

Original Article

Dietary Reference Intakes (DRIs) in Japan

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Following the comprehensive systematic review of domestic and overseas scientific evidence, the “Dietary Reference Intakes for Japanese, 2005 (DRI-J)” was published in April, 2005. The DRIs-J were prepared for health individuals and groups and designed to present a reference for intake values of energy and 34 nutrients to maintain and promote health and to prevent lifestyle-related diseases and illness due to excessive consumption of either energy or nutrients. The DRI-J also includes a special chapter for basic knowledge of DRIs. The energy recommendation is provided as an estimated energy requirement (EER), while five indices were used for nutrients: Estimated average requirement (EAR), recommended dietary allowance (RDA), adequate intake (AI), tolerable upper intake level (UL), and tentative dietary goal for preventing lifestyle-related [chronic non-communicable] diseases (DG). Whilst the first four indices are same as the ones used in other countries, DG is unique index in Japan, which was set as a reference value for preventing non-communicable diseases such as cardiovascular (including hypertension), major types of cancer and osteoporosis. This report (DRI-J) is the first dietary guidance in Japan, which applied evidence-based approach utilizing a systematic review process. Only a few articles from within Japan and other Asian countries could be used for its establishment. The project to establish the DRI-J revealed a severe lack of researchers and publications focused upon establishing DRIs for Japanese. Further review is therefore required in preparation for the next revision scheduled in 2010.

Key Words: Dietary Reference Intakes, Recommended Dietary Allowance, Estimated Energy Requirement, Japan

HISTORY OF DIETARY RECOMMENDATIONS IN JAPAN

In Japan, the Recommended Dietary Allowances (RDA) were first established in 1970, after which a revision was made every five years. The concept of Dietary Reference Intakes (DRIs) was first introduced in the 6th revision of RDA (2000-2004).¹

In order to follow the approach of DRIs introduced in the 6th revision more comprehensively, the 7th revision was established as the “Dietary Reference Intakes for Japanese 2005”.²

The “Dietary Reference Intakes for Japanese, 2005” (DRIs-J) was prepared for healthy individuals or groups and designed to show reference intake values of energy and each nutrient to maintain and promote health and prevent lifestyle-related diseases. The DRIs-J have been prepared not only to prevent energy or nutrient deficiency that may be caused by inadequate nutrient intake, but also for the primary prevention of lifestyle-related diseases and illnesses caused by excess consumption of energy and nutrients. It is expected that those who use this DRIs-J should not become too focused upon the values presented, but rather should understand the concept of the DRIs-J thoroughly and apply them correctly.

PROCESS OF ESTABLISHMENT

The project to establish DRIs-J started in April, 2002. About 100 scientists from all regions of Japan. Two-three scientists were asked to participate in this project for each nutrient. Using a systematic review process, over 15,000 publications were searched and collected during the two

years. Following the review of the manuscript by the Japanese Ministry of Health, Labour, and Welfare, the “Dietary Reference Intakes for Japanese (2005)” was published in April, 2005. The current version is effective up to March 2010.

Since the DRIs were based on the results of as many reliable studies as possible, the results were integrated in accordance with the approach that is introduced in Table 1.

BASIC CONCEPTS OF DRIS-J

Basic concepts

DRIs were established based on a scientific basis, utilizing domestic and foreign research investigations and data that are available.

DRIs were based on the following three basic concepts:

1. “True” optimal intake varies among individuals and within an individual. Therefore, due to the difficulty of measuring the ‘true’ optimal intake for maintaining and promoting health and preventing deficiencies, a probability approach is necessary in deriving and applying optimal intake values.

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Table 1. Method to integrate the research results

Quality of the study	The presence (or absence) of studies on the Japanese	Basic concept in integration
When it is relatively even	When there are studies on Japanese as the research subjects	Priority placed on the results of studies conducted on Japanese
	When there are no studies on Japanese as the research subjects	Use of the overall means
When the quality is highly variable in each study	When there are high-quality studies on Japanese as the study subjects	Priority placed on the results of studies on Japanese
	When there are studies on Japanese as the study subjects but these studies are relatively low in quality in comparison with other studies	Select high-quality studies and use the mean of such studies
	When there are no studies on Japanese as the test subjects	

Table 2. Definitions of indices used in the DRIs-J

Indices	Definition
For energy Estimated Energy Requirement (EER)	The intake value at which the risks of both deficiency and excess intake are minimized
For nutrients Estimated Average Requirement (EAR)	The mean requirement value for Japanese (stratified by gender and age) was estimated based on requirement values determined from specific population group studies. It is the estimated daily intake level which would meet the requirement of 50 percent population of a particular gender and age group.
Recommended Dietary Allowance (RDA)	RDA is defined as the estimated daily intake level that is considered to meet the requirement of most (97 to 98%) of a particular gender and age group. $RDA = \text{mean EAR} + 2 \times \text{standard deviation (of EAR)}$
Adequate Intake (AI)	When the sufficient scientific basis to compute EAR and RDA cannot be obtained, this the AI is a quantity that is sufficient to maintain a satisfactory nutritional status of a particular gender and age group. In general, the AI is decided determined based on epidemiological studies worked on estimating nutritional intake of healthy individuals.
Tentative Dietary Goal for Preventing Lifestyle-related Diseases (DG)	DG is defined as the intake level (or range) that Japanese should currently aim to consume primarily to prevent lifestyle-related diseases. In the DRIs, particular emphasis was placed on the primary prevention of cardiovascular diseases (e.g., hypertension, hyperlipidemia, stroke, and myocardial infarction), cancer (in particular, stomach cancer), fractures, and osteoporosis. Specifically, it was directed toward the intake of proteins, lipids (fatty acids), cholesterol, carbohydrates, dietary fiber, calcium, sodium (table salt), and potassium.
Tolerable Upper Intake Level (UL)	The maximum intake level that shows the indicates an upper limit of the habitual intake that is considered to be free of the risk of causing a disease due to excessive intake. If the intake exceeds this level, it is believed that a latent risk for developing a disease increases.

- Emphasis should be placed on prevention of lifestyle-related diseases. To meet this, it is necessary to indicate a "range of intake" and adopt an idea that keeping one's intake in the range could reduce the risk of lifestyle-related diseases.
- Clearly indicate that excessive intake beyond the range increases the risk of developing health problems due to excessive intake.

Based on these concepts, one index for energy and five indices for nutrients are presented below. These indices are collectively called "Dietary Reference Intakes (DRIs)" (Table 2).

Energy

Energy must be computed based on a concept that is different from those used for nutrients. An adult requires a fixed amount of energy to maintain his/her body weight:

if his/her intake does not meet the requirement, weight losses, emaciation, and protein energy malnutrition may ensue; if the intake exceeds the required intake, weight gain or obesity may occur. It is understood that the optimum state of energy intake is achieved when energy intake and expenditure are balanced, causing no changes in body weight (for adults). Figure 1 illustrates that, with an increase in habitual intake, the risk of deficiency is reduced and that of excess intake increases. The intake at which both risks are lowest is Estimated Energy Requirement (EER).

The double-labeled water (DLW) is a method used to determine energy expenditure by healthy individual who maintain normal daily activities. The United States and Canada were the first in the world to adopt this technique in their DRIs for estimating energy expenditure. Due to the financial and technical constraints, the EER for an

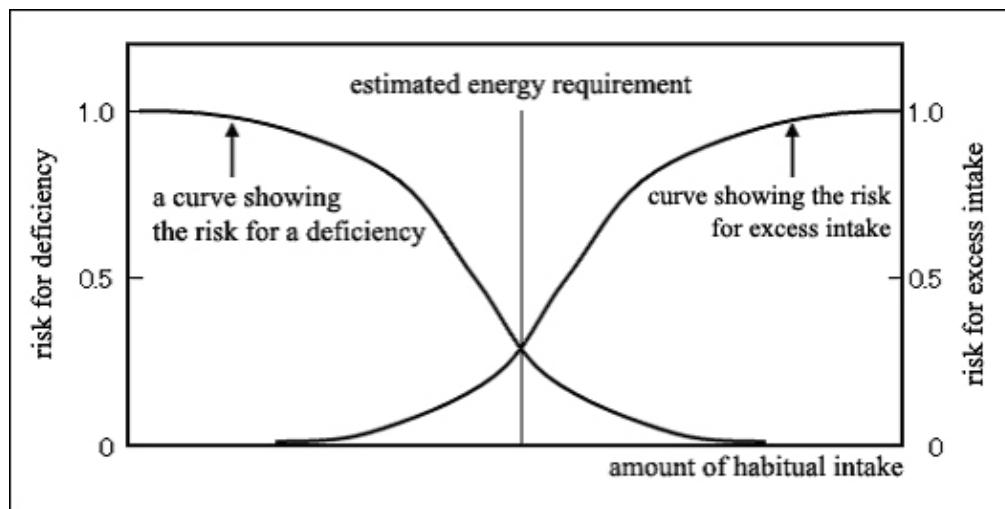


Figure 1. A model to understand the Estimated Energy Requirement (EER)

adult was calculated from his/her Basal Metabolic Rate (BMR) (= reference Basal Metabolic Rate × reference body weight) and Physical Activity Level (PAL).

