The Chinese University of Hong Kong
The Nethersole School of Nursing
CADENZA Training Programme

CTP 003: Chronic Disease Management and End-of-life Care

Web-based Course for
Professional Social and Health Care Workers

Module II Chapter 3

香港賽馬會慈善信託基金
The Hong Kong Jockey Club Charities Trust

CTP 003 Web-based course

Module II

Chronic Disease Management

Chapter 3

Nutritional Management of Chronic Diseases

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Lecture outline

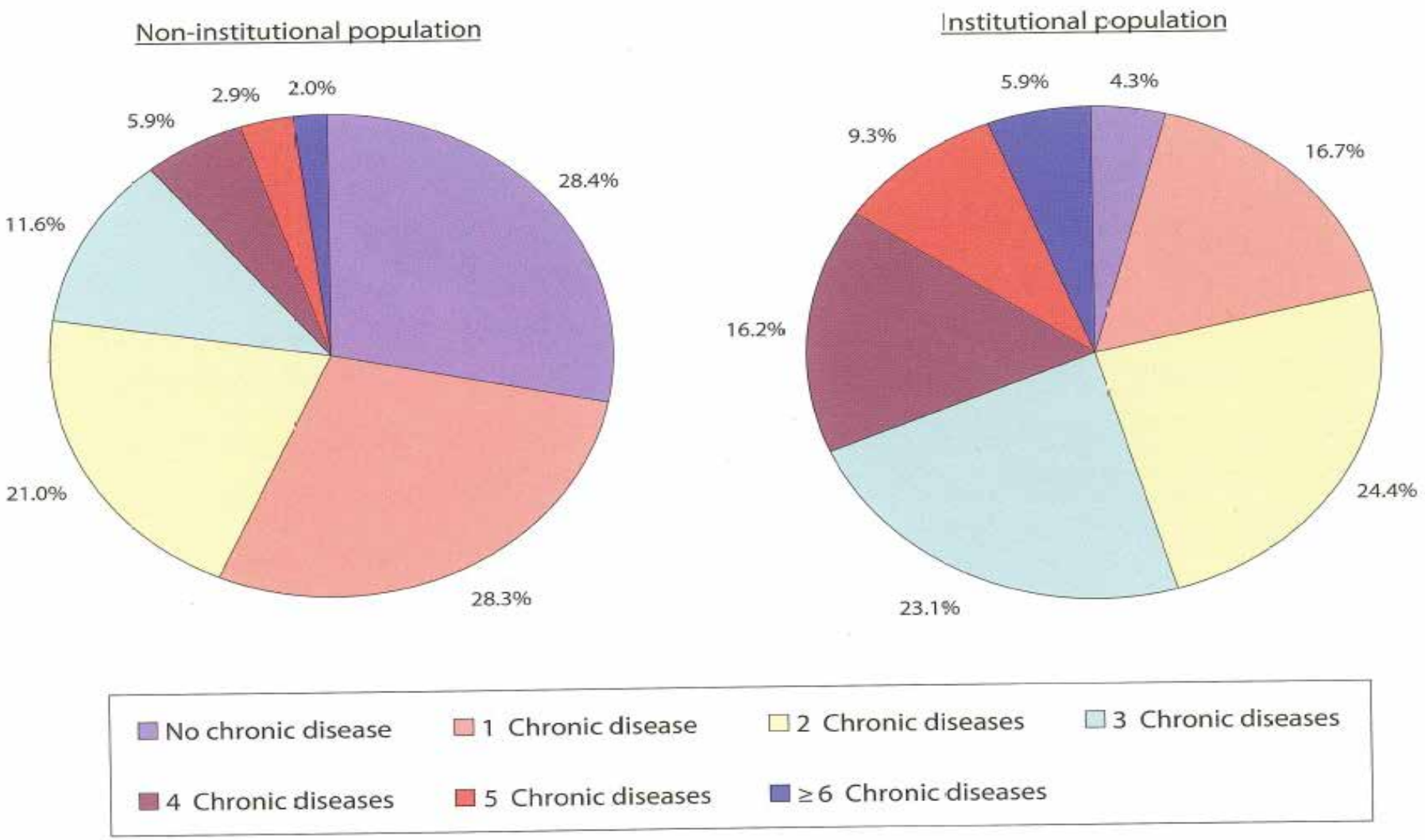
- Ageing and health
- Nutritional management of common chronic diseases
  - Hypertension
  - Cardiovascular disease
    - atherosclerosis
    - coronary heart disease
    - heart disease
    - stroke
  - Diabetes Mellitus

Ageing and health

- Ageing people are prone to chronic diseases.
- In 2004, ~9% older people were underweight; ~27% were obese.
- In HK, 28% non-institutional population aged 60+ reported to have one chronic illness, 21% two and 22% three or more.

(Thematic Household Survey Report No. 21)

Figure 6.2a Number of chronic diseases present in the Hong Kong population aged 60 and above, 2004



Note:
Including chronic diseases that did not require regular medical treatment.

(Chau & Woo, 2010)

Source: Thematic Household Survey Report No. 21.

Effects of ageing

- Physiological change
  - Central nervous system
  - Skeletal system (muscle, joint)
  - Cardiovascular system
  - Immune system
  - Gastrointestinal system
  - Endocrine system
  - Skin and muscle
  - Sensory organs (eyes, ears, etc.)
  - Reproductive system

(Mahan & Escott-Stump, 2008)

