

# **Exercise and Physical Activity Guide for Health Promotion 2006**

~ To Prevent Lifestyle-related Diseases ~

**<Exercise Guide 2006>**

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by Dr. Izumi Tabata  
(Director of Health Promotion and Exercise Program  
National Institute of Health and Nutrition, Japan),  
with assistance of Miki Miyoshi  
(Center for Collaboration and Partnership,  
National Institute of Health and Nutrition, Japan)

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## **Purpose of formulating the Guide**

## Purpose of the Guide

- Recently, the control of lifestyle-related diseases has been a significant issue in Japan. Based on the results of various studies that have been published, the reference values for the quantity of physical activity, exercise and physical fitness were set in the “Exercise and Physical Activity Reference for Health Promotion 2006: Physical Activity, Exercise, and Physical Fitness” (EPAR2006).
- Based on the EPAR2006, the preparation committee formulated the “Exercise and Physical Activity Guide for Health Promotion 2006”, in order to introduce safe and effective physical activity and exercise widely among the general population. This guide specifically describes; 1) the methods to assess one’s current quantity of physical activity, exercise and physical fitness, based on which the goals will be set; 2) how to select and plan exercise considering one’s physical characteristics and condition, so as to achieve the goals.
- The subjects of this exercise guide are healthy adults. Yet, it must be noted that there are individual differences in physical fitness, and thus the appropriate intensity of exercise would vary by each individual. It is therefore crucial even for a healthy adult to fully understand this guide, before starting an exercise with higher intensity than walking. If one suffers from a chronic illness, s/he should consult his/her doctor to ensure the safe exercise program.
- In order to prevent lifestyle-related diseases, it is necessary to undertake a regular physical activity continuously. For which, it is recommended that one could start with increasing the physical activity moderately in one’s daily life. For example, walking to school/office and housework are the kinds of activity in which many people can readily incorporate in their daily lives.
- In addition to increasing the quantity of physical activity, it is important to assess one’s diet and resting for prevention of lifestyle-related diseases. Let’s take a balanced diet and avoid excessive energy intake, with referring to the Japanese Food Guide Spinning Top.



# Chapter 1. Theoretical Concept

# 1. Physical activity and exercise

In this exercise guide, physical activity, exercise and nonexercise activity (NEA) are defined as follows:

① Physical activity

All bodily movement that accompanies energy expenditure above resting energy expenditure.

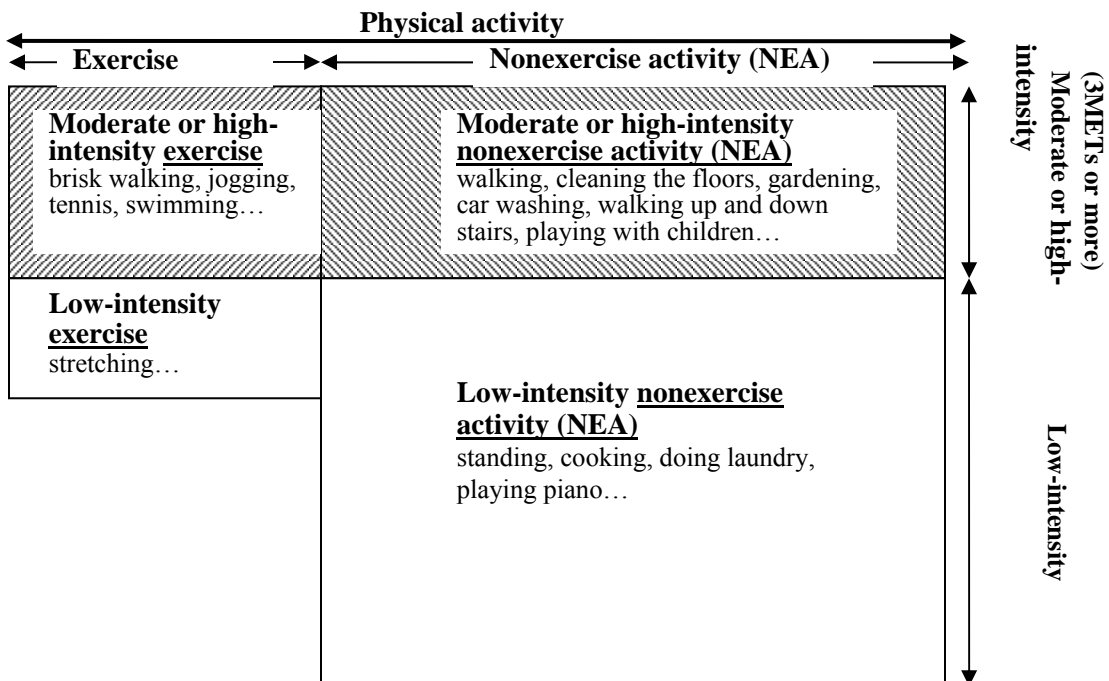
② Exercise

A kind of physical activity that are practiced intentionally for maintaining and improving one's physical fitness.

③ NEA (nonexercise activity)

A kind of physical activity that are not classified as exercise. This category includes the occupational activities.

Fig. 1. Classification of exercise and physical activity, and their intensities



As the unit to express the intensity and quantity of physical activity, “METs” and “METs·hour (called as “Ekusasaizu (Ex))” is used, respectively.

① MET (unit of intensity)

MET (metabolic equivalent) is an index for intensity of physical activity, calculated as energy expenditure (oxygen uptake, mL/kg/min) during a specific physical activity divided by sitting/resting energy expenditure. With defining MET of sitting/resting as 1, for example, that of normal walking is 3.

② “Ekusasaizu (Ex)” (=METs·hour) (unit of quantity)

METs·hour is a unit to express the quantity of physical activity, calculated by multiplying the intensity of physical activity (METs) by the duration of the activity (hour). The higher intensity the physical activity, the shorter the time needed to achieve 1 Ex.

<Examples>

Physical activity with 3 METs for one hour:  $3 \text{ METs} \times 1 \text{ hour} = 3 \text{ Ex (METs·hour)}$

Physical activity with 6 METs for 30 minutes :  $6 \text{ METs} \times \frac{1}{2} \text{ hour} = 3 \text{ Ex (METs·hour)}$

**[Reference] Energy expenditure equivalent to “1 Ex” of physical activity**

Energy expenditure equivalent to 1 Ex of physical activity would vary according to one’s body weight. Specifically, it can be calculated using the following formula. The weight-dependent energy expenditure calculated by this formula is compiled in the table below. Now, let’s check the energy expenditure that corresponds to your own goal of physical activity.

Simple conversion formula: energy expenditure (kcal) = 1.05 × Ex (METs·hour) × body weight (kg)

**(Table) Energy expenditure equivalent to “1 Ex” of physical activity, according to body weight**

Body weight	40 kg	50 kg	60 kg	70 kg	80 kg	90 kg
Energy expenditure	42 kcal	53 kcal	63 kcal	74 kcal	84 kcal	95 kcal

\* Total energy expenditure including sitting/resting energy expenditure.

**[Reference] Why “calorie (kcal)” is not used to express the quantity of physical activity?**

While “calorie (kcal)” is generally used to express energy expenditure, it is quite difficult to quantify physical activity and exercise using “calorie (kcal)”, due to its variability by one’s body weight. For example, when two individuals, one weighing 40 kg and the other weighing 80 kg, undertake the same physical activity, the energy expenditure of the heavier person is twice that of the one weighing 40 kg. Thus, in order to indicate the quantity of physical activity and exercise necessary for prevention of lifestyle-related diseases independent of one’s body weight, this exercise guide adopts the units of “METs” and Ex.



## 2. The quantity of physical activity for health promotion

### (1) Goal for physical activity and exercise

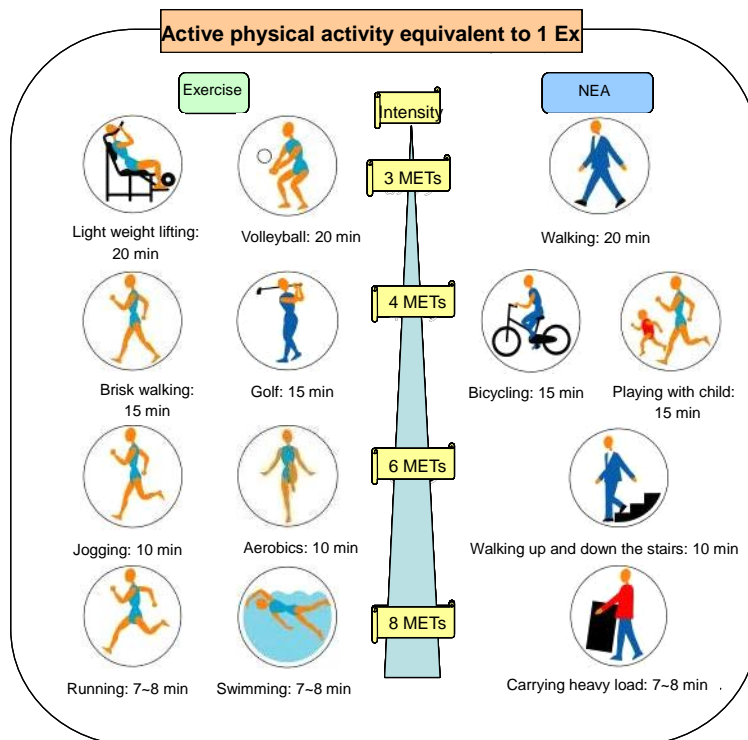
**Let's target 23 Ex (METs·hour) per week by physical activity, of which 4 Ex by active exercise!**

The goal of quantity of physical activity for health promotion was set at 23 Ex or more per week by active physical activity (including both exercise and NEA), of which 4 Ex or more by active exercise.

Based on the results of a systematic review of domestic and foreign literature on the association between physical activity/exercise and lifestyle-related diseases, this goal was set by calculating the mean of quantity of physical activity and exercise necessary for prevention of lifestyle-related diseases.

The “active physical activity” is defined as those with intensity of 3 METs or more. The MET of sitting/resting is 1, and the physical activity with less than 3 METs are not included in this goal.