EER for adults (kcal/day) = BMR × PAL

For infants and children in the growth stage, the EER includes that needed to maintain the current body weight plus that which is necessary for growth. For pregnant women and lactating mothers, additional energy values due to fetal growth and lactating were added to complete the EER.

Nutrients

For nutrients, Estimated Average Requirements (EAR) and Recommended Dietary Allowance (RDA) were selected as indices for the presence (or absence) of a deficiency and its extent.

The Adequate Intake (AI) was computed for nutrients for which insufficient data were available to determine EAR and RDA. For certain nutrients, the DRIs-J were determined for the primary prevention of lifestyle-related diseases. For which these nutrients a “Tentative Dietary Goal for Preventing Life-style Related Diseases (DG)” was set as the index to show the quantity of intake that the modern Japanese should aim to consume for the primary prevention of lifestyle-related diseases. Whilst other indices are same as the ones used in other countries, DG is a unique index in Japan. The relationship between the type of DG vis-à-vis the content and nutrients is shown in Table 3.

The Upper Intake Level (UL) was set to prevent adverse health conditions that would be caused by an excessive intake of certain nutrients. However, there are nutrients for which an UL could not be established due to a lack of sufficient scientific data. Figure 2 represents the general concept of these indices.

Table 4 shows those nutrients for which DRIs have been set and the indices that have been provided for ages one year and over. Thirty-four nutrients were investigated. For infants (ages 0 through 11 months), the adequate intake was set for twenty-eight nutrients, excluding saturated fatty acids, cholesterol, carbohydrates, dietary fibers and chromium.

Table 3. Type of DG relative to the contents and its relations to the nutrients

Types of DG relative to the contents	Nutrients
Nutrients defined to bring their intake close to DG	Dietary fiber, n-3 fatty acids, calcium, potassium (with the intake increase desired) Cholesterol, sodium (with reductions in intake increase desired)
DG is defined within a range and nutrients intake is designed to be within this defined range EAR, RDA, or AI are given but only UL is listed for DG	Total fats, saturated fatty acids, carbohydrates Proteins, n-6 fatty acids

DG, tentative dietary goal for preventing life-style related diseases; EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level

BASIC POINTS TO BE NOTED IN DESIGNING THE DRIS-J

Age groups

The age groups employed in the current design are; Age 0 to 5 months, 6 to 11 months, 1 to 2 years, 3 to 5 years, 6 to 7 years, 8 to 9 years, 10 to 11 years, 12 to 14 years, 15 to 17 years, 18 to 29 years, 30 to 49 years, 50 to 69 years, 70 years and older, pregnant women, and lactating mothers. Infants were divided into 2 groups: “after birth to under 6 months (ages 0 through 5 months)” and “6 months to under one year (ages 6 through 11 months).”

Children were defined as those ages 1 through 17 years and adults, those ages 18 years and over. If there is a need for separating the aged from adults, those ages 70 years and over were designated as such.

Reference physiques

For the DRIs-J, only a single representative value is obtained through computation for each gender and age group, without giving any consideration to physical distinctions (heights and weights) within each group. In other words, the DRIs-J are designed for those in the group with the representative physique. The representative physiques for those ages one year and over were based on the median heights and weights of the

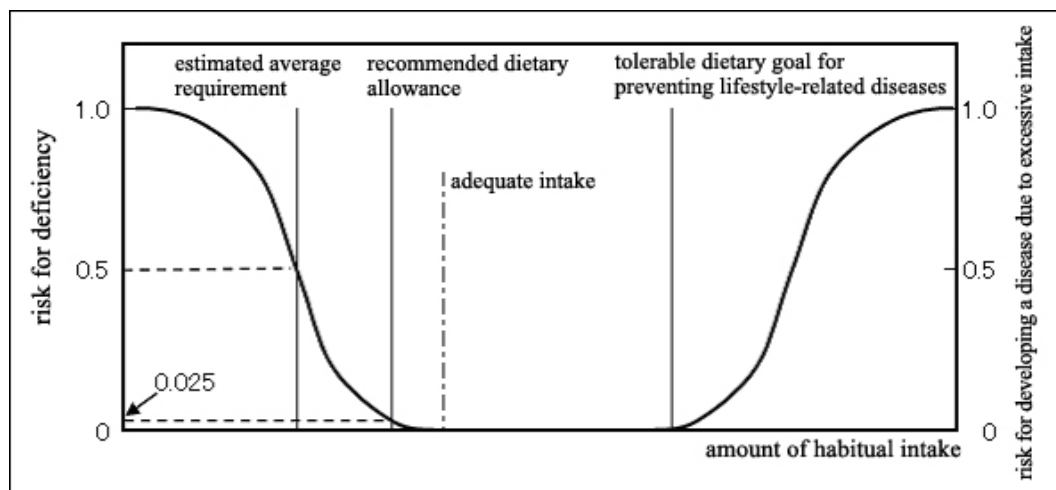


Figure 2. A model to understand the indices for DRIs (Estimated Average Requirement, Recommended Daily Allowance, Adequate Intake and Tolerable Upper Intake Level). The figure shows the risk of deficiency exist for 0.5 (50%) for EAR and 0.02 to 0.03 (mean, 0.025, 2 to 3% or 2.5%) for RDA. Note that there is a potential risk of developing a disease from adverse effects due to excessive intake when the amount exceeds UL. It can also be seen that when the intake is between RDA and UL, the risk of a deficiency or developing a disease due to excessive intake is near zero (0). An AI is not in a fixed relationship with EAR or RDA. If it is possible to compute the last two simultaneously, the estimated intake is believed to be greater than RDA (on the right side in the figure). The estimated intake was added for reference. Because the DG is determined from the EDA or AI and the median of the current intake, it cannot be displayed here.

Table 4. Nutrients for which DRIs have been established and its indices (aged ≥ 1 year)¹

		EAR	RDA	AI	DG	UL
Proteins		○	○	-	○	-
	Total fats	-	-	-	○	-
	Saturated fatty acids	-	-	-	○	-
Lipids	n-6 fatty acids	-	-	○	○	-
	n-3 fatty acids	-	-	○	○	-
	Cholesterol	-	-	-	○	-
Carbohydrates		-	-	-	○	-
Dietary fibers		-	-	○	○	-
	Vitamin B ₁	○	○	-	-	-
	Vitamin B ₂	○	○	-	-	-
	Niacin	○	○	-	-	○
	Vitamin B ₆	○	○	-	-	○
Water-soluble vitamins	Folic acid	○	○	-	-	○ ²
	Vitamin B ₁₂	○	○	-	-	-
	Biotin	-	-	○	-	-
	Pantothenic acid	-	-	○	-	-
	Vitamin C	○	○	-	-	-
	Vitamin A	○	○	-	-	○
Oil-soluble vitamins	Vitamin E	-	-	○	-	○
	Vitamin D	-	-	○	-	○
	Vitamin K	-	-	○	-	-
	Magnesium	○	○	-	-	○ ²
Minerals	Calcium	-	-	○	○	○
	Phosphorus	-	-	○	-	○
	Chromium	○	○	-	-	-
	Molybdenum	○	○	-	-	○
	Manganese	-	-	○	-	○
Trace elements	Iron	○	○	-	-	○
	Copper	○	○	-	-	○
	Zinc	○	○	-	-	○
	Selenium	○	○	-	-	○
	Iodine	○	○	-	-	○
Electrolytes	Sodium	○	-	-	○	-
	Potassium	-	-	○	○	-

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; DG, tentative dietary goal for preventing life-style related diseases; UL, tolerable upper intake level. ¹Including when the DRIs were defined for only certain age groups.