Hypertension

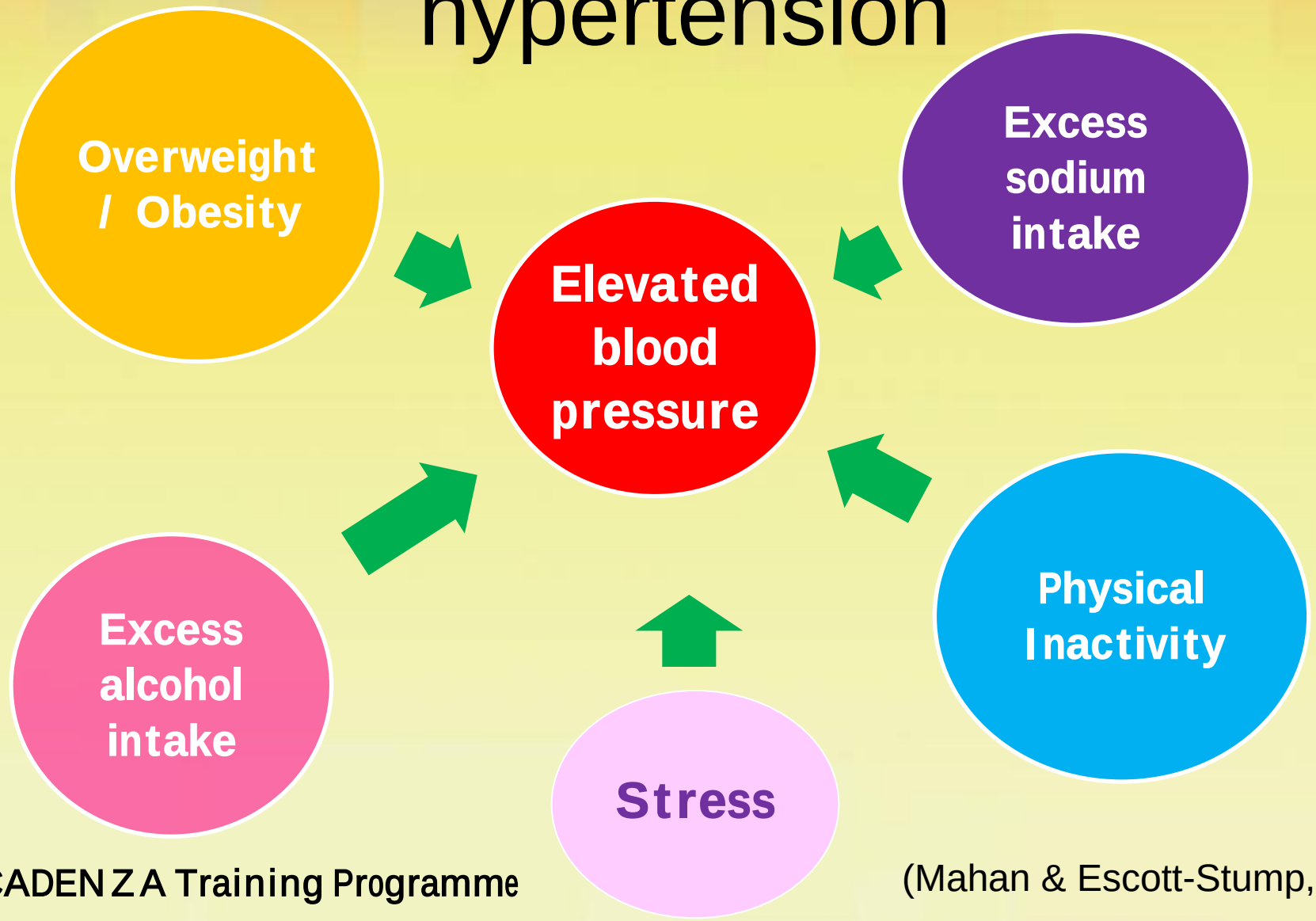
Hypertension

- Defined as consistently raised blood pressure

Category	Blood pressure (mm Hg)		
	Systolic		Diastolic
Normal	<120	and	<80
Pre-hypertension	120-139	or	80-89
Hypertension, Stage 1	140-159	or	90-99
Hypertension, Stage 2	>160	or	>100

(Seventh report of Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure , JNC 7)

Modifiable factors for hypertension



(Mahan & Escott-Stump, 2008)

Hypertension

- Predisposed to target organ diseases
  - Ø Cardiovascular – left ventricular hypertrophy, coronary heart disease, heart failure
  - Ø Cerebrovascular – stroke
  - Ø Renal – proteinuria, renal failure
  - Ø Retinopathy

(Mahan & Escott-Stump, 2008)

Nutritional Management Of Hypertension

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Nutritional Management of Hypertension

- Weight management
- Sodium restriction
- Alcohol restriction
- Nutrition education

(Mahan & Escott-Stump; 2008, JNC7)

Weight management

- Weight loss reduces blood pressure in overweight hypertensive patients and in overweight persons with high-normal blood pressure

(Stevens et al., 2001)

Weight management

- Lose weight if overweight/obese
  - ü Aerobic exercise reduced SBP on average by ~4mmHg and DBP by ~2mmHg
  - ü Normalise blood lipid and glucose
  - ü Synergistic effect with drug therapy
  - ü Stage 1 Hypertensives achieve normal BP by weight loss alone
- Recommendation:
  - ü Regular aerobic exercise at least 30min/day, 3 - 4/week

(Stevens et al., 2001, JNC 7)

Sodium restriction

- Dietary Approaches to Stop Hypertension (DASH) diet

- DASH diet pattern:
  - ü low in saturated fat, total fat and cholesterol
  - ü low-fat diary products
  - ü increased fruit + vegetables
  - ü increased whole grains and nuts

For more details, please click on:

http://www.nhlbi.nih.gov/health/public/heart/hbp/dash/new_dash.pdf

DASH diet

- DASH diet follows the American Heart Association guidelines ↓ saturated fat and cholesterol intake
- Aimed to ↑ nutrients that have a BP lowering effect
  - e.g., potassium
    calcium
    magnesium
    protein and fibre

(National Institutes of Health, 2006)

Research evidence of DASH diet

- Two DASH studies conducted in the U.S.
- Subjects in first DASH study: 459 adults with SBP<160 mmHg and DBP 80-95 mmHg
- 27% of the subjects had high blood pressure

(National Institutes of Health, 2006)

Research evidence of DASH diet

- It compared three eating plans:

  Diet 1: a diet with foods similar to an American's regular diet

  Diet 2: Diet 1 plus more fruits and vegetables

  Diet 3: DASH diet

- All diets included 3000mg sodium per day

(National Institutes of Health, 2006)

Research evidence of DASH diet

RESULTS of the first study

- Participants following Diet 2 and DASH diet had reduced BP

- But participants on DASH diet noticed greatest effect
  - especially those who had high blood pressure

(National Institutes of Health, 2006)

Research evidence of DASH diet

- The second DASH study looked at the effect on BP of a reduced dietary sodium intake.
- 412 participants were randomly assigned to 2 diets; the DASH diet and a diet similar to an American's regular diet for a month at each of the three sodium levels
  - 3000mg Na (typical American diet)
  - 2300mg Na (intermediate intake)
  - 1500mg Na (lower intake)

(National Institutes of Health, 2006)

Research evidence of DASH diet

RESULTS of the second DASH study

- ↓ Dietary sodium ↓ BP for both diets

- At each sodium level, BP was lower on DASH diet than on the other diet

- The greatest BP reductions from DASH at 1500mg/d sodium level

(National Institutes of Health, 2006)

