Obesity

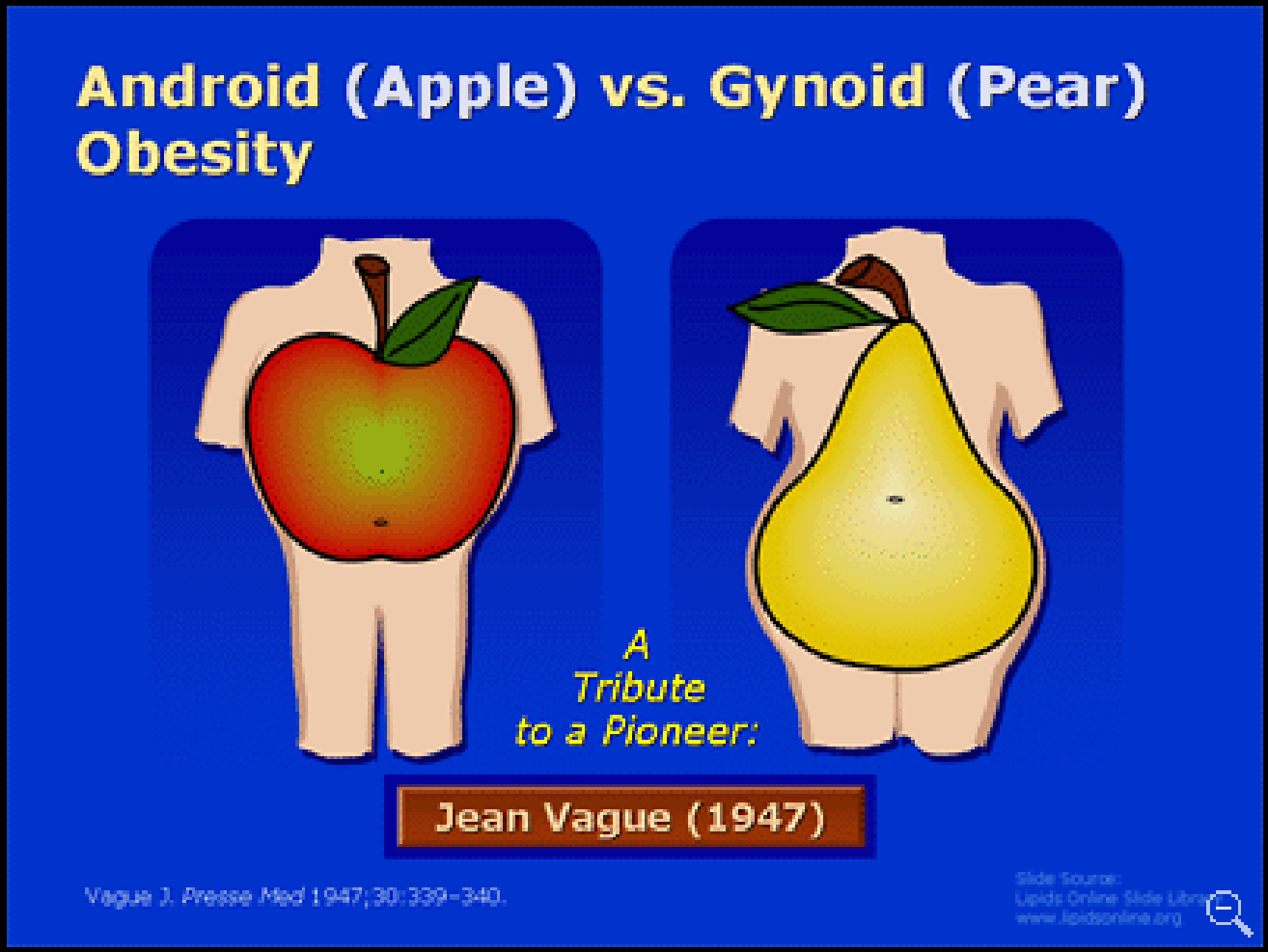
OBESITY

A condition in which excess body fat may put a person at health risk.

Abnormal growth of the adipose tissue due to enlargement of fat cells (hypertrophic) or an increase in fat cell number (hyperplastic) or a combination of both.

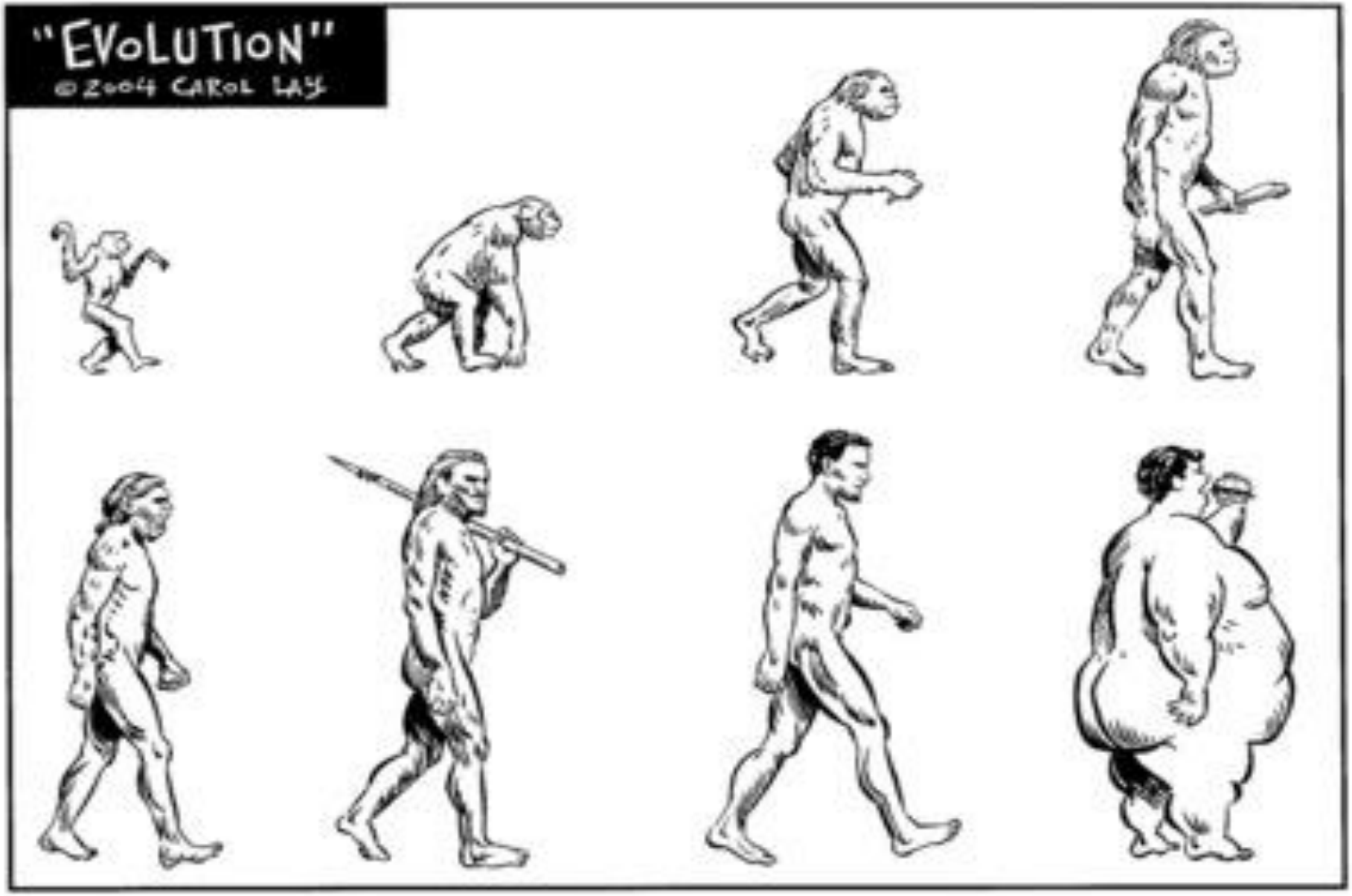
- **Fat Cell Bulk**
- **Fat Cell Distribution**

TYPES OF OBESITY



Android(abdominal)obesity – fat distributed in & around abdomen.

Gynoid obesity – fat distributed evenly & peripherally.



