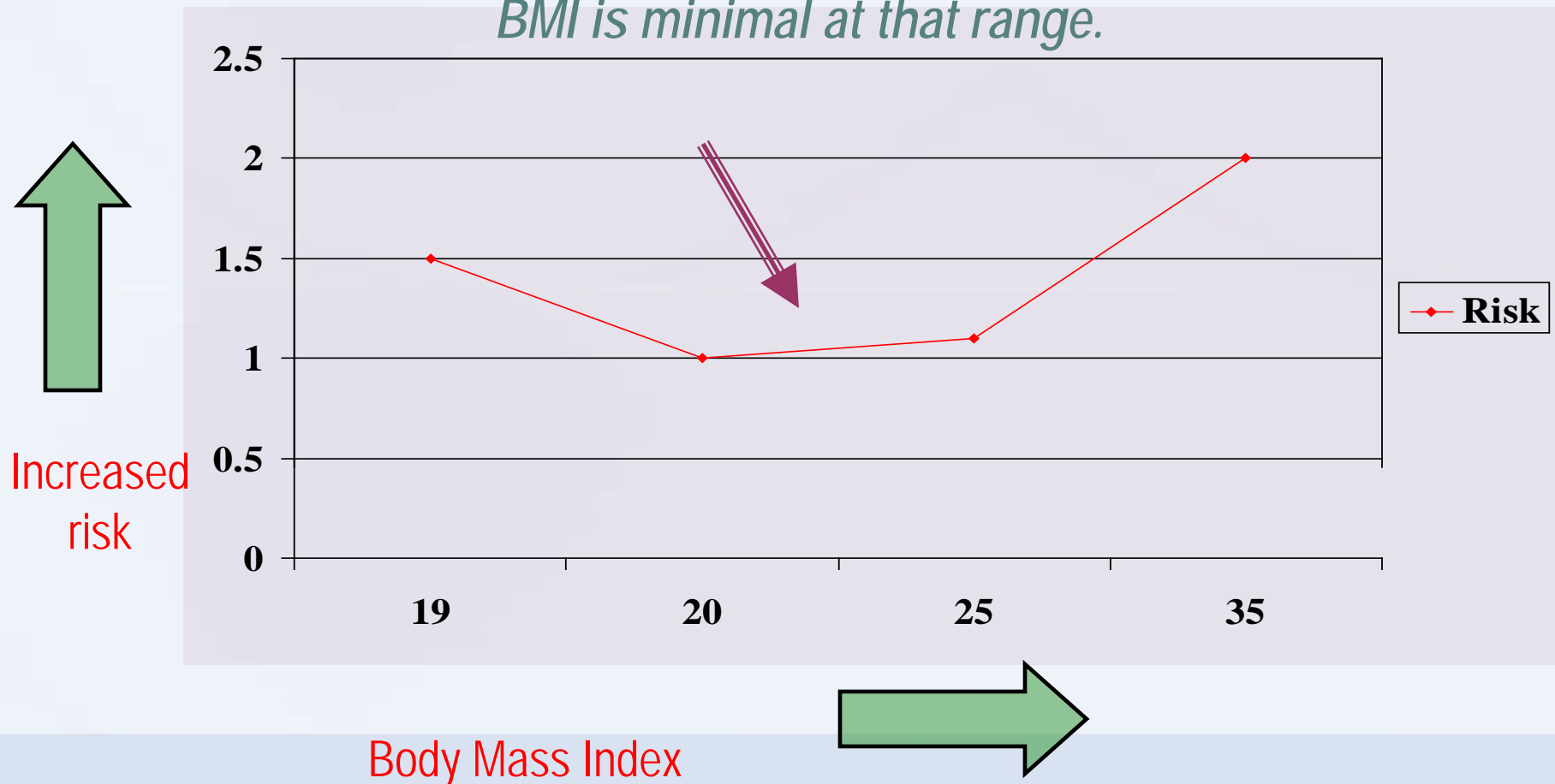
<i>Category</i>	<i>BMI</i>
Underweight	<18.5
Normal Weight	<i>18.5-22.9</i>
Overweight	≥ 23
At risk	<i>23-24.9</i>
Obesity	≥ 25

Shera AS, Rafique G, Khwaja IA, Ara J, Baqai S, King H. Pakistan national diabetes survey: prevalence of glucose intolerance and associated factors in Shikarpur, Sindh Province. Diabetic Med 1995; 12:1116-21.