**Fig. 2. Active physical activity equivalent to 1 Ex**



## **(2) Relationship between the quantity of physical activity and the risk for developing lifestyle-related diseases**

Active physical activity would activate physical function by increasing energy expenditure, which would promote the metabolism of carbohydrates and lipids, possibly leading to reduced visceral fat. Consequently, lifestyle-related diseases can be prevented through improvement of blood glucose level, dyslipidemia and blood pressure.

It has been reported that the increased energy expenditure and improved physical fitness, both of which are by exercise, also have preventive effect on lifestyle-related diseases.

In this guide, the quantity of physical activity and exercise with which one could reduce the risk of developing lifestyle-related diseases is indicated as the goals, based on the results of studies on the effects of physical activity and exercise on development of lifestyle-related diseases.

However, the goals shown here should be revised regularly in the future, based on the review of the latest evidence.

## [Reference]

### **The quantity of exercise necessary to reduce visceral fat — for those with metabolic syndrome or prodromal one —**

The goals for the quantity of physical activity to prevent lifestyle-related diseases have already been explained in [(1) goals for quantity of physical activity]. This section explains the quantity of exercise necessary for people with “metabolic syndrome (visceral fat syndrome)” or prodromal one to reduce visceral fat and also to improve the symptoms related to metabolic syndrome.

#### **(A) Need of reducing visceral fat**

The individuals who have metabolic syndrome are characterized by visceral fat obesity (abdominal circumference:  $\geq 85$  cm for male,  $\geq 90$  cm for female); in addition, the syndrome is complicated with at least two of the following three components: elevated blood glucose, lipid abnormality and elevated blood pressure. Those with prodromal metabolic syndrome have one of the above three components in addition to visceral fat obesity.

It is said that those with metabolic syndrome or prodromal one would have high risk of developing myocardial infarction or stroke by having multiple risks.

Metabolic syndrome can be caused by an unfavorable lifestyle, including lack of physical activity and overeating. By increasing the quantity of exercise and improving one’s diet, visceral fat can be reduced and the symptoms of metabolic syndrome can be improved, by which it is expected that the risks of developing myocardial infarction and stroke will decrease.

#### **(B) Combined effects of increased exercise and improved diet**

Reduction in abdominal circumference, an index of visceral fat accumulation, by 1 cm corresponds to the reduction in body weight by about 1 kg (mostly composed of fat). In order to reduce weight by 1 kg, it is necessary to expend about 7,000 kcal, which is the sum of increase in energy expenditure by exercise and decrease in energy intake by improved diet. For example, in order to reduce in abdominal circumference by 1 cm within one month, one must expend about 230 kcal per day by increased exercise and improved diet.

Generally speaking, a combined approach of diet and exercise can be more effective, rather than a single approach by exercise alone, to reduce one’s body weight as well as visceral fat. It is therefore possible to reduce one’s visceral fat more by improving his/her diet, with referring the Japanese Food Guide Spinning Top, in addition to increasing the quantity of exercise.

#### **(C) Quantity of exercise required to reduce visceral fat**

The goal of quantity of exercise for health promotion was set at 4 Ex per week. According to the studies that examined the association between the quantity of exercise and visceral fat, about 10 Ex/week or more of exercise is required to ensure the reduction in visceral fat. For example, if 30 minutes’ brisk walking is done 5 times a week, it corresponds to 10 Ex.

Without changing the dietary intakes, s/he can lose about 1-2% of visceral fat within a month, by increasing the quantity of exercise by 10 Ex per week.

### **3. Physical fitness**

#### **(1) Physical fitness for health promotion**

Physical fitness encompasses multiple elements related to the capacity of physical activity; endurance, muscle strength, balancing capacity and flexibility.

Of which, this exercise guide focuses on “endurance” and “muscle strength”, because the association with prevention of lifestyle-related diseases has been well-established and also because it is possible for the general population to practice and self-evaluate it.

Studies have shown that the one with higher endurance and muscle strength would have lower risk of developing lifestyle-related diseases. It is therefore expected that lifestyle-related diseases can be prevented by improving these elements of physical fitness through exercise.

#### **(2) Need of exercise suitable for one’s physical fitness**

It is important that one selects the types of exercise suitable for his/her current physical fitness. By which, s/he can practice it safely and effectively and also expect the positive psychological effect including having exhilaration and relieving anxiety.

If you follow the exercise program with low intensity for your physical fitness, you may not achieve the expected effect. On the contrary, if you follow the one with extremely high intensity for your physical fitness, you may get injured or suffer from extreme muscle pain on the following day, which could make you quit the program without attaining the expected effect.

Besides, it is important to determine whether to adopt an exercise focusing on endurance (e.g. jogging, running), or the one focusing on muscle strength (e.g. weight lifting), or a combination of these two types of exercise. Based on which, one should practice the program together with warm-up and cool-down including stretching before and after the routine exercise, to achieve his/her goal.

S/he could plan safer and more effective exercise program, by consulting the specialists on exercise such as the Health Fitness Programmer.



## Chapter 2. Practical Section

# Flowchart from assessment to practice

## 1. Assessment of the current quantity of physical activity

Let's check the current quantity of physical activity, using the "Check sheet to assess the quantity of physical activity" (Page 16)

## 2. Assessment of physical fitness

Let's check if your physical fitness (endurance, muscle strength) matches the goal set for your gender and age (Page 17)

## 3. Setting the goal for the quantity of physical activity

### (1) How much quantity of physical activity to be increased?

Based on the goal for the quantity of physical activity (\*) and the current quantity of physical activity assessed in 1., determine how much quantity of physical activity and exercise you should increase (Page 20).

\* 23 Ex per week by active physical activity, of which 4 Ex by active exercise

### (2) What type of exercise to be undertaken?

Based on the current physical fitness assessed in 2., select the types of exercise you will undertake (Page 21).

## 4. Practice

### (1) To achieve the goal

To achieve the goal set in 3., let's increase the NEA in your daily life and practice exercise suitable for your current stage (Page 30).

### (2) For safe exercise

Be cautious to avoid an accident during exercise (Page 36).

## 1. Assessment of the current quantity of physical activity

Let's assess your current quantity of physical activity.

Compared with the goal for physical activity (23 Ex) and that for exercise (4 Ex), let's check your current quantity by using the following check sheet.

### Check sheet to assess the quantity of physical activity

	activities					Exercise	NEA	Total
Mon.						Ex	Ex	Ex
Tues.						Ex	Ex	Ex
Wed.						Ex	Ex	Ex
Thurs.						Ex	Ex	Ex
Fri.						Ex	Ex	Ex
Sat.						Ex	Ex	Ex
Sun.						Ex	Ex	Ex
Total						Ex	Ex	Ex

### Examples of exercise corresponding to 1 Ex

Activities	Time (minutes)
Bowling, volleyball, frisbee, weight lifting (light or moderate effort)	20
Brisk walking, Radio calisthenics, Golf (using power cart), table tennis, badminton, aquabics, Tai Chi	15
Light jogging, weight lifting(vigorous effort), jazzercise, aerobics, basketball, swimming (leisurely), soccer, tennis, skiing, skating	10
Running, swimming, judo, karate	7-8

### Examples of NEA corresponding to 1 Ex

Activities	Time (minutes)
Walking, Sweeping floor, loading/unloading a car, child care, car washing	20
Brisk walking, bicycling, nursing, gardening, Walk/run - playing with child(ren) or animals, moderate	15
Mowing lawn, walk, power mower; Moving furniture; Climbing the stairs; Shoveling snow by hand	10
Carrying heavy loads	7-8

\* Refer to "Appendix 1" for other exercise and physical activity: Tables for METs and Ex of each physical activity (p.33).

\* When there are multiple values for a single activity, the one that is considered to appear more frequently is listed (c.f., taking the value for leisure activity over that for competitive sport).



## 2. Assessment of the current physical fitness

Let's assess your current physical fitness to plan the exercise program suitable for your physical fitness. There are several methods to assess one's physical fitness, of which we focus on the simple methods to assess endurance and muscle strength by oneself. If you wish to measure your physical fitness more accurately, you could take several tests at the facilities where the specialists on exercise such as the Health Fitness Programmer are available.

### (1) Assessment of endurance

Here, the methods typically used to assess endurance are shown as below;

- ① Walk for 3 minutes at a rate which you feel somewhat hard and measure the distance.
- ② Let's assess your endurance by comparing the distance (①) with the values in **Table 1**.
- ③ If the distance (①) exceeds the value for your gender and age group in **Table 1**, your current endurance almost reaches the goal for preventing lifestyle-related diseases.
- ④ If the distance (①) is less than the value of **Table 1**, your endurance has not reached the goal.

\* If you have any chronic illness, consult your doctor ensure the safe testing.

\* Do not do this test when you have strong knee/back pain.

\* Avoid testing on a very hot/cold day.

**Table 1. Reference walking distance according to gender and age group**

Sex/Age		20s	30s	40s	50s	60s
Males	Walking distance (m) for 3 minutes	375	360	360	345	345
	Walking speed (m/minute)	125	120	120	115	115
Females	Walking distance (m) for 3 minutes	345	345	330	315	300
	Walking speed (m/minute)	115	115	110	105	100

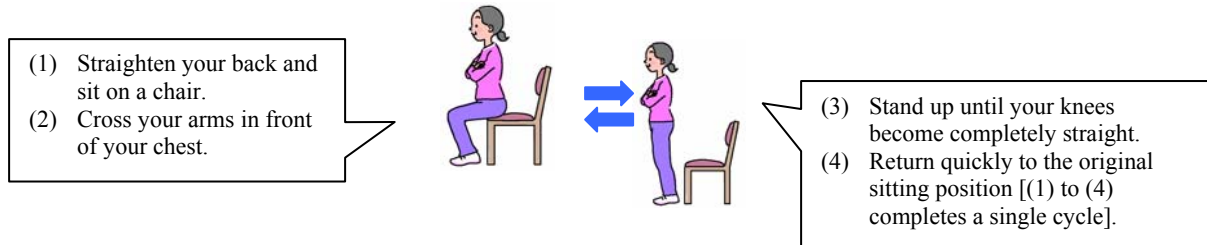
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1. Nakagaichi M, Tanaka T. Development of a 12-min treadmill walk test at a self-selected pace for the evaluation of cardiorespiratory fitness in adult men. *Appl Human Sci* 1998; 17(6):281-8
2. Astrand PO, Rodahl K. Chapter 14. Applied sports physiology. in: *Textbook of work physiology: physiological bases of exercise*, 3rd ed. McGraw-Hill, New York. 1986, pp646-82
3. Ministry of Health, Labour and Welfare of Japan. *Exercise and Physical Activity Reference for Health Promotion* 2006.