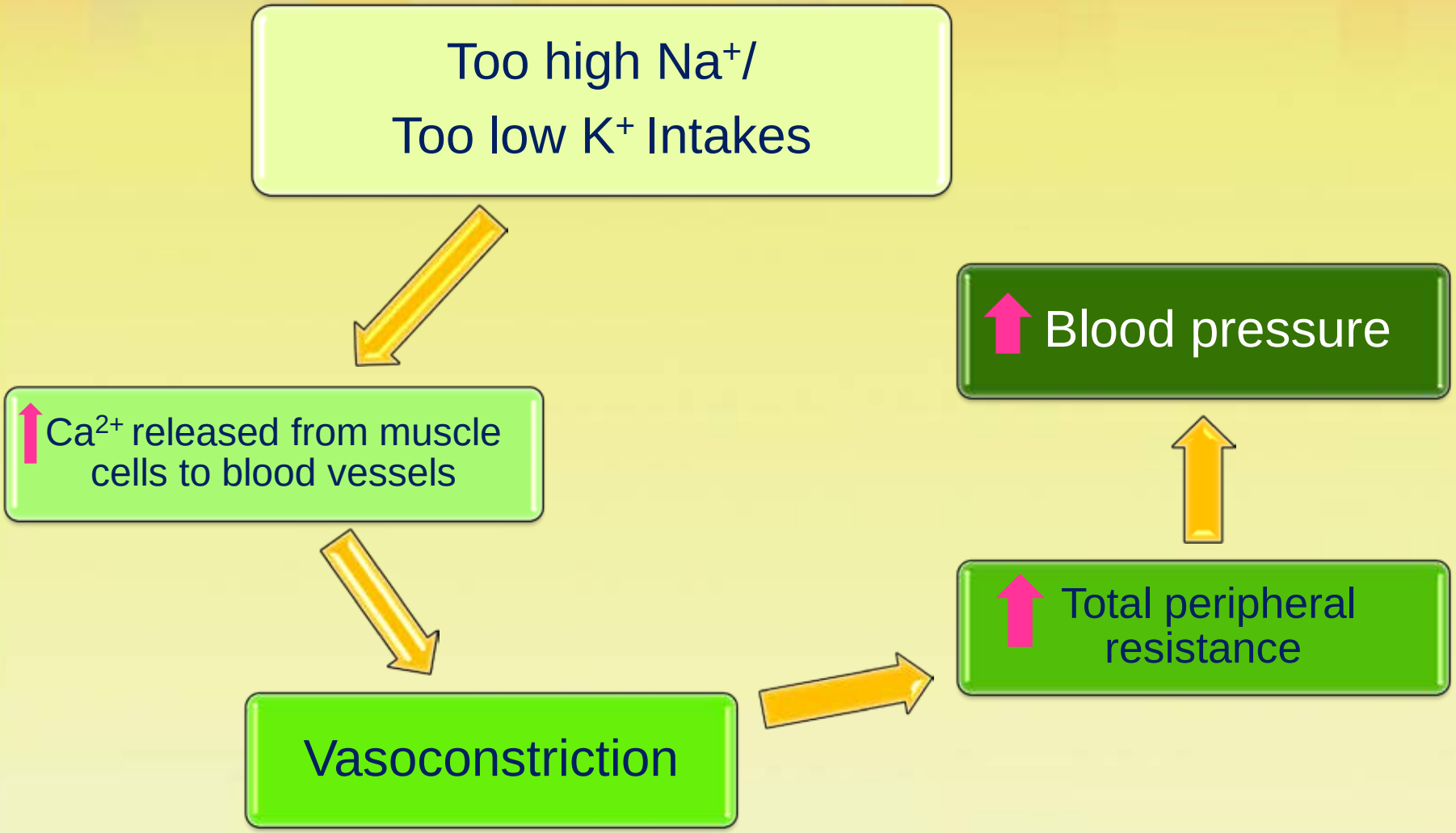
Do you know what other dietary nutrients need to be controlled for hypertensive patients?

Other dietary factors for hypertension

- *Potassium*
  - ü Counters the negative effect of sodium to lower BP by:
  - ü 1) reducing peripheral vascular resistance by direct arteriolar dilatation; 2) increased loss of water and sodium from the body; 3) suppression of renin and angiotensin secretion; 4) stimulation of sodium-potassium pump
  - ü No effects seen from supplements

 (Mahan & Escott-Stump; 2008, NICE guideline, 2004; JNC7)

Proposed mechanism of dietary factors on hypertension development



(Mahan & Escott-Stump; 2008, JNC7)

Other dietary factors for hypertension

- *Calcium*
  - ü Peptides from milk proteins shown to function as angiotensin which helps control BP
- *Magnesium*
  - ü Acts as vasodilator
  - ü Potent inhibitor of vascular smooth muscle contraction
  - ü No evidence to support supplementation
- *Fat*
  - ü Not directly affecting BP
  - ü Reducing saturated and total fat helps weight control and reduced CVD risk

(Mahan & Escott-Stump; 2008, NICE guideline, 2004; JNC7)

Alcohol restriction

- *Alcohol*
  - ü Limit to <1oz (30ml) of ethanol
  - ü 3 drinks/day is the threshold for raising BP by 3 mmHg
  - – 1 drink = ½ oz or 15ml ethanol.
  - – E.g. 12 oz (360ml) of beer, 5 oz of wine (150ml), or 1 oz(30ml) of 100-proof whiskey) per day
- Recommendation:
  - ü Men: <2 drinks/day; Women: <1 drink/day

(Mahan & Escott-Stump; 2008, NICE guideline, 2004; JNC7)

Lifestyle modification recommendation

Modification	Recommendation	Average SBP reduction range
Weight reduction	Maintain normal body weight (BMI 18.5-22.9)	5 – 20 mmHg/10Kg
DASH eating plan	Adopt a diet rich in fruits, vegetables, low fat diary products with reduced saturated fat and total fat	8 -14 mmHg
Dietary sodium reduction	Reduce dietary sodium intake to <2.3g Na	2 – 8 mmHg
Aerobic physical activity	Regular aerobic physical activity at least 30min/day	4 – 9 mmHg
Moderation of alcohol consumption	Men: <2drinks/day Women: <1 drink/day (1drink = ½ oz or 15ml ethanol. E.g. 12oz beer, 5 oz wine)	2 – 4 mmHg

amme

(JNC 7)

Nutrition education

- Educate the public to ↓ sodium gradually in diet
  - ü Avoid MSG in cooking, use natural ingredients e.g., garlic, ginger, herbs, spices
  - ü Avoid processed/preserved foods, choose fresh foods
  - ü Avoid sauces

