1. Overview of Lifestyle Modification

Cardiovascular disease (CVD) develops by various environmental factors such as overeating and low physical activity on the top of genetic predispositions. Many epidemiological studies have revealed that the excessive intake of cholesterol and animal fat (saturated fatty acids) results in increased serum total cholesterol (TC) levels. Overeating and low physical activity are primary causes of metabolic syndrome that lead to abdominal obesity, glucose intolerance, increased blood pressure and triglyceride (TG) levels and decreased HDL-C levels. Such imbalances in lifestyle result in CVDs, such as myocardial infarction. According to the Hisayama study, the prevalence of obesity, impaired glucose tolerance and hypercholesterolemia was increased over 1961, 1974 and 1988 in both men and women, while that of hypertension and smoking decreased, as risk factors for cerebrovascular disease. The National Nutrition Survey in Japan showed marked decrease in consumption of rice and all types of grains from 1946 to 1990 while that of milk, dairy products and meat markedly increased, indicating the Westernization of Japanese dietary habits. Therefore, prevention of CVD should be based in principle on stop smoking, maintaining ideal body weight, restriction of animal fat and cholesterol intake, reduction of salt intake, and increase of fish, vegetables and fruits, and perform aerobic exercise for at least 30 minutes per day.

2. Smoking Cessation

Smoking is an independent risk factor for CVD. It significantly increases the risk of cardiovascular death and death from any cause, and cessation of smoking reduces a risk of death and incidence of CVD regardless a past history of coronary artery disease (CAD), age and sex. The effects of smoking cessation are immediate and a longer cessation period is associated with a further decrease in risk. Therefore, people of all ages should be advised to stop smoking to prevent CVD. However, providing smoking cessation instructions in an outpatient setting is not always easy, and long-term counseling based on relevant procedures is often needed. Because the rate of smoking cessation significantly increases 1.3-fold when a clinician spends only a few minutes to advise a patient to stop smoking, the Guidelines for Smoking Cessation issued by nine societies, including the Japanese Circulation Society, recommend the use of an instructional method known as the “5A approach” (Ask, Advise, Assess, Assist, Arrange), which can be performed in the short term in routine outpatient or screening settings. The details of this instructional procedure are presented in Supplemental Table 1.
nicotine replacement therapy with a nicotine patch or nicotine gum, or the use of varenicline, a \( \alpha 4 \beta 2 \) nicotine receptor partial agonist, significantly increases the success rate of smoking cessation\(^{12, 13}\). Patient management for smoking cessation is covered by health insurance in Japan if certain requirements are met\(^{14}\).

Meta-analyses conducted in overseas reported that passive smoking increases the relative risk of developing CAD 1.3-fold (95% CI: 1.2 to 1.4)\(^{15}\), and that smoking bans in public places decrease the incidence of hospitalization due to acute coronary syndrome\(^{16, 17}\). Furthermore, a prospective study conducted in Japan showed that the hazard ratio for diabetes mellitus associated with passive smoking is 1.8 (95% CI: 1.1 to 3.1)\(^{18}\). Therefore, it is also important to instruct people to avoid passive smoking to prevent CVD.

3. Management of Obesity

To achieve and maintain an ideal body weight is an important target for lifestyle modification. Obesity, especially excess visceral fat accumulation, is considered to be an independent risk factor for CVD and promotes atherosclerosis directly or indirectly via dyslipidemia, impaired glucose tolerance, hypertension and dysregulated adipocytokine activity\(^{19-22}\). Therefore, it is important to achieve lifestyle modification through dietary management and exercise.

