Comprehensive education course
for Asian diabetes educators

# Nutrition therapy in diabetes

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**Severance Hospital**
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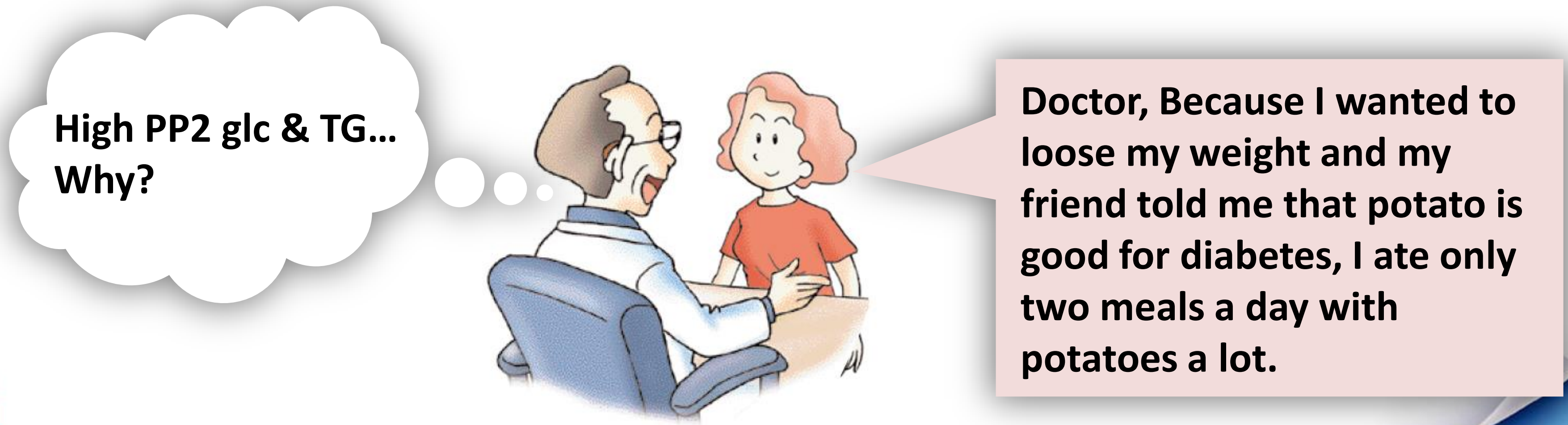
Korean
Diabetes
Association

# Example

46 years old woman, T2D for 1y, oral anti-diabetic drugs

Ht 161 cm / Bwt 76 kg

| Parameters | Values | Parameters | Values |
|---|---|---|---|
| Glucose (FBS) | 128 mg/dL | Glucose (PP2) | 252 mg/dL↑ |
| Total Cholesterol | 179 mg/dL | HDL-Cholesterol | 52 mg/dL |
| Albumin | 4.6 g/dL | TG | 321 mg/dL ↑↑ |
| HbA1c | 7.9% | γ-GTP | 42 U/L |


High PP2 glc & TG… Why?
Doctor, Because I wanted to loose my weight and my friend told me that potato is good for diabetes, I ate only two meals a day with potatoes a lot.

# Example

## What is the problem?

1. Too much Carbs!
2. Low basic knowledge of nutrition/food
3. Unbalanced meal pattern

**Needs Nutrition therapy!**

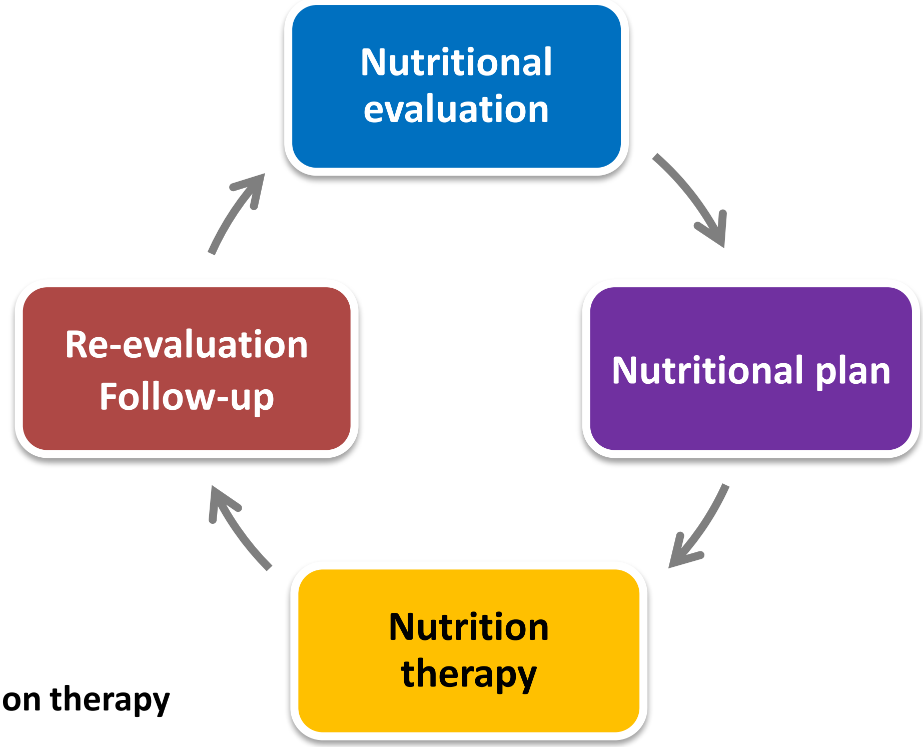
# Objective

- Understand the clinical nutrition in diabetes
- Practice individualized clinical nutrition
- Evaluation of caloric requirement
- Meal planning
  - Principles of diet therapy
  - Food exchange table
  - hand portion method
  - The plate model

# Clinical nutrition

- Clinical nutrition

: A comprehensive service provided by clinical nutritionist to treat diseases or injuries



Nutritional evaluation

Nutritional plan

Nutrition therapy

Re-evaluation Follow-up

Flowchart of clinical nutrition therapy

- **Diabetic clinical nutrition**

**: Assistance provided to help diabetic patient correct his/her behavior pattern and improve overall management of diabetes, including nutritional status.**

- **What diabetic patients must know**

**: Educating diabetes and diet therapy**

**Individualized meal plan that best fits the lifestyle and diabetes management.**

# Objective of diabetic clinical nutrition

- Maintain blood glucose, serum lipid, blood pressure within normal limit

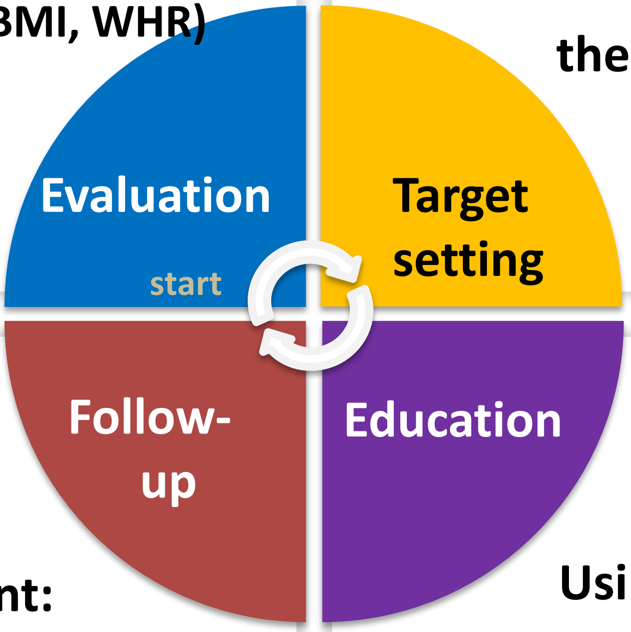
- Provide adequate calories :
  - Adult– Attain and maintain ideal body weight
  - Children/adolescent– Normal growth and development
  - Pregnancy, breastfeeding, critical care patients, etc. – provide adequate calorie and nutrition
- Preventing and treating acute/chronic complications of diabetes
- Promoting health by choosing healthy food and exercising regularly
- Fulfilling each individual's nutritional requirement while also considering lifestyle preferences