Read food label on foods

- ü ~2000mg Na = ~1 teaspoon of table salt
- ü 140mg Na = low sodium

(Mahan & Escott-Stump; 2008, NICE guideline, 2004; JNC7)

Nutrition Education

- Maintain adequate intake of calcium and magnesium for general health
- Stop smoking
- Reduce intake of dietary saturated fat and cholesterol for overall CVD health
- Avoid frequent eating out

(Mahan & Escott-Stump; 2008, NICE guideline, 2004; JNC7)

Cardiovascular disease

Atherosclerosis

- Arterial wall thickening results in hardening of the arteries

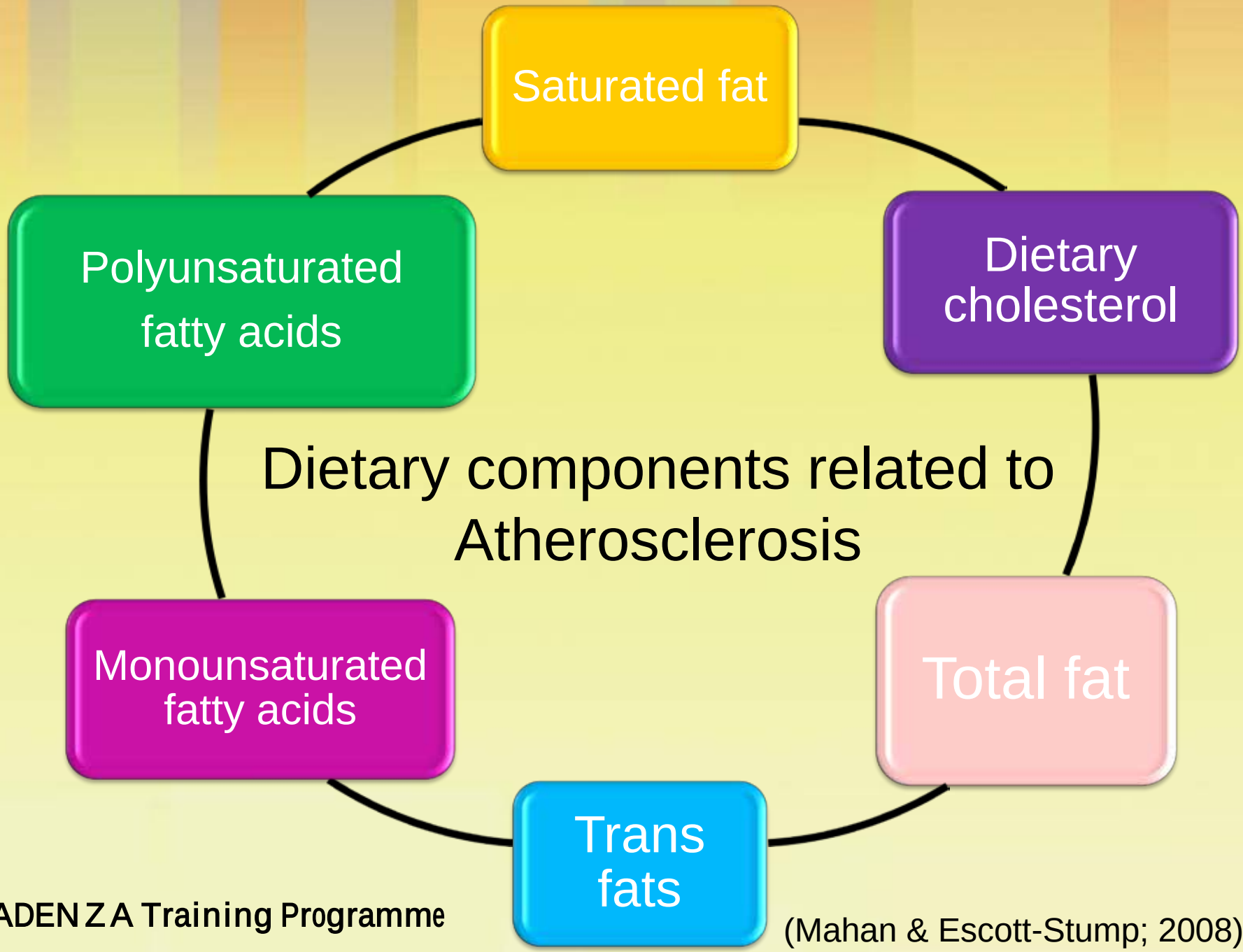
Ø Plaques (made by fat, cholesterol and other substances) build up in the wall of blood vessel

Ø Narrowing the vessel ↓ blood flow to the organ

Ø ↑ End-organ damage

(Mahan & Escott-Stump; 2008)

(Mahan & Escott-Stump; 2008)



(Mahan & Escott-Stump; 2008)

Effects of different types of fat on plasma lipids

- Saturated fat (SA)
  - Ø ‘bad fat’
  - Ø ↑ total cholesterol (TC) and low-density lipoprotein (LDL)
- Polyunsaturated fatty acids (PUFA)
  - Ø ‘neutral fat’
  - Ø Omega-3 [Eicosapentaenoic acid (EPA) and Docosahexaenoic acid (DHA)] and omega-6
  - Ø ↓ LDL and HDL
- Monounsaturated fatty acids (MUFA)
  - Ø ‘good fat’
  - Ø ↓ TC and LDL
  - Ø Does NOT lower HDL

(Mahan & Escott-Stump; 2008, NCEP 2002; ATPIII Final Report 2002)

Effects of different types of fat on plasma lipids

- Dietary cholesterol
  - Ø ↑ TC and LDL
  - ØCholesterol responsiveness varies among individuals
- Total fat intake
  - Ø ↑ obesity
  - ØHigh-fat diets ↑ postprandial lipidemia and chylomicron remnants
    - Øassociated with ↑ risk of CHD

(Mahan & Escott-Stump; 2008, NCEP, 2002; ATPIII Final Report, 2002)

Effects of different types of fat on plasma lipids

- Trans fats
  - cis form unsaturated fatty acids hydrogenated to form trans form
  - Widely used in food industry to harden unsaturated oils
  - ↑ LDL ↓ HDL

(Mahan & Escott-Stump; 2008, NCEP 2002; ATPIII Final Report 2002)

Coronary Heart Disease (CHD)

- Insufficient blood supply to the heart due to accumulation of fatty substances in the coronary arteries.
- Underlying cause is atherosclerosis.
- Causing angina, myocardial infarction and strokes in the cerebral arteries.

(Mahan & Escott-Stump; 2008)

Can you name some beneficial dietary factors which can help prevent CHD?