The status of body weight is evaluated based on the body mass index (BMI).

\[
\text{BMI} = \frac{\text{body weight (kg)}}{\text{height (m)}^2}
\]

In Japan, a BMI of 22 is considered to be an ideal body weight and a BMI of \( \geq 25 \) is considered to be overweight\(^{23}\). A diagnosis of obesity as a disease is made when the obese people are currently or potentially accompanied by health problems\(^{23}\). Attention should be paid to visceral fat accumulation even if the BMI is within the normal range. For screening of obesity in daily clinical practice, a waist circumference at the umbilical level of \( \geq 85 \) cm for men and \( \geq 90 \) cm for women is used as the screening criteria for visceral fat accumulation\(^{23, 24}\). The area of visceral fat at the umbilical level can be measured more accurately using abdominal CT, in which an adipose tissue area of \( \geq 100 \) cm\(^2\) is defined as visceral obesity. Visceral fat accumulation is a central factor in the development of metabolic syndrome. Decreasing the amount of visceral fat can improve not only dyslipidemia, but also hypertension and impaired glucose tolerance\(^{25}\).

The target of the body weight in treatment of obese patients should not immediately be set as a BMI of \( < 25 \). It should be noted that acute weight loss in a short term by an aggressive approach such as a very low calorie diet may lead to rebound weight gain at a high rate. Weight loss through diet/exercise therapy is expected to provide relatively mild improvement in abnormalities in plasma lipids, blood glucose and blood pressure caused by obesity, even if the BMI is within the range of obesity. Therefore, it is advisable to achieve a 5% decrease in body weight or waist circumference over three to six months and to maintain this achievement over time (Supplemental Table 2)\(^{26, 27}\).

4. Diet Therapy

1) Diet and Dietary Habits for the Prevention of CVD

- **Traditional Japanese Diet**

  The mortality from CAD in Japan is much lower than that observed in other developed countries due to several factors, including the effects of diet. Many epidemiological studies have shown that a traditional Japanese diet incorporating Japanese foods is effective for preventing CAD\(^{28-39}\). In the traditional Japanese diet, saturated fatty acids are supplied from meat and poultry, monounsaturated fatty acids are from meat, poultry, fish and vegetable oils, n-6 polyunsaturated fatty acids are from vegetable oils and soy products and n-3 polyunsaturated fatty acids are from seafood and plant foods. Cholesterol is derived from meat, eggs, fish and seafood\(^{40}\). More fish, soy and soy products are consumed than meat and eggs, and fatty acids are consumed in a balanced manner suitable for preventing atherosclerosis\(^{40}\). In addition, the consumption of millet and barley, low-polished rice, fruits, vegetables, seaweed and green tea contributes to a sufficient intake of dietary fiber, vitamins and minerals\(^{41}\)

However, the Japanese diet has the disadvantage for health with a greater intake of salt; thus, it is necessary to make efforts to reduce the amount of salt intake. It has also been reported that maintaining the Japanese dietary pattern but with a lower salt content reduces mortality from CAD by approximately 20% as compared with a Western dietary pattern\(^{42}\).  

2) **Optimization of Total Energy Intake and Energy Nutrient Ratio**

- **Maintenance of an Ideal Body Weight and Balance of Energy Nutrients**

  With diet therapy, appropriate energy intake to meet the demands of physical activity, aimed at maintaining an ideal body weight and balanced nutrient intakes, is the most important component of preventing CVD. The recommended percentage of energy derived from fat is 20% to 25%, while that from carbohydrates is 50% to 60%.
• Lipids (Saturated/Unsaturated Fatty Acids and Cholesterol)

It is essential to reduce the intake of saturated fatty acids and cholesterol, which are contained in large amounts in animal fat; however, there are significant individual differences in the absorption rate of cholesterol. Increased intake of saturated fatty acids has been reported to exacerbate insulin resistance and increase the LDL-C levels in Japan as well as in Western countries. In contrast, it has been reported in Japan that an extremely low intake of saturated fatty acids is associated with an increased incidence of cerebral hemorrhage; thus, the percentage of energy derived from saturated fatty acids should be at least 4.5% but less than 7%. Meanwhile, excessive intake of trans unsaturated fatty acids, produced by the hydrogenation of polyunsaturated fatty acids which are contained in hard margarine and shortening, increases oxidized LDL, decreases HDL-C, and thereby increases the risk of CAD. In order to reduce the intake of saturated fatty acids and cholesterol, meat with less fat should be selected and excessive intake of meat, dairy products and eggs should be avoided.