# Practicing *individualized* clinical nutrition

# Practicing individualized clinical nutrition

- **Health status (blood labs, complications, drug, etc.)**
- **Socio-economic status**
- **Body measurements (BMI, WHR)**
- **Diet problem (teeth)**
- **Diet evaluation (Habit, history)**

**Individualized target setting based on nutrional evaluation and therapy goal**


Evaluation
start
Target setting
Follow-up
Education

**Evaluating effects of nutritional management: modify diet plan if necessary**

**Using diet planner to construct and educate appropriate diet plan**

# Diet evaluation

## Methods

- Diet record
  - Learn normal diet through interview
  - Self-record : (2 weekdays, 1 weekend) Date, time, location, food name, ingredient, amount, supplements, exercise

## Content

- Diet pattern everyday/special day (regularity, binge eating, etc.)
- Amount, frequency
- Diet balanced?
- Eating out, snack, alcohol
- Depending on folk medicine?
- Socio-economic status
- Problems in eating (teeth, etc.)

**Helps plan, target, and reinforce diet therapy**

# Example of diet record

Oct. 4th, 2018

| Type | Time (place) | Food | Ingredient | Amount (about…) | Blood glucose |
|---|---|---|---|---|---|
| Breakfast | 8:00 (Home) | Barley rice | Barley | 1/3 bowl | |
| | | Roast seaweed | Seaweed<br>Sesame oil | ½ plate<br>½ teaspoon | |
| | | Kimchi | Cabbage kimchi | ½ plate | |
| | | Coffee | Coffee<br>Sugar<br>Powder milk | <br>5g<br>10g(fat:2g) | |
| Snack | 10:30 (Home) | Milk | Low fat Milk | 200mL | |
| Lunch | 13:00 (Work) | White rice | White rice | 1 bowl | |
| | | Cabbage-miso soup | Cabbage | ½ plate | |
| | | Fried noodle | Noodle,<br>Beef<br>Spinach<br>Sesame oil | ½ bowl<br>¼ plate<br>½ plate<br>1 teaspoon | 230 (2 hours after meal) |
| | | Kimchi | Cabbage kimchi | ½ plate | |
| Snack | | | | | |
| Dinner | 19:00 (Chinese restaurant) | Noodle with black sauce | Noodle<br>Onion<br>Pork<br>Oil | 1 portion | |
| | | Pickle | Radish | ½ plate | |
| | | Kimchi | Cabbage kimchi | ½ plate | |
| Night snack | | | | | |

- Folk medicine (Deer horn)
- Exercise
- Other

# Determining caloric requirement

# Calculation of caloric requirement

- Calculation based on ideal body weight
- Modified according to activity level, age, weight change, etc.
- Consider normal caloric intake
- Long·short-term target weight based on individual’s appropriate weight rather than ideal body weight.
- Consider normal growth/development for children and adolescents

# Ideal body weight / Evaluating obesity

## Ideal body weight

**Appropriate weight to maintain health in everyday life**

- **Men = Height (m) × Height (m) × 22**
- **Women = Height (m) × Height (m) × 21**

## Obesity (BMI)

$$\frac{\text{Current weight (kg)}}{\text{Height (m)} \times \text{Height(m)}}$$

| BMI(kg/m$^2$) | Classification |
|---|---|
| < 18.5 | Underweight |
| 18.5~22.9 | Normal |
| 23~24.9 | Overweight |
| ≥ 25 | Obese |

# Determining caloric requirements in adult

- **Daily requirement (kcal/day) = IBW (kg) × coefficient for activity level**

IBW=ideal body weight

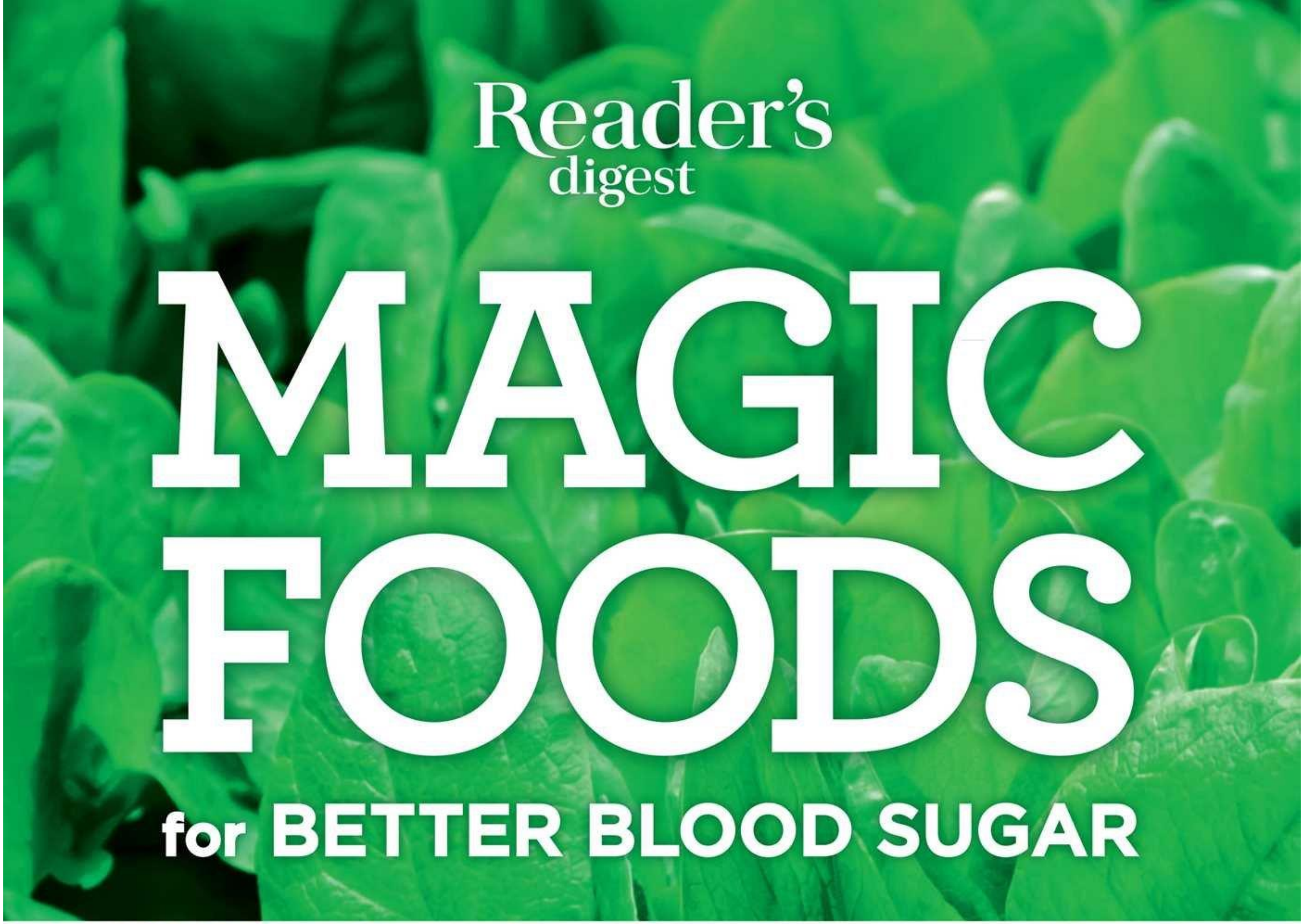
| Obesity / Activity level | Caloric requirement |
|---|---|
| **Obese** / Low physical activity | IBW × 25~30 (kcal/day) |
| **Normal** / Average physical activity | IBW × **30**~35 (kcal/day) |
| **Low body weight** / Intense physical activity | IBW × 35~40 (kcal/day) |