²Defined as intake from other than normal food.

Table 5. Reference physique (reference height and reference weights)

Sex Age	Males		Females ¹	
	Reference height (cm)	Reference weights (kg)	Reference height (cm)	Reference weights (kg)
0-5 months	62.2	6.6	61.0	6.1
6-11	71.5	8.8	69.9	8.2
1-2 years	85.0	11.9	84.7	11.0
3-5	103.5	16.7	102.5	16.0
6-7	119.6	23.0	118.0	21.6
8-9	130.7	28.0	130.0	27.2
10-11	141.2	35.5	144.0	35.7
12-14	160.0	50.0	154.8	45.6
15-17	170.0	58.3	157.2	50.0
18-29	171.0	63.5	157.7	50.0
30-49	170.0	68.0	156.8	52.7
50-69	164.7	64.0	152.0	53.2
≥70	160.0	57.2	146.7	49.7

¹ Excluding pregnant women.

corresponding gender and age that were obtained at the time of the 2001 National Nutrition Survey in Japan³ and for infants ages 0 through 11 months, the median of the group of corresponding age (in months) obtained from the 2000 National Growth Survey in Infancy and Childhood⁴ were used. These are called the “reference physiques” (reference heights and reference weights) (**Table 5**).

Notes for each life stage

Infant. Experiments cannot be conducted on infants less than 6 months old to determine their EAR or RDA. It was assumed that the quality and quantity of human milk consumed by healthy infants would be equivalent to the optimum nutritional requirement for infants. For the infants' DRIs, AI was computed: specifically, the product of the nutrient concentration of the human milk and the amount consumed by the infant was used. The mean quantity taken by an infant during this period has been reported to be 0.78 L/day.⁴ Therefore the standard quantity consumed by a healthy infant was set at 0.78 L/day for the DRIs.

For infants ages 6 through 11 months, consumption of food other than human milk (or other milk products prepared for infants) must be taken into consideration; however, valid, accurate data are scarce. The values for infants aged 0 through 5 months and/or those 1 through 2 years were extrapolated.

Children. Very few studies are available that would be sufficient to set DRIs for children. When sufficient data were not extant, the values were estimated by employing the extrapolation method to those values of adults.

Because of the scarcity of information, it was often not able to set ULs. It should be noted that the absence of UL does not necessarily assure freedom from developing health problems when the intake becomes excessive.

Elderly. For the aged, weakening of their masticatory function, deterioration of digestive and absorptive function, and a reduction in food intake due to less physical activities exist. Characteristics of this age group include frequent and wide variation of their individual food intake

and the fact that many aged individuals are affected by an illness. Sufficient attention should be directed not only to the age but also to individual characteristics.

Pregnant and Lactating Women. First, the DRIs for non-pregnant and non-lactating women are computed for their specific age category, and then a certain amount is added for pregnancy and lactation.

The typical duration of pregnancy was assumed to be 280 days and the cumulative effect for fetal growth was expressed in terms of volume per day. If it is necessary to divide the duration of pregnancy, the following 3 divisions were proposed: early stage (less than 16 weeks); mid-stage (16 to less than 28 weeks); and late stage (28 weeks and thereafter).

For the lactating stage, data on lactation is necessary; no reliable data for Japanese women were available; so the amount of maternal milk ingested by an infant (0.78 L/day)⁴ was used as the daily volume of lactation.

Because of the paucity of data on UL for pregnant and lactating women, many nutrients are without UL. The absence of UL does not necessarily assure that one is free from developing health problems due to excessive intake. It is convenient as a rule to refer to the UL for non-pregnant or non-lactating women of comparable age; however, these values did not incorporate any consideration about the effect on the fetus during pregnancy or the milk during the lactating period which may be associated with a certain risk. Thus, close attention should be paid to the UL for these women. Because the scientific basis related to these problems is not available, no quantitative reference could be provided.

BASIC APPROACH FOR APPLICATION

Basic concept of DRI-J Use

The DRIs are used for various purposes but their application may be roughly classified into the following: for the “assessment of the current state of nutrient intake” and “for designing dietary plans (including planning for dietary consultation, public nutrition and food service).” The application is further divided by whether it is for “individuals” or “groups.”

Table 6. Concept of Dietary Reference Intakes uses for dietary assessment (excluding energy requirements)¹⁻³

	For an Individual	For a Group
EAR	If the habitual intake is less than EAR, the probability for deficiency is more than 50%: the probability increases as the habitual intake is reduced below EAR.	The percentage of those with a habitual intake less than EAR is generally equal to that suffering from insufficient intake.
RDA	When the habitual intake exceeds the EAR and approaches RDA, the probability for deficiency is reduced. When it reaches RDA, the probability becomes low (2.5%).	Not used.
AI	If the habitual intake exceeds AI, the probability for deficiency becomes very low.	When the median intake of the group is more than AI, the percentage of those suffering from a deficiency is small. If the median intake is less than AI, the percentage cannot be determined.
DG ⁴	If the habitual intake has reached DG or within the range indicated, the risk for lifestyle-related disease ⁶ is very unlikely.	The percentage of those not achieving DG or those with an intake outside the range corresponds to those having a risk of developing a lifestyle-related disease. ⁶
UL ⁵	As the habitual intake exceeds the upper limit and continues to increase, the risk for developing a disease ⁶ related to excessive intake increases.	The percentage of those with habitual intake exceeding UL corresponds to the percentage of those having a risk for developing a disease ⁶ due to excessive intake.

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; DG, tentative dietary goal for preventing lifestyle-related diseases; UL, tolerable upper intake level. ¹ The assessment based on intake is meant to be used for screening. To know the true nutritional state, it is necessary to obtain clinical information, results of biochemical determinations and physiological data. ² It has been reported in American and European studies that the energy intake (although the extent may vary in the method of survey or study subjects) is often underreported by 5 to 15%.⁴ Among Japanese, it is also known that the mean for a group be underreported by 8% than actual intake.⁵ The tendency is particularly notable when the subjects are obese,²⁰ but the quantitative relationship has not been elucidated. For the nutrients, underreporting, such as seen for energy, is suspected but details are not known. ³ It is desirable that the habitual intake be estimated as accurately as possible. (Refer to 4-3.) ⁴ The nutrient intake and related risk for developing a lifestyle-related disease are ongoing events and should be regarded carefully. The “high” and “low” risks are relative concepts. ⁵ There are some nutrients for which no UL is indicated because there is no sufficient scientific basis to determine the actual value. It by no means assures safety from excessive intake. ⁶ The “risk” here means the probability of developing a lifestyle-related disease or disorder due to excessive consumption of the nutrient in question.

Table 7. Concept of Dietary Reference Intakes uses for dietary planning¹ (excluding energy requirements)

	For an Individual	For a Group
EAR	Not used	The percentage of those with a habitual intake below EAR should be brought down to less than 2.5%
RDA	Those whose habitual intake is less than EAR should try to achieve the RDA.	Not used
AI	One should try to bring his/her habitual intake close to AI.	The goal is to bring the mean of the group to AI.
DG ²	One should strive to bring his/her habitual intake close to DG or within the range indicated.	Reduced the percentage of those whose habitual intake is below DG or outside the range.
UL ³	One should bring the habitual intake below UL.	The percentage of those whose habitual intake exceeds UL should be brought to zero (0)

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; DG, tentative dietary goal for preventing lifestyle-related diseases; UL, tolerable upper intake level. ¹ It is important to design and implement a plan tailored to the subject, based on a dietary assessment (using not only the dietary intake but also biochemical and physiological data). The numerical indices are not to be followed faithfully. The dietary assessment, which constitutes the basis of planning, is used for screening purposes. To understand one's true nutritional status, clinical information, results of biochemical tests and physiological data are needed. ² The nutrient intake and related risk for developing a lifestyle-related disease are ongoing events and should be regarded carefully. The “high” and “low” risks are relative concepts. The “risk” here means the probability of developing a lifestyle-related disease or disorder due to excessive consumption of the nutrient in question. ³ There are certain nutrients for which no UL are indicated because there is no sufficient scientific basis to determine the actual value. It by no means guarantees safety from excessive intake.