Shera AS, Basit A, Fawwad A, et al., Pakistan National Diabetes Survey: prevalence of glucose intolerance and associated factors in the Punjab Province of Pakistan. Prim Care Diabetes 2010; 4: 79-83

Why is a BMI of 20-25 considered as a reference weight?


This is because the relationship between morbidity and mortality and BMI is minimal at that range.



Other Markers of Fat

Body Fat Percentage: The percentage of fat in body; people with similar BMI can have different fat percentages.

Examples of hidden fat

CaseA		CaseB	
F		Gender	F
34		Age	34
5' 7 7/8"		Height	5' 7 1/2"
144.0 lb		Weight	141.0 lb
22.0 (Normal)		BMI	21.8 (Normal)
27.2% Normal		Body fat percentage	34.5% High

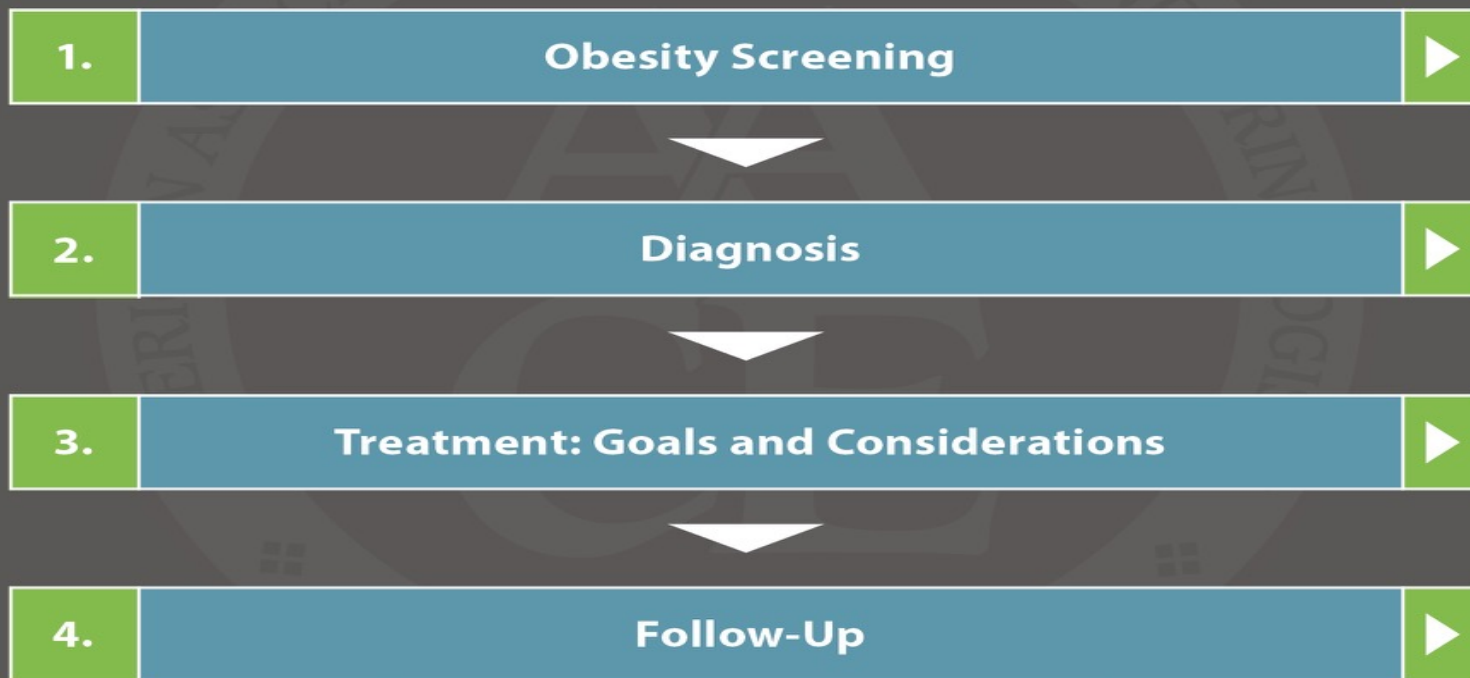
Step by Step Approach for Managing Obesity



AACE/ACE ALGORITHM FOR THE MEDICAL CARE OF PATIENTS WITH OBESITY



ALGORITHM COMPONENTS





1.

Obesity Screening



1.