**Ex) IBW 60kg, average physical activity and exercise. Requirement?**

**60kg × 30 ~ 35 = 1800 ~ 2100 kcal/day**

*Korean Diabetes Association, Diabetes Education Guideline. 2015*

# Diet planning



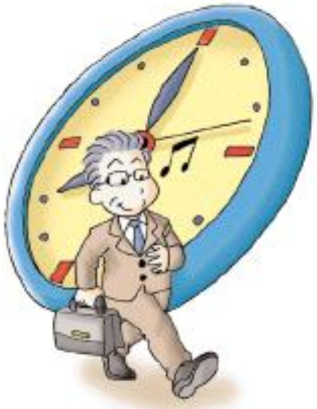
Reader's digest

# MAGIC FOODS

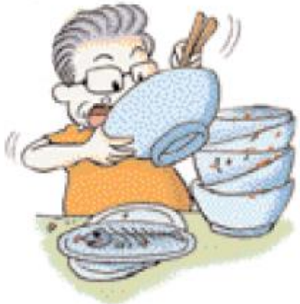
## for BETTER BLOOD SUGAR

# 3 Major Principles of diet therapy

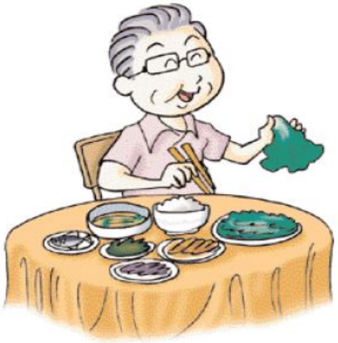
**Regularly**



**Properly**



**Balanced**



# Good diet habit (brief)

- Regularly eat right amount of food at regular interval.
- Beware of simple sugars (sugar, honey, etc.).
- Consume enough dietary fiber.
- Consume adequate amount of fat; restrict cholesterol.
- Avoid salt intake.
- It is recommended to avoid alcohol.

➡ **Diabetic diet is healthy diet!** Families participate together.

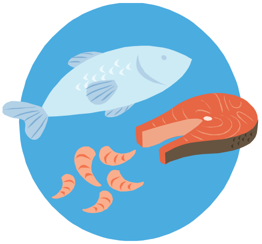
*Korean Diabetes Association, Food exchange table guideline. 2010*

# Nutrients

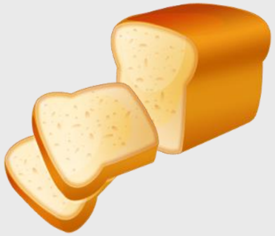
- Carbohydrate
- Protein
- Fat
- Vitamin
- Minerals

# Nutrients to blood glucose

**Fat** → **Minimal**



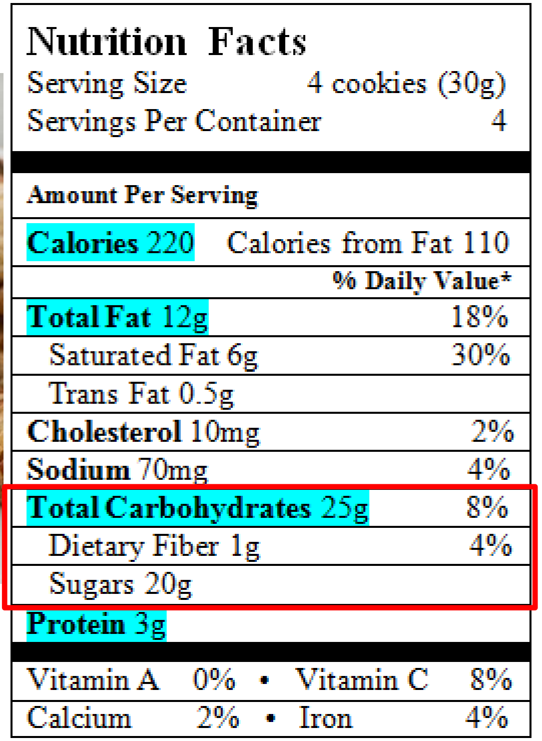
**Protein** → **Minimal**



**Carbohydrate** → **100% turns into Blood glucose**

# How can we know amount of carbs?

1. **Look at the label**
2. **Search on internets**
3. **Use ‘Food Exchange Table’**



**Nutrition Facts**

| | |
|---|---|
| Serving Size | 4 cookies (30g) |
| Servings Per Container | 4 |
| **Amount Per Serving** | |
| **Calories** 220 | Calories from Fat 110 |
| | **% Daily Value*** |
| **Total Fat** 12g | 18% |
| Saturated Fat 6g | 30% |
| Trans Fat 0.5g | |
| **Cholesterol** 10mg | 2% |
| **Sodium** 70mg | 4% |
| **Total Carbohydrates** 25g | 8% |
| Dietary Fiber 1g | 4% |
| Sugars 20g | |
| **Protein** 3g | |
| Vitamin A 0% • Vitamin C 8% | |
| Calcium 2% • Iron 4% | |

**Let’s look at the label…**

# Diet planning using

- Local food guides
- Food exchange table
- The hand portion method
- The plate model

# Simple diabetes meal planning

ADA 2018

A simple and effective approach to glycemia and weight management emphasizing portion control and healthy food choices may be considered for those with type 2 diabetes who are not taking insulin, who have limited health literacy or numeracy, or who are older and prone to hypoglycemia.