Excluding energy requirements, basic handling of all nutrients is shown in Table 6 (dietary assessment) and Table 7 (dietary planning). In preparing these tables, the concept adopted in the DRIs of the United States and Canada was used as a reference.⁵

It is essential that a dietary plan be prepared and implemented, based on a dietary assessment (not only the intake but also biochemical indices and physical measurements). It should be noted that the value indicated by the DRIs are estimates and not necessarily the amount that are applicable to all circumstances in real life.

Notes for applying DRIs

1. The subjects to whom the Dietary Reference Intakes are applied are, as a rule, healthy individuals or groups that are composed of healthy individuals. The healthy individuals here may include those who have some mild conditions such as hypertension, hyperlipidemia and hyperglycemia but enjoy a normal life and no specific dietary guidance is being given or diet therapy or diet restriction is imposed.
2. Although the unit used in DRIs is “per day”, it is a value for which average habitual intake is converted into a daily intake level.
3. When applying DRIs to nutritional consultation, lunch programs and others, it is especially desirable to consider the following: energy, lipids, proteins, vitamin A, vitamin B, vitamin C, calcium, iron, sodium and dietary fibers.
4. Fundamentally, RDA, AI and DG should be fulfilled through a balanced diet that is composed of normal food in daily life.
5. Regarding UL, adverse health conditions are not brought about just because the UL is exceeded temporarily through meals consisting of normal foods.
6. For aged, weakening of their masticatory function, deterioration of digestive and absorptive function, and a reduction in food intake due to less physical activities exist. This age group often has a marked variation in their individual intake and many aged individuals are affected by an illness. Thus, sufficient attention should be directed not only to the age but also to individual characteristics.

DRIS OF ENERGY AND NUTRIENTS

DRIs of energy and each nutrient in the current DRIs-J are shown in the tables of Appendix.

FUTURE ISSUES OF DRIS-J

This is the first dietary reference intake report in Japan, which applied evidence-based approach with a systematic review process. Only a few articles from within Japan and other Asian countries could be used for their establishment. The project to establish the DRI-J revealed a severe lack of scientific publications focused upon establishing DRIs for Japanese. Further research is therefore required prior to the next revision scheduled in 2010.

AUTHOR DISCLOSURES

Satoshi Sasaki, no conflicts of Interest

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[APPENDIX]

Dietary Reference Intakes (DRIs) for energy: Estimated Energy Requirements (EERs) (kcal/day)

Sex	Males			Females		
	I	II	III	I	II	III
PAL						
0-5 months infants						
Breastfed	-	600	-	-	550	-
Formula-fed	-	650	-	-	600	-
6-11 months	-	700	-	-	650	-
1-2 years	-	1,050	-	-	950	-
3-5	-	1,400	-	-	1,250	-
6-7	-	1,650	-	-	1,450	-
8-9	-	1,950	2,200	-	1,800	2,000
10-11	-	2,300	2,550	-	2,150	2,400
12-14	2,350	2,650	2,950	2,050	2,300	2,600
15-17	2,350	2,750	3,150	1,900	2,200	2,550
18-29	2,300	2,650	3,050	1,750	2,050	2,350
30-49	2,250	2,650	3,050	1,700	2,000	2,300
50-69	2,050	2,400	2,750	1,650	1,950	2,200
≥ 70 ¹	1,600	1,850	2,100	1,350	1,550	1,750
Pregnant women:						
Early-stage (amount to be added)				+50	+50	+50
Mid-stage (amount to be added)				+250	+250	+250
Late-stage (amount to be added)				+500	+500	+500
Lactating women (amount to be added)				+450	+450	+450

PAL: Physical activity level. ¹For adults, the following formula was used for computation: Estimated Energy Requirement=Basal Metabolic Rate (kcal/day) × PAL. For those between 18~69 years, the PALs were designated as I=1.50, II=1.75 or III=2.00. For those 70 years or older, the following were used instead: I=1.30, II=1.50, III=1.70. The seeming discrepancy in Estimated Energy Requirements for the 50~69 and over 70 year group is mostly explained by this.

(Reference 1)

The description and duration of physical activity levels (ages 15 through 69 years)¹

PAL ²	Low (I)	Moderate (II)	High (III)	
	1.50 (1.40~1.60)	1.75 (1.60~1.90)	2.00 (1.90~2.20)	
Details of daily activities	Subjects remain sedentary most of the time and engage mainly in less energetic activities.	Subjects remain sedentary most of the time but the activities include any of the following: move within the work site, work performed while standing, interacting with customers, commuting, shopping, housekeeping, and light sport activities.	Subjects engage in work that require moving or remain standing; or they customarily engage in active athletic activities.	
Classification of each activity (hours/day) ²	Sleeping (1.0)	8	7~8	7
	Sedentary or being still while standing (1.5 : 1.1~1.9)	13~14	11~12	10
	Low-intensity activities such as slow walking and house-keeping (2.5 : 2.0~2.9)	1~2	3	3~4
	Mid-intensity activities such as exercise or labor that can be sustained for an extended period (includes normal speed walking) (4.5 : 3.0~5.9)	1	2	3
	Highly-intensity activities, such as exercise or labor that requires frequent rest (7.0 : >6.0)	0	0	0~1

PAL, Physical activity level. ¹ Representative values. The range is shown in parentheses. ² Data in parentheses is an activity factor (Af: intensity per unit time of each physical activity, expressed in a multiple of the basal metabolism). (Representative value: lower threshold~upper threshold).

(Reference 2)

Examples of physical activity classifications

Classification of physical activities (within the range of Af ¹)	Examples of physical activities
Sleeping (1.0)	Sleeping
Sedentary activities while sitting or standing (1.1~1.9)	Lying down, sit in a relaxed manner (reading books, writing, and watching television), carrying on a conversation (while standing), cooking, dining, toileting activities (dressing, face-washing, and using the toilet facilities), sewing (hand-sewing and operating a sewing machine), engaging in a hobby or entertainment (flower arrangement, tea ceremony, mah-jong, playing musical instrument), driving, desk work (book-keeping and operating a word processor and OA equipment).
Low-intensity activities, such as slow walking or household chores (2.0~2.9)	Standing in a train or bus. Walk slowly for shopping or just enjoy a walk (45 m/min.). Doing laundry (using a washing machine). House cleaning (using a vacuum cleaner).
Mid-intensity exercise or labor that can be sustained for an extended period (including normal walking) (3.0~5.9)	Tend a home vegetable garden. Play gate-ball. Normal walking (71 m/min.). Bathing. Cycling (at a normal speed). Walking with a child on one's back. Playing catch-ball. Playing golf. Dancing (light). Hiking (on level ground). Climbing up and down stairs. Lifting or taking down bedding. Normal walking (95 m/min). Gymnastics (following radio or television instructions).
High-intensity activities such as exercise or labor that require frequent rest (>6.0)	Muscle training, aerobic dancing (active), rowing, jogging (120 m/min), tennis, badminton, volleyball, skiing, basketball, soccer, skating, jogging (160 m/min), swimming, running (200 m/min).

¹ Activity factor (Af) is computed from the relative metabolic rate cited by Numajiri⁴⁵⁾ as follows: Af=energy metabolic rate + 1.2. Each physical activity was based on the mean during the time of activity. The data during rest and interruption were excluded.