Beneficial dietary factors

- Soluble fibre – ↓ serum cholesterol and LDL
  - Øinterferes with bile acid reabsorption
  - Øthe bacteria in the colon ferment the fibre to produce short-chain fatty acids, which inhibit cholesterol synthesis
- Found in pectin (in fruits and vegetables), guar gum and oats
- The effect of lipid-lowering varies by food source

(Mahan & Escott-Stump; 2008, Lichtenstein et al., 2006, ATPIII Final Report, 2002)

Beneficial dietary factors

- Soy protein
  - Øif replacing animal protein, ↓ TC, LDL and triglycerides
  - Ødaily intake of 25g soy with isoflavones ↓ LDL by 4 – 8% in hypercholesterolemia person
- Plant stanols and sterols
  - Øisolated from soybean oils or pine tree oil
  - Ødaily intake of 2-3g ↓cholesterol by 9-20%

(Mahan & Escott-Stump; 2008, Lichtenstein et al., 2006, ATPIII Final Report, 2002)

Beneficial dietary factors

- Antioxidants
  - ü Vitamin C, E and β-carotene ↓ LDL oxidation
  - ü Phytonutrients and catechins have been found to improve vascular reactivity – green tea, red wine, red grapes, olive oil
  - ü American Heart Association does *NOT* recommend supplementation
  - ü Recommend whole food

(Mahan & Escott-Stump; 2008, Lichtenstein et al., 2006, ATPIII Final Report, 2002)

Nutritional Management of Heart Disease

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Therapeutic Lifestyle Changes
Aggressive Diets

Therapeutic Lifestyle Changes

- This intervention is tried *before* drug therapy
- Diet change and physical activity for 3-6 months
- Aims to reach optimal lipid goals
- Previous dietary recommendation: step I and step II diets

(Mahan & Escott-Stump; 2008, Lichtenstein et al., 2006, NCEP 2002)

Therapeutic Lifestyle Change

- Step I diet

Saturated fat	Up to 10% of energy
Dietary cholesterol	Up to 300 mg daily

- Step II diet

Saturated fat	<8% of energy
Dietary cholesterol	Up to 200 mg daily

(Mahan & Escott-Stump; 2008, Lichtenstein et al., 2006, NCEP 2002)

Therapeutic Lifestyle Change

- The ATP III dietary recommendations, known as Therapeutic Lifestyle Change (TLC) diet

Nutrient	Recommended Intake
Saturated fat	< 7% Calories
Polyunsaturated fat	Up to 10% of total calories
Monounsaturated fat	Up to 20% of total calories
Total fat	25 - 35%of calories
Cholesterol	< 200mg/day

From ATPIII materials (http://www.nhlbi.nih.gov/guidelines/cholesterol/atp3_rpt.htm)

(Mahan & Escott-Stump; 2008, Lichtenstein et al., 2006, NCEP 2002)

Therapeutic Lifestyle Change (TLC) diet

A continued adherence to TLC diet is helpful for reducing the risk of CHD

- ü ↓ Intake of saturated fat, trans fats, total fat and cholesterol
- ü Skimmed milk and skimmed milk products
- ü Lean meat, poultry and fish, 5-6 oz/day
- ü Fruits and vegetables
- ü Fibre from grains, cereals and legumes
- ü Encourage use of plant stanols and sterols

(Mahan & Escott-Stump; 2008, Lichtenstein et al., 2006, NCEP 2002)

Therapeutic Lifestyle Change (TLC) diet

Food preparation techniques

- Lower fat cooking
  - ü Broiling, baking, grilling, steaming, poaching without added fat
- Low-fat preparation method
  - ü Trim fat from meat
  - ü drain fat after cooking
  - ü Remove skin from poultry

(Mahan & Escott-Stump; 2008, Lichtenstein et al., 2006, NCEP 2002)

Aggressive Diets

- Suitable for the highly motivated patients who want to avoid drug therapy

- Very-low-fat diets
  - ü Emphasise grains, legumes, fruits and veg. and *non-fat* dairy products

Nutrient	Recommendation
Saturated fat	< 3%
Cholesterol	< 5mg
Total fat content	< 10% of total calories

(Mahan & Escott-Stump; 2008, Lichtenstein et al., 2006, NCEP 2002)

Stroke

Stroke

- Cerebrovascular disease
- Acute onset of focal/ global neurologic deficit
- Often proceeded by transient ischemic attacks
- Risk factors:
    - old age
    - smoking
    - hypertension
    - CHD
    - diabetes

(Mahan & Escott-Stump; 2008)