Screen positive for
overweight or obesity
BMI ≥ 25 kg/m²
(≥ 23 kg/m² in some
ethnicities)

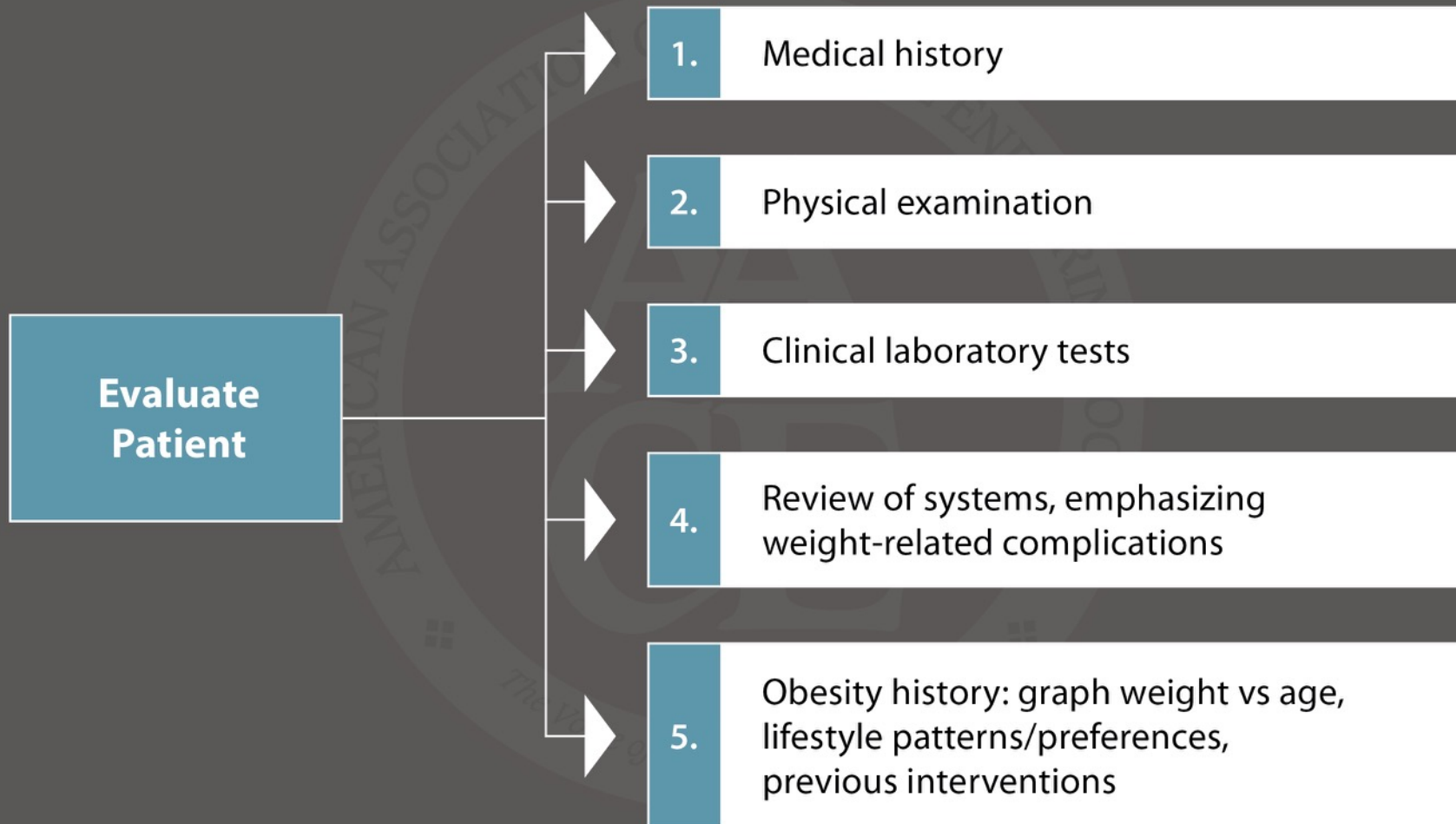
2.

Presence of weight-
related disease or
complication that
could be improved by
weight loss therapy



2.

Diagnosis: Evaluation





3.

Treatment Based on Clinical Judgment

PRIMARY	SECONDARY	TERTIARY	TERTIARY
<ul style="list-style-type: none">• Healthy meal plan• Physical activity• Health education• Built environment	<ul style="list-style-type: none">• Lifestyle/behavioral therapy• Consider pharmacotherapy if lifestyle alone not effective	<ul style="list-style-type: none">• Lifestyle/behavioral therapy• Consider pharmacotherapy (BMI ≥ 27)	<ul style="list-style-type: none">• Lifestyle/behavioral therapy• Add pharmacotherapy (BMI ≥ 27)• Consider bariatric surgery (BMI ≥ 35)

Treatment Approach

- Make the diagnosis (and communicate it)
- Assess readiness for change
- Prescribe diet and exercise
- Consider medications and surgery

Treatment Approach (Contd.)