Dietary Reference Intakes (DRIs) for protein

Sex	Males				Females			
Age	EAR (g/day)	RDA (g/day)	AI (g/day)	DG (% energy) ¹	EAR (g/day)	RDA (g/day)	AI (g/day)	DG (% energy) ¹
0-5 months infants								
	Breastfed	-	-	10	-	-	-	10
Formula-fed	-	-	15	-	-	-	15	-
6-11 months infants								
	Breastfed	-	-	15	-	-	-	15
Formula-fed	-	-	20	-	-	-	20	-
1-2 years	15	20	-	-	15	20	-	-
3-5	20	25	-	-	20	25	-	-
6-7	30	35	-	-	25	30	-	-
8-9	30	40	-	-	30	40	-	-
10-11	40	50	-	-	40	50	-	-
12-14	50	60	-	-	45	55	-	-
15-17	50	65	-	-	40	50	-	-
18-29	50	60	-	<20	40	50	-	<20
30-49	50	60	-	<20	40	50	-	<20
50-69	50	60	-	<20	40	50	-	<20
≥ 70	50	60	-	<25	40	50	-	<25
Pregnant women (amount to be added)					+8	+10	-	-
Lactating women (amount to be added)					+15	+20	-	-

¹ The TGs (upper threshold) were set as protein energy ratio (%). EAR, estimated average requirement, RDA, recommended dietary allowance; AI, adequate intake; DG, tentative dietary goal for preventing life-style related diseases

Dietary Reference Intakes (DRIs) for fat

	Total fat (% energy)				Saturated fatty acids (% energy)	
	Male		Females		Males	Females
	AI	DG	AI	DG	AI	AI
0-5 months	50	-	50	-	-	-
6-11	40	-	40	-	-	-
1-2 years	-	20<, <30	-	20<, <30	-	-
3-5	-	20<, <30	-	20<, <30	-	-
6-7	-	20<, <30	-	20<, <30	-	-
8-9	-	20<, <30	-	20<, <30	-	-
10-11	-	20<, <30	-	20<, <30	-	-
12-14	-	20<, <30	-	20<, <30	-	-
15-17	-	20<, <30	-	20<, <30	-	-
18-29	-	20<, <30	-	20<, <30	4.5<, <7.0	4.5<, <7.0
30-49	-	20<, <25	-	20<, <25	4.5<, <7.0	4.5<, <7.0
50-69	-	20<, <25	-	20<, <25	4.5<, <7.0	4.5<, <7.0
≥ 70 ¹	-	15<, <25	-	15<, <25	4.5<, <7.0	4.5<, <7.0
Pregnant women			-	20<, <30		
Lactating women			-	20<, <30		

AI, adequate intake; DG, tentative dietary goal for preventing life-style related diseases. Saturated fatty acid: C4:0, C6:0, C8:0, C10:0, C12:0, C14:0, C15:0, C16:0, C17:0, C18:0, C20:0, C22:0, C24:0. Note: When the subject is ≥10 years old and the blood LDL cholesterol level is high, the arteriosclerotic process may progress. Treatment that includes restriction on saturated fatty acids is desired.

Dietary Reference Intakes (DRIs) for fat

	n-6 fatty acids ¹				n-3 fatty acids ² (g/day)				Cholesterol ³ (mg/day)	
	Males		Females		Males		Females		Males	Females
	AI (g/day)	DG (% en- ergy)	AI (g/day)	DG (% en- ergy)	AI	DG	AI	DG	DG	DG
0-5 months	4.0	-	4.0	-	0.9	-	0.9	-	-	-
6-11	5.0	-	5.0	-	1.0	-	1.0	-	-	-
1-2 years	6.0		6.0		1.1	-	1.0	-	-	-
3-5	8.0		7.0		1.5	-	1.5	-	-	-
6-7	9.0		8.5		1.6	-	1.6	-	-	-
8-9	9.0		10		1.9	-	2.0	-	-	-
10-11	11		11		2.1	-	2.1	-	-	-
12-14	13		10		2.6	-	2.1	-	-	-
15-17	14		11		2.8	-	2.3	-	-	-
18-29	12	<10	10	<10	-	>2.6	-	>2.2	<750	<600
30-49	11	<10	9.5	<10	-	>2.6	-	>2.2	<750	<600
50-69	10	<10	9.0	<10	-	>2.9	-	>2.5	<750	<600
≥ 70 ¹	8.0	<10	7.0	<10	-	>2.2	-	>2.0	<750	<600
Pregnant women	/		9.0	<10	/		2.1	-	/	
Lactating women			10	<10			2.4	-		

AI, adequate intake; DG, tentative dietary goal for preventing life-style related diseases. ¹N-6 fatty acids: C16:3, C18:2, C18:3, C20:2, C20:3, C20:4, C22:2, C22:5. No goal was computed for children; but by using the values set for an adult, it is desirable to avoid excessive intake. ²N-3 fatty acids: C18:3, C18:4, C20:4, C20:5, C22:5, C22:6. ³When the subject is ≥10 years-old and the blood LDL cholesterol level is high, the arteriosclerotic process may progress. Treatment that includes restriction on cholesterol intake is desired.

Dietary Reference Intakes (DRIs) for carbohydrates (% energy)

Sex	Males					Females				
Age	EAR	RDA	AI	DG	UL	EAR	RDA	AI	DG	UL
0-5 months	-	-	-	-	-	-	-	-	-	-
6-11	-	-	-	-	-	-	-	-	-	-
1-2 years	-	-	-	-	-	-	-	-	-	-
3-5	-	-	-	-	-	-	-	-	-	-
6-7	-	-	-	-	-	-	-	-	-	-
8-9	-	-	-	-	-	-	-	-	-	-
10-11	-	-	-	-	-	-	-	-	-	-
12-14	-	-	-	-	-	-	-	-	-	-
15-17	-	-	-	-	-	-	-	-	-	-
18-29	-	-	-	50<, <70	-	-	-	-	50<, <70	-
30-49	-	-	-	50<, <70	-	-	-	-	50<, <70	-
50-69	-	-	-	50<, <70	-	-	-	-	50<, <70	-
≥ 70	-	-	-	50<, <70	-	-	-	-	50<, <70	-
Pregnant women (amount to be added)	/					-	-	-	-	-
Lactating women (amount to be added)						-	-	-	-	-

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; DG, tentative dietary goal for preventing life-style related diseases; UL, tolerable upper intake level

Dietary Reference Intakes (DRIs) for dietary fibers (g/day)

Sex	Males					Females				
Age	EAR	RDA	AI	DG	UL	EAR	RDA	AI	DG	UL
0-5 months	-	-	-	-	-	-	-	-	-	-
6-11	-	-	-	-	-	-	-	-	-	-
1-2 years	-	-	-	-	-	-	-	-	-	-
3-5	-	-	-	-	-	-	-	-	-	-
6-7	-	-	-	-	-	-	-	-	-	-
8-9	-	-	-	-	-	-	-	-	-	-
10-11	-	-	-	-	-	-	-	-	-	-
12-14	-	-	-	-	-	-	-	-	-	-
15-17	-	-	-	-	-	-	-	-	-	-
18-29	-	-	27	20	-	-	-	21	17	-
30-49	-	-	26	20	-	-	-	20	17	-
50-69	-	-	24	20	-	-	-	19	18	-
≥ 70	-	-	19	17	-	-	-	15	15	-
Pregnant women (amount to be added)						-	-	-	-	-
Lactating women (amount to be added)						-	-	-	-	-

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; DG, tentative dietary goal for preventing life-style related diseases; UL, tolerable upper intake level

Dietary Reference Intakes (DRIs) for vitamin B₁ (mg/day)¹

Sex	Males				Females			
Age	EAR	RDA	AI	UL	EAR	RDA	AI	UL
0-5 months	-	-	0.1	-	-	-	0.1	-
6-11	-	-	0.3	-	-	-	0.3	-
1-2 years	0.4	0.5	-	-	0.4	0.5	-	-
3-5	0.6	0.7	-	-	0.6	0.7	-	-
6-7	0.7	0.9	-	-	0.7	0.8	-	-
8-9	0.9	1.1	-	-	0.8	1.0	-	-
10-11	1.0	1.2	-	-	1.0	1.2	-	-
12-14	1.2	1.4	-	-	1.0	1.2	-	-
15-17	1.2	1.5	-	-	1.0	1.2	-	-
18-29	1.2	1.4	-	-	0.9	1.1	-	-
30-49	1.2	1.4	-	-	0.9	1.1	-	-
50-69	1.1	1.3	-	-	0.9	1.0	-	-
≥ 70	0.8	1.0	-	-	0.7	0.8	-	-
Pregnant women (amount to be added)					+0	+0	-	-
early-stage					+0.1	+0.1	-	-
mid-stage					+0.2	+0.3	-	-
late-stage							-	-
Lactating women (amount to be added)					+0.1	+0.1	-	-

¹ Computed using the Estimated Energy Requirement for PAL II. EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level; PAL, physical activity level