## (2) Assessment of muscle strength

Muscle strength, especially of the legs, is affected by aging; hence this guide focuses on muscle strength of the legs.

- ① Sit on a chair and stand up (as shown below) 10 times and measure the required time using a stopwatch.



- \* Use a sturdy and stable chair.
- \* Do this test bare-footed or with low-heeled shoes.
- \* Do not hold your breath during this test.
- \* Do not do this test when you have strong knee/back pain.

- ② Let's assess your muscle strength by comparing the time (①) with the values in **Table 2**.

Please note that the motion can not be counted as one cycle, if your buttocks do not touch the seat when you sit down or if the knees are not completely straight when you stand up.

- ③ If the time (①) falls on “average” or “fast” for your gender and age group in **Table 2**, your current muscle strength almost reaches the goal for preventing lifestyle-related diseases.

- ④ If the time (①) falls on “slow” in **Table 2**, your muscle strength does not reach the goal.

**Table 2. Reference time (seconds) according to gender and age group**

Age (years)	Males			Females		
	Fast	Average	Slow	Fast	Average	Slow
20-39	-6	7-9	10-	-7	8-9	10-
40-49	-7	8-10	11-	-7	8-10	11-
50-59	-7	8-12	13-	-7	8-12	13-
60-69	-8	9-13	14-	-8	9-16	17-

(Data are provided by Prof. Fukunaga, Laboratory of Sports Biomechanics, Faculty of Sport Sciences, Waseda University)

### **3. Setting the goal for the quantity of physical activity**

#### **(1) Concept of goal setting**

Detail methods are presented here to set a goal for the quantity of physical activity for health promotion. Let's think about the goal based on the current quantity of physical activity.

Let's enjoy walking anytime and anywhere: 10,000 steps per day (70,000 steps per week)!

Let's work up a good sweat by exercise suitable for you: total 60 minutes per week!

If 23 Ex per week of physical activity, the target Ex set for health promotion, are converted to the number of steps, it corresponds to approximately 8,000 to 10,000 steps per day (56,000 to 70,000 steps per week). Likewise, 4 Ex per week of exercise corresponds to about 60 minutes of brisk walking or about 35 minutes of playing tennis per week.

#### **(A) Setting the goal for the quantity of physical activity**

Let's examine the current quantity of physical activity, by comparing with the goal. If your current quantity of physical activity has not reached the goal, you should try to achieve it first by increasing the time of walking or bicycling in your daily life. Let's start measuring the number of steps using a pedometer, as it is as easy as weighing yourself on a scale.

If the quantity of your physical activity has already reached the goal, you should maintain the current quantity and improve physical fitness by exercise based on the results of physical fitness test.

#### **(B) Setting the goal for the quantity of exercise**

Let's examine the current quantity of exercise. It is important to set the goal of the quantity of exercise in accordance with one's current exercise habit and physical fitness.

If you have no habit of exercise, you should start with the exercise of 2 Ex per week, and when you get used to exercise, you should set the goal as 4 Ex by increasing the quantity of exercise little by little.

If the current quantity of exercise exceeds 4 Ex per week, increase the quantity of exercise with setting the goal as 10 Ex.

It will be effective to do exercise by which one could increase your physical fitness safely and effectively to the goal, based on the results of physical fitness test. With referring to “(2) Exercises suitable for your physical fitness (see below)”, let’s exercise to achieve the goal.

## (2) Exercises suitable for one’s physical fitness

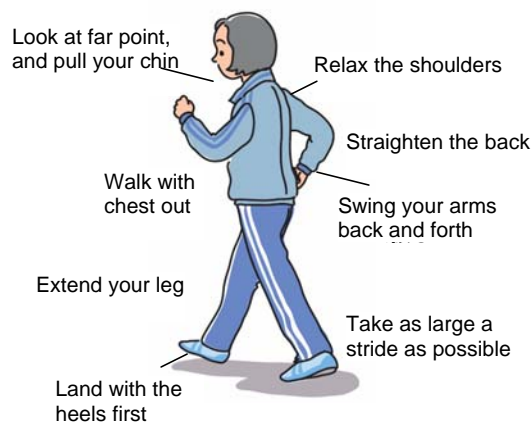
As mentioned in the previous section, it is effective to undertake exercise suitable for your current physical fitness. Focusing on endurance and muscle strength, this section explains the types of exercise to increase them.

### (A) To increase endurance

Q 1. What kinds of exercise would increase endurance?

A1. Exercises suitable to increase endurance are: brisk walking, jogging, bicycling, aerobics, aquatic exercises, swimming, ball games and dancing. For the person who starts exercise for the first time, brisk walking is recommended. Fig. 3 shows an ideal form for brisk walking.

**Fig. 3. Ideal form for brisk walking**



Q2. How much exercise to be done?

A2. Exercise to increase your endurance doesn't have to be very hard. You could increase your endurance safely by moderate exercise. For example, moderate brisk walking can be explained as below:

- Walking at a speed slightly faster than usual.
- You may feel slightly out of breath, but can still keep a smile on your face.
- You can continue for some time, but may feel anxious to continue for a long time.
- You start to sweat in about 5 minutes.
- After about 10 minutes' walking, you feel a slight muscle pain in your calf.

If you exercise for the first time, you should start with the speed that you feel very easy, and you could gradually increase the speed to the moderate level.

Let's target the quantity of exercise at 4 Ex per week, as is recommended in the EPAR2006

### **(B) To increase muscle strength**

Q1 What kinds of exercise would enhance muscle strength?

A1. Let's start muscle resistance training that uses your body weight as a load, which you can easily do at home. Of course, you can also start with resistance training using a machine under the guidance of a specialist on exercise.

The following figures show the examples of resistance training that you can do at home.

Every action should be done with a correct posture, slowly without a rebound, and with being conscious of the muscles that are being trained.

## ○ Examples of resistance training at home

### ① Squatting (strengthening the front side of femoral muscle and the major psoas muscle)



- 1) Stand with the feet at shoulder-width apart and the toes turned outward. Straighten the back and extend both arms forward.
- 2) Bend the knees in 3 seconds, with keeping the same direction as the toes, like sitting on a chair and maintain this posture for one second.
- 3) Return to the original posture within the next 3 seconds.

- \* Make sure that the knees do not come ahead of the toes.
- \* Do not bend down your head.

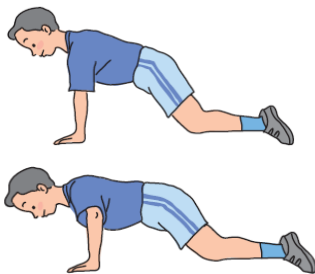
### ② Hip extension (strengthening the back side of femoral muscle and buttocks)



- 1) With straightening the back and fixing the waist unmoved, put force to the lower buttocks.
- 2) Raise a foot backward from the heel in 3 seconds, and maintain the posture for one second.
- 3) Return the foot to its original position within the next 3 seconds.

- \* Make sure that the upper body does not lean forward.
- \* Raise the foot without bending backward.
- \* Do not put your weight on the chair.

### ③ Push-ups (strengthening the chest and arm muscles)



- 1) Bend the knees a little and rest on the floor. Stretch both arms vertically to the floor (with the elbows slightly bent).
- 2) Place your hands slightly wider than shoulder-width apart. Turn the fingers slightly inward.
- 3) Bend the elbows slowly and maintain this posture for one second.
- 4) Return slowly to the original posture (do not bend backward).

**Q2 How much exercise to be done?**

A2. The goal for the quantity of resistance training should be set based on the results of assessment of muscle strength shown in page 19.

- “Slow” → ① to ③ (Page 23) should be done 10 times × 1 set, 5 to 7 times a week.
- “Average” → The ① to ③ (Page 23) should be done 10 times × 2 sets, 5 to 7 times a week.
- “Fast” → The ① to ③ (Page 23) should be done 10 times × 3 sets, 5 to 7 times a week.

\* If you are not confident with your muscle strength, the maximum number of sets should be limited to 2.

**Q3. How to increase one’s muscle strength in his/her daily life?**

A3. In the daily life, you can expect the increase of your muscle strength by climbing up and down stairs or slopes.

For example, let’s use the stairs instead of an escalator or lift at a train station or building.



### (3) Specific examples

Let's see the cases where the person achieved the goal for the quantity of physical activity by adding some activities in his/her daily life.

#### Case 1. Mr. A, an office worker who commutes by train

	Activities					Exercise	NEA	Total
Mon	Commuting	Commuting				0Ex	2Ex	2Ex
Tues	Commuting	Commuting				0Ex	2Ex	2Ex
Wed	Commuting	Commuting	Volleyball			1Ex	2Ex	3Ex
Thur	Commuting	Commuting				0Ex	2Ex	2Ex
Fri	Commuting	Commuting				0Ex	2Ex	2Ex
Sat	Walking a dog	Playing with child	Playing with child			0Ex	3Ex	3Ex
Sun	Walking a dog	Washing a car	Washing a car	Brisk walking	Brisk walking	2Ex	3Ex	5Ex
<b>Total</b>						3Ex	16Ex	<b>19Ex</b>



	Activities					Exercise	NEA	Total
Mon	Commuting	Commuting	Taking walk			0Ex	3Ex	3Ex
Tues	Commuting	Commuting	Taking walk			0Ex	3Ex	3Ex
Wed	Commuting	Commuting	Volleyball			1Ex	2Ex	3Ex
Thur	Commuting	Commuting	Taking walk			0Ex	3Ex	3Ex
Fri	Commuting	Commuting	Volleyball			1Ex	2Ex	3Ex
Sat	Walking a dog	Playing with child	Playing with child			0Ex	3Ex	3Ex
Sun	Walking a dog	Washing a car	Washing a car	Brisk walking	Brisk walking	2Ex	3Ex	5Ex
<b>Total</b>						4Ex	19Ex	<b>23Ex</b>

#### Physical activity of Mr. A in a week

- Exercise
  - Volleyball (20 min.): 1 Ex /time  
Once a week
  - Brisk walking (30 min.): 2 Ex /time  
Once a week
- Daily activities
  - Commuting: 2 Ex / day  
(40 minutes round trip) 5 times /week
  - Walking a dog (20 min.): 1 Ex / time  
Twice a week
  - Playing with child (30 min.): 2 Ex /time  
Once a week
  - Washing a car (40 min.): 2 Ex / time  
Once a week

#### Evaluation and goal

Mr. A was short of 4 Ex in the quantity of physical activity to reach the goal of 23 Ex. Physical fitness test showed that he had lower endurance than the goal.