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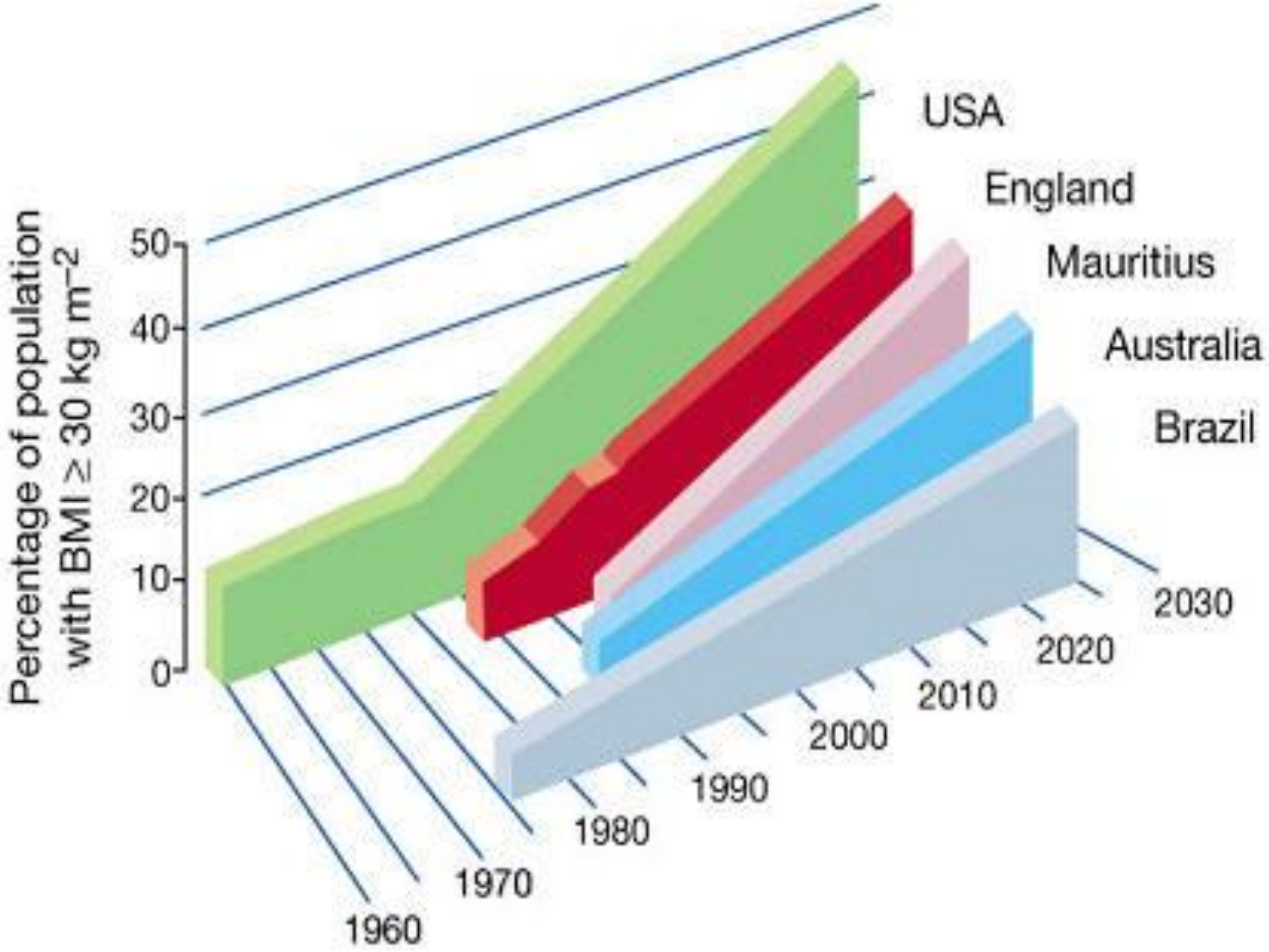
More Americans Obese Than Ever
USA
DANZIGER
NYTS/CWS Jan 13 08 (3863)

Obesity, a Global Problem



Risk factor for Non Communicable Diseases

Obesity

- Oesteoprosis
- Mental Health
- Psychological well being
- Accidents
- Muscloskeletal injuries

- Cardiovascular diseases
  CAD, CHF, Stroke
- Insulin Resistance and
- Type-2 Diabetes Mellitus
- Reproductive disorders
- Pulmonary diseases
- Gall stone disease
- Cancer- Colon, Rectum, Prostate-Male
- Gall stone–bile duct, breast, endometrium cervix, ovary- Female
- ã Bone: Joint and skin diseases

High Prevalence of Metabolic Syndrome

(Syndrome X)

Hypertension
Increased Insulin Resistance
Central Obesity
Dyslipidemia

Indian Scenario : Diabetes

Between 1988 and 2000, there was a 70% increase in the prevalence of Diabetes in the city of Chennai

The recent study document a prevalence of 13% in adults

Possible Reasons:
Average per capita energy (Kcals) intake as per expenditure classes , India

Expenditure Classes	Urban (1972-73)	Urban (1993-94)
Lower 30%	1579	1682
Middle 40%	2154	2111
Top 30%	**2572**	**2405**

Source: NSSO, 1997

Average daily per capita dietary intake of Fats in India

Year	Fat (g) Rural	Fat(g) Urban
1972-73	24	36
1983	27	37
1993-94	31.4	42
1999-2000	36.1	49.6

Source: NSSO 2001

Life style changes between 1972-2000

Increase in Sedentary Life style

Decrease Physical activities

Intake of calories remaining same

Increase in Fat intake

Most manual jobs have been replaced by mechanized jobs

Transportation to school /work place universally by use of motor car/Bus/Bicycles

Increase in hours for activities :TV viewing/ Computer

PREVALENCE OF OBESITY

In developed countries

20 – 40% of adults

10 – 20 % of adolescents & children

In India

10% adults

2% children

Facts about overweight and obesity (WHO ,2005)

- **1.6 billion adults (age 15+) overweight,**
- **400 million adults were obese.**

WHO projection by 2015

- **2.3 billion adults will be overweight,**
- **More than 700 million will be obese**

Sequelae of Obesity

- Heart disease
- Certain cancers (e.g., breast, uterine, cervical, colon, esophageal)
  - 14% of all deaths from cancer in men, 20% in women
- Type II Diabetes: 1998 – 4.9%; 2000 – 6.5%
  - Epidemic of type II diabetes in children
- Gallstones

Sequelae of Obesity

- Sleep apnea
- Pseudotumor cerebri
- GERD
- Worsening of asthma

Sequelae of Obesity

- Weaker bones
- Depression and suicide
- Decreased fertility
- Increased risk of diabetes and multiple birth defects among offspring

Sequelae of Obesity

- Decreases in social and physical functioning
- Decrease in some health-related quality of life (QOL) measures
  - Severely obese children and adolescents have QOL similar to those with cancer

Sequelae of Obesity

- Barrier to preventive care
  - e.g., mammograms and Pap smears, despite higher rates of breast and cervical cancer)
  - 20% more likely to have false-positive mammograms

Sequelae of Obesity

- Marginalization and discrimination
- Lower life expectancy
- More strongly associated with chronic medical conditions and reduced health-related quality of life than smoking, heavy drinking or poverty

Economic Consequences of Obesity

- Costs to business:
  - Lost productivity
  - Absences
  - Underperformance
  - Higher insurance premiums

NATURAL HISTORY

- **PRE-OBESE STATIC PHASE**
  - Energy intake is normal
  - Weight remains normal
- **DYNAMIC PHASE**
  - Intake > expenditure
  - Stages of waxing & waning of wt. may remain for years
  - Efforts to lose wt.,
  - Followed by inability to maintain lost wt.
- **OBESE STATIC PHASE**
  - Intake = expenditure
  - Wt. stabilization @ higher level than baseline

CAUSATION

ENERGY IMBALANCE

- ↑ energy intake
- ↓ energy expenditure
- Both

Energy –

- Fat = 9 kcal/gm
- Carbo. = 4 kcal / gm
- Protein = 4 kcal / gm

EXPENDITURE

- Basal metabolism (40-50%)
- Physical activity (30-50%)
- Dietary thermogenesis (10%)

POSITIVE ENERGY BALANCE:

- Intake > expenditure
- ↑ store , ↑ body wt.
- Overwt. → Obesity

- ***Dietary goals (prudent diet):***

1. **Dietary – limited to approx. 20-30 % of total daily intake**
   - **Saturated fats should contribute no more than 10% of the total energy intake; unsaturated vegetable oils should be substituted for the remaining fat requirement**
2. **Excessive consumption of refined should be avoided; some amount of carbohydrate rich in natural fibre should be taken**

should account for approx. 15-20 %...