Nutritional Management of Stroke

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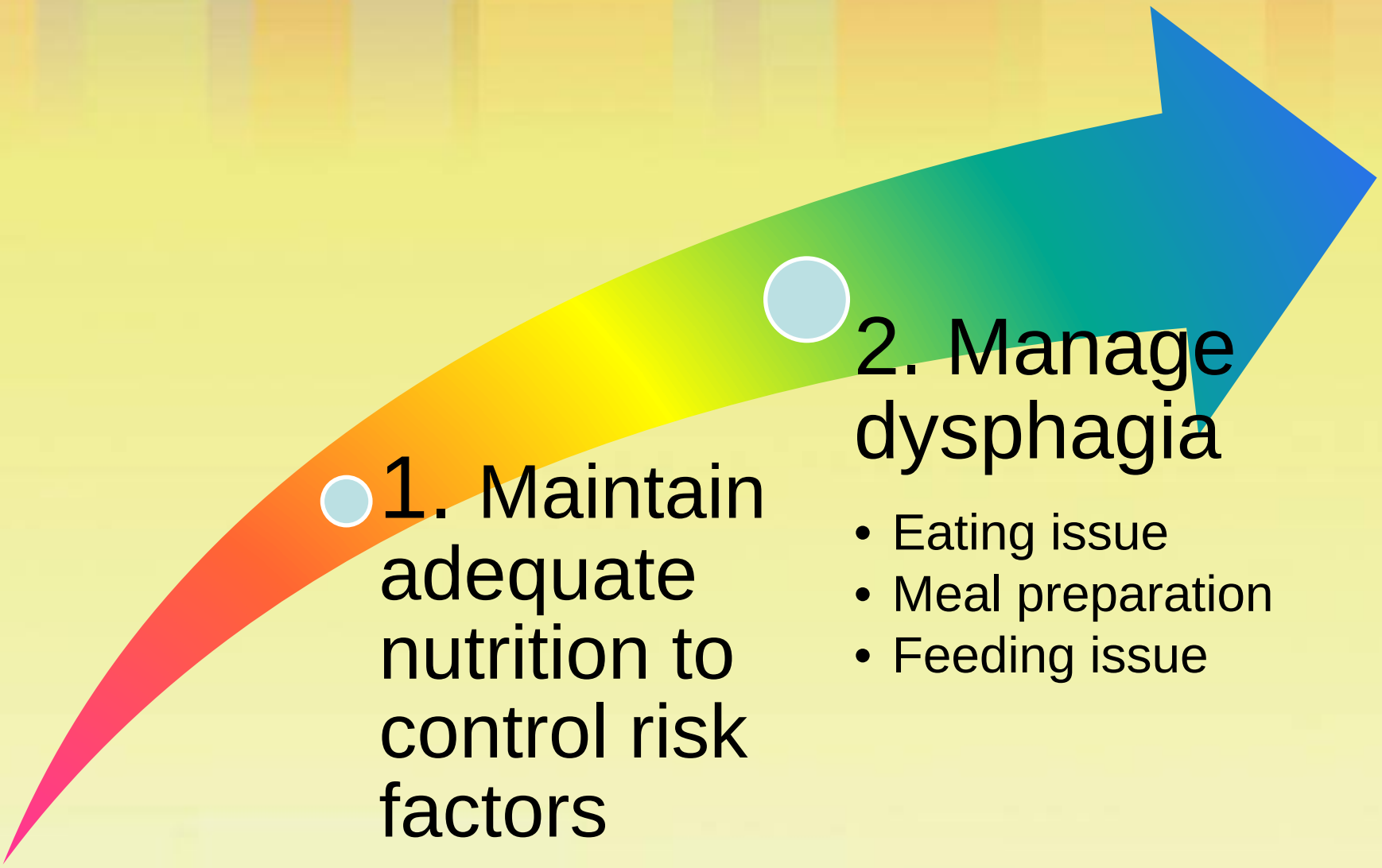
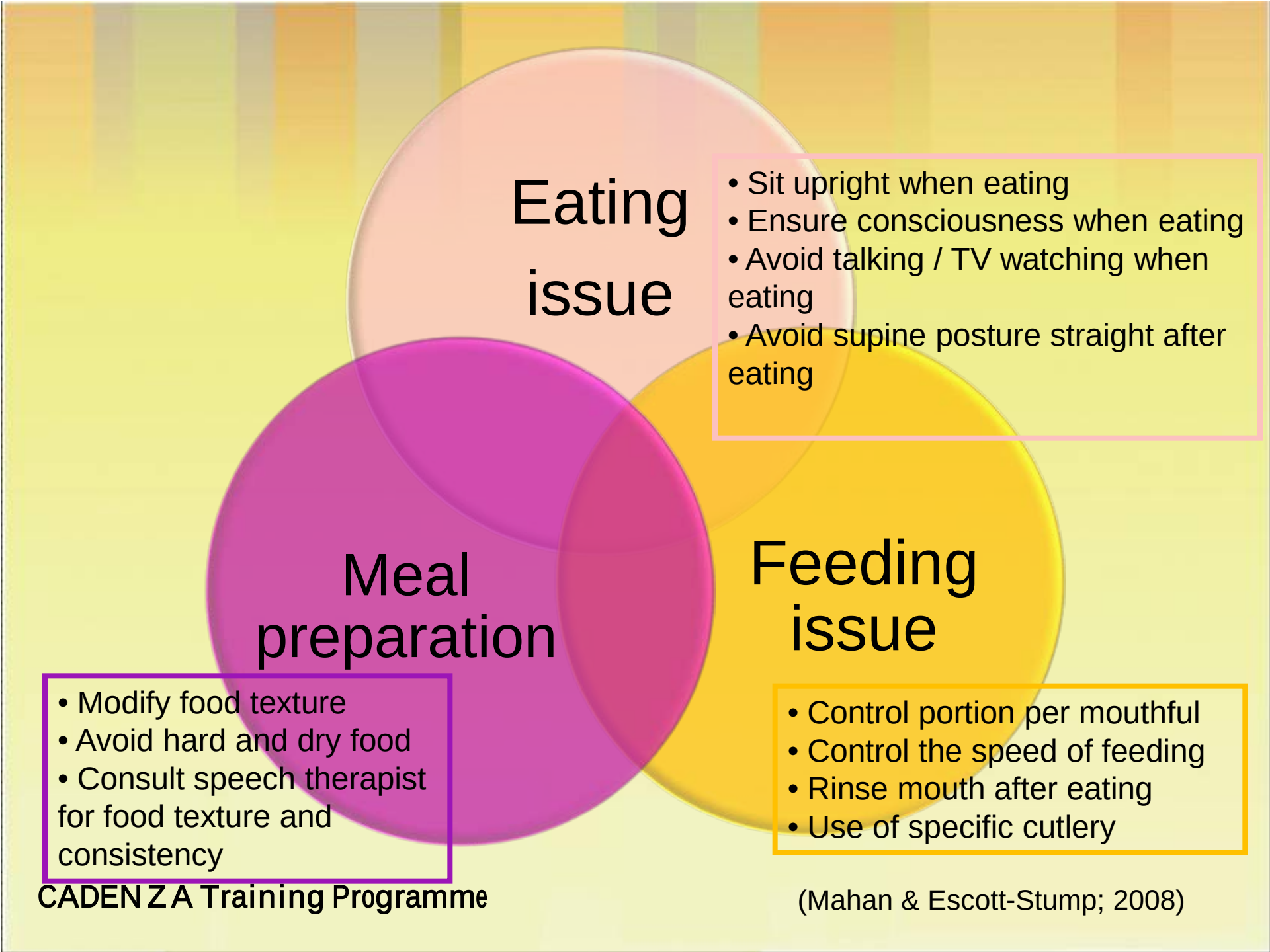

1. Maintain adequate nutrition to control risk factors
2. Manage dysphagia
• Eating issue
• Meal preparation
• Feeding issue

Diet for stroke patients

- Control dietary cholesterol and sodium
- 2-3 servings (~12 oz)/wk of fatty fish intake
- Follow healthy eating guidelines to avoid malnutrition
- Increase energy-dense food if underweight
- Nutrition support if unable to oral feed

(Mahan & Escott-Stump; 2008)



(Mahan & Escott-Stump; 2008)

Meal for stroke patients

- Control taste and temperature of food
- Modify food texture
- Choose fresh food
- Small frequent meals
- Feeding assistance

(Mahan & Escott-Stump; 2008)