Mr. A decided to add the following activities, utilizing the lunch time.



#### Physical activity that Mr. A added

- Exercise
  - Volleyball (20 min.): 1 Ex /time  
Once a week
- Daily activities
  - Taking a walk : 1 Ex / day  
(at lunch time) 3 times /week

#### Results

Mr. A achieved the goal for the quantity of both physical activity and exercise. He plans to continue exercise, so as to achieve the goal of endurance as well by increasing the time of brisk walking.

**Case 2. Mrs. B, a housewife who stays at home most of the day**

	Activities					Exercise	NEA	Total
Mon	Shopping	Sweeping floor	Sweeping floor			0Ex	3Ex	3Ex
Tue	Playing with child	Playing with child	Aerobics	Aerobics	Aerobics	3Ex	2Ex	5Ex
Wed	Shopping	Sweeping floor	Sweeping floor			0Ex	3Ex	3Ex
Thur	Playing with child	Playing with child				0Ex	2Ex	2Ex
Fri	Shopping	Aerobics	Aerobics	Aerobics		3Ex	1Ex	4Ex
Sat	Playing with child	Playing with child				0Ex	2Ex	2Ex
Sun	Gardening	Gardening				0Ex	2Ex	2Ex
<b>Total</b>						6Ex	15Ex	<b>21Ex</b>



	Activities					Exercise	NEA	Total
Mon	Shopping	Sweeping floor	Sweeping floor			0Ex	3Ex	3Ex
Tues	Playing with child	Playing with child	Aerobics	Aerobics	Aerobics	3Ex	2Ex	5Ex
Wed	Shopping	Sweeping floor	Sweeping floor			0Ex	3Ex	3Ex
Thur	Playing with child	Playing with child				0Ex	2Ex	2Ex
Fri	Shopping	Aerobics	Aerobics	Aerobics		3Ex	1Ex	4Ex
Sat	Playing with child	Playing with child	Resistance training			1Ex	2Ex	3Ex
Sun	Gardening	Gardening	Resistance training			1Ex	2Ex	3Ex
<b>Total</b>						8Ex	15Ex	<b>23Ex</b>



**Physical activity of Mrs. B in a week**

- Exercise
- Aerobics (30 min.): 3 Ex / time  
Twice a week
- Daily activities
- Shopping: 1 Ex / time  
(20 min. round trip) 3 times / week
- Playing with child (30 min.): 2 Ex / time  
3 times / week
- Sweeping floor (40 min.): 2 Ex / time  
Once a week
- Gardening (40 min.): 1 Ex / time  
Twice a week

**Evaluation and goal**

Mrs. B was short of 2 Ex in the quantity of physical activity to reach the goal of 23 Ex. Physical fitness test showed that she had lower muscle strength than the goal.



Mrs. B decided to add the following activities, during the weekend.

**Physical activity that Mrs. B added**

- Exercise
- Resistance training (20 min.): 1 Ex /time  
Twice a week

**Results**

Mrs. B achieved the goal for the quantity of both physical activity and exercise. She plans to continue resistance training, so as to achieve the goal of muscle strength.

**[Reference] Setting a goal for the quantity of exercise to reduce visceral fat**

~ for the persons with metabolic syndrome or prodromal one ~

To prevent lifestyle-related diseases, especially metabolic syndrome, it is effective to reduce one's visceral fat by increasing the quantity of exercise and improving his/her diet. Let's set a goal to reduce the visceral fat, using the following sheet.

**SHEET FOR REDUCING VISCERAL FAT**

To reduce visceral fat without vigorous effort

~Keeping a good balance of exercise and diet~

If you have abdominal circumference  $\geq 85\text{cm}$  (for male) or  $\geq 90\text{cm}$  (for female), let's follow the following calculation to plan a method suitable for you to reduce your abdominal circumference.

① What is your abdominal circumference?

① cm

② What is your short-term goal for abdominal circumference?

② cm

The cut-off abdominal circumference for metabolic syndrome is 85cm for male and 90cm for female. If your abdominal circumference is much higher than this value, set a reasonable and gradual goal.

③ How long does it take to achieve the goal?

Steady course:

① - ② cm

$\div 1\text{cm/month} =$

③ mo.

Quick course:

① - ② cm

$\div 2\text{cm/month} =$

③ mo.

④ Amount of energy to be reduced to achieve the goal

① - ② cm

$\times 7,000\text{kcal}^{\ast} =$

④ kcal

④ kcal

$\div$

③ mo.

$\div 30\text{ days} =$

Amount of energy to be reduced per day

kcal

$\ast$  To reduce abdominal circumference by 1cm (=body weight by 1kg), about 7,000 kcal should be

⑤ How do you reduce this amount of energy ?

Amount of energy to be reduced per day

kcal

By exercise

kcal

By diet

kcal



## Energy expenditure by exercise



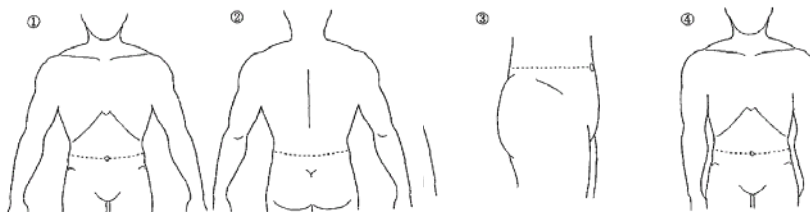
	Brisk walking	Swimming	Bicycling (light effort)	Golf	Light jogging	Running	Tennis (Singles)
METs	4.0	8.0	4.0	3.5	6.0	8.0	7.0
Time	10 min	10 min	20 min	60 min	30 min	15 min	20 min
Ex	0.7	1.3	1.3	3.5	3.0	2.0	2.3
Energy expenditure by body weight							
50kg	25kcal	60kcal	55kcal	130kcal	130kcal	90kcal	105kcal
60kg	30kcal	75kcal	65kcal	155kcal	155kcal	110kcal	125kcal
70kg	35kcal	85kcal	75kcal	185kcal	185kcal	130kcal	145kcal
80kg	40kcal	100kcal	85kcal	210kcal	210kcal	145kcal	170kcal

Energy expenditure is calculated by “(METs × body weigh×time (h)×1.05) – resting metabolic rate”. All the values are shown in 5 kcal unit.

## Measurement of abdominal circumference

- Measure at the navel level, at the standing position.
- Stand with both feet together: the arms are placed naturally on the sides. Try not to strain the abdominal muscles
- Breathe naturally and read the scale of tape measure at the end of exhalation.
- Make sure that the tape measure is placed horizontally around the back/waist.
- For an accurate measurement, do not wear underwear

### Measuring site of abdominal circumference



#### **4. To achieve the goal**

##### **(1) Advice for achieving the goal**

Here is the advice for you to achieve the goal that you have set for the quantity of physical activity. For which, it is important that you increase the quantity of NEA in your daily life and practice exercise suitable to your life style.

Furthermore, to achieve the goal, it is effective to exercise considering your current life stage.

##### **(A) Advice for increasing the quantity of NEA**

To increase the quantity of NEA, it is effective to increase the number of steps in your daily life. Let's achieve your goal for physical activity by acquiring a walking habit.

##### **○ Six key points to develop a walking habit in your daily life**

① Let's learn the number of steps by the time of walking. For example, walking for 10 minutes roughly corresponds to 1,000 steps.

② Let's learn the number of steps by experience of your behavioral pattern. For example, you can learn how many steps you usually take for going to a supermarket or commuting.

③ Do not try too hard from the start. If you plan to increase your steps by 4,000 steps, start with an increment of 1,000 steps a day. You can gradually increase the number of steps to 4,000 steps in 3 months.

④ Walking does not have to be continuous. You can aim at total 10,000 steps in a day (70,000 steps for a week).

⑤ You should create as many opportunities as possible to walk as a mode of transportation in your daily life.

⑥ Let's walk with a specific purpose. It may be good to go shopping or visiting historical sites during the weekend.

## (B) Advice for increasing the quantity of exercise

It is important to maintain the reference quantity of exercise per week. For example, you can do brisk walking at a pace suitable to your lifestyle, either once a week for 60 minutes or 6 times a week for 10 minutes each.

## (2) Advice for achieving the goal, according to one's current stage

These are the advices that may help you in achieving the goal suitable for your current stage.

First, find out your current stage by referring to the flow chart below.