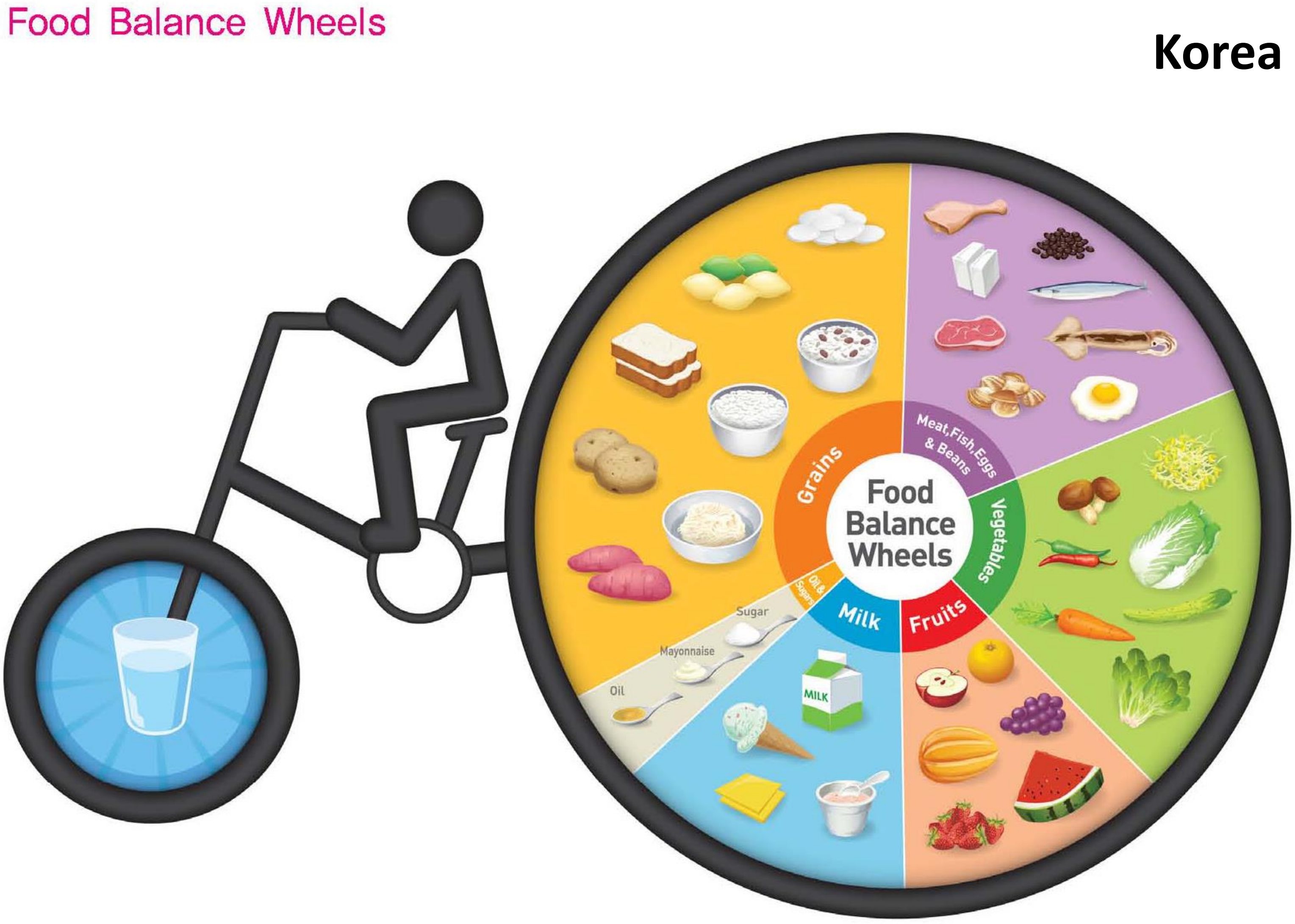
**Grade. B**

International Diabetes Federation

*ADA STANDARDS OF MEDICAL CARE IN DIABETES—2018*

# Local food guide

**Korea**


Food Balance Wheels
Food Balance Wheels
Grains
Meat, Fish, Eggs & Beans
Vegetables
Fruits
Milk
Oil & Sugars
Sugar
Mayonnaise
Oil
MILK

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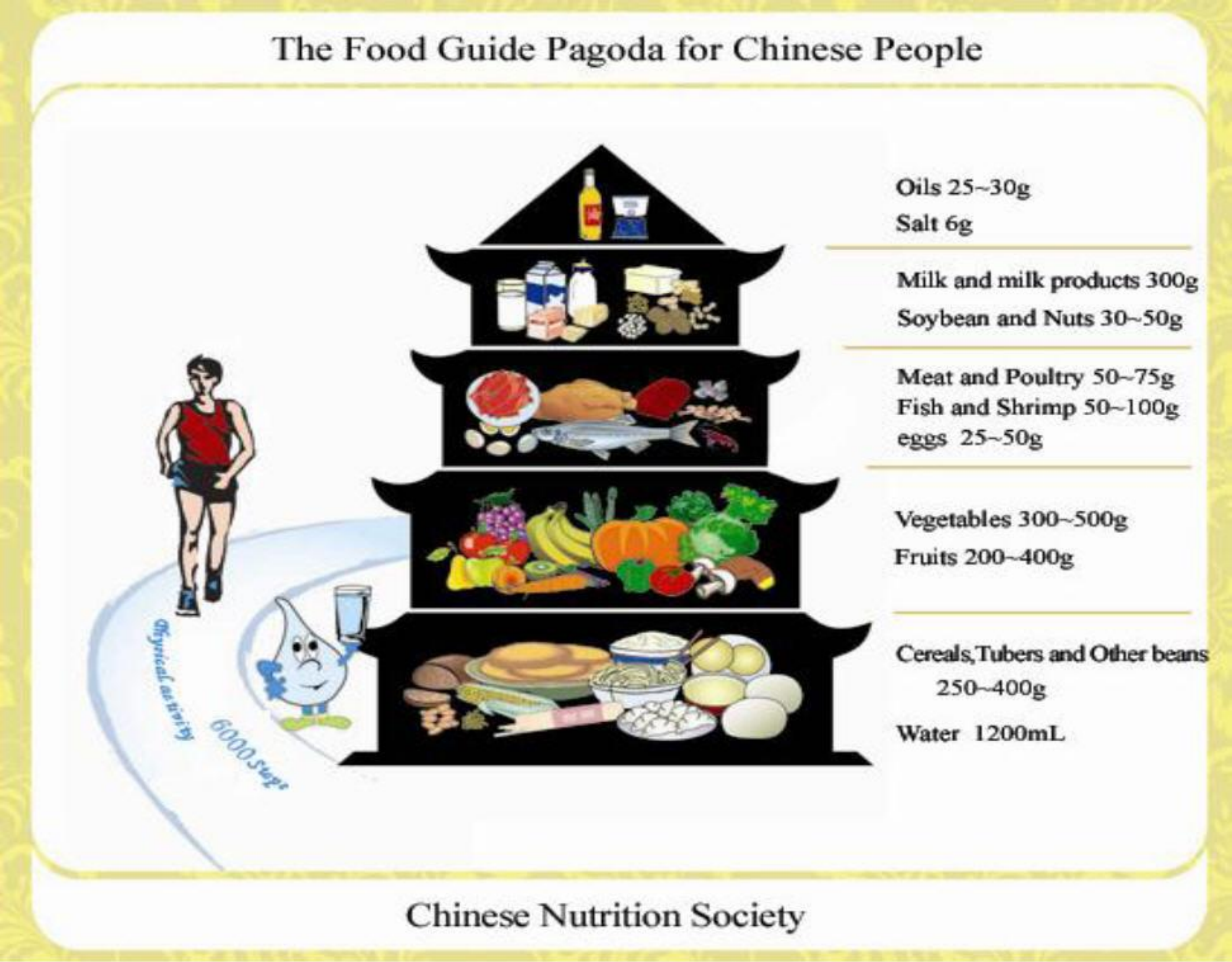
# Local food guide