Dysphagia

- Difficulty in swallowing may accompany neurologic disease

- Symptoms
  - dro
  - chokin
  - inab
  - holdi ducec ecesses
  - absent g reflex
  - chronic upper respiratory infections

Increased risk of malnutrition due to inadequate intake of energy

(Garcia & Chambers. 2010)

Diabetes Mellitus

Type 2 Diabetes (T2DM)

- A lifelong disease characterised by hyperglycemia resulting from a combination of resistance to insulin action and an insufficient compensatory insulin secretory response.
- Do not need insulin treatment for survival

(Mahan & Escott-Stump; 2008)

High Risk Groups

(Mahan & Escott-Stump; 2008)

The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus (revised 2003)

1. Fasting blood glucose >7.0 mmol/l

2. Symptoms of hyperglycemia + causal plasma glucose >11.1mmol/l

3. 2hr plasma glucose >11.1mmol/l during a 75g-Oral Glucose Tolerance Test (OGTT)

(ADA, 2008)

Glycosylated hemoglobin HbA1c

- Reflects the average glucose level over the past 3-months
- Correlated with the risk of development of DM complications
- Cut-off point for DM diagnosis >6.5%

(ADA, 2008)

Diagnosis and Screening Criteria

	Criteria
P qto cn'dnqqf 'i nwequg"	<5.6
Rquwr tcpf kcn'	<7.8
Rtg/f kcdgvke'*r tg/r tcpf kcn'	5.6 - 6.9
Rtg/f kcdgvke''*r quwr tcpf kcn'	7.8 – 11.0
F kcdgvgu'■'hcuvkpi "	≥7
F kcdgvgu''/''r quwr tcpf kcn'	≥11.1

You may click the following link to test your risk of having diabetes
http://www.diabetes.org/diabetes-basics/prevention/diabetes-risk-test/

Diabetics need to control….

A – A1c <6.5%

B – Blood pressure <130/80 mmHg

C – Cholesterol LDL <2.6 mmol/l

ADA, 2008

Nutritional Management Of Diabetes Mellitus

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Energy control
Follow dietary guidelines
Carbohydrate counting
Hypoglycemia management

Goals of DM nutrition management

1. Prevent diabetes
2. Manage diabetes
   - Ø Achieve and maintain
     - blood glucose levels
     - lipid profile
     - blood pressure
3. Prevent /slow the risk of developing complications
4. Address individual nutrition needs
   - Ø individualised meal plan
   - Ø maintain pleasure of eating

(Mann et al., 2004; ADA, 2008)

Energy control

- Overweight /obesity esp. central obesity ↑ insulin resistance
- ↑ lipolysis
- causing insulin sensitivity ↓

- Asian populations ↑ risk BMI >23 kg/m^2
- Waist circumference <36 inches/90cm (men)
  <32 inches/80cm (women)

(Mann et al., 2004)

(Mann et al., 2004; ADA, 2008)

Energy control

- Weight loss through
  - lifestyle modification (diet + exercise)
  - weight loss medication
  - bariatric surgery if BMI >35kg/m^2
- American Dietetic Association recommends obese older persons to have 5-10% weight loss from initial body weight.

(Mann et al., 2004; ADA, 2008)

Dietary guidelines for T2DM

- Carbohydrate (CHO) should come from a variety of whole grains, legumes, fruits and vegetables and low-fat milk.
- CHO intake NO LESS than 130g/d (~=2 ½ bowls of rice)
  - Restrict intake of sugary beverages
- Sweetener is safe, approved by the US FDA
  - Sweetener with added fructose is NOT recommended for diabetics

(Mann et al., 2004; ADA, 2008)

Dietary guidelines for T2DM

Nutrient	Recommended intake
Protein	0.8 – 1.0g per kg body weight
Saturated fat	< 7% total calories
Polyunsaturated fat	Up to 10% of total calories
Monounsaturated fat	Up to 20% of total calories
Total fat	25 - 35%of calories
Cholesterol	< 200mg/day
Dietary fibre	14g/1000kcal
Sodium	< 2000mg/day

(Mann et al., 2004; ADA, 2008)

Carbohydrate exchange approach

- Both the amount and the type of CHO influence the level of glucose.
- Foods in the same group contains similar amount of CHO (10g CHO per serving).
- Foods in each group can be exchanged
  - ↑ variety and flexibility while maintaining consistent blood sugar and nutrition

Sugar free ≠ carbohydrate free
Sugar free ≠ calorie free

(Mann et al., 2004; ADA, 2008)

Cereal grain group CHO exchange
Each serving = ~50g CHO

1 medium bowl of rice (150g)

5 full tablespoons of rice

2 Standard slices of bread

3 packages of soda cracker

2 ½ bowls of Congee/Oatmeal

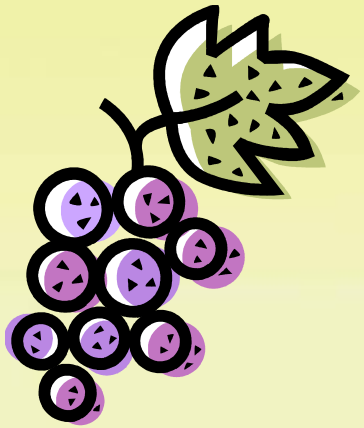
You may click this link for your reference
http://www.nhlbi.nih.gov/health/public/heart/obesity/lose_wt/fd_exch.htm

Fruit group – CHO exchange
Each serving = 10g CHO

1 small apple

1 small orange

½ medium pear



10 small or
5 big grapes

½ medium
banana

Diary products CHO exchange
Each serving = 12g CHO

1 cup of milk (8oz)

1 small carton of Yogurt (4oz)

Legume group CHO exchange

2 tablespoons of cooked beans

=

1 full tablespoon rice

Glycemic index (GI)