- Initial goal: 10% weight loss
- Rate of weight loss
 - 1 to 2 pounds per week
- Slow weight loss is more stable
- After 6 months, weight loss is more difficult
 - Ghrelin & Leptin are at work!
 - Changes in resting metabolic rate
 - Energy requirements decrease as weight decreases
 - Diet adherence wavers

Physical Activity

Physical activity should be an integral part of weight loss

- **Start slowly**
- **Increase intensity & duration gradually**
- **Long-term goal**
 - 30 to 45 minutes or more of physical activity
 - 5 or more days per week
 - Burn 1000+ calories per week

Recommend Physical Activity

- What does it take to burn 1000 calories per week?



Running
11 miles



Walking
12 miles



Cycling 22 miles

Gardening
5 hours



Indications for use of obesity drugs

A combined intervention of behavior therapy, dietary changes and increased physical activity should be maintained for at least 6 months before considering pharmacotherapy.

Pharmacotherapy for Weight Loss

- ***Adjunct*** to diet & physical activity
- BMI ≥ 30 Or, BMI ≥ 27 with other risk factors
- Should not be used for cosmetic weight loss
 - Only for risk reduction
- Use only when 6-month trial of diet & physical activity fails to achieve weight loss

CONTRAINDICATIONS OR CAUTIONS TO THE USE OF OBESITY DRUGS

- Pregnancy or lactation
- Unstable cardiac disease
- Uncontrolled hypertension (SBP >180, DBP > 110 mmHg)
- Unstable severe systemic illness
- Unstable psychiatric disorder or history of anorexia
- Other drug therapy, if incompatible (eg MAO inhibitors, migraine drugs, adrenergic agents, arrhythmic potential)
- General anesthesia

NHLBI Obesity Education Initiative, Expert Panel on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults

Currently Available Agents Indicated for Treatment of Obesity

<u>Generic</u>	<u>Usual Dose</u>	<u>Mechanism of Action</u>	<u>Side Effects</u>
•Orlistat	120 mg with each meal	Peripheral: Blocks absorption of about 30% of consumed fat	GI symptoms (oily spotting, flatus with discharge, fecal urgency, oily stools, incontinence)
Phentermine	15-37.5 mg per day as a single or split dose	Central: Stimulates release of norepinephrine	CNS stimulation, tachycardia, dry mouth, insomnia, palpitations

Newer drugs approved by FDA

- **Lorcaserin- June 2012** (Selectively activates serotonin 2C receptors in brain promotes satiety)
- **Phentermine & Topiramate ER-** July 2012 (mediates release of catecholamine's in hypothalamus reduced appetite)
- **Naltrexone & Bupropion-** Sept 2014 (Effect on 2 separate areas of brain. Exact neurochemical effects not known)
 - Mesolimbic dopamine circuit
 - Exact neurochemical effects not known
- **Liraglutide-** Dec 2014 (Glucagon like peptide 1 receptor agonist.)

**Remember There is no
miracle drug to tackle
obesity overnight.**

Future drugs may use new strategies

- Combine drugs that affect appetite and those that affect addiction (or craving)
- Stimulate gut hormones that reduce appetite
- Shrink the blood vessels that feed fat cells in the body, thereby preventing them from growing
- Target genes that affect body weight
- Change bacteria in the gut to control weight