While the intake of saturated fatty acids should be reduced, the intake of unsaturated fatty acids should be increased. Patients should be instructed to consume more fish, especially bluefish, which is rich in n-3 polyunsaturated fatty acids. Epidemiological studies conducted in Japan have revealed a negative correlation between the intake of fish and n-3 polyunsaturated fatty acids and mortality from coronary events and myocardial infarction. These effects are considered to be mediated by TG-lowering effects, hypotensive effects, platelet aggregation inhibitory effects and improvements in the endothelial function achieved by n-3 polyunsaturated fatty acids, which are contained in large amounts in fish oil. On the other hand, polyunsaturated fatty acids are easily oxidized; therefore, it should be noted that excessive intake of these fatty acids results in increased levels of oxidized LDL and decreased levels of HDL-C.

• Selection of Carbohydrates

Carbohydrates include sugar, which is digestible and absorbable, and dietary fiber, which is indigestible. The type and intake of carbohydrates affect glucose metabolism and the levels of TG and HDL-C. The glycemic index (GI) and glycemic load (GL) are indexes used to evaluate postprandial blood glucose following the intake of carbohydrates. Many studies have reported that these indexes exhibit positive correlations with the obesity index and the levels of TG and fasting blood glucose and a negative correlation with the level of HDL-C.

An increased intake of dietary fiber inhibits fat absorption in the intestines and decreases the GI and GL. The intake of dietary fiber, especially soluble dietary fiber, has a LDL-C-lowering effect. A relationship between the consumption of greater amounts of dietary fiber and decreased mortality from CAD and CVD has been reported. To ensure sufficient dietary fiber intake, consuming adequate amounts of plant foods, such as unrefined grains, soy, tofu, beans, and vegetables, is useful. This leads to a low GI/GL diet.

• Soy, Soy Products, Vegetables and Fruits

It has been reported that the intake of plant foods from soy and soy products and their major components, isoflavones, is associated with inhibition of the development of CAD and cerebral infarction in women. This is thought to be due to the mild decreases in the level of LDL-C, antioxidant effects, hypotensive effects and estrogen effects induced by the isoflavones, protein, and polyunsaturated fatty acids contained in soy. The consumption of plant foods other than soy, such as fruits, vegetables, pulses, and grains, as well as green tea, coffee and oolong tea, is also associated with inhibition of the development of CAD. In particular, a relationship between an increased intake of green tea and decreased mortality from CAD has been reported in Japanese women. Plant sterols, rich in soy and germ, are expected to inhibit the absorption of exogenous cholesterol in the gastrointestinal tract. A meta-analysis showed that an intake of plant sterols of ≥ 2 g/day results in decreases in the LDL-C level of up to 9%. Frequent consumption of fruit and vegetables is recommended because these foods are low in calories and rich in dietary fiber, vitamins and minerals. It has also been reported that the intake of potassium, vitamin C and vitamin B₆ is associated with inhibition of the development of CAD.

• Salt and Alcohol

An excessive intake of salt increases blood pressure and promotes atherosclerosis. The intake of salt should be reduced to < 6 g/day. Light to moderate alcohol consumption has been shown to be associated with the prevention of CAD, while excessive consumption of alcohol increases blood pressure and enhances TG synthesis in the liver.

3) Diet to Improve Risk Factors

Diet modification is essential for preventing CVD
because it is effective for managing the risk factors of CVD, as has been demonstrated in many studies. Patients should be given individualized dietary instructions in consideration of prior assessments of their lifestyles including their nutrient intakes (Table 2).

- **Hyper-LDL Cholesterolemia and Diet**
  The intake of saturated fatty acids, cholesterol and trans unsaturated fatty acids, which increase the level of LDL-C, should be reduced. The percent energy from saturated fatty acids should be less than 7%, while cholesterol intake should be less than 200 mg/day. Specifically, the intake of meat, milk and eggs, which contain high amount of fat, should be limited. Furthermore, the intake of foods with LDL-C-lowering effects, particularly soluble dietary fiber and plant sterols, should be increased.