4. **Sources rich in energy such as**
   should be restricted…

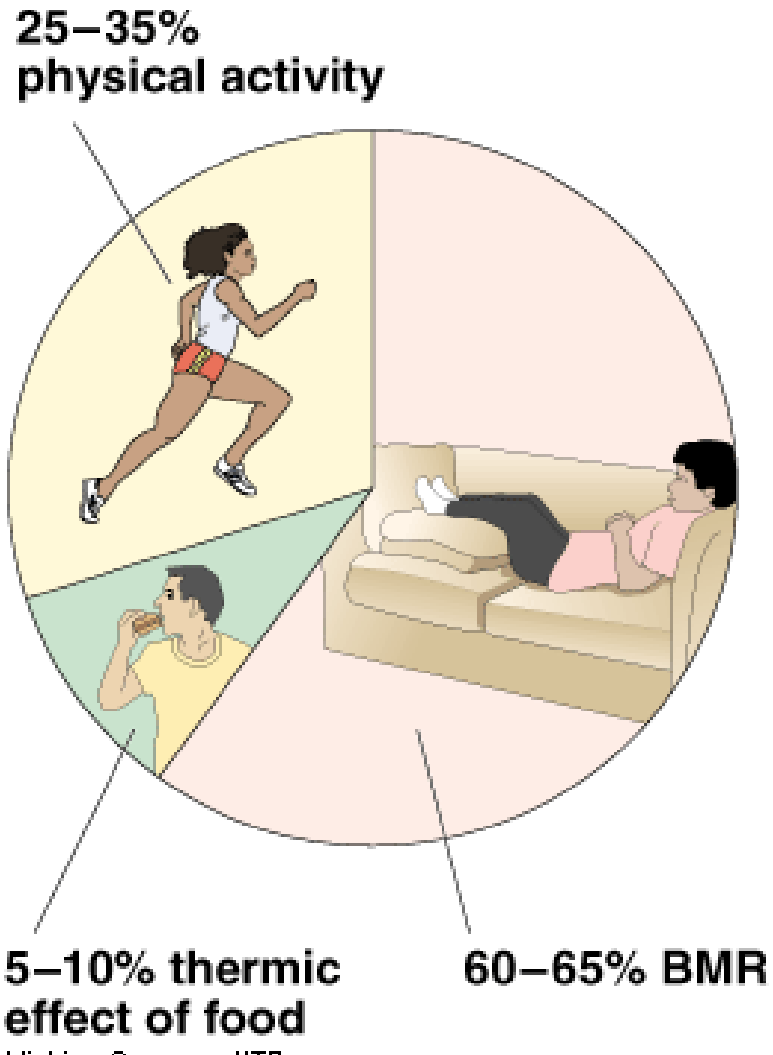
   intake should be reduced to not more than 5 grams per day…

   such as colas, ketchups and other foods that supply empty calories should be reduced…

Diet should be adapted to special needs of growth, pregnancy, lactation, physical activity and medical disorders…

Energy Out

- 3 main components:
  - Basal Metabolic Rate
  - Thermic Effect Food
  - Physical activity

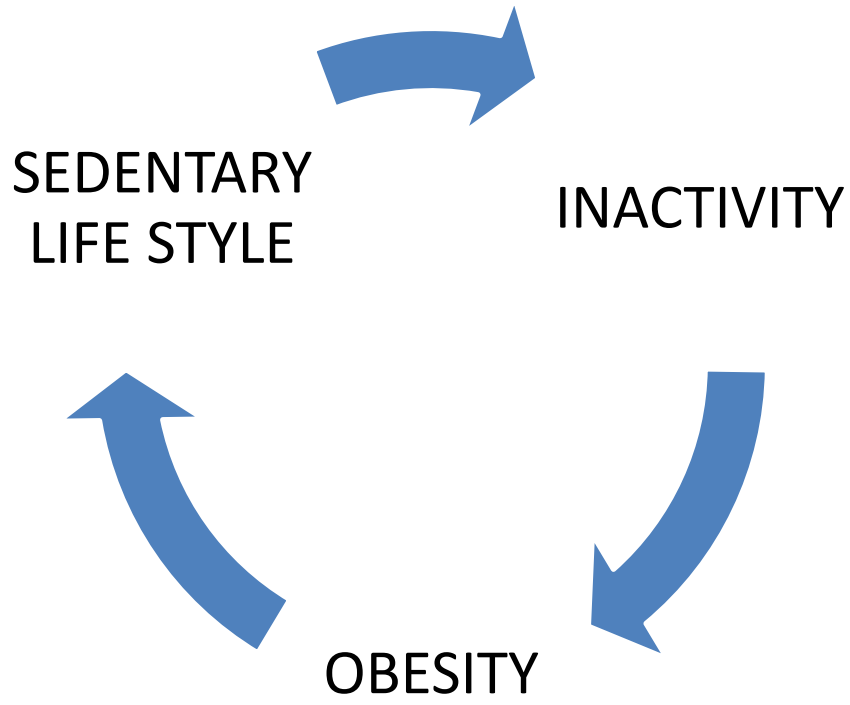


Multiple causation

DIETARY FACTORS

- Capacity of fat storage in human – unlimited, efficient
- Fat – palatable & pleasurable food
- Ill-sustained, rebound increase in appetite, positive energy balance
- Carb. – high intake – positive energy balance – fat
- Protein – high intake – helps control wt.
- Small freq. meals - helps control wt.
- Large, plentiful meals - ↑ wt.
- post-prandial hyperlipidaemia → deposition
- Not utilized unless glucose level ↓

PHYSICAL INACTIVITY



SEDENTARY BEHAVIOUR –

A state when body movement is minimal & energy exp. Approximates resting BMR

- PAL – Physical Activity Level
- Daily energy exp. As a multiple of BMR
- Active individual – 1.75 or more
- Sedentary individual - <1.4
- 1 hour moderate activity ↔ ↑ PAL 0.2 or more

(walking 5.6 km/h for 1 hr
Cycling 15 km/h for 45 mins
Running 13 km/h for 30 mins)

- 100 kcal/day extra ↔ 5 kg/year wt. gain

EXCESS ALCOHOL INTAKE

- 7 kcal / gm
- Oxidation of alcohol is given priority by body (over other substances' oxidation)
- Body derives energy from alcohol & subsequent diet contributes to obesity
- ↑ risk of abdominal fat distribution
- Sometimes, alcoholics are thin also.
- Because of… eating less, relying more on alcohol for energy

SMOKING

DON'T SMOKE TO LOSE WEIGHT!!!

OBESITY ASSESSMENT

- Active mass
- Fatty mass
- Extracellular fluid
- Connective tissue
- Structurally, obesity is ---- ↑ in fatty mass at the expense of other masses
- Water (fluid) content is never increased in obesity
- Visible changes very easy to assess

VISUAL ASSESSMENT

1. Skin fold thickness (triceps, sub-scapular)
2. Waist circumference
3. Waist : Hip ratio (>0.85 f, >1 m)
4. Body weight (>120% of normal wt. for age)
5. BMI

VARIOUS INDICES

BMI (QUETLET'S INDEX)

BMI = weight (kg) / height^2 (m^2)

PONDERAL INDEX

BMI = Height (cm) / weight (kg)$^{1/3}$

ROHRER'S PONDERAL INDEX FOR NEWBORN

BMI = Birth wt. (gm) x 100/ Birth length^3 (cm^3)

BROCA'S INDEX

Weight (kg) = Height (cm) – 100

LORENTZ INDEX

Weight = [Height (cm) -100] – [Ht. (cm)-150/2(f) or 4 (m)]

CORPULENCE INDEX

BMI = Actual wt. / Desirable wt. (should not exceed 1.2)

MEASUREMENTS OF OBESITY

1.Body mass index (BMI,Quetelet index:WHO classi.)

Wt (kg) / Ht $(m)^2$

Classification of adults according to BMI

Classification	BMI (kg/m^2)	Risk of comorbidities
Underweight	< 18.50	Low (but risk of other clinical problems increased)
Normal range	18.50-24.99	Average
Overweight :	≥ 25.00	
Pre-obese	25.00-29.99	Increased
Obese class I	30.00-34.99	Moderate
Obese class II	35.00-39.99	Severe
Obese class III	≥ 40.00	Very severe

Body mass index (ICMR criteria)

18-22.99: Normal

23-24.99: Overweight

25-26.99: Gr I Obesity

27-28.99: Gr II Obesity

≥29: Severe obesity

Revised BMI cut offs for asians (as per 5th edition of Oxford Textbook of public heath)

18.5--22.9	Normal
23--24.9	Overweight
>25	Obese
>32.5	should go for bariatric surgery for fat reduction.