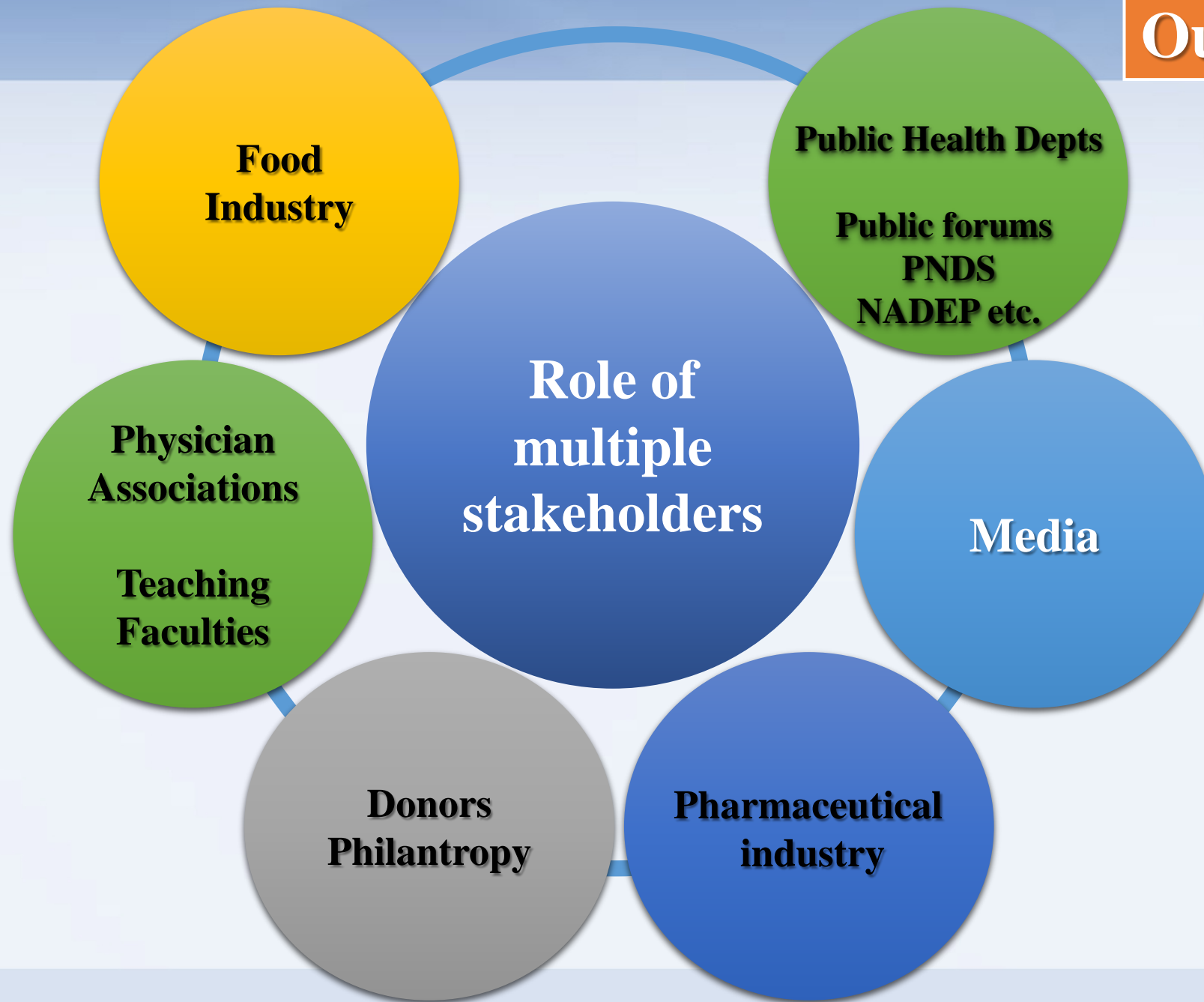
Obesity

What needs to be done?

- **Low-cost and effective screening strategies**
- **Massive awareness campaigns**
- **Population based implementation**
- **Identification of roles of various stake holders**

Focus on children





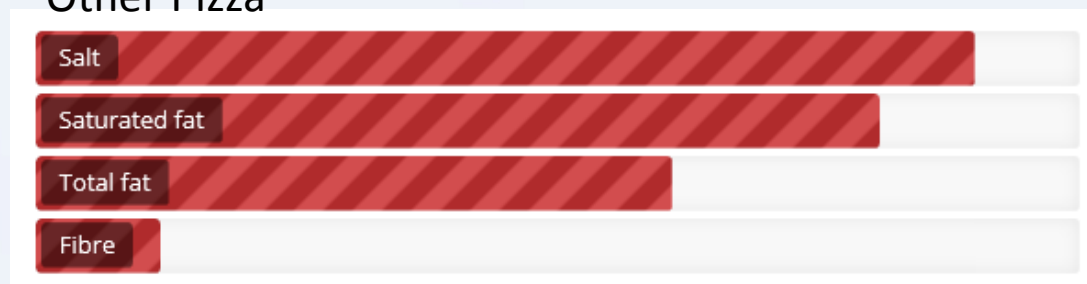
Few major examples of such collaborations

- Lowest salt in crisps in United Kingdom
- Cycling mandatory over the weekends in Brazil/Argentina
- No soft drinks vending machines in schools in Saudi Arabia
- Scottish pizza developed with minimal entrepreneurship and complete taste