**China**



The Food Guide Pagoda for Chinese People

Oils 25~30g
Salt 6g

Milk and milk products 300g
Soybean and Nuts 30~50g

Meat and Poultry 50~75g
Fish and Shrimp 50~100g
eggs 25~50g

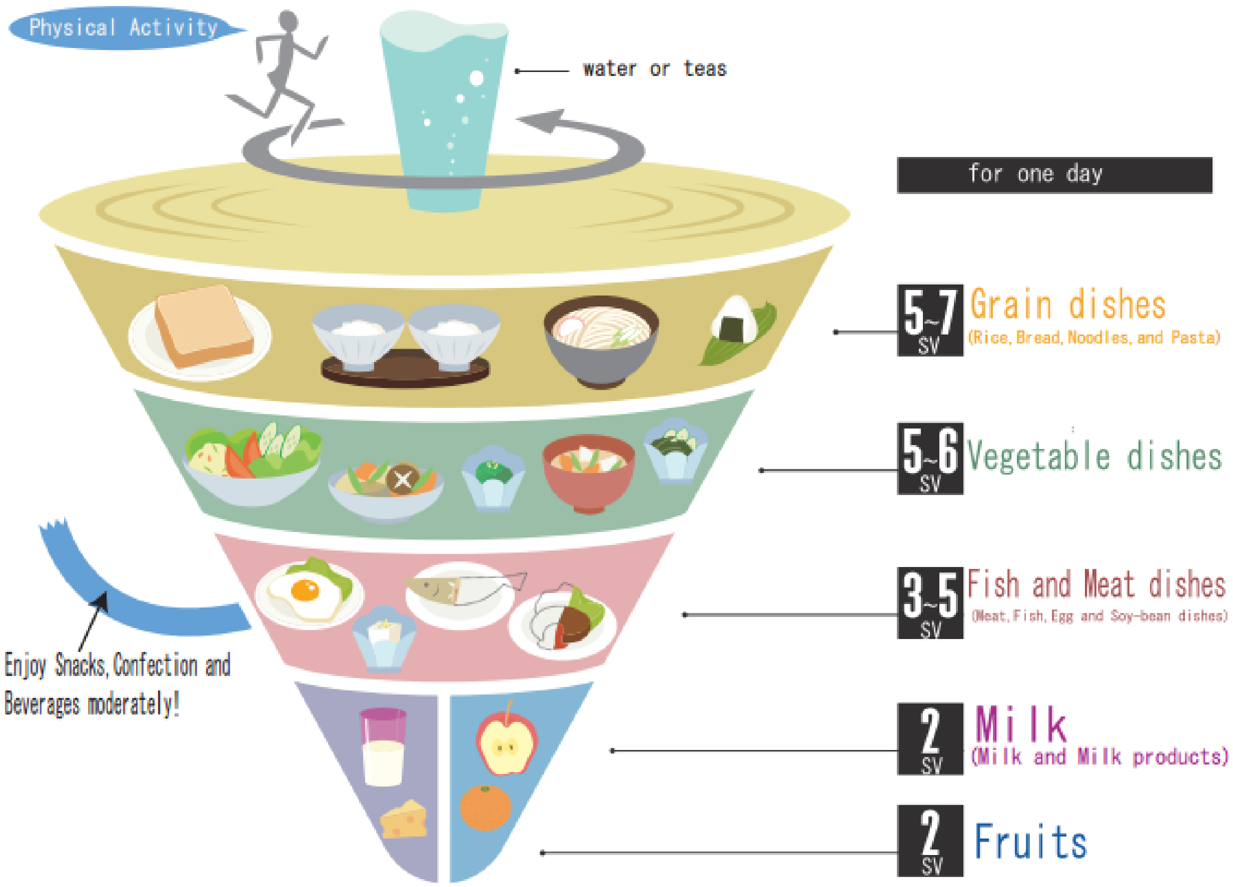
Vegetables 300~500g
Fruits 200~400g

Cereals,Tubers and Other beans
250~400g
Water 1200mL

Chinese Nutrition Society

# Local food guide

**Japan**

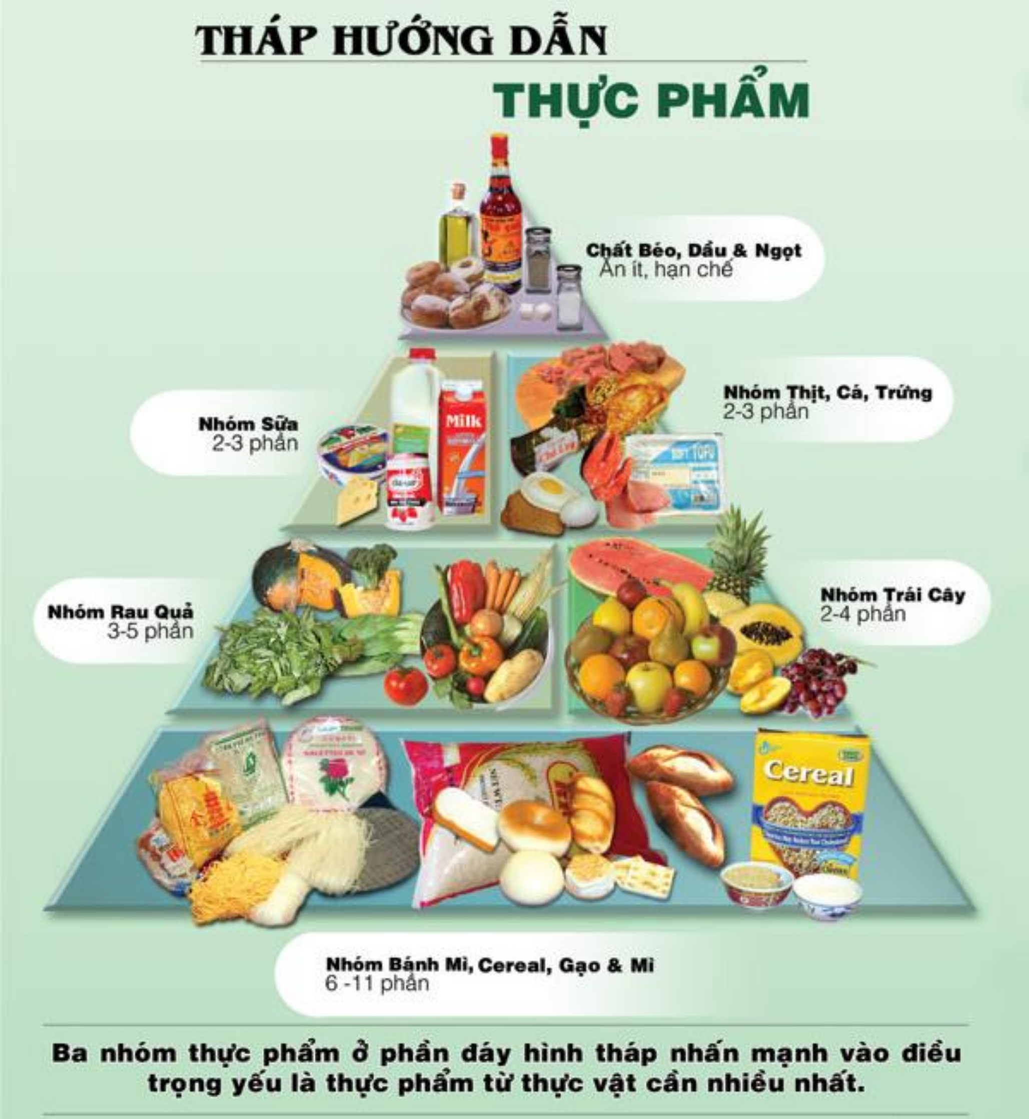

Physical Activity
water or teas
for one day
5~7 SV
Grain dishes
(Rice, Bread, Noodles, and Pasta)
5~6 SV
Vegetable dishes
3~5 SV
Fish and Meat dishes
(Meat, Fish, Egg and Soy-bean dishes)
2 SV
Milk
(Milk and Milk products)
2 SV
Fruits
Enjoy Snacks, Confection and Beverages moderately!

※ SV is an abbreviation of "Serving", which is a simply countable number describing the approximated amount of each dish or food served to one person

International
Diabetes
Federation

# Local food guide

**Vietnam**

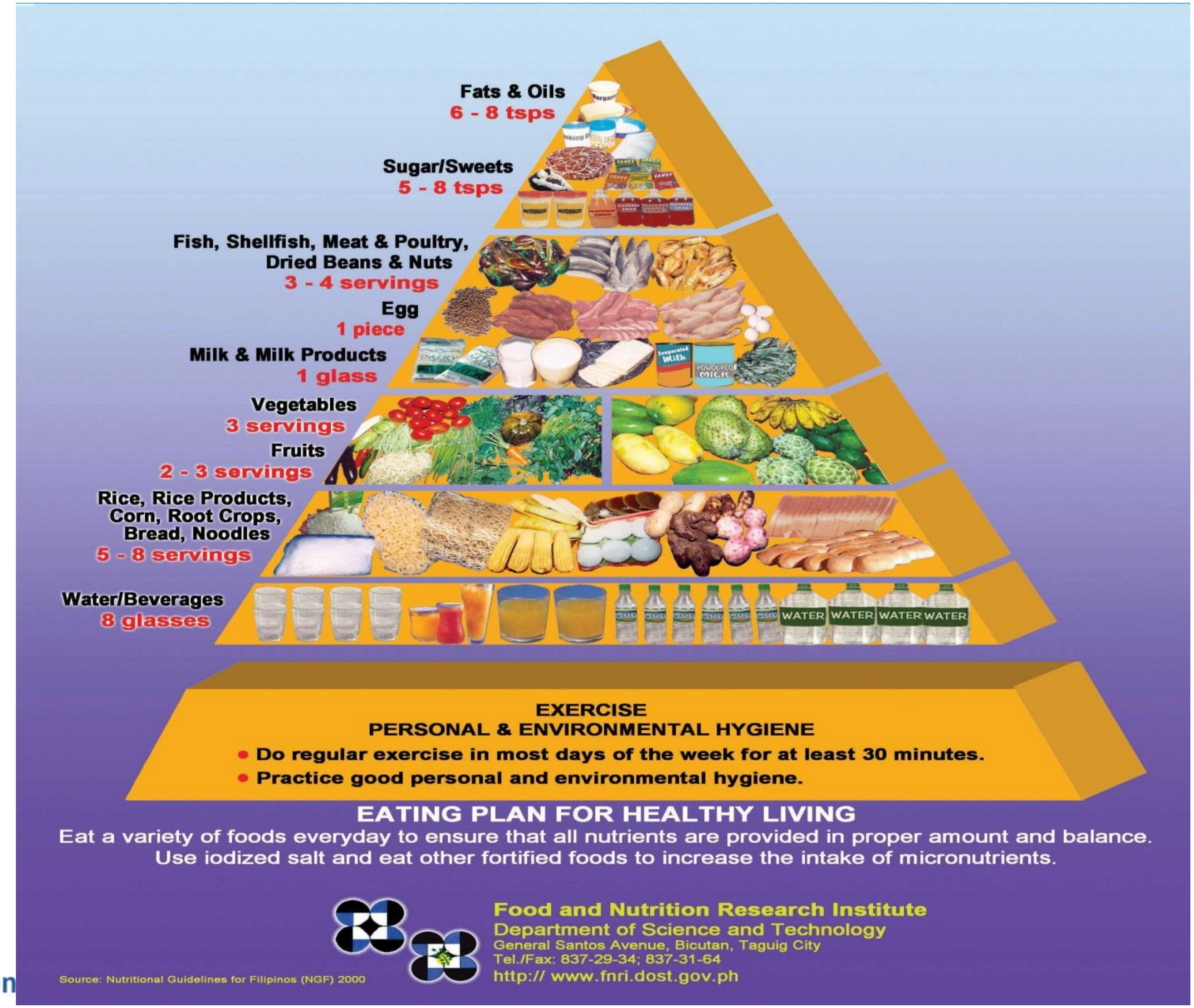

THÁP HƯỚNG DẪN
THỰC PHẨM
Chất Béo, Dầu & Ngọt