MORBID OBESITY

Wt. 45kg more than normal
Or
Wt. 100% above normal
Or
BMI > 40

Mortality 12 times more (25-34 years age)
&
6 times more (35-45 years age)

Relative Risk Assessment

Greatly Increased (RR >3)	Moderately Increased (RR 2-3)	Slightly Increased (RR 1-2)
NIDDM	CHD	Cancer
Gall bladder disease	Hypertension	Repro. Hormones abnormalities
Insulin resistance	Osteoarthritis	Impaired fertility
Breathlessness	Hyperuricaemia / Gout	Low back pain
Sleep apnoea	Vericose veins	Increased anaesthetic risk
	Hernias	Foetal defects associated with maternal obesity

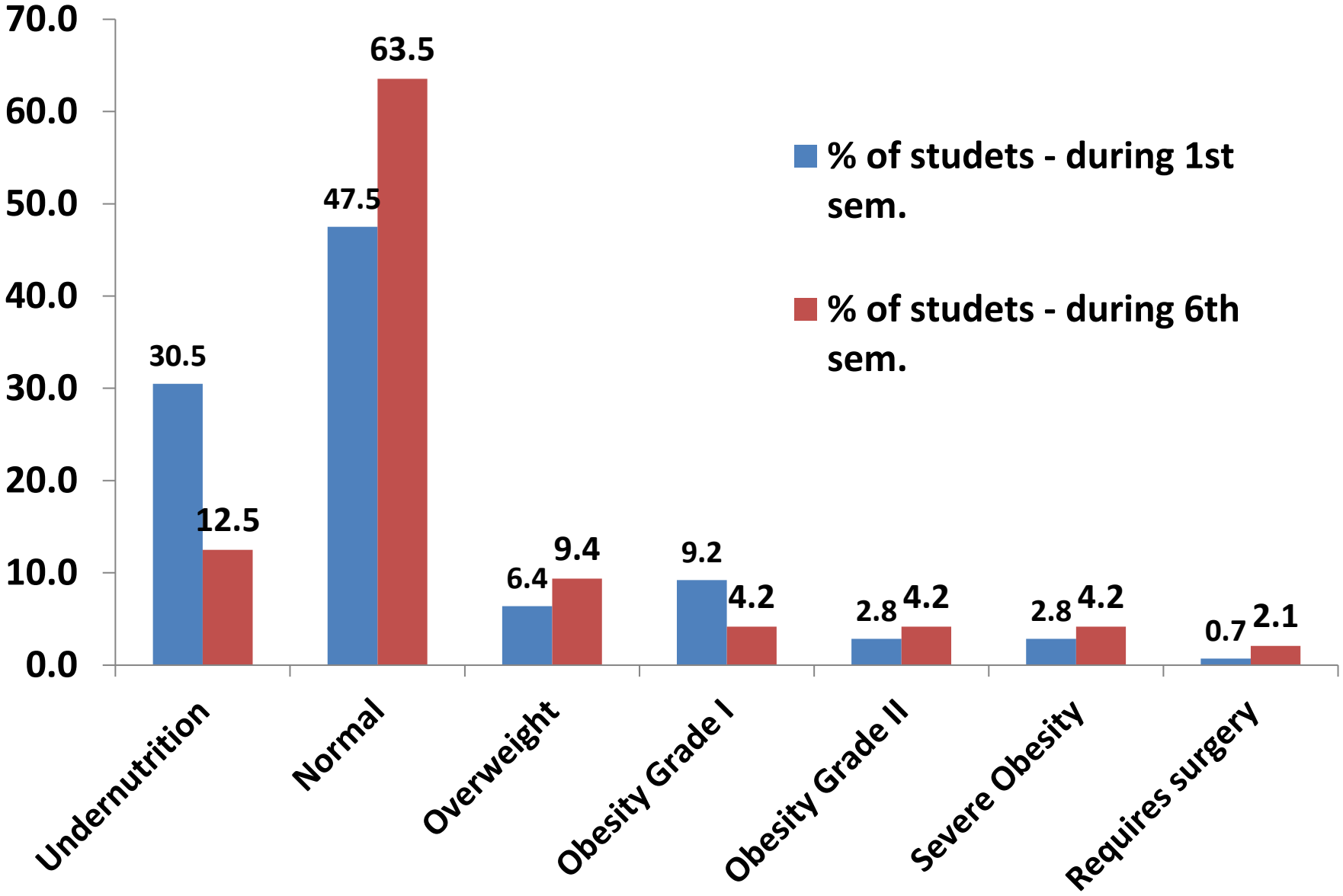
Adult weights and heights corresponding to recommended cut - off values for body mass index

	BMI							
	16.0	17.0	18.5	20.0	22.0	25.0	30.0	40.0
Height (cm)	Thinness					Overweight		
	Body weight (kg)							
140	31.4	33.3	36.2	39.2	43.1	49.0	58.8	78.4
142	32.3	34.3	37.3	40.3	44.4	50.4	60.5	80.7
144	33.2	35.3	38.4	41.5	45.6	51.8	62.2	82.9
146	34.1	36.2	39.4	42.6	46.9	53.3	63.9	85.3
148	35.0	37.2	40.5	43.8	48.2	54.8	65.7	87.6
150	36.0	38.2	41.6	45.0	49.5	56.3	67.5	90.0
152	37.0	39.3	42.7	46.2	50.8	57.8	69.3	92.4
154	37.9	40.3	43.9	47.4	52.2	59.3	71.1	94.9
156	38.9	41.4	45.0	48.7	53.5	60.8	73.0	97.3
158	39.9	42.4	46.2	49.9	54.9	62.4	74.9	99.9
160	41.0	43.5	47.4	51.2	56.3	64.0	76.8	102.4
162	42.0	44.6	48.3	52.5	57.7	65.6	78.7	105.0
164	43.0	45.7	49.8	53.8	59.2	67.2	80.7	107.6
166	44.1	46.8	51.0	55.1	60.6	68.9	82.7	110.2
168	45.2	48.0	52.2	56.4	62.1	70.6	84.7	112.9
170	46.2	49.1	53.5	57.8	63.6	72.3	86.7	115.6
172	47.3	50.3	54.7	59.2	65.1	74.0	88.8	118.3
174	48.4	51.5	56.0	60.6	66.6	75.7	90.8	121.1
176	49.6	52.7	57.3	62.0	68.1	77.4	92.9	123.9
178	50.7	53.9	58.6	63.4	69.7	79.2	95.0	126.7
180	51.9	55.1	59.9	64.8	71.3	81.0	97.2	129.6
182	53.0	56.3	61.3	66.2	72.9	82.8	99.4	132.5
184	54.2	57.6	62.6	67.7	74.5	84.6	101.6	135.4
186	55.5	58.8	64.0	69.2	76.1	86.5	103.8	138.4
188	56.6	60.1	65.4	70.7	77.8	88.4	106.0	141.4
190	57.8	61.4	66.8	72.2	79.4	90.3	108.3	144.4

For easy reference and calculation of BMI values corresponding to recommended cut-offs, first find the height of the individual in the left hand column. The weights given in the row for that height correspond to various recommended cut-off values for adult BMI. Weight for two normal BMI values are also included.