- **Hypertriglyceridemia and Diet**
  The percentage of energy derived from carbohydrates should be slightly reduced, and excessive consumption of alcohol should be limited. The intake of n-3 polyunsaturated fatty acids should be increased. In patients with hyperchylomicronemia, fats should be limited more strictly. The percentage of energy derived from fat should be limited to less than 15%, comprised primarily of medium-chain fatty acids or n-3 polyunsaturated fatty acids.

- **Hypo-HDL Cholesterolemia and Diet**
  If the patient consumes alcohol moderately and exhibits no abnormalities in TGs, alcohol consumption does not need to be limited. Excessive intake of trans unsaturated fatty acids and n-6 polyunsaturated fatty acids should be limited.

- **Metabolic Syndrome and Diet**
  In general, for patients with visceral fat accumulation and high insulin resistance, the total energy intake should be limited and a diet with a low percentage of energy derived from carbohydrates should be consumed. When selecting carbohydrates, low-GI/GL diets are desirable. Total caloric reduction with a moderate amount of fat in combination with exercise can improve insulin resistance and the components of metabolic syndrome, even if weight loss is modest.

- **Hypertension and Diet**
  Efforts should be made to reduce the salt intake while increasing the fruit and vegetable intake. This leads to sodium restriction and sufficient intake of potassium, resulting in the promotion of urinary excretion of sodium. Excessive consumption of alcohol should be avoided because it increases blood pressure.

- **Diabetes Mellitus and Diet**
  In patients with type 2 diabetes, amelioration of obesity is the most important component of disease management. Overeating should be avoided and the energy intake should be tailored for the level of daily physical activity. Hyperglycemia should be corrected by dividing the energy intake equally into the three meals, i.e. breakfast, lunch and dinner, whenever possible. Regarding the levels of energy intakes of nutrients, the ratio of sugar to other nutrients should not be increased. In particular, the intake of sugar and saturated fatty acids should be limited. In patients with type 1 diabetes, appropriate quantities of dietary energy should be consumed to maintain an ideal body weight, with consumption of a nutrient-balanced diet.

### Glossary

**Glycemic Index (GI) and Glycemic Load (GL)**
The GI is a ranking of carbohydrates based on how much they raise blood glucose levels after the consumption of foods containing 50 g of carbohydrate. It is a relative index with 50 g of glucose serving as the reference value of 100. The GL is the value calculated from GI and is the amount of carbohydrate by which postprandial blood glucose change is predicted.

### 5. Exercise Therapy

Physical inactivity is associated with increased body fat (obesity), dyslipidemia, metabolic syndrome, hypertension, diabetes mellitus/impaired glucose toler-
Lifestyle Modification

A meta-analysis of 25 randomized controlled trials (RCTs) that compared the effects of exercise therapy comprising ≥15 minutes of aerobic therapy for eight weeks with those of non-exercise therapy showed that the exercise therapy significantly increased the levels of HDL-C (Δ 2.53 mg/dL, 95% CI: 1.36 to 3.70)\(^{119}\). The increased HDL-C levels exhibited a positive correlation with the length of exercise, and exercise of ≥121 minutes/week significantly increased the HDL-C levels. A meta-analysis of four RCTs conducted in Japan comparing the effects of aerobic exercise of mild to moderate intensity for 10 weeks to 24 months with those of non-exercise therapy showed that the exercise significantly increased the levels of HDL-C (Δ 10.0 mg/dL, 95%CI: 5.39 to 14.65)\(^{88}\).