Next, proceed to the page shown in the box of your stage. You will find an advice to practice and continue the physical activity and exercise suitable to your current stage. Then, let's

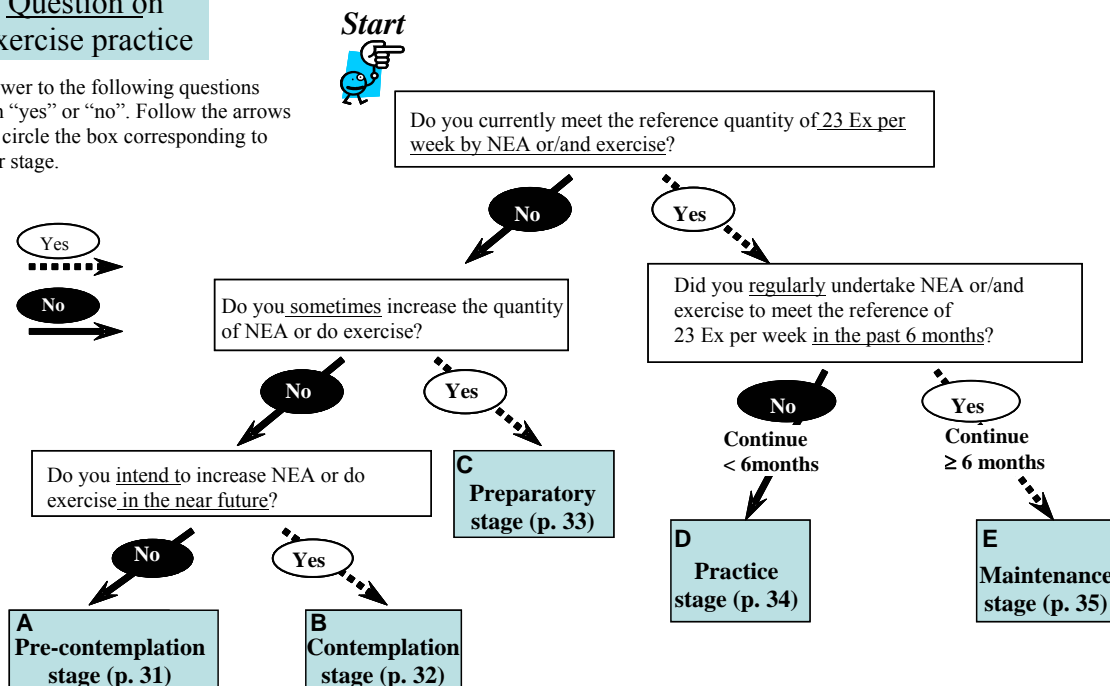
consider how you are going to incorporate physical activity and exercise into your daily life.

You should evaluate the quantity of physical activity every 3 to 6 months, to adjust the goal and also to re-evaluate your stage.

### “What's your current stage?”

#### Question on exercise practice

Answer to the following questions with “yes” or “no”. Follow the arrows and circle the box corresponding to your stage.



\* NEA: non-exercise activity

## A. For the persons in the pre-contemplation stage

### The persons in this stage are...

Currently, you are not doing any exercise and the quantity of your NEA is also low. Yet, you still do not consider starting exercise or increasing NEA in the near future.

You have not achieved the goal of the quantity of physical activity necessary for health promotion. If you remain in the current stage, you will be at risk of developing lifestyle-related diseases. First, let's start with considering increasing the quantity of physical activity.

### Advice :

Let's imagine your future health status!

- Perhaps, you are focusing too much on the burden of exercise, aren't you? Let's turn your attention to the future benefits too. First, please imagine the immediate effects: you will be more resistant to diseases, you will lose your weight, you no longer lose your breath when you climb stairs, and you do not need a special effort when you stand up.
- If you continue to keep the quantity of your physical activity low, what will happen to your body in the future? Imagine also the influences on other people around you. Whatever little effort you make now will bring you a much better future. Just imagine yourself being more active and healthy.
- You may say that you do not like or are not good at or are not confident with or have no time to do any exercise. You can even prevent lifestyle-related diseases by increasing NEA, instead of doing exercise.

Be more active, rather than do nothing.

Let's start with what you can do.

- Let's start with what you can do immediately. It is better to do even a little activity, rather than do nothing. As a starter, let's challenge stretching, walking and climbing stairs, all of which you can do without any special preparation.
- You may consider consulting a specialist about the types of exercise suitable for you and how to increase your NEA. Surely, you will receive a helpful advice from him/her.

## B. For the persons in the contemplation stage

### The persons in this stage are...

Currently, you are not doing any exercise and the quantity of your NEA is also low. Thus, you have not achieved the goal of the quantity of physical activity necessary for health promotion. If you maintain the current status, you will be at risk of developing lifestyle-related diseases.

What a wonderful that you are planning to increase your NEA and start exercise in the near future. Let's take a first step toward realization of your plan.

### Advice :

Let's start with increasing the quantity of physical activity!

- Even without doing exercise, you can maintain and promote your health by moving actively in your daily life. The recommended quantity of physical activity for health promotion corresponds to about 8,000 to 10,000 steps per day. You do not need to aim at this goal from the start. Let's start with the steps you can do and increase gradually.
- How about start with an increment of 1,000 steps a day, and then gradually increase the number of steps, as you get used to it? Walking for 10 minutes roughly corresponds to 1,000 steps.
- You do not have to focus too much on the number of steps. You may set a goal of doing the activities, such as taking a walk, commuting, floor cleaning, gardening, car washing, carrying a load and playing with a child, for about 60 minutes in total every day. Even without allocating a separate time for exercise, you could also exercise while you do housework.

How do you feel after you tried?

- You may notice that there are unexpectedly many things you can do to increase NEA. Now, you know that you can do. Let's have self-confidence.
- Let's set a minimum goal that you can easily accomplish everyday, like taking slightly large steps while walking or stretching your back once every hour.
- Let's find a place for walking in a nearby park or on the way to your office. By looking into your daily life, let's consider when, where and how much activity you can do.
- At the beginning, you may start with a little exercise, for example once in the weekend for 30 minutes. Anyway, let's start a new challenging exercise even for a short time.
- You may consider consulting a specialist about the types of exercise suitable for you and how to increase your NEA. Surely, you will receive a helpful advice from him/her



## C. For the persons in the preparatory stage

### The persons in this stage are...

Currently, you have not achieved the goal of the quantity of physical activity necessary for health promotion. Yet, you are occasionally trying to increase NEA and do exercise. Unfortunately, the current quantity of physical activity is not sufficient to prevent lifestyle-related diseases. So, let's change the frequency of activities from "occasionally" to "regularly".

### Advice :

Let's start with doing exercise once a week, and enjoy continuing it!

- You have tried, even occasionally, to increase NEA or do exercise. You've done well. As this cannot be done easily, you should have self-confidence. What you have to do next is to change the frequency of activities from "occasionally" to "regularly".
- For health promotion, you are advised to increase NEA and continue them and do exercise of at least 4 Ex per week, which corresponds to brisk walking, bicycling or dancing for about one hour per week, or aerobics, swimming, jogging, playing tennis or soccer for about 40 minutes per week.
- You can do these exercises at once or can divide into 2, 3 or 6 times in a week. For example, you can do brisk walking either once a week for 60 minutes, twice a week for 30 minutes each or 3 times a week for 20 minutes each.

Devise a way to continue the exercise!

- Let's place the items that encourage you to practice exercise around you. For example, you may post your goal of exercise program (e.g. number of steps) on your fridge, or place your walking shoes in a visible place at the entrance; or hang your sportswear in your room.
- First, let's grasp when, where and how long you undertake the activities. Based on which, you can set a specific and practical goal of exercise. If you cannot achieve your goal, your goal may not be realistic. Let's set a 95% achievable and short-term goal.
- Let's ask your family or friends to give you a moral support or join you in exercising. It may be a good idea to declare your goal of exercise in front of them.

## D. For the persons in the practice stage

### The persons in this stage are...

Currently, you undertake a great quantity of NEA or exercise regularly. You have achieved the goal of the quantity of physical activity necessary for health promotion. You can maintain and promote your health by continuing the current practice. As it is still less than 6 months since you performed physical activity regularly, there is a risk that you may go back to the previous sedentary life. Let's continue the current practice, while being cautious of the risk of rebounding.

### Advice :

Let's try to keep the current practice!

- You have increased your NEA and practiced exercise. You have done very well. Now, it is time to consider how you can keep these practices.
- Let's look back now. You must have been tempted to give up several times. You have overcome the situations that stopped you to continue the exercise (e.g. working late, taking care of your family). You could anyway manage to continue the exercise, for which you should have self-confidence.
- Now, you must be aware of the physical effects of exercise; e.g., you feel less tired; you can climb the stairs more easily; your abdominal circumference is reduced and your clothes fit better; and you no longer have stiff shoulders. Let's recognize these effects again.
- Let's control the various factors that could interfere with your current exercise habit. For example, prepare indoor activities in case of bad weather, as a replacement of walking; if you've got a sudden work by which you could not do the planned exercise, increase the quantity of physical activity on another day so that you can maintain the goal of Ex per week; and if you feel bored with the routine program, change the route for walking or try a different type of exercise.
- Let's put the schedules of NEA and exercise in your personal notebook or calendar in advance. By which, a higher priority will be placed on these activities in your mind.
- Sometimes, you may not feel like doing any exercise. Even if that happens, you should anyway go to the place of exercise or change your clothes for exercise.

## E. For the persons in the maintenance stage

### The persons in this stage are...

Currently, you undertake a great quantity of NEA or exercise regularly. You have achieved the goal of the quantity of physical activity necessary for health promotion. You can maintain and promote your health by continuing the current practice. Let's maintain the current condition.

### Advice :

Let's have a confidence that you have continued.  
Let's invite your family and friends to join you.

- How wonderful that you could continue your program in spite of the many temptations and difficulties that you have encountered. You should congratulate yourself.
- Let's recognize again the physical effects of exercise that you feel in your daily life; e.g., you feel less tired; you can climb the stairs more easily; your abdominal circumference is reduced and your clothes fit better; and you no longer have stiff shoulders.
- Let's control the various factors that could interfere with your NEA and exercise. For example, prepare indoor activities in case of bad weather, as a replacement of walking; if you've got a sudden work by which you could not do the planned exercise, increase the quantity of physical activity on another day so that you can maintain the goal of Ex per week; and if you feel bored with the routine program, change the route for walking or try a different type of physical activity.
- Let's put the schedules of NEA and exercise in your personal notebook or calendar in advance. By which, a higher priority will be placed on these activities in your mind.
- Having continued the program for a certain period, reward yourself for your effort. The reward may be traveling, taking a special meal or buying a new sportswear you wanted.
- Lastly, you should understand that it is not unusual that your program can be interrupted by some reasons. Yet, it is only yourself who can restart the program. Be prepared also for the risk of rebounding. However, even if you have stopped your habit temporarily for some reason, do not feel anxious too much. Instead of trying very hard to restart the program in a rush, take your time in going back to your previous exercise habit.