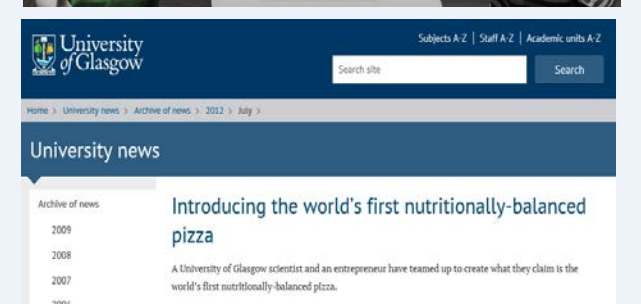
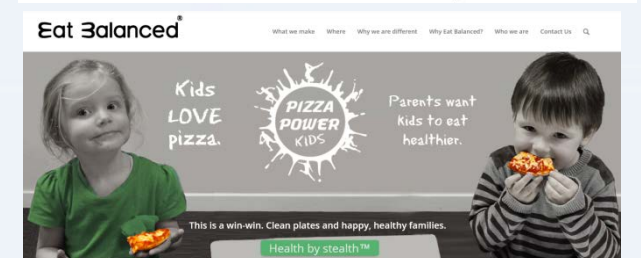


Analysis shows the pizzas, which cost around £3.50, to be healthier than shop-bought salads

Other Pizza



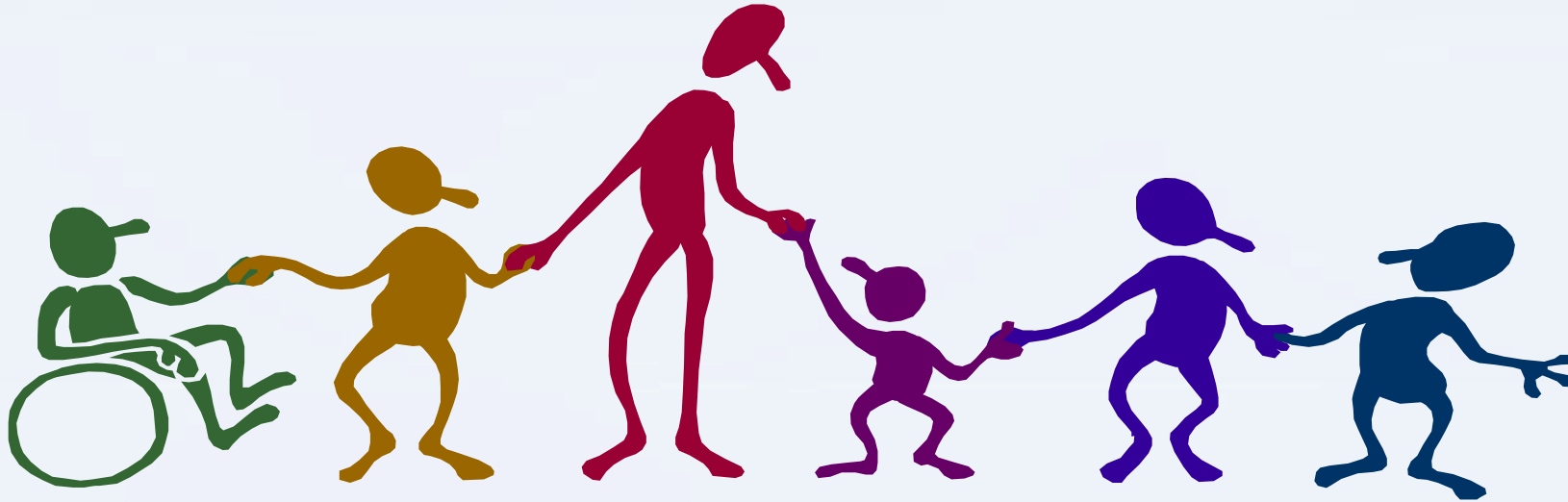
Pizza power Kids



Conclusion

- Diet/lifestyle changes remain the mainstay of the treatment of obesity
- Expect only modest weight loss at best with current drugs
- Be aware of Rx indications and contraindications
- Off label use of non-indicated products is not recommended
- Investigational agents may offer hope for treatment of obesity in the future

Taking Action to Prevent Obesity



Change will come more easily if everyone is involved.



“Enjoy present pleasures in
such a way as not to injure
future ones.”

~Seneca (4 BC- 65 AD)



Thank You

For Your Kind Attention...!!