Ăn ít, hạn chế
Nhóm Sữa
2-3 phần
Nhóm Thịt, Cá, Trứng
2-3 phần
Nhóm Rau Quả
3-5 phần
Nhóm Trái Cây
2-4 phần
Nhóm Bánh Mì, Cereal, Gạo & Mì
6 -11 phần

Ba nhóm thực phẩm ở phần đáy hình tháp nhấn mạnh vào điều trọng yếu là thực phẩm từ thực vật cần nhiều nhất.

Internation
Diabetes
Federation

# Local food guide

**Philippine**



Fats & Oils
6 - 8 tsps

Sugar/Sweets
5 - 8 tsps

Fish, Shellfish, Meat & Poultry, Dried Beans & Nuts
3 - 4 servings

Egg
1 piece

Milk & Milk Products
1 glass

Vegetables
3 servings

Fruits
2 - 3 servings

Rice, Rice Products, Corn, Root Crops, Bread, Noodles
5 - 8 servings

Water/Beverages
8 glasses

EXERCISE
PERSONAL & ENVIRONMENTAL HYGIENE

- Do regular exercise in most days of the week for at least 30 minutes.
- Practice good personal and environmental hygiene.

EATING PLAN FOR HEALTHY LIVING

Eat a variety of foods everyday to ensure that all nutrients are provided in proper amount and balance. Use iodized salt and eat other fortified foods to increase the intake of micronutrients.