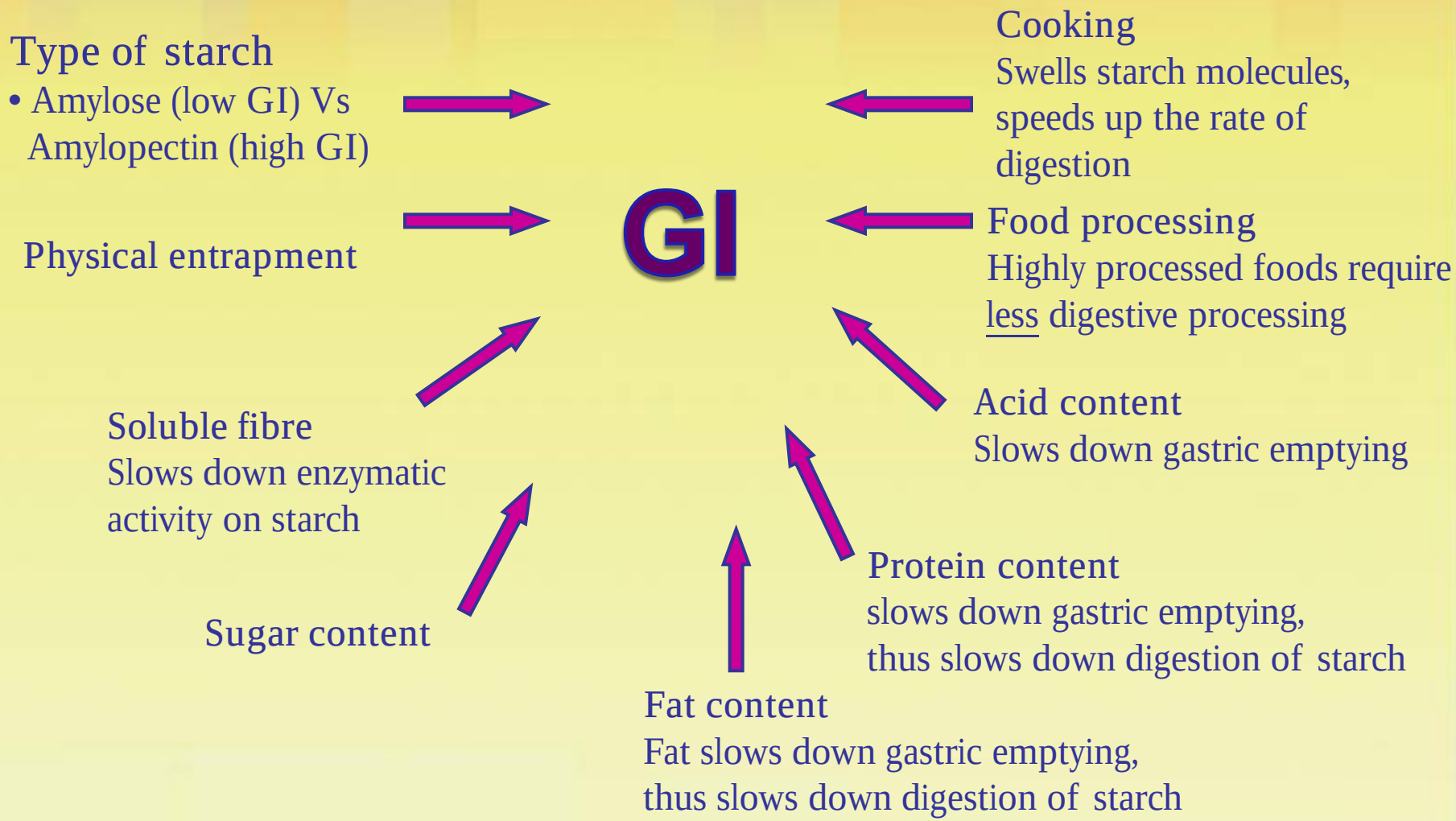
A scale to estimate how much blood glucose level rises after ingestion of a given portion of carbohydrate when compared to a reference food (usually glucose or white bread).

- ↑ GI value = ↑ blood glucose rise after the ingestion of the food

GI Ranking	Glucose standard	White bread standard
Low GI	< 55	< 79
Medium GI	56 – 69	80 – 99
High GI	Ø70	> 100

(Mann et al., 2004; ADA, 2008)

Factors Influencing GI Ranking



(Mann et al., 2004; ADA, 2008)

Glycemic Load (GL)

Measures the degree of glycemic response and insulin demand produced by a specific amount of a specific food.

- GL reflects both the *quality* and the *quantity* of dietary carbohydrates.

GL = GI/100 x CHO (grams) per serving

Example: GL of an apple = 40/100 x 15g = 6g

(Mann et al., 2004; ADA, 2008)

Glycemic Load classification

- Helps predict blood glucose response to specific amount of carbohydrate food compared to the reference food (glucose or white bread)

	Glucose	White bread
Low GL	< 10	< 14
Medium GL	11 -19	15 -27
High GL	>20	>27

(Mann et al., 2004; ADA, 2008)

Glycemic index of different foods

Food	GI	Food	GI	Food	GI
All-bran	30	Peanuts	13	Plum	24
Special K cereal	69	Digestive biscuit	59	Apple	34
Cornflakes	80	Milk chocolate	42	Kiwi fruit	47
Weetabix	74	Rice cakes	87	Mango	60
Whole wheat	49	Cauliflower	15	Banana	58
Croissant	67	Cabbage	10	Whole milk	31
Hamburger bun	61	Pumpkin	75	Ice-cream	62

For more detail, please click the following link
http://www.the-gi-diet.org/lowgifoods/

Hypoglycemia

- Blood glucose <4 mmol/l
- Imbalance between diet, exercise, and medications
  - missed meal after medications / overdose of medication
  - drinking on empty stomach
  - insufficient intake of CHO
  - unaccustomed exercise
- Symptoms
  - dizziness, sweating, severe hunger, unconsciousness

(ADA, 2008)

Hypoglycemia Management

- 15/15 rule
  1. Give 15g CHO and wait for 15mins before re-testing blood glucose
  2. Repeat if blood glucose <4mmol/l
  3. Additional 10-15g CHO with protein food if >30mins until the next scheduled meal or snack
- Injection of glucagon if oral intake of CHO not allowed or unconscious

(ADA, 2008)

Hypoglycemia Management

CHO choices for treating hypoglycemia

- Each serving = ~15g CHO

ü Glucose tablet	3 pieces
ü Sugar	1 tablespoon
ü Fruit juice	½ cup
ü Soft drink	1/3 can

(ADA, 2008)

Prevention of hypoglycemia

- Regular self-check blood glucose level esp. before bed time.
- Always carry an emergency supply of CHO and some form of diabetic identification.
- Control the portion of CHO for each meal and eat in 'small frequent meal' pattern.
- Diet control: Extra CHO may be needed for extra exercise.
- Never consume alcohol on an empty stomach and in excessive amounts.

(ADA, 2008)

Summary of DM eating plan

- ü Regular time and portion for eating.
- ü Daily intake of 2 portions of fruit and 3 portions of vegetables.
- ü Avoid high-fat food esp. saturated fat (animal fat).
- ü Avoid food with high sugar content.
- ü Avoid high-salt food.
- ü Practise abstinence; moderate alcohol consumption if current drinker, avoid empty stomach when drinking.

Reference

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