Source : (5)

BMI changes in UG students (over time of 5 semesters)



82 kg
(180 lb)

82 kg
(180 lb)

WAIST CIRCUMFERENCE

- Mid-point between lower border of rib-cage and iliac crest
- Obese - Male ≥ 102 cm, Female ≥ 88 cm

Waist circumference cut offs >90cm Men, >80cm Women

Revised BMI cut offs for asians (as per 5th edition of Oxford Textbook of public heath)

WAIST HIP RATIO

- WHR > 1 (males) ---- Obese
- WHR > 0.85 (females) ---- Obese

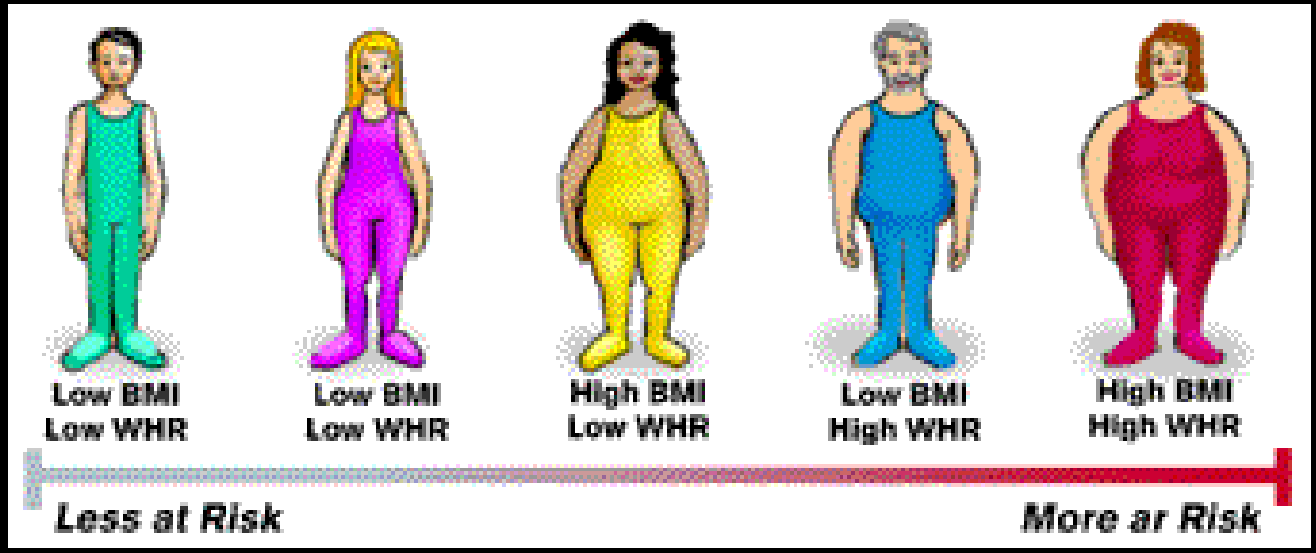
5.Waist circumference:

Obesity if - M: 102 cm or more, F: 88 cm or more

6.Waist hip ratio(WHR)

WHR(obesity) : >1 in males,

>0.85 in females



Chief exitement in a woman's life is spotting females who are fatter than she is!

– Helend Rowland

ADVANTAGE OF WAIST CIRCUMFERENCE

- Convenient
- Easy & simple
- Not related to height
- Correlate closely with BMI
- Closely related to risk

SKINFOLD THICKNESS

- Fat deposition under skin – accessble
- Use of calipers **(Harpenden's Skin Caliper)**
- Mid-triceps – Biceps – subscapular – suprailiac
- <40 mm in boys, <50 mm girls (normal)
- **Disadvantages**:
  - No generalized standards, have to be fixed locally
  - Poor repeatability

OTHER MEASURES:

- Total body water
- Total body potassium
- Body density
- Complex techniques, so not used routinely

Epidemiological trends

Developed countries

- Younger population
- Low SE class

Developing countries

- Middle aged
- High SE class (**MISCONCEPTION – MYTH – problem of affluent countries)**

- PREVALENCE IN INDIA – AROUND 8% (>25 BMI)
- **"Obesity is really widespread"**
- PHASE OF '**NUTRITION TRANSITION**'
- **Fact – found in all countries in varying degrees**

Epidemiological trends (Contd.)

- Women have higher rates of obesity worldwide
- Men have higher rates of being overweight

- **Prevalence:**
  - Most prevalent form of MALnutrition in developed countries
  - Definitions are not standardized
  - Data not available – not reliable
  - 20-40% adults
  - 10-20% adolescents & children

EPIDEMIOLOGICAL DETERMINANTS - Host Factors

1. **Age & Sex**

- -Increasing age
- -one third obese from childhood
- Infants with excessive wt. – higher tendecy of obesity in later age
- Most adipose tissue formation – early in life and hence obese infants lay down more such cells (hyperplastic obesity) – extremely diff. to treat
- Close relationship between intrauterine growth and risk of obesity and co-morbidities in later life
- Pre-school & adolescent period – irregular meals & changed food habits
- 15-49 years in women & early 30s in men (age grp at relatively higher risk)
- Post-menopausal women – very high risk
- In women, BMI also increases with successive pregnancies (average 1 kg/pregnancy)
- Consecutive pregnancy – wt. loss

2. Genetic factors

- amount of fat is influenced by genetic factors

- Genetic susceptibility –
- Increased risk of obesity when exposed to adverse environment
- Both polygenic (multiple genes) and major gene effect
- Twin studies – shows – close correlation between wt. of identical twins even in dissimilar environments
- Relative contribution of gene v/s environment is UNCERTAIN

3. Ethnicity

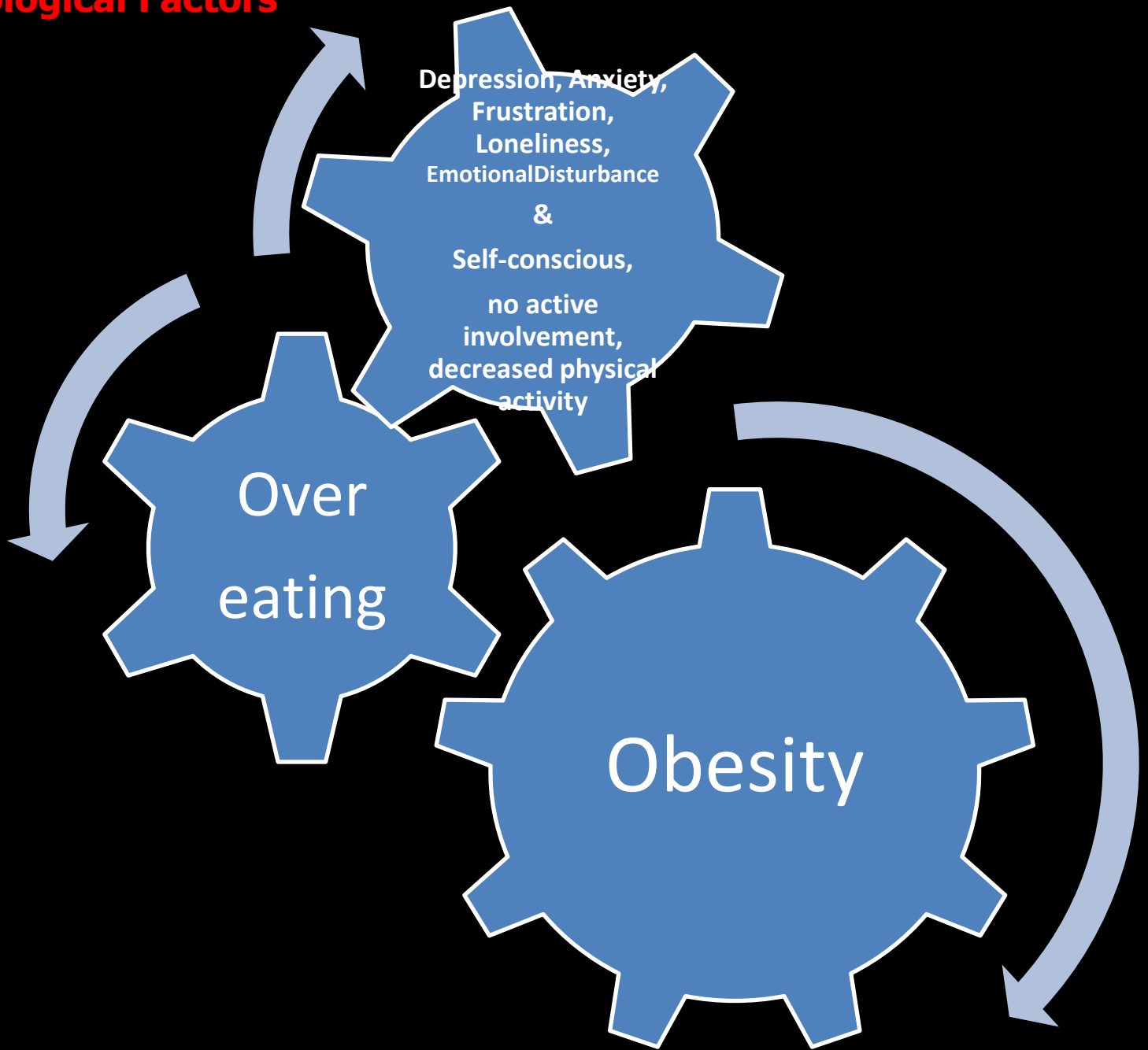
- Certain races – higher tendency of obesity
- Indians residing overseas have higher risk of obesity
- (?? Genetic predisposition which becomes evident only when exposed to more affluent life style)

4. Endocrinological Factors

Various hormonal syndromes – responsible

-Cushing's syndrome, GH deficiency, etc.