Food and Nutrition Research Institute
Department of Science and Technology
General Santos Avenue, Bicutan, Taguig City
Tel./Fax: 837-29-34; 837-31-64
http:// www.fnri.dost.gov.ph

Source: Nutritional Guidelines for Filipinos (NGF) 2000

# Food exchanges

- Similar food types placed in same exchange groups
- Within groups, a single food based on weight, measure, size has the same carbohydrate or kcal value as another
- Food from different groups cannot be interchanged

ex)

**1 exchange unit**

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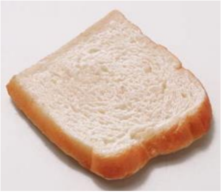

≠

Butter
NEW ZEALAND BUTTER

**1/3 bowl of Rice (70g)**

**1 slice of Bread (35g)**

**1½ tsp of Butter**

# Food exchange table

- **Groups everyday food with similar nutritional components into 6 food groups**
- **Grains, Fish and meat, Vegetable, Fat, Milk, Fruits**
- **Nutritional component of each food group**

| | | Calories (kcal) | Carbohydrate (g) | Protein (g) | Fat (g) |
|---|---|---|---|---|---|
| Grain | | 100 | 23 | 2 | - |
| Fish and meat | Low-fat | 50 | - | 8 | 2 |
| | Mid-fat | 75 | - | 8 | 5 |
| | High-fat | 100 | - | 8 | 8 |
| Vegetables | | 20 | 3 | 2 | - |
| Fats | | 45 | - | - | 5 |
| Milk | Whole | 125 | 10 | 6 | 7 |
| | Low-fat | 80 | 10 | 6 | 2 |
| Fruits | | 50 | 12 | - | - |

*Korean Diabetes Association, Food exchange table guideline. 2010*

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Korean Diabetes Association

**1 Unit**

**8 Units/day**

# Grain (Carbohydrate 23g, Protein 2g, 100kcal)

Rice 70g (1/3 bowl)

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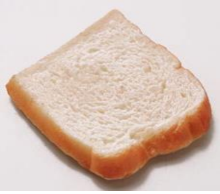

Bread 35g (1 slice)

Rice cake 50g
(3 pieces)

Sweet potato
70g
(1/2 piece)

Potato 140g
(1 piece)

Corn
70g
(1/2 piece)

Cracker
20g
(5 pieces)

Grain powder
30g
(1/4 cup)

- If possible, pick multigrain rice and wheat breads than white rice/bread

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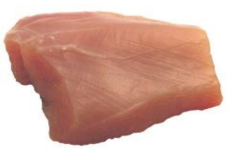
Korean Diabetes Association

**1 Unit**

**5 Units/day**

# Fish and Meat (carbohydrate 8g, fat 2~8g, 50~100kcal)

## Low-fat


Chicken meat 40g (1 piece)

Pork loin 40g (1 piece)

Stingray 50g (1 small piece)

Anchovies 15g (¼ cup diced)

Pollack 15g (½ piece)

## Mid-fat

Beef sirloin 40g (1 piece)

Mackeral 50g (1 small piece)

Hairtail 50g (1 small piece)

Black bean 20g (2 large spoon)

Tofu 80g (1/5 block)

## High-fat

Chicken with skin 40g (1 drumstick)

Bacon 40g

Tuna can 50g (1/3 cup)

Fried tofu 30g (5 pieces)

Cheese 30g (1.5 piece)

- Foods in high-fat group also contain large amount of fat and cholesterol. Beware when planning diet.

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**1 Unit**

**7 Units/day**

# Vegetables (Carbohydrate 3g, Protein 2g, 20kcal)

**Spinach 70g**
**(1/3 cup boiled)**

=

※

**Carrot 70g**
**(1/3 large piece)**

※ Bellflower root 40g

Fresh chili 70g (7~8 pieces)

※ Lotus root 40g

※ Pumpkin 40g (1/10 piece)

Seaweed (raw) 70g

Mushroom 50g (3 large pieces)

**Eat raw or marinated instead of juicing to increase dietary fiber**

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**1 Unit**

**4 Units/day**

# Fat (fat 5g, 45kcal)

**Soybean oil 5g**
**(1 teaspoon)**

=

**Pine nut**
**(1 tablespoon)**

Sesame oil 5g
(1 teaspoon)

Walnut 8g
(1.5 piece)

Peanuts 8g
(8 pieces)

Italian dressing 10g
(2 teaspoon)

Mayonasie 5g
(1 teaspoon)

- **Avoid deep-fries: use in stir-fry or vegetable marination**
- **Nuts should be limited to 1-2 units/day for calorie control**

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Korean Diabetes Association

**1 Unit**

**2 Units/day**

# Milk

**(Whole milk: Carbohydrate 10g, Protein 6g, Fat 7g, 125kcal)**
**(Low-fat milk: Carbohydrate 10g, Protein 6g, Fat 2g, 80kcal)**

**Whole milk**
**200cc(1 cup)**

**Soy milk**
**200cc(1 cup)**

우유
저지방&칼슘
ESL

**Low-fat milk**
**200cc(1 cup)**

- Low-fat milk contains less saturated fat and choleterstol compared to normal milk

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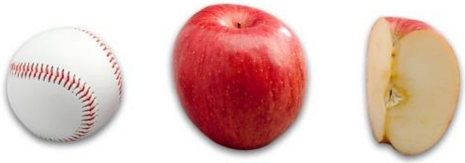
**1 Unit**

**2 Units/day**

# Fruits (Carbohydrate 12g, 50kcal)



**Apple 80g**
**(1/3 piece)**

=

**Tomato 350g**
**(2 pieces)**

**Banana 50g**
**(1/2 piece)**

**Strawberry**
**150g**
**(7 pieces)**

**Watermelon**
**150g**
**(1 slice)**

**Tangerine 120g**
**(2 pieces)**

**Persimmon**
**50g**
**(1/3 pieces)**

- **Fruit juices have low dietary fiber. Eat fresh fruits.**

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Korean Diabetes Association

# Food distribution per meal

- Keeping meal time and amount in regular interval crucial for maintaing steady blood glucose
- Meal frequency and snacks based on everyday lifestyle
- Example of distributing exchange units in 1800kcal meals

| Food group | | Units | Morning | Snack | Lunch | Snack | Dinner | Snack |
|---|---|---|---|---|---|---|---|---|
| Grain | | 8 | 2 | | 3 | | 3 | |
| Meat and fish | Low-fat | 2 | | | 1 | | 1 | |
| | High-fat | 3 | 1 | | 1 | | 1 | |
| Vegetable | | 7 | 2 | | 3 | | 2 | |
| Fat | | 4 | 1 | | 1.5 | | 1.5 | |
| Milk | | 2 | | 1 | | | | 1 |
| Fruit | | 2 | | | | 1 | | 1 |

- Adjust according to drugs, hypoglycemic time, gestational diabetes, and blood glucose level

# Meal planning using ‘Carbohydrate counting’

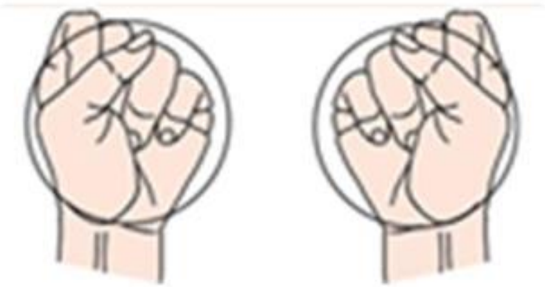
- Focus on consumed carbohydrates that determined blood glucose, rather than total calories.
- Emphasis on total amount of carb, not the type.

| | |
|---|---|
| **Basic carb. counting** | Distribute regular amount of carbohydrate into meals and snacks at same time very day to maintain steady carbohydrate intake |
| **Advanced carb. counting** | Multiple insulin injection or using insulin pump |

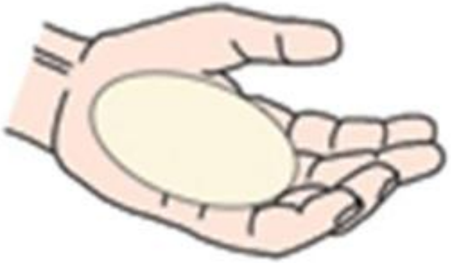
- Not easy to apply to other culture..