Dietary Reference Intakes (DRIs) for vitamin B₂ (mg/day)¹

Sex	Males				Females			
Age	EAR	RDA	AI	UL	EAR	RDA	AI	UL
0-5 months	-	-	0.3	-	-	-	0.3	-
6-11	-	-	0.4	-	-	-	0.4	-
1-2 years	0.5	0.6	-	-	0.4	0.5	-	-
3-5	0.7	0.8	-	-	0.6	0.8	-	-
6-7	0.8	1.0	-	-	0.7	0.9	-	-
8-9	1.0	1.2	-	-	0.9	1.1	-	-
10-11	1.2	1.4	-	-	1.1	1.3	-	-
12-14	1.3	1.6	-	-	1.2	1.4	-	-
15-17	1.4	1.7	-	-	1.1	1.3	-	-
18-29	1.3	1.6	-	-	1.0	1.2	-	-
30-49	1.3	1.6	-	-	1.0	1.2	-	-
50-69	1.2	1.4	-	-	1.0	1.2	-	-
≥ 70	0.9	1.1	-	-	0.8	0.9	-	-
Pregnant women (amount to be added)	/							
early-stage					+0	+0	-	-
mid-stage					+0.1	+0.2	-	-
late-stage					+0.3	+0.3	-	-
Lactating women (amount to be added)	/				+0.3	+0.4	-	-

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level; PAL, physical activity level

Dietary Reference Intakes (DRIs) for niacin (mg NE/day)¹

Sex	Males				Females			
Age	EAR	RDA	AI	UL ²	EAR	RDA	AI	UL ²
0-5 months ³	-	-	2	-	-	-	2	-
6-11	-	-	3	-	-	-	3	-
1-2 years	5	6	-	-	4	5	-	-
3-5	7	8	-	-	6	7	-	-
6-7	8	10	-	-	7	9	-	-
8-9	9	11	-	-	9	10	-	-
10-11	11	13	-	-	10	12	-	-
12-14	13	15	-	-	11	13	-	-
15-17	13	16	-	-	11	13	-	-
18-29	13	15	-	300 (100)	10	12	-	300 (100)
30-49	13	15	-	300 (100)	10	12	-	300 (100)
50-69	12	14	-	300 (100)	9	11	-	300 (100)
≥ 70	9	11	-	300 (100)	7	9	-	300 (100)
Pregnant women (amount to be added)	/							
early-stage					+0	+0	-	-
mid-stage					+1	+1	-	-
late-stage					+2	+3	-	-
Lactating women (amount to be added)	/				+2	+2	-	-

NE, niacin equivalents; EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level, PAL, physical activity level. ¹ Computed using the Estimated Energy Requirement for PAL II. ² Quantity (mg) for the upper threshold of nicotinamide. The value in parentheses is the quantity (mg) of nicotinic acid. ³ Unit, mg/day

Dietary Reference Intakes (DRIs) for vitamin B₆ (mg/day)¹

Sex Age	Males				Females			
	EAR	RDA	AI	UL ²	EAR	RDA	AI	UL ²
0-5 months	-	-	0.2	-	-	-	0.2	-
6-11	-	-	0.3	-	-	-	0.3	-
1-2 years	0.4	0.5	-	-	0.4	0.5	-	-
3-5	0.5	0.6	-	-	0.5	0.6	-	-
6-7	0.7	0.8	-	-	0.6	0.7	-	-
8-9	0.8	0.9	-	-	0.8	0.9	-	-
10-11	1.0	1.2	-	-	1.0	1.2	-	-
12-14	1.1	1.4	-	-	1.0	1.3	-	-
15-17	1.2	1.5	-	-	1.0	1.2	-	-
18-29	1.1	1.4	-	60	1.0	1.2	-	60
30-49	1.1	1.4	-	60	1.0	1.2	-	60
50-69	1.1	1.4	-	60	1.0	1.2	-	60
≥ 70	1.1	1.4	-	60	1.0	1.2	-	60
Pregnant women (amount to be added)					+0.7	+0.8	-	-
Lactating women (amount to be added)					+0.3	+0.3	-	-

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level, PAL, physical activity level. ¹ Computed using the Estimated Energy Requirement for PAL II. ² Quantity as pyridoxine.

Dietary Reference Intakes (DRIs) for folic acid (µg/day)¹

Sex Age	Males				Females			
	EAR	RDA	AI	UL ²	EAR	RDA	AI	UL ²
0-5 months	-	-	40	-	-	-	40	-
6-11	-	-	60	-	-	-	60	-
1-2 years	80	90	-	-	80	90	-	-
3-5	90	110	-	-	90	110	-	-
6-7	110	140	-	-	110	140	-	-
8-9	140	160	-	-	140	160	-	-
10-11	160	200	-	-	160	200	-	-
12-14	200	240	-	-	200	240	-	-
15-17	200	240	-	-	200	240	-	-
18-29	200	240	-	1,000	200	240	-	1,000
30-49	200	240	-	1,000	200	240	-	1,000
50-69	200	240	-	1,000	200	240	-	1,000
≥ 70	200	240	-	1,000	200	240	-	1,000
Pregnant women (amount to be added)					+170	+200	-	-
Lactating women (amount to be added)					+80	+100	-	-

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level. ¹ Intake of 400 µg/day is desired for women who are planning to get pregnant or may be pregnant to reduce the risk of neural tube closure. ² Quantity as pteroyl-monoglutamic acid (intake from sources other than ordinary food).

Dietary Reference Intakes (DRIs) for vitamin B₁₂ (µg/day)

Sex	Males				Females			
Age	EAR	RDA	AI	UL ¹	EAR	RDA	AI	UL ¹
0-5 months	-	-	0.2	-	-	-	0.2	-
6-11	-	-	0.5	-	-	-	0.5	-
1-2 years	0.8	0.9	-	-	0.8	0.9	-	-
3-5	0.9	1.1	-	-	0.9	1.1	-	-
6-7	1.2	1.4	-	-	1.2	1.4	-	-
8-9	1.4	1.6	-	-	1.4	1.6	-	-
10-11	1.6	2.0	-	-	1.6	2.0	-	-
12-14	2.0	2.4	-	-	2.0	2.4	-	-
15-17	2.0	2.4	-	-	2.0	2.4	-	-
18-29	2.0	2.4	-	-	2.0	2.4	-	-
30-49	2.0	2.4	-	-	2.0	2.4	-	-
50-69	2.0	2.4	-	-	2.0	2.4	-	-
≥ 70	2.0	2.4	-	-	2.0	2.4	-	-
Pregnant women (amount to be added)					+0.3	+0.4	-	-
Lactating women (amount to be added)					+0.3	+0.4	-	-

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level. ¹The ULs were not set: even if it is taken in excess, the intrinsic factor secreted from the stomach becomes saturated and excess vitamin B₁₂ is not absorbed.

Dietary Reference Intakes (DRIs) for biotin (µg/day)

Sex	Males				Females			
Age	EAR	RDA	AI	UL	EAR	RDA	AI	UL
0-5 months	-	-	4	-	-	-	4	-
6-11	-	-	10	-	-	-	10	-
1-2 years	-	-	20	-	-	-	20	-
3-5	-	-	25	-	-	-	25	-
6-7	-	-	30	-	-	-	30	-
8-9	-	-	35	-	-	-	35	-
10-11	-	-	40	-	-	-	40	-
12-14	-	-	45	-	-	-	45	-
15-17	-	-	45	-	-	-	45	-
18-29	-	-	45	-	-	-	45	-
30-49	-	-	45	-	-	-	45	-
50-69	-	-	45	-	-	-	45	-
≥ 70	-	-	45	-	-	-	45	-
Pregnant women (amount to be added)					-	-	+2	-
Lactating women (additional value)					-	-	+4	-

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level

Dietary Reference Intakes (DRIs) for pantothenic acid (mg/day)

Sex Age	Males				Females			
	EAR	RDA	AI	UL	EAR	RDA	AI	UL
0-5 months	-	-	4	-	-	-	4	-
6-11	-	-	5	-	-	-	5	-
1-2 years	-	-	4	-	-	-	3	-
3-5	-	-	5	-	-	-	4	-
6-7	-	-	6	-	-	-	5	-
8-9	-	-	6	-	-	-	5	-
10-11	-	-	6	-	-	-	6	-
12-14	-	-	7	-	-	-	6	-
15-17	-	-	7	-	-	-	5	-
18-29	-	-	6	-	-	-	5	-
30-49	-	-	6	-	-	-	5	-
50-69	-	-	6	-	-	-	5 ¹	-
≥ 70	-	-	6	-	-	-	5	-
Pregnant women (amount to be added)	/				-	-	+1	-
Lactating women (amount to be added)					-	-	+4	-

¹ The values were smoothed in relation to those of the preceding and succeeding age groups. EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level

Dietary Reference Intakes (DRIs) for vitamin C (mg/day)