5. Psychological Factors



EPIDEMIOLOGICAL DETERMINANTS

4. Physical activity

- regular exercise is protective
- To burn 1 kg fat: 8000 kC required(approx.)

6. Eating habits

-Junk food

-Extra 100 Kcal/day consumption :5 kg wt gain/year

12. Smoking

-use of tobacco lowers body weight

14. Drugs

- Corticosteroids, contraceptives, insulin, ß blockers promotes weight gain

8.Personality

-Type A personality at risk

10. Alcohol

-increases fat in man, decreases fat in women

ENVIRONMENTAL FACTORS

1. EDUCATION

-inverse relation with level of education

2. SOCIO-ECONOMIC STATUS

Obesity – closely related to SE status

Inversely proportional

Higher classes – Class I and II

Middle class – Class III

Lower classes – Class IV and V

Prasad's modified classification (1965 and revised thereafter)

3. MODERNIZATION / URBANIZATION

-Improved standard of living

Deleterious nutritional and physical activity patterns

Sedentary life style

Work pattern having laborous tasks – replaced by motorized transport & mechanized equipments

Factors Contributing to Obesity

Lifestyle	Psychosocial	Biomedical
• Poor diet • Skipping meals • Sugary soft drinks • Poor sleep • Snacking • Alcohol • Sedentariness • Etc.	• Depression • Anxiety • Binge eating • Boredom • Social events • Low income • Stress • Etc.	• Genetics • Metabolism • Intrauterine growth • Medications • Injury • Mobility issues • Etc.

Selected Medications That Can Cause Weight Gain

- **Psychotropic medications**
  - Tricyclic antidepressants
  - Monoamine oxidase inhibitors
  - Specific SSRIs
  - Atypical antipsychotics
  - Lithium
  - Specific anticonvulsants
- **β-adrenergic receptor blockers**
- **Diabetes medications**
  - Insulin
  - Sulfonylureas
  - Thiazolidinediones
- Highly active antiretroviral therapy
- Tamoxifen
- Steroid Hormones
  - Glucocorticoids
  - Progestational steriods

EXAMPLE OF ENERGY SAVING ACTIVITY PATTERN IN MODERN SOCIETY

Transport
Home – Fuel, AC/Heater (Energy Utilization)
Prepare food (or ready-made?)
Equipments – Vaccum cleaner, washing machine, etc.
Less time for shopping/cooking/gardening/household tasks
Workplace – mechanization, robots, computerization – only few % are actual labourers
Public health / others –
Elevators, escalators, etc.
Television viewing is the most important cause of Physical Inactivity and subsequent Obesity

SOCIAL CIRCUMSTANCES –

Marriage, pregnancy, child-birth, social or professional gatherings, social events
All lead to change in eating patterns

Education is not inclusive of practical nutritional education in majority of settings

EPIDEMIOLOGICAL DETERMINANTS

⬆ Obesity
Age: Increasing age
Females(specifically after menopause)
Genetic factors
Sedentary life, low physical activity
High SE
Junk Food,eating frequently,sweets,refined foods
Endocrine ds.(cushing's syndrome,GH defi.)
Illiteracy in affluent societies
Alcohol(In males)
Depression,anxiety,frustration,loneliness
Type A personality
Drugs: Corticosteroids,OCPs,Insulin,Beta blockers

Table 11.4. Characteristic behaviour patterns of Type A and B personalities[9]

Type A behaviours	Type B behaviours
• Hurried speech • Constant rapid movement/eating • Open impatience with the rate at which things occur and how others operate • Chronic sense of time urgency • Thinking and performing several things at once. • An active attempt to dominate the conversation, to determine the topics and to remain preoccupied with one's own thoughts when others are talking. • Vague guilty feelings during period of relaxation when doing nothing. • Over concern with getting things worth having no time to become the things worth being • No compassion for others • Characteristic nervous gestures-tics, clench fist and jaw, pound on table, grind teeth.	• Complete freedom from all Type A traits • No sense of time urgency • No free-floating hostility • No felt need to display or discuss one's achievements and accomplishments unless the situation demands it. • An ability to relax without guilt and to work without agitation.

The Vicious Cycle Of Childhood Obesity

Healthy Child

TELEVISION

Video Games

High Fat Foods

CHIPS

All Study -No Action

CANDY

Mildly Obese Child

I'm too tired to climb stairs.

I'm no good at sports.

Extra 10 Lbs. Inhibits Movement

Moderately Obese Child

Extra 20-50 Lbs · Exercise uncomfortable & painful

The other kids make fun of me.

Severely Obese Child

Asthma, Diabetes, & Musculoskeletal Disease Prevent Exercise and Bring On Depression & Low Esteem

Obese Adult

Coronary Artery Disease
Diabetes
Pulmonary disease
High medical bills
Mortality

Childhood obesity

1. **Prader-willi syndrome:**

   Remarkable hyperphagia, mental retardation, hypotonia, short stature, hypogenitalism, feeding difficulties, DM manifesting in later childhood or adolescence, sticky saliva (string sign) in neonates and infants is diagnostic…

2. Endogenous obesity:

Uncommon – the cause is usually an endocrinal disorder (Frohlich syndrome, Laurence-Moon – Biedle syndrome, Cushing's syndrome, ennchephalitis or CNS inf damaging hypothalamus and intracranial tumors figure in this categoty)

3. **Familial obesity:**

   Genetic

   Too much of food!!!

4. **Physiological obesity:**

   Onset at adolescence (common in girls)

   temporary

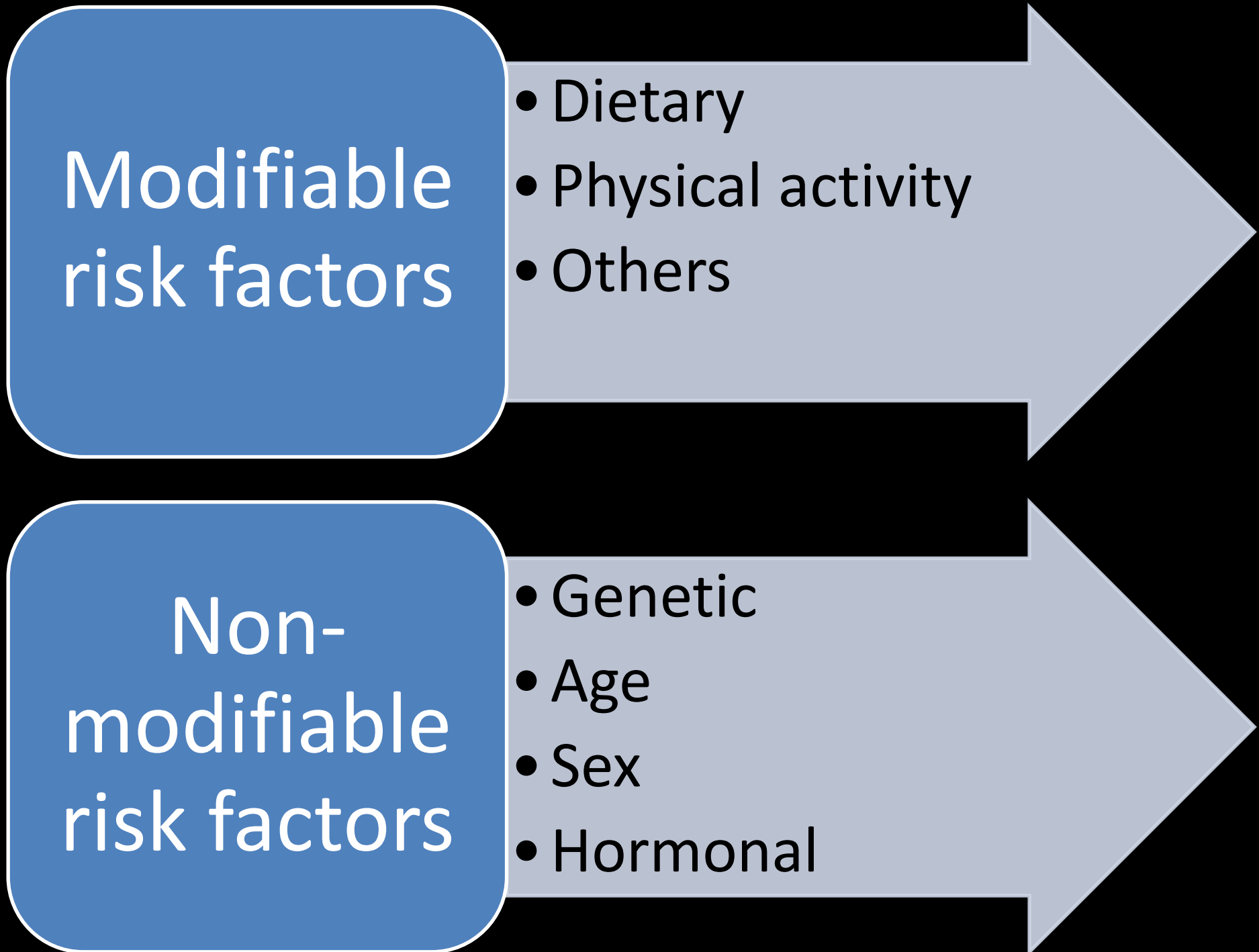
- Wt: >90th percentile or >20% of average wt for age
- Ht: normal or little more
- Fat deposition: generalized, double chin, gluteal region, thighs, abd and around breasts
- Knock knee deformity may be present
- May have emotional problems