Check the following:

- ① Are you sure that your physical activity program is not biased to a certain type of actions?
- ② Are you enjoying the physical activity instead of doing it as an obligation?
- ③ Are you certain that your physical activity is not adversely affecting your physical condition?

If your condition falls on any of the above ①-③, you should consult a specialist on exercise.

## **5. Notes on practicing exercise**

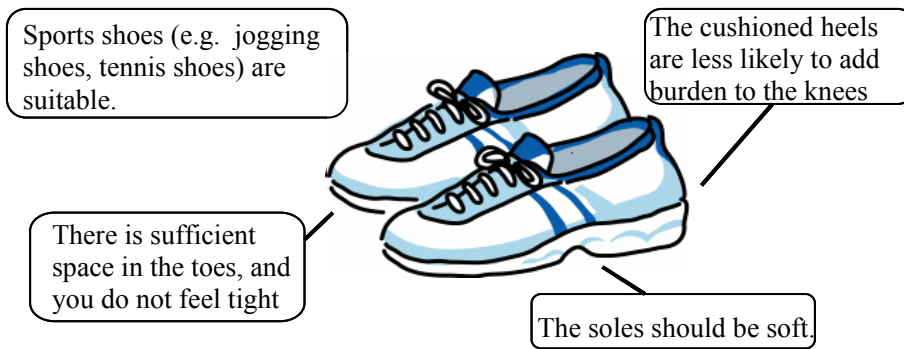
When you do exercise, it is important to pay attention to your physical condition and the weather on that day, as well as your chronic illness, so as to avoid any accident. If you suffer from a chronic illness, consult your doctor so that you can practice exercise safely.

In addition, it is important that you select the type of exercise suitable to your physical fitness, and also that you do warm-ups and cool-down, including stretching, before and after exercise.

### **(1) Notes for a safe exercise**

- ① To prevent an accident and reduce the fatigue after exercise, make sure to do the warm-up and cool-down exercises. Please also refer to “(2) Warm-up and cool-down exercises” (p.37).
- ② If you have chronic knee pain or backaches, consult your doctor or a specialist on exercise before starting the exercise program. If a strong pain occurs during or after exercise, stop the exercise immediately.
- ③ If you suffer from a chronic disease such as cardiovascular ones, exercise may quickly elevate your blood pressure. Do not start the exercise without consulting your doctor or a specialist on exercise. Check your blood pressure and physical condition before exercise, and if you do not feel quite well, you should stop the exercise.
- ④ Adjust the quantity or intensity of exercise to suit your physical condition on that day.
- ⑤ When you exercise outdoors or at a place with high temperature during summer, you must be careful not to suffer from dehydration or heat stroke. To prevent these symptoms, make sure to drink sufficient fluids before, during and after exercise.
- ⑥ You should wear clothes that are suitable for the season, with which you can move freely. It is recommended to wear the sports shoes that do not place the burden to your knees or ankle joints.

**Fig. 4. An example of good sports shoes**



## (2) Warm-up and cool-down exercise

It is known that injuries and pain caused by physical activity and exercise are likely to occur at the sites that are frequently and actively used. Warm-up and cool-down exercise (including stretching) should be selected in accordance with the type of exercise, focusing on the sites where injuries or pain are likely to occur.

### Light exercise: slow and large motions to relax muscles and joints

① Knee bends



② Light leg stretch



③ Upper body bends



④ Side stretch



⑤ Rotate upper body



⑥ Back stretch



⑦ Rotate wrists and ankles



⑧ Light jump



⑨ Deep breath



**Stretching: slowly extend (for about 20 sec.) to relax muscles and joints**

[Leg] ① Calf



② Hamstring



③ Quadriceps



④ Inner thigh



[Body trunk] ① buttock/lumber



② Upper back



③ Neck



[Shoulder/arm]

① Shoulders



② Triceps



③ Wrists



**Key points**

- ① Do not hold your breath.
- ② Stretch slowly for 20 to 30 seconds.
- ③ Stretch moderately, at the level without a pain.
- ④ Feel that the stretched muscle is sufficiently extended.
- ⑤ Do not use a recoiling power or put too much pressure.



# Appendix

## **Appendix 1. Tables for METs and Ex of each physical activity**

For your reference to self-evaluate the quantity of your physical activity and plan various combinations of physical activity (exercise and NEA) to meet the exercise guide, the following tables show the time corresponding to one Ex (METs·hour) for various types of physical activity.

### **Exercise of 3 METs or more (included in the computation of the goal for the quantity of exercise)**

METs	Specific physical activities	Time (min/day) corresponding to 1 Ex
3.0	Bicycling using a stationary ergometer: 50 watts, very light effort; Weight lifting (light or moderate effort); Bowling; Playing frisbee; Volleyball	20
3.5	Calisthenics (home exercise, light or moderate effort); Playing golf (using power cart, excluding the waiting time. <b>See Note 2</b> )	18
3.8	Walking for exercise (level, 94 m/min.)	16
4.0	Walking at a brisk pace (level, 95-100 m/min.); Water exercise/stretching; Table tennis, ping-pong; Tai chi, Water aerobics/calisthenics	15
4.5	Badminton, golf (walking and carrying clubs, excluding the waiting time)	13
4.8	Ballet; modern dance; twist, jazz or tap dancing	13
5.0	Softball or baseball; Children's games (hopscotch, dodge ball, playground apparatus, marbles etc.); Walking (level, very brisk pace, 107 m/min.)	12
5.5	Bicycling using a stationary ergometer: 100 watts, light effort	11
6.0	Weight lifting (power lifting or body building, vigorous effort); Slimnatics; jazzercise; Jog/walk combination (jogging component of less than 10 min.); Basketball; Swimming, leisurely	10
6.5	Aerobics	9
7.0	Jogging; Soccer; Tennis; Swimming, backstroke; skating; skiing	9
7.5	Mountain climbing: with 1-2 kg load	8
8.0	Cycling (approx. 20km/h), leisure, moderate effort; Running: 134 m/min., Swimming, slow crawl (approx. 45 m/min.), moderate or light effort	8
10.0	Running: 161 m/min.; judo; jujitsu; karate; kick boxing; tae-kwon-do; rugby; Swimming, breast stroke	6
11.0	Swimming, butterfly; Swimming, fast crawl (approx 70 m/min.), vigorous effort	5
15.0	Running, stairs, up	4

Ainsworth BE, Haskell WL, Whitt MC, et al. Compendium of Physical Activities: An update of activity codes and MET intensities. *Med Sci Sports Exerc* 2000; 32(Suppl): S498-S516.

**Note 1:** When there are multiple values for a single activity, the one that is considered to appear more frequently is listed (c.f., taking the value for leisure activity over that for competitive sport).

**Note 2:** Each value represents that while engaged in activity, not while resting. For example, if one played golf using a power cart, and if s/he spent 2 hours out of total 4 hours for waiting, the calculation should be 3.5 METs x 2 hours = 7 Ex(METs·hour).



**Nonexercise activity (NEA) of 3 METs or more (included in the computation of the goal for the quantity of physical activity)**

METs	Description of activities	Time (min/day) corresponding to 1 Ex
3.0	Walking (level, 67 m/min.); Walking with small child(ren); Walking the dog; Shopping; Fishing (from boat, sitting (2.5) to fishing in stream (6.0)); House cleaning; Putting away household items; Carpentry; Packing; Playing guitar, rock and roll band (standing); Loading/unloading a car; Walking down the stairs; Child care, standing	20
3.3	Walking (level, 80 m/min., moderate pace) commuting; Carpet sweeping; Sweeping floors	18
3.5	Mopping; Vacuuming; Packing/unpacking box; Carrying light load; Electrical work and plumbing	17
3.8	Walking for exercise (level, 94 m/min.), Scrubbing floor on hands and knees; Scrubbing bathroom/bathtub	16
4.0	Walking at a brisk pace (level, 95-100 m/min.); Bicycling: <16 km/h, leisure, to work or for pleasure; Walk/run - playing with child(ren), or animals, moderate; Pushing the wheelchair; Raking roof with snow rake; Playing drums; Playing with a child (walk or run, at a moderate intensity)	15
4.5	Planting seedlings/shrubs, weeding, cultivating garden; Farming: feeding cattle/horses	13
5.0	Walk/run – Playing with child(ren), or animals, vigorously; Working at a very brisk pace (level, 107 m/min.)	12
5.5	Mowing lawn, walk, power mower	11
6.0	Moving furniture, household items, carrying boxes, Shoveling snow by hand	10
8.0	Carrying heavy load; Farming: forking straw bales, cleaning corral or barn, poultry, vigorously; Climbing the stairs	8
9.0	Carrying load upstairs	7

Ainsworth BE, Haskell WL, Whitt MC, et al. Compendium of Physical Activities: An update of activity codes and MET intensities. Med Sci Sports Exerc 2000; 32(Suppl): S498-S516.