Table 3 shows the basic guidelines for exercise therapy. Efforts should be made to increase physical activity in daily living and undertake exercise suited to the lifestyle of the individual. Aerobic exercise should be primarily performed, and brisk walking and slow jogging are recommended. Regarding the intensity of exercise, approximately 50% of the maximum oxygen uptake is suitable in terms of efficacy and safety. At 50% intensity, the increase in blood pressure observed during exercise is mild, blood lactate is not accumulated and exercise can be performed for an extended period of time. Exercise of at least 30 minutes duration per day at least three times per week (daily if possible) or of at least 180 minutes per week is desirable. For the elderly with a reduced muscle mass, aerobic exercise in combination with mild resistance (muscle) exercise is useful, and bench-stepping training, which can be performed in a room, is recommended\(^{88}\). The Ministry of Health, Labour and Welfare established the “Exercise and Physical Activity Guide for Health Promotion 2006” to prevent lifestyle-related diseases (Supplemental Tables 3A to 3C)\(^{120}\). A unit to express the quantity of exercise, the “Ekusasaizu (Ex) (= METs·hour),” was established, and the target quantity of physical activity to prevent lifestyle-related diseases was set at 23 Ex or more per week. For example,
walking or bicycling for 15 minutes, jogging or aerobics for 10 minutes and swimming for seven to eight minutes are equivalent to 1 Ex.

On the other hand, unaccustomed exercise carries a risk of musculoskeletal injury. For patients with CVD, strenuous exercise may cause sudden death or myocardial infarction \(^{121, 122}\). This requires careful consideration, and when exercise therapy is performed, complications of potential CVD and bone and joint disease should be assessed.

**Footnotes**

This is an English version of the guidelines of the Japan Atherosclerosis Society (Chapter 7-A) published in Japanese in June 2012.

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Supplemental Table 1. 5A Approach

Step
Step 1: Ask (Identify all smokers systematically at each examination.)
Step 2: Advise (Clearly, strongly, and individually advise all smokers to stop smoking.)
Step 3: Assess (Assess the desire to smoking cessation.)
Step 4: Assist (Assist patients in smoking cessation.)
Step 5: Arrange (Arrange a schedule of follow-up examinations.)

Strategies for implementation

Step 1
• Prepare a system within the medical organization to ensure that all patients are asked about smoking at each examination and the answers are recorded.
• Add a space for smoking (to distinguish current, former, and non-smokers) to the section of vital signs such as the blood pressure, heart rate, body temperature, and body weight. Alternatively, attach a sticker indicating the smoking status to all charts.

Step 2
• Clearly: “It is important for you to stop smoking now. I am ready to help you.” or “It is not enough to cut back on smoking only when you are sick.”
• Strongly: “As your attending physician, I must let you know that smoking cessation is the most important step you can take to protect your health. I and the hospital staff are ready to help you.”
• Individually: Relate smoking with the current state of health/disease, social and economic cost, motivation/desire to quit smoking, and impact on children and family.

Step 3
• Ask all smokers if they are willing to stop smoking now (within 30 days).
  - If they are, support them in cessation.
  - If they are not, motivate them to cessation.

Step 4
Assist patients to make a plan of smoking cessation.
• Set a date to start smoking cessation (preferably within 2 weeks)
• Tell family, friends, and colleagues about smoking cessation and ask for their understanding and support.
• Mentally prepare for problems that will arise in smoking cessation (particularly during the first few weeks) in advance. They include nicotine-withdrawal symptoms.
• Eliminate tobacco from the environment on smoking cessation. Before smoking cessation, avoid smoking in places where you spend prolonged periods of time such as the office, home, and car.

Counsel the patients (training in problem-solving skills)
• It is important not to smoke even a single cigarette: Not even a puff is permitted after the day you start to quit.
• History of smoking cessation: Look back on what helped and interfered with smoking cessation during past attempts.
• Alcohol: Since alcohol consumption may lead to a resumption of smoking, patients should reduce or give up drinking during smoking cessation.
• Smokers in the family: Smokers in the family make smoking cessation difficult. Persuade these family members to quit smoking at the same time or not to smoke in the patient’s presence.

Provide social support in medical activities
• Say, “I and my staff are always ready to help you.”

Help the patients to receive social support from people other than medical professionals.
• Say, “Ask your spouse/partner, friends, and colleagues for social support.”

Recommend undergoing drug therapy
• Recommend the use of drugs with established efficacy. Explain how these drugs increase the success rate of smoking cessation and alleviate withdrawal symptoms.
• Use a nicotine-replacing agent and bupropion hydrochloride SR (not approved in Japan) as the first choices.