- Rx: dietary restriction and exercise

PREVENTION & CONTROL

PREVENTION

- Primordial (even before the risk factors appear)
- Primary (periodic check up, screening, before symptoms appear, risk factors modification)
- Secondary (avoid further progression)
- Tertiary (management of complications)


Modifiable risk factors
• Dietary
• Physical activity
• Others
Non-modifiable risk factors
• Genetic
• Age
• Sex
• Hormonal

Weight control within healthy range of BMI

1.Dietary changes

Strategies for prevention of wt. gain > better than treating obesity

AIM:
Prevent normal to overweight
Prevent overweight to obesity
Prevent re-gaining of wt. in those who actually lost some wt. (previosuly overweight or obese)

AT COMMUNITY LEVEL – UNIVERSAL APPROACH
To stabilize the obesity levels
To decrese incidence
To decrese prevalence
Reduction of mean weight of individuals towards normal level

Median population BMI between 21-23

Increase of 1 in BMI leads to 5% increase in prevalence

- Eat whole grains, complex carbohydrates
- Eat seasonal fruit with skin
- Eat starch rich food (potatoes, rice etc.)
- Use different oils for cooking
- Limit oil/fat consumption by 0.5 litres/person/month
- Avoid dry fruits, refined sugars
- Adequate level of essential nutrients in balanced diet


Coca-Cola
Sprite
Fanta
PEPSI
600mL


Doritos
Nutter Butter
Cheetos
Crunchy
Fritos
JUNK
FOOD
JUNKIE
Thinking of You Copyright 2008

2.Increase physical activity

Burn extra calories

Use stairs in place of lift

Walking/jogging/running/physical work

Ideal exercise = 1/2 hour per day – moderate (on most of the week-days, at least 5)

3.Health Education

Knowledge, attitudes, practices, beliefs

Promoting healthy lifestyle

Utilization of media

4.Treatment

Medical (fenfluramine, amphetamine)

Surgical (liposuction, gastric bypass, gastroplasty, jaw wiring etc.)

Medications

A) Serotonin Nor-epinephrine Reuptake Inhibitor: reduces food intake.

Sibutramine: initial dose 10mg/day, max 20mg/day.

B) Orlistat: Lipase inhibitor. Alters metabolism, dec absorption of dietary fat.

TABLE 3
Summary of New Weight Loss Medications

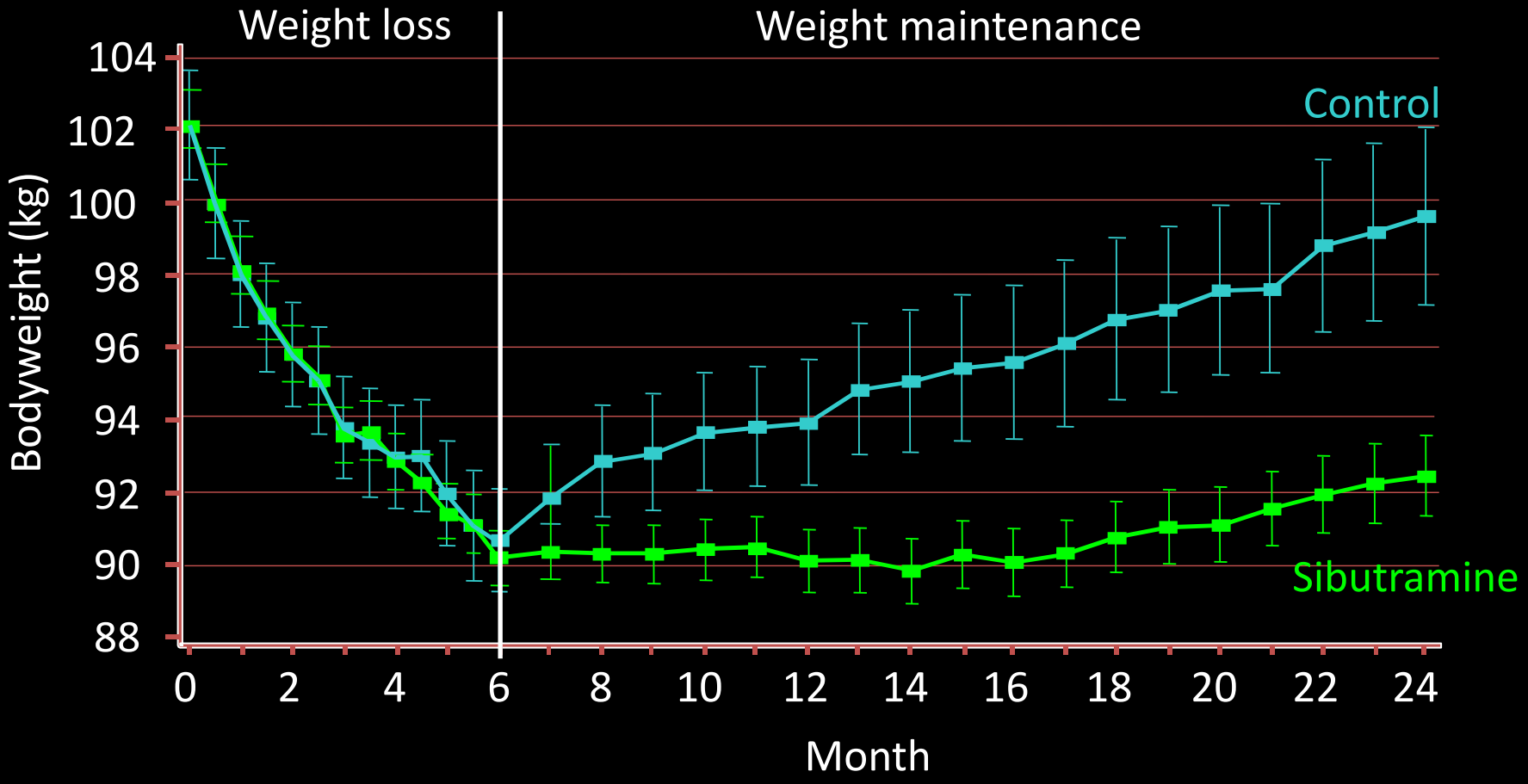
Medication	Mechanism of effect	Side effects	Dosage	Cost
Sibutramine (Meridia)	Reuptake inhibitor of serotonin, norepinephrine and dopamine	Elevated blood pressure, tachycardia, headache, insomnia, constipation, dry mouth	10 mg daily initially; can increase to 15 mg daily after 4 weeks in nonresponders	$ 87*
Orlistat (Xenical)	Reversible lipase inhibitor	Fecal incontinence, oily spotting, flatulence, vitamin malabsorption	120 mg three times daily with meals	119**

*--Estimated cost to the pharmacist based on average wholesale prices (rounded to the nearest dollar), for one month of therapy at the lowest usual dosage, in Red Book. Montvale, N.J.: Medical Economics, 1999. Cost to the patient may be greater, depending on prescription filling fee.

**--Average wholesale price (rounded to the nearest dollar), for one month of therapy at the lowest usual dosage, from Acculine, a wholesale information database.