**Note 1:** When there are multiple values for a single activity, the one that is considered to appear more frequently is listed

**Note 2:** Each value represents that while engaged in activity, not while resting.

**Activities of less than 3 METs (excluded in the computation of the goals for the quantity of physical activity and exercise)**

METs	Description of activities
1.0	Sitting quietly (or lying down); Watching TV or listening to music; Reclining; Riding in a car
1.2	Standing quietly
1.3	Sitting – reading book or newspaper
1.5	Sitting – talking or talking on the phone, reading, eating, driving a car, light desk work, knitting, doing a manual craft and typing Taking care of a pet (in a sitting position, light intensity); Bathing (sitting)
1.8	Standing - talking or talking on the phone, reading and doing a manual craft;
2.0	Cooking or food preparing – standing or sitting; Implied standing – laundry, fold or hang cloths, put clothes in washer or dryer, packing; Playing guitar, classical or folk (sitting); Dressing, undressing; Talking and eating or eating only (standing); Grooming (brushing teeth, washing, shaving etc.); Showering, toweling off (standing); Walking slowly (level, outdoors or indoors ground, less than 54 m/min. )
2.3	Wash dishes (standing); ironing; Implied walking – putting away clothes, gathering cloths to pack; putting away laundry Standing - casino gambling, duplicating machine (standing); Standing – light work (bartending, store clerk, factory worker)
2.5	Stretching* and hatha yoga*; Light cleaning (dusting, straightening up, changing linen and carrying out trash); Serving food, setting table, cooking or food preparation, and putting away (walking) etc.; Watering plants; Sitting - playing with child(ren) or animals; Child care (sitting/kneeling); Playing piano or organ; Farming: driving harvester, cutting hay, irrigation work; Playing catch* (football or baseball); Operating a motor scooter or motorcycle; Pushing or pulling stroller with child or walking with children; Walking (level, 54 m/min.)
2.8	Standing - playing with child(ren) or animals

\*Indicates exercise: the others are classified as nonexercise activity (NEA).

Ainsworth BE, Haskell WL, Whitt MC, et al. Compendium of Physical Activities: An update of activity codes and MET intensities. Med Sci Sports Exerc 2000; 32(Suppl): S498-S516.

**Note 1:** When there are multiple values for a single activity, the one that is considered to appear more frequently is listed (c.f., taking the value for leisure activity over that for competitive sport).

**Note 2:** Each value represents that while engaged in activity, not while resting.

**Appendix 2. Case examples of approaches to increase the quantity of physical activity according to one's lifestyle**

Specific examples are shown here to illustrate how to increase the quantity of physical activity according to one's exercise habit, lifestyle and physical condition. You may refer to an example close to your case or the one that you find interesting, so as to increase the quantity of your physical activity.

**Case 1. A man in his 30's who wants to prevent metabolic syndrome.**

Health promotion by working out a lack of exercise

“Reduce the visceral fat by brisk walking!”



**Case 2. A man in his 50's wishing to treat metabolic syndrome**

Reduce the abdominal circumference by physical activity

“Increase the quantity of physical activity in your daily life”



**Case 3. A woman in her 30's who wants to practice an active lifestyle**

Healthy weight control through exercises

“Gain a smart figure by exercise once a week!”



**Case 4. A woman in her 40's who wants to regain the slim figure**

Health promotion through diet and exercise

“Healthy weight control through exercise and diet!”



**Case 5. A woman in her 50's who wants to remove anxiety on her health after illness**

Regain an active body through exercise

“Regain health through exercise after an illness”



**Case 6. A woman in her 60s who wants to live a more active life**

A more active life by increasing physical fitness

“A fatigue-free life with increased muscle strength”



## Case 1 “Reduce the visceral fat by brisk walking!”

Mr. Koji, 38 years old, sales representative

### (1) How did he get started to increase the quantity of physical activity?

Mr. Koji had engaged actively in athletic activities at the high school and had been confident of his physical fitness. Having been employed after graduation, however, he had little time for exercise. In addition, he was often involved in the drink/dinner related to his job after work. As a result, he gained weight by 25 kg (60kg→85 kg). At that time, his boss was hospitalized with myocardial infarction, which made him worry about his own health. He lost his breath when he climbed the stairs to the third floor and he also found his colleagues easily climbed faster than him, which further bothered him. He was told at the health guidance after the health check-up that “You will be at risk of developing lifestyle-related disease if you continue the current life style”. So he decided to lose his weight.

### (2) Device to increase the quantity of physical activity

He has ever gone to a fitness club regularly. However, when he could not go there for several days due to his work, he often gave up continuing it. Following the suggestion by his colleagues, he started commuting by train, instead of car. As a daily goal, he decided to walk for about 30 minutes (round trip between the station and the office) with a speed by which he feels a bit hard to breathe.

Wearing a pedometer, he set a goal to walk 10,000 steps a day. He entered the number of steps in his PC, and drew a graph to check the daily difference.

He weighed himself everyday, with paying particular attention to his abdominal circumference. And, he set a goal to lose 5 kg within 3 months.

He also improved his diet, by stopping to eat fast, reducing the intake of fried food, increasing the intake of vegetables and replacing regular canned coffee with sugar-free one.

#### [Exercise program for Mr. Koji]

Brisk walking for 30 minutes, 5 times a week      $4 \text{ METs} \times 30/60 \times 5 = 10\text{Ex/week}$

### (3) Results after 3 months

By acquiring the daily walking habit, the mean number of steps per day increased from 5,500 to 10,000 steps, and he also lost body weight by 4 kg.

Looking at a positive effect on weight reduction, he would wish to continue the program. However, he tends to sweat a lot and thus, it is hard for him to continue the walking exercise in summer. Besides, he may have to stop the walking exercise during the rainy season too.

So, he is now considering to stop the morning exercise for a while because of his sweating problem, and instead, he could get off the train at the next to the nearest station (to increase the walking distance) or stop at an air-conditioned fitness club on his way back from work.

## Case 2 “Increase the quantity of physical activity in your daily life”

Mr. Shinji, 50 years old

### (1) How did he get started to increase the quantity of physical activity?

Mr. Shinji was conscious of a lack of exercise, but he was too busy with his work to allocate time for exercise. Meanwhile, he began to put on fat around his abdominal and his cholesterol level and blood pressure showed the abnormal levels. At a health check-up, he was told that he had developed a visceral fat syndrome and fatty liver, which made him decide to lose his weight.

Then, he devised to increase the quantity of physical activity in his daily life.

### (2) Device to increase the quantity of physical activity

Usually, it takes about 10 minutes to walk from home to the nearest station. In the morning, he normally walks in a hurry, while he often walks more slowly on his way home. By walking this distance, whether it is fast or slowly, he could add 20 minutes of walking a day. In addition, it takes about 10 minutes between his office and the nearest station. There are several stairs on the way, and if he uses the station exit close to the office, he uses more stairs.

He decided to take a walk outside the office for a change for about 10 minutes after lunch. In the weekends, he used to stay at home most of the time, but he decided to walk outside for at least 20 minutes (1 Ex) by going to a supermarket or taking a walk in the neighborhood.

He also decided to start gardening in the weekend, which takes about 1 to 2 hours each time. Of which, he spend about 30 minutes for the activities with slightly higher intensity, such as weeding and leveling the ground.

### (3) Results after 6 months

Mr. Shinji has not started any exercise yet, but he has lost his weight by 3 kg in 6 months. He noticed that he reduced his abdominal circumference by one notch of his belt. The results of his blood test showed that he is now outside the critical levels. Although he is not yet quite confident with his physical fitness, he feels that he can now walk more easily than before.

### Mr. Shinji’s physical activity

<b><u>Weekdays (5 days a week)</u></b>	
Walking from home to the station (20 minutes round trip)	1 Ex
Walking from his office to the nearest station (20 minutes round trip)	1 Ex
Going out at lunch time on foot (20 minutes round trip)	1 Ex
Stairs at the station and office (5 minutes)	0.5 Ex
<b>Total</b>	<b><u>3.5 Ex</u></b>
<b><u>Weekend (2 days a week)</u></b>	
Shopping and taking a walk (20 minutes round trip)	1 Ex
Gardening (30 minutes)	2 Ex
<b>Total</b>	<b><u>3 Ex</u></b>
<b><u>Total Ex in a week</u></b>	<b><math>3.5 \times 5 + 3 \times 2 = 23.5 \text{ Ex}</math></b>

### Case 3 “Gain a smart figure by exercise once a week!”

Ms. Mika, 30 years old, office worker working 5 days a week, with exercise experience

#### (1) How did she get started to increase the quantity of physical activity?

When she became 30 years old, she suddenly began to feel stiff shoulders and easily-fatigued. She was shocked as she looked old, when she saw her own figure in a large mirror at a department store. She has been interested in dieting and has tried many methods, though she has not yet found the one suitable for her. Her BMI is 20, which is in the normal range, but the percentage body fat is as high as 30%. At the health check-up, she learnt that her bone mineral density was only 75% of the average for her age.

She became worried that she would be bent with age, if she maintains the current conditions.

#### (2) Device to increase the quantity of physical activity

At the health guidance, she was told that an extreme diet may reduce her bone mineral density and also that the high percentage of body fat is possibly due to low muscle mass, rather than high body fat. Therefore, she decided to participate in an exercise program once a week.

She learnt that muscle training is necessary to maintain and increase the bone mineral density and stretching is effective for easing stiff shoulders.

#### Exercise program for Ms. Mika

- Aerobic exercises

1. Walking (80 m/min.), for 20 minutes,  $3.3 \text{ METs} \times 20/60 \times 1 \approx 1 \text{ Ex}$

↓

2. When she gets used to walking, increase the time to 30 minutes,  $3.3 \text{ METs} \times 30/60 \times 1 \approx 1.5 \text{ Ex}$

↓

3. When her muscle strength increases, walk faster.

Brisk walking 30 minutes,  $4 \text{ METs} \times 30/60 \times 1 = 2 \text{ Ex}$

- 7 types of resistance training (10 to 15 times for each action, start with one set)

----- 20 minutes for the entire program

$3 \text{ METs} \times 20/60 \times 1 = 1 \text{ Ex}$

↓

When she gets used to resistance training, increase the load by one of the following methods:

① 15 to 20 times for each action (30 minutes)  $1.5 \text{ Ex}$

② 2 sets of all types of action (40 minutes)  $2 \text{ Ex}$

- Gymnastics, for 15 minutes

She started with the program of 2 Ex in total, which increased to 4 Ex in 3 months. Although she undertook the program once a week only, she could eventually meet the reference quantity.

In her daily life, she started using the stairs for 10 minutes daily, which increased the quantity of physical activity by 10 Ex.

#### (3) Results after 6 months

Her posture has been improved. She noticed that she is now walking more lightly.