Sex Age	Males				Females			
	EAR	RDA	AI	UL	EAR	RDA	AI	UL
0-5 months	-	-	40	-	-	-	40	-
6-11	-	-	40	-	-	-	40	-
1-2 years	35	40	-	-	35	40	-	-
3-5	40	45	-	-	40	45	-	-
6-7	50	60	-	-	50	60	-	-
8-9	55	70	-	-	55	70	-	-
10-11	70	80	-	-	70	80	-	-
12-14	85	100	-	-	85	100	-	-
15-17	85	100	-	-	85	100	-	-
18-29	85	100	-	-	85	100	-	-
30-49	85	100	-	-	85	100	-	-
50-69	85	100	-	-	85	100	-	-
≥ 70	85	100	-	-	85	100	-	-
Pregnant women (amount to be added)					+10	+10	-	-
Lactating women (amount to be added)					+40	+50	-	-

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level

Dietary Reference Intakes (DRIs) for vitamin A ($\mu\text{g RE/day}$)

Sex Age	Males				Females			
	EAR	RDA ¹	AI ¹	UL ²	EAR	RDA ¹	AI ¹	UL ²
0-5 months	-	-	250	600	-	-	250	600
6-11	-	-	350	600	-	-	350	600
1-2 years	200	250	-	600	150	250	-	600
3-5	200	300	-	750	200	300	-	750
6-7	300	400	-	1,000	250	350	-	1,000
8-9	350	450	-	1,250	300	400	-	1,250
10-11	400	550	-	1,550	350	500	-	1,550
12-14	500	700	-	2,220	400	550	-	2,220
15-17	500	700	-	2,550	400	600	-	2,550
18-29	550	750	-	3,000	400	600	-	3,000
30-49	550	750	-	3,000	450	600	-	3,000
50-69	500	700	-	3,000	450	600	-	3,000
≥ 70	450	650	-	3,000	400	550	-	3,000
Pregnant women (amount to be added)					+50	+70	-	-
Lactating women (amount to be added)					+300	+420	-	-

RE=retinol equivalents. EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level. 1 $\mu\text{g RE} = 1 \mu\text{g retinol} = 12 \mu\text{g } \beta\text{-carotene} = 24 \mu\text{g } \alpha\text{-carotene} = 24 \mu\text{g } \beta\text{-cryptoxanthin}$. ¹ Includes provitamins and carotenoids. ² Does not include provitamins or carotenoids.

Dietary Reference Intakes (DRIs) for vitamin E (mg/day)¹

Sex Age	Males				Females			
	EAR	RDA	AI	UL	EAR	RDA	AI	UL
0-5 months	-	-	3	-	-	-	3	-
6-11	-	-	3	-	-	-	3	-
1-2 years	-	-	5	150	-	-	4	150
3-5	-	-	6	200	-	-	6	200
6-7	-	-	7	300	-	-	6	300
8-9	-	-	8	400	-	-	7	300
10-11	-	-	10	500	-	-	7	500
12-14	-	-	10	600	-	-	8	600
15-17	-	-	10	700	-	-	9	600
18-29	-	-	9	800	-	-	8	600
30-49	-	-	8	800 ²	-	-	8	700
50-69	-	-	9	800	-	-	8	700
≥ 70	-	-	7	700	-	-	7	600
Pregnant women (amount to be added)					-	-	+0	-
Lactating women (amount to be added)					-	-	+3	-

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level. ¹ Computation was made on α -tocopherol. Vitamins E other than α -tocopherol are not included. ² The value was smoothed in relation to those for the preceding and succeeding age groups.

Dietary Reference Intakes (DRIs) for vitamin D ($\mu\text{g}/\text{day}$)

Sex Age	Males				Females			
	EAR	RDA	AI	UL	EAR	RDA	AI	UL
0-5 months ¹	-	-	2.5 (5)	25	-	-	2.5 (5)	25
6-11 ¹	-	-	4 (5)	25	-	-	4 (5)	25
1-2 years	-	-	3	25	-	-	3	25
3-5	-	-	3	25	-	-	3	25
6-7	-	-	3	30	-	-	3	30
8-9	-	-	4	30	-	-	4	30
10-11	-	-	4	40	-	-	4	40
12-14	-	-	4	50	-	-	4	50
15-17	-	-	5	50	-	-	5	50
18-29	-	-	5	50	-	-	5	50
30-49	-	-	5	50	-	-	5	50
50-69	-	-	5	50	-	-	5	50
≥ 70	-	-	5	50	-	-	5	50
Pregnant women (amount to be added)					-	-	+2.5	-
Lactating women (amount to be added)					-	-	+2.5	-

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level.

¹Adequate intakes for an infant who is exposed to appropriate sunlight. The value in parentheses is adequate intakes for those with less sunlight exposure.

Dietary Reference Intakes (DRIs) for vitamin K ($\mu\text{g}/\text{day}$)

Sex Age	Males				Females			
	EAR	RDA	AI	UL	EAR	RDA	AI	UL
0-5 months	-	-	4	-	-	-	4	-
6-11	-	-	7	-	-	-	7	-
1-2 years	-	-	25	-	-	-	25	-
3-5	-	-	30	-	-	-	30	-
6-7	-	-	40	-	-	-	35	-
8-9	-	-	45	-	-	-	45	-
10-11	-	-	55	-	-	-	55	-
12-14	-	-	70	-	-	-	65	-
15-17	-	-	80	-	-	-	60	-
18-29	-	-	75	-	-	-	60	-
30-49	-	-	75	-	-	-	65	-
50-69	-	-	75	-	-	-	65	-
≥ 70	-	-	75	-	-	-	65	-
Pregnant women (amount to be added)					-	-	+0	-
Lactating women (amount to be added)					-	-	+0	-

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level

Dietary Reference Intakes (DRIs) for magnesium (mg/day)

Sex Age	Males				Females			
	EAR	RDA	AI	UL ¹	EAR	RDA	AI	UL ¹
0-5 months	-	-	21	-	-	-	21	-
6-11	-	-	32	-	-	-	32	-
1-2 years	60	70	-	-	55	70	-	-
3-5	85	100	-	-	80	100	-	-
6-7	115	140	-	-	110	130	-	-
8-9	140	170	-	-	140	160	-	-
10-11	180	210	-	-	180	210	-	-
12-14	250	300	-	-	230	270	-	-
15-17	290	350	-	-	250	300	-	-
18-29	290	340	-	-	230	270	-	-
30-49	310	370	-	-	240	280	-	-
50-69	290	350	-	-	240	290	-	-
≥ 70	260	310	-	-	220	270	-	-
Pregnant women (amount to be added)					+30	+40	-	-
Lactating women (amount to be added)					+0	+0	-	-

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level. ¹When the nutrient is obtained from ordinary food, no upper threshold is set. When the nutrient is obtained from a source other than ordinary food, the upper threshold is set at 350 mg/day for adults and 5 mg/kg weight/day for children.

Dietary Reference Intakes (DRIs) for calcium (mg/day)

Sex Age	Males			Females		
	AI	DG	UL ²	AI	DG	UL ²
0-5 months						
Breastfed infants	200	-	-	200	-	-
Formula-fed infants	300	-	-	300	-	-
6-11 months						
Breastfed infants	250	-	-	250	-	-
Formula-fed infants	400	-	-	400	-	-
1-2 years	450	450 ³	-	400	400	-
3-5	600	550	-	550	550 ³	-
6-7	600	600	-	650	600	-
8-9	700 ⁴	700	-	800	700	-
10-11	950	800	-	950	800	-
12-14	1,000	900	-	850	750	-
15-17	1,100	850	-	850	650	-
18-29	900	650	2,300	700	600 ⁴	2,300
30-49	650	600 ⁴	2,300	600 ⁴	600 ⁴	2,300
50-69	700	600	2,300	700	600	2,300
≥ 70	750	600	2,300	650	550	2,300
Pregnant women (amount to be added) ¹				+0	-	-
Lactating women (amount to be added) ¹				+0	-	-

AI, adequate intake; DG, tentative dietary goal for preventing life-style related diseases; UL, tolerable upper intake level. ¹No additional value is defined; but it is desirable to achieve the adequate intake. When a subject suffers from a placental dysfunction such as pregnancy toxemia, active efforts should be made to consume calcium. ²Because sufficient studies have not been conducted on the upper threshold, it is not set for those under 17 years. However, it by no means recommends excessive intake or assures the safety of such an intake. ³Because the adequate intake and the median value of the current intake are close, the former is adopted. ⁴The value was smoothed in relation to those of the preceding and succeeding age groups.