Provide supplementary study materials
• Select study materials appropriate for the characteristics of the patient from those published by the government or NPOs.

Step 5
• Timing: The first follow-up examination should be scheduled immediately after the beginning of smoking cessation, within 1 week if possible. The second should be scheduled within 1 month. Make a schedule for subsequent follow-ups.
• What should be done in follow-up examinations: Congratulate the patient on smoking cessation. If the patient has started smoking again, study the situation, and advise them to try again. Advise the patient to regard the failure as a chance to learn for future success. Anticipate problems that have actually arisen and those expected to arise.
• Assess the use of drug therapy and its problems. Evaluate the possibility of the use of, or suggestion to use, stronger treatments.
Supplemental Table 2. Classification of Overweight and Diagnostic Criteria for Obesity

Definition of overweight
A state in which fatty tissue is excessive and BMI is \( \geq 25 \text{ kg/m}^2 \).

Classification of overweight
Overweight should be classified according to the table below based on the body mass index: \( \text{BMI} = \frac{\text{body weight (kg)}}{[\text{height (m)}]^2} \).

<table>
<thead>
<tr>
<th>BMI (kg/m(^2))</th>
<th>Category</th>
<th>WHO criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 18.5</td>
<td>Low weight</td>
<td>Under weight</td>
</tr>
<tr>
<td>18.5 ( \leq ) - &lt; 25</td>
<td>Normal weight</td>
<td>Normal range</td>
</tr>
<tr>
<td>25 ( \leq ) - &lt; 30</td>
<td>Overweight (grade I)</td>
<td>Pre-obese</td>
</tr>
<tr>
<td>30 ( \leq ) - &lt; 35</td>
<td>Overweight (grade II)</td>
<td>Obese class I</td>
</tr>
<tr>
<td>35 ( \leq ) - &lt; 40</td>
<td>Overweight (grade III)</td>
<td>Obese class I</td>
</tr>
<tr>
<td>40 ( \leq )</td>
<td>Overweight (grade IV)</td>
<td>Obese class III</td>
</tr>
</tbody>
</table>

Note 1: It should be noted that overweight (BMI \( \geq 25 \)) is not always a state that medically requires weight loss. The standard body weight (ideal body weight) should be calculated with the following formula: standard body weight (kg) = height (m)\(^2\) \times 22. This is based on a BMI of 22, which is most unlikely to be associated with disease.

Note 2: BMI \( \geq 35 \) should be defined as severe overweight.

Definition of obesity
Obesity is a state in which health problems have been caused by or are related to overweight, or a state in which weight loss is indicated medically because problems are anticipated, and should be treated as a disease entity.

Diagnosis of obesity
The patient is overweight (BMI \( \geq 25 \)) and meets any of the following criteria:
1. The patient has health problems caused by or related to overweight and weight loss is required (the problems can be improved or progression can be prevented by weight loss).
2. There is a high risk of health problems if the patient does not lose weight.
   - Visceral fat accumulation is suspected by screening of the waist circumference and visceral obesity is definitively diagnosed by abdominal CT scanning.

Japan Society for the Study of Obesity, ed.: 2011 Diagnostic Guidelines for Obesity. Study of Obesity, 2011:17 (extra edition) opening chart P1, Table A
### Supplemental Table 3A.

<table>
<thead>
<tr>
<th>Physical activity</th>
<th>Exercise</th>
<th>NEA (nonexercise activity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All bodily movement that accompanies energy expenditure above resting energy expenditure</td>
<td>Physical activity that is practiced intentionally for maintaining and improving one's physical fitness</td>
<td>Physical activity that is not classified as exercise</td>
</tr>
</tbody>
</table>

### Moderate or high-intensity exercise
- Brisk walking, jogging, tennis, swimming...

### Moderate or high-intensity nonexercise activity (NEA)
- Walking, cleaning floors, gardening, car washing, carrying a load, nursing, walking up and down stairs, playing with children...