## Case 4. “Healthy weight control through exercise and diet!”

Ms. Yumiko, 45 years old, housewife

### (1) How did she get started to increase the quantity of physical activity?

Ms. Yumiko has junior high school and high school children. She weighed 55 kg when she got married, but perhaps due to a fatty diet that her fast-growing children preferred, she now weighs 78 kg. Encouraged by advice given at the health guidance after a health check-up, “Now, you have visceral fat syndrome, but you can improve the symptoms of lifestyle-related diseases if you lose your weight by 3 kg”, she decided to participate in the exercise class.

#### Ms. Yumiko’s current quantity of physical activity

Mean number of steps per week is 6000 steps; No time is allocated for exercise.  
(Judging from the number of steps as 6,000 steps per week, the quantity of her daily NEA corresponds to 3,000 steps per day  $\approx$  30 minutes of NEA: e.g. house cleaning, gardening).

Quantity of physical activity per week:  $3 \text{ METs} \times 30/60 \times 7 = 10.5 \text{ Ex}$

The above assessment shows that she was short of about 13 Ex to reach the reference of 23 Ex.

### (2) Device to increase the quantity of physical activity

She started the following program. Because of the excessive body weight, she decided to start with walking at a normal speed, a bicycle ergometer and resistance training.

As for diet, she reduced the intake of fried food and snack. She also began to be concerned about the appropriate food intake for her, using the “Japanese Food Guide Spinning Top.”

#### Exercise program for Ms. Yumiko

* Walking (30 minutes with normal speed), 4 times a week	$3 \text{ METs} \times 30/60 \times 4 = 6 \text{ Ex}$
* Bicycle ergometer (30 minutes), twice a week	$4 \text{ METs} \times 30/60 \times 2 = 4 \text{ Ex}$
* Resistance training (squatting, sit-ups etc.) (15 minutes), twice a week	$4 \text{ METs} \times 15/60 \times 2 = 2 \text{ Ex}$
Quantity of physical activity $\rightarrow$ 22.5 Ex . . . . .	She needs just one more effort!
Quantity of exercise $\rightarrow$ 6 Ex . . . . .	She has met the reference value!

### (3) Results after 3 months

The evaluation after 3 months showed that she lost her weight by 4 kg, with improvements in all the tested parameters, and in particular her blood glucose level and lipid profile got back to the normal ranges. Exercise has become an essential part of Ms. Yumiko’s daily life, and she had got a habit of walking after supper with her husband, Mr. Takashi. She was also told by her daughter recently that she has recently become attractive. In this way, Ms. Yumiko is enjoying a purposeful life now.

## Case 5. “Regain health through exercise after an illness!”

Ms. Keiko, 55 years old, she is concerned about her health after an illness

### (1) How did she get started to increase to increase the quantity of physical activity?

Ms. Keiko stopped all types of exercises for 1 year, because of a breast cancer operation and the subsequent treatment. Having sufferance from this life-threatening illness, she lost all confidence in her own physical fitness. During the past one year, she gained 7 kg (height, 155 cm; weight, 64.6 kg; BMI, 26.9), due to overeating with a belief that she could regain her physical strength by eating a lot and also to staying in bed for treatment. When she began to be concerned about the current condition, her doctor suggested that she should start exercise.

### (2) Device to increase the quantity of physical activity

With no experience of exercise at all and having just recovered from illness, she felt anxious to plan the exercise program on her own. So, her doctor introduced a health facility with the Health Fitness Programmer, where she started the training program twice a week.

#### Twice a week exercise program for Ms. Keiko

• Aerobic exercises	
* Aquatic walking 500 m (30 minutes; net 15 minutes)	$4 \text{ METs} \times 15/60 \times 2 = 2 \text{ Ex}$
* Bicycle ergometer (40W) (30 minutes)	$4 \text{ METs} \times 30/60 \times 2 = 4 \text{ Ex}$
• 4 types of resistance training (15 times each, with intensity by which you can do 20 times) ----- 20minutes for the entire program	
	$\frac{3 \text{ METs} \times 20/60 \times 2 = 2 \text{ Ex}}$
	<b>Total 8 Ex</b>

### (3) Results after one year

After one year of training, she now enjoys her daily life by incorporating various devices to maintain the exercise habit. She gets along well with other participants of the same class. Her physical fitness has improved, so that she is now able to walk fast. She also enjoys aerobics and aquabics at her own pace. She has lost her weight by 9 kg. Her doctor says that she is in a very good condition and praises her efforts to have continued the exercise program.

#### Ms. Keiko’s current exercise program

• Aerobic exercises	
* Walking (90 m/min., 30 minutes), twice a week	$4 \text{ METs} \times 30/60 \times 2 = 4 \text{ Ex}$
* Aerobics (30 minutes), once a week	$6 \text{ METs} \times 30/60 \times 1 = 3 \text{ Ex}$
* Aquabics (45 minutes), once a week	$4 \text{ METs} \times 45/60 \times 1 = 3 \text{ Ex}$
• 5 types of resistance training (15 times each, with intensity by which you can do 20 times) ----- 20 minutes for the entire program, twice a week	
	$\frac{3 \text{ METs} \times 20/60 \times 2 = 2 \text{ Ex}}$
	<b>Total 12 Ex</b>



## Case 6. “A fatigue-free life with increased muscle strength”

Ms. Noriko, 68 years old, with hypertension and left knee pain

### (1) How did she get started to increase the quantity of physical activity?

Ms. Noriko currently lives alone. Because she feels knee pain and gets easily tired when she walks, she hardly goes out.

Yet, she wanted to do something to prevent being bedridden. Then, she came across a leaflet on a city-organized program to prevent becoming in need of nursing care, and decided to participate in the program.

### (2) Device to increase the quantity of physical activity

The initial exercise program, once a week (total 12 sessions) for 3 months

(Stretching while sitting, 15 minutes)	
Calisthenics while sitting	20 minutes
Exercise to increase muscle strength by using own weight while sitting	
	(7 types × 10 times = 1 set) 20 minutes
	<b>Light exercise for total 40 minutes = 2 Ex</b>

Since she had started attending the exercise program, her posture improved and she became less likely to be tired. The number of steps per day was 3,200 steps before starting the exercise program, which subsequently increased to 4,200s steps.

Increase of 1,000 steps equivalent to 10 minutes of physical activity	$0.5 \times 7 = 3.5 \text{ Ex}$
	<b>Increase of total 6 Ex</b>

### (3) Results after 3 months

Although the quantity of physical activity has not yet reached the goal in the exercise guideline, a positive effect was observed in the physical fitness test for prevention of being in need of nursing care. Initially, Ms. Noriko was not certain if she could continue the program for 3 months, but she gained self-confidence after having completed the program. She used to have the impression of exercise as “hard” or “demanding” only, though in fact, she even felt young again by enjoying the exercise with other participants. She also used to have a fear of falling when going down the stairs, but as she gained self-confidence in her physical fitness, she now actively goes out again.

At the end of the 3-month program, she decided to continue to attend the class. When there is no class, she undertakes 10-minute exercise 3 times a week, with watching TV at home.

Body weight	50.5 kg → 49.9 kg
Physical fitness	
10 m walking at full power	6.6 seconds → 6.3 seconds
Standing on one foot, with eyes opened	15 seconds → 23 seconds
Grip strength	22 kg → 24 kg

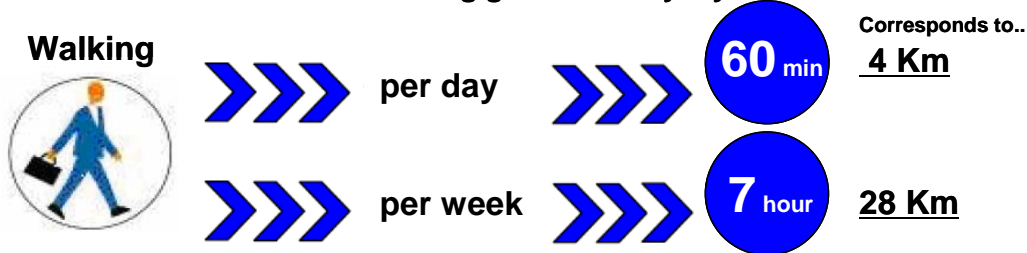
### Appendix 3. An Example of press release

## Exercise and Physical Activity Guide for Health Promotion 2006

### 1. For people who want to increase physical activity for health promotion

#### ■ Health promotion by physical activity

Let's walk to achieve the following goals in everyday life.



➤ When one uses a pedometer...  
The goal should be set as 10,000 steps per day (70,000 per week),  
including 2,000~4,000 steps unconsciously taken in everyday life.

#### ■ Health promotion by exercises

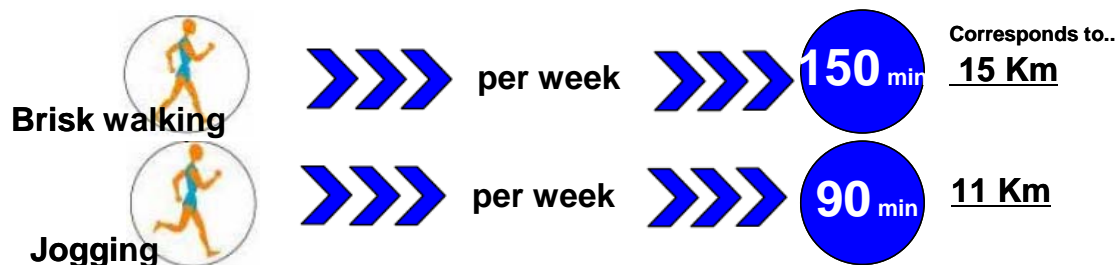
Let's practice more exercises, in addition to physical activity in everyday life, according to your lifestyle and physical fitness. For example, the following goals can be set (\*).



\*In this case, the goal of walking should be 50 minutes per day (350 minutes per week)

### 2. For people who are conscious about visceral fat

Let's try to achieve the following goals, so as to reduce visceral fat and improve the metabolic syndrome. People with no exercise habit could start with one fifth of these goals, and then increase the amount of exercise gradually.



Note) Make sure to do warm-up and cooling-down before/after exercise, which should be suitable to your physical fitness. For more detailed information, refer to the website of the Ministry of Health, Labour and Welfare of Japan (<http://www.mhlw.go.jp/bunya/kenkou/undou.html>).