STORM

Mean bodyweight changes during weight loss and weight maintenance phases over 2 years



James WPT, Lancet 2001

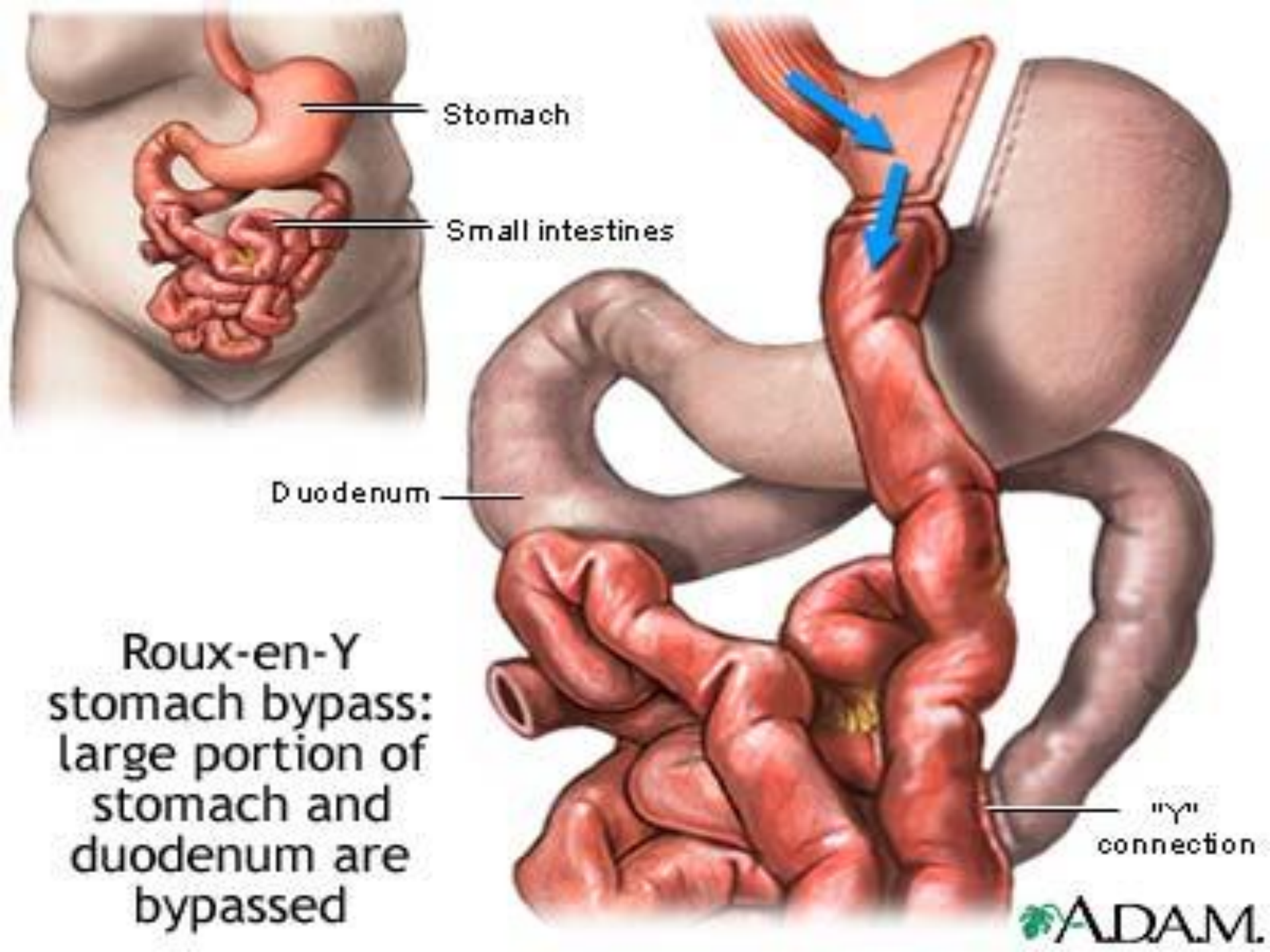
Surgery

- **Roux-en-Y gastric bypass.**
- **Lap band procedure**

Criteria: a) ***BMI > 40 or >35 with 2 comorbidities.***

b) Failure of non surgical methods

c) Presence of 2 or more medical conditions that would benefit with weight loss.



Roux-en-Y stomach bypass: large portion of stomach and duodenum are bypassed

15558-03dg fotosearch.com


15558-04dg fotosearch.com

HIGH-RISK APPROACH:

SELECTIVE PREVENTION

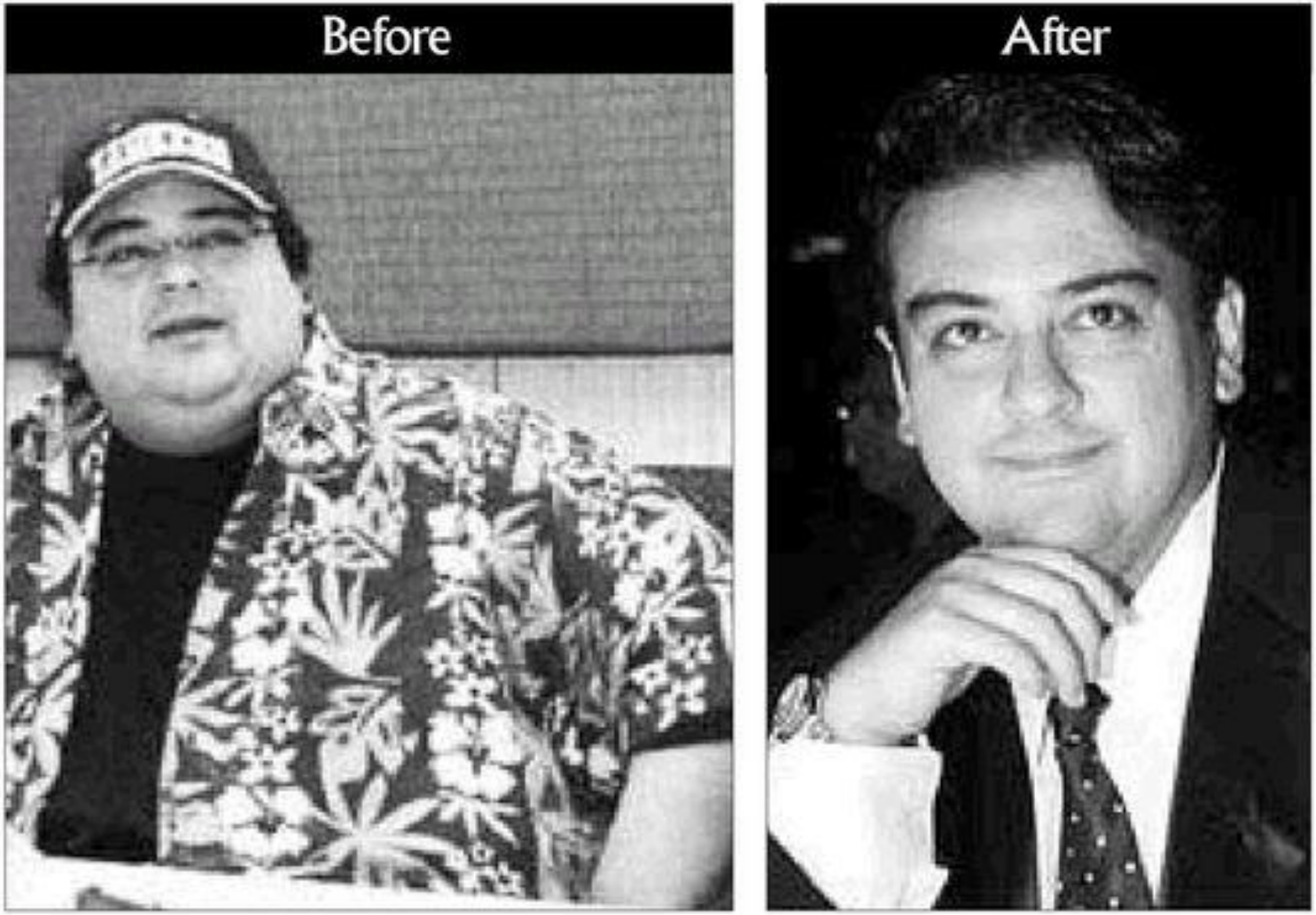
In those who are overweight but not still obese

Targeted prevention / intervention

Reducing the waist circumference (android obesity)

Identification (screening) & Referral of these high-risk individuals

Monitoring & evaluation



The now stunningly slim singer and music composer Adnan Sami, right, says he realized the seriousness of his weight problem when a doctor announced that he has only six months to live.

Oversize Coffin

Thank you….

Thank you….

Dr Urvish Joshi

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A'bad