### Low-intensity exercise
- Stretching...

### Low-intensity nonexercise activity (NEA)
- Standing, cooking, doing the laundry, desk work, playing the piano...

### Explanation
1. MET (metabolic equivalent) is a unit indicating the intensity of physical activity. With the MET of sitting/resting as 1, for example, that of normal walking is 3.
2. “Ekusasaizu (Ex)” 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), i.e., “METs・hour.”
3. Physical activity of 3 METs or more is defined as “active” physical activity or “moderate or high-intensity” physical activity.

Adapted from the Ministry of Health, Labour and Welfare's "Exercise and Physical Activity Guide for Health Promotion 2006."123

### Supplemental Table 3B. Goals for the Quantity of Physical Activity to Prevent Lifestyle-Related Diseases

| Basic goal | 23 Ex (METs・hour) per week by physical activity, of which 4 Ex is active exercise. |
| Goal to reduce visceral fat | About 10 Ex/week or more of exercise is required to ensure a reduction in visceral fat. |
| Specific examples of physical activity | Example 1) Physical activity corresponding to 23 Ex per week: walking 8,000 to 10,000 steps per day 7 days per week 
Example 2) Exercise corresponding to 4 Ex: brisk walking for 60 mins or tennis for 40 min 
Example 3) Exercise corresponding to 10 Ex: 30 min brisk walking 5 days per week |

(Examples of exercise and physical activity corresponding to 1 Ex are shown in Supplemental Table 4)

Adapted from the Ministry of Health, Labour and Welfare's “Exercise and Physical Activity Guide for Health Promotion 2006.”123
Supplemental Table 3C. Examples of Physical Activity Corresponding to 1 Ex

<table>
<thead>
<tr>
<th>Activities</th>
<th>Time(min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examples of exercise corresponding to 1 Ex</td>
<td></td>
</tr>
<tr>
<td>Bowling, volleyball, frisbee, weight lifting (light or moderate effort)</td>
<td>20</td>
</tr>
<tr>
<td>Brisk walking, radio calisthenics, golf (using a power cart), table tennis, badminton, aquabics, Tai Chi</td>
<td>15</td>
</tr>
<tr>
<td>Light jogging, weight lifting (vigorous effort), jazzercise, aerobics, basketball, swimming (leisurely), soccer, tennis, skiing, skating</td>
<td>10</td>
</tr>
<tr>
<td>Running, swimming, judo, karate</td>
<td>7 ~ 8</td>
</tr>
<tr>
<td>Walking, sweeping the floor, loading/unloading a car, childcare, car washing</td>
<td>20</td>
</tr>
<tr>
<td>Examples of NEA corresponding to 1 Ex</td>
<td></td>
</tr>
<tr>
<td>Brisk walking, cycling, nursing, gardening, walking/running - playing with child(ren), moderate intensity</td>
<td>15</td>
</tr>
<tr>
<td>Mowing the lawn, walking, using a power mower; moving furniture; climbing stairs; shoveling snow by hand</td>
<td>10</td>
</tr>
<tr>
<td>Carrying heavy loads</td>
<td>7 ~ 8</td>
</tr>
</tbody>
</table>


**Explanation**

In 2006, the preparation committee proposed the creation of an exercise reference and exercise guide for health promotion^{124}. In this guide, "physical activity" is defined as "all bodily movement that accompanies energy expenditure above resting energy expenditure," and is classified into "exercise" that is practiced intentionally for maintaining and improving one's physical fitness and "nonexercise activity (NEA)" (Supplemental Table 3A). To prevent lifestyle-related diseases, walking about 8,000 to 10,000 steps per day or corresponding physical activity and moderate exercise suitable for individuals (e.g., brisk walking for 60 minutes per week, tennis for 40 minutes) is recommended (Supplemental Tables 3B and 3C). Trying to use the stairs instead of an escalator or lift is considered to be an effective way to increase muscle strength in daily living. Furthermore, exercise involving 30 minutes brisk walking 5 times a week is required to ensure a reduction in visceral fat.