  → need to develop own ‘Food Exchange Table’

# Handy portion method



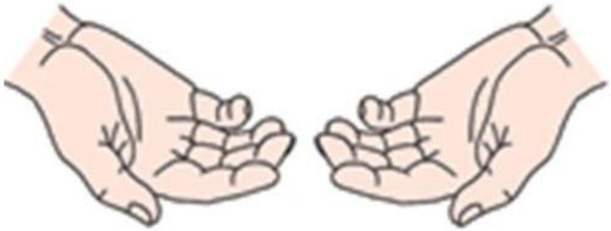
**Carbohydrates (starch and fruit)**
: choose an amount equivalent
  to the size of two fists.
: For fruit use one fist



**Protein**
: choose an amount equivalent to
  the size of the palm of your hand
  and the thickness of your little
  finger

(Reprinted with permission from CDA, 2003)

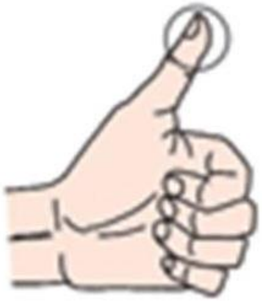
# Handy portion method



**Vegetables**

:choose as much as you can hold in both hands.

These should be low CHO vegetables – green or yellow beans, cabbage or lettuce.



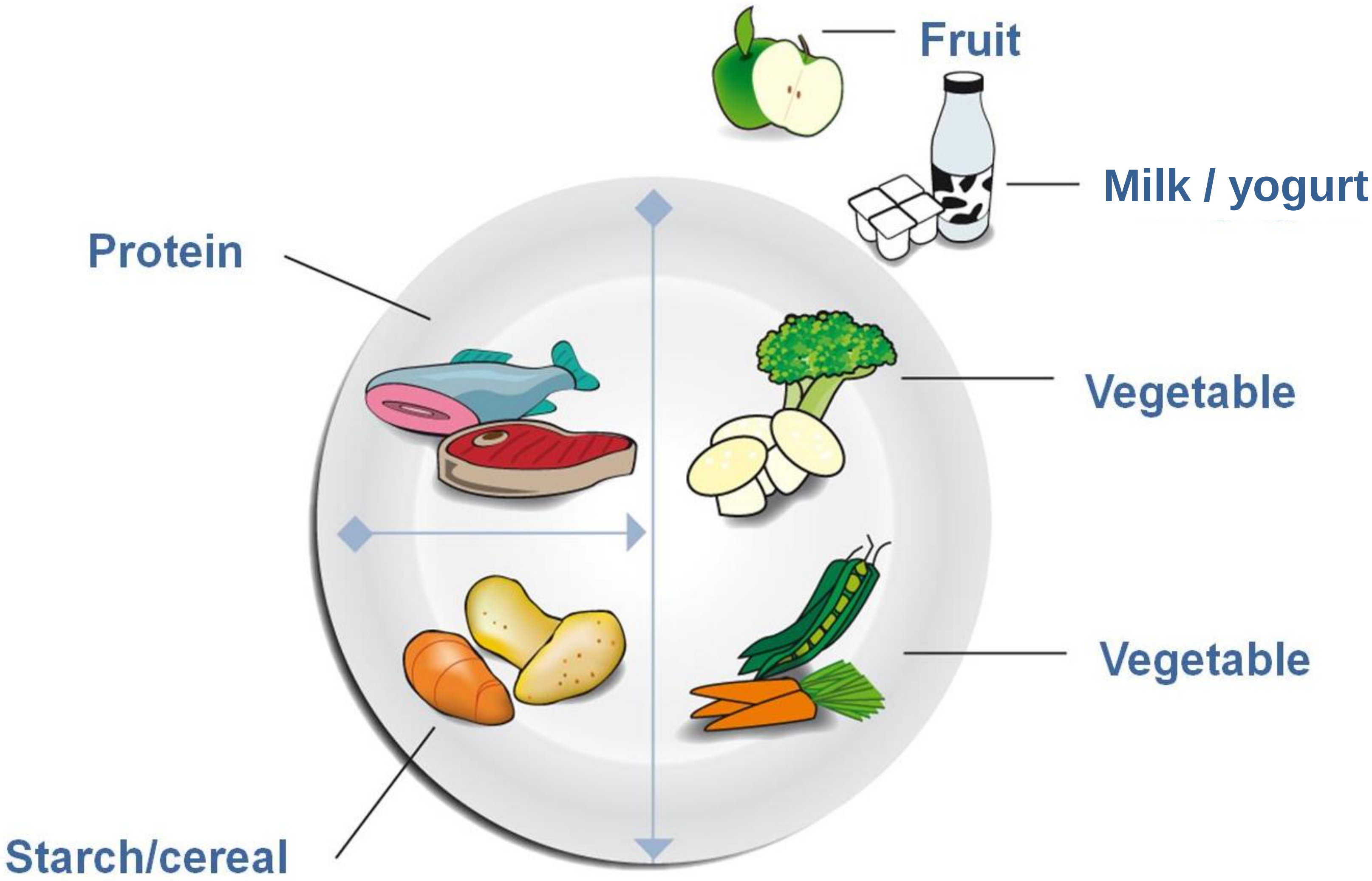
**Fat**

:limit fat to an amount the size of the tip of your thumb.

Drink no more than 250 ml of low-fat milk with a meal

(Reprinted with permission from CDA, 2003)

# Plate model


Fruit
Milk / yogurt
Protein
Vegetable
Vegetable
Starch/cereal

# Plate model

## Useful as a basic teaching tool for people who

- Have recently been diagnosed
- Want a simple plan or find it difficult to implement other advanced plans
- Have difficulty reading or dealing with numbers
- Learn better by visualising
- Eat out frequently
- Want to reduce the amount of proteins or carbohydrates they ingest

International
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# Macronutrients Composition

ADA 2018

There is no single ideal dietary distribution of calories among carbohydrates, fats, and proteins for people with diabetes; therefore, macronutrient distribution should be individualized while keeping total calorie and metabolic goals in mind. **[Grade E]**

A variety of eating patterns are acceptable for the management of type 2 diabetes and prediabetes. **[Grade B]**

| | ADA | CDA | KDA |
|---|---|---|---|
| Carbohydrates | Based on Individualized assessment of current eating patterns, preferences, and metabolic goals. | 45-60% | 50-60% |
| Protein | | 15-20%<br>(or 1-1.5g / kg BW) | 15-20% |
| Fat | | 20-35% | <25% |

*ADA 2018* *CDA 2015* *KDA 2015*