Dietary Reference Intakes (DRIs) for phosphorus (mg/day)

Sex Age	Males				Females			
	EAR	RDA	AI	UL	EAR	RDA	AI	UL
0-5 months	—	—	130	—	—	—	130	—
6-11	—	—	280	—	—	—	280	—
1-2 years	—	—	650	—	—	—	600	—
3-5	—	—	800	—	—	—	800	—
6-7	—	—	1,000	—	—	—	900	—
8-9	—	—	1,100	—	—	—	1,000	—
10-11	—	—	1,150	—	—	—	1,050	—
12-14	—	—	1,350	—	—	—	1,100	—
15-17	—	—	1,250	—	—	—	1,000	—
18-29	—	—	1,050	3,500	—	—	900	3,500
30-49	—	—	1,050	3,500	—	—	900	3,500
50-69	—	—	1,050	3,500	—	—	900	3,500
≥ 70	—	—	1,000	3,500	—	—	900	3,500
Pregnant women (amount to be added)					—	—	+0	—
Lactating women (amount to be added)					—	—	+0	—

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level

Dietary Reference Intakes (DRIs) for chromium (µg/day): Provisional

Sex Age	Males				Females			
	EAR	RDA	AI	UL	EAR	RDA	AI	UL
0-5 months	-	-	-	-	-	-	-	-
6-11	-	-	-	-	-	-	-	-
1-2 years	-	-	-	-	-	-	-	-
3-5	-	-	-	-	-	-	-	-
6-7	-	-	-	-	-	-	-	-
8-9	-	-	-	-	-	-	-	-
10-11	-	-	-	-	-	-	-	-
12-14	-	-	-	-	-	-	-	-
15-17	-	-	-	-	-	-	-	-
18-29	35	40	-	-	25	30	-	-
30-49	35	40	-	-	25	30	-	-
50-69	30	35	-	-	25	30	-	-
≥ 70	25	30	-	-	20	25	-	-
Pregnant women (amount to be added)					-	-	-	-
Lactating women (amount to be added)					-	-	-	-

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level

Dietary Reference Intakes (DRIs) for molybdenum ($\mu\text{g/day}$): Provisional

Sex Age	Males				Females			
	EAR	RDA	AI	UL	EAR	RDA	AI	UL
0-5 months	—	—	—	—	—	—	—	—
6-11	—	—	—	—	—	—	—	—
1-2 years	—	—	—	—	—	—	—	—
3-5	—	—	—	—	—	—	—	—
6-7	—	—	—	—	—	—	—	—
8-9	—	—	—	—	—	—	—	—
10-11	—	—	—	—	—	—	—	—
12-14	—	—	—	—	—	—	—	—
15-17	—	—	—	—	—	—	—	—
18-29	20	25	—	300	15	20	—	240
30-49	20	25	—	320	15	20	—	250
50-69	20	25	—	300	15	20	—	250
≥ 70	20	25	—	270	15	20	—	230
Pregnant women (amount to be added)					—	—	—	—
Lactating women (amount to be added)					—	—	—	—

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level

Dietary Reference Intakes (DRIs) for manganese (mg/day)

Sex Age	Males				Females			
	EAR	RDA	AI	UL	EAR	RDA	AI	UL
0-5 months	-	-	0.001	-	-	-	0.001	-
6-11	-	-	1.2	-	-	-	1.2	-
1-2 years	-	-	1.5	-	-	-	1.5	-
3-5	-	-	1.7	-	-	-	1.7	-
6-7	-	-	2.0	-	-	-	2.0	-
8-9	-	-	2.5	-	-	-	2.5	-
10-11	-	-	3.0	-	-	-	3.0	-
12-14	-	-	4.0	-	-	-	3.5 ¹	-
15-17	-	-	4.0 ¹	-	-	-	3.5	-
18-29	-	-	4.0	11	-	-	3.5	11
30-49	-	-	4.0	11	-	-	3.5	11
50-69	-	-	4.0	11	-	-	3.5	11
≥ 70	-	-	4.0	11	-	-	3.5	11
Pregnant women (amount to be added)					-	-	+0	-
Lactating woman (amount to be added)					-	-	+0	-

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level. ¹The value was smoothed in relation to those of the preceding and succeeding age groups.

Dietary Reference Intakes (DRIs) for iron (mg/day)¹

Sex Age	Males				Females					
	EAR	RDA	AI	UL	Not menstruating ²		Menstruating		AI	UL
					EAR	RDA	EAR	RDA		
0-5 months infants										
Breastfed	-	-	0.4	-	-	-	-	-	0.4	-
Formula-fed	-	-	7.7	-	-	-	-	-	7.7	-
6-11 months	4.5	6.0	-	-	4.0	5.5	-	-	-	-
1-2 years	4.0	5.5	-	25	3.5	5.0	-	-	-	20
3-5	3.5	5.0	-	25	3.5	5.0	-	-	-	25
6-7	5.0	6.5	-	30	4.5	6.0	-	-	-	30
8-9	6.5	9.0	-	35	6.0	8.5	-	-	-	35
10-11	7.5	10.0	-	35	6.5	9.0	9.5	13.0	-	35
12-14	8.5	11.5	-	50	6.5	9.0	9.5	13.5	-	45
15-17	9.0	10.5	-	45	6.0	7.5	9.0	11.0	-	40
18-29	6.5 ³	7.5 ³	-	50	5.5 ³	6.5 ³	9.0 ³	10.5 ³	-	40
30-49	6.5	7.5	-	55	5.5	6.5	9.0	10.5	-	40
50-69	6.0	7.5	-	50	5.5	6.5	9.0	10.5	-	45
≥ 70	5.5	6.5	-	45	5.0	6.0	-	-	-	40
Pregnant women (amount to be added)					+11.0	+13.0	-	-	-	-
Lactating women (amount to be added)					+2.0	+2.5	-	-	-	-

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level. ¹ The values were set excluding those with menorrhagia (blood loss exceeding 80 mL/period). ² Applies to pregnant and lactating women. ³ The value was smoothed in relation to those of the preceding and succeeding age groups.

Dietary Reference Intakes (DRIs) for copper (mg/day)

Sex Age	Males				Females			
	EAR	RDA	AI	UL	EAR	RDA	AI	UL
0-5 months	-	-	0.3	-	-	-	0.3	-
6-11	-	-	0.3	-	-	-	0.3	-
1-2 years	0.2	0.3	-	-	0.2	0.3	-	-
3-5	0.3	0.4	-	-	0.3	0.3	-	-
6-7	0.3	0.4	-	-	0.3	0.4	-	-
8-9	0.4	0.5	-	-	0.4	0.5	-	-
10-11	0.5	0.6	-	-	0.5	0.6	-	-
12-14	0.6	0.8	-	-	0.6	0.7	-	-
15-17	0.7	0.9	-	-	0.5	0.7	-	-
18-29	0.6	0.8	-	10	0.5	0.7	-	10
30-49	0.6 ¹	0.8 ¹	-	10	0.6	0.7	-	10
50-69	0.6	0.8	-	10	0.6	0.7	-	10
≥ 70	0.6	0.8	-	10	0.5	0.7	-	10
Pregnant women (amount to be added)					+0.1	+0.1	-	-
Lactating women (amount to be added)					+0.5	+0.6	-	-

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level. ¹ The value was smoothed in relation to those of the preceding and succeeding age groups.

Dietary Reference Intakes (DRIs) for zinc (mg/day)

Sex Age	Males				Females			
	EAR	RDA	AI	UL	EAR	RDA	AI	UL
0-5 months								
Breastfed infants	-	-	2	-	-	-	2	-
Formula-fed infants	-	-	3	-	-	-	3	-
6-11 months	-	-	3	-	-	-	3	-
1-2 years	4	4	-	-	3	4	-	-
3-5	5	6	-	-	5	6	-	-
6-7	5	6	-	-	5	6	-	-
8-9	6	7	-	-	5	6	-	-
10-11	6	8	-	-	6	7	-	-
12-14	7	9	-	-	6	7	-	-
15-17	8	10	-	-	6	7	-	-
18-29	8	9	-	30	6	7	-	30
30-49	8	9	-	30	6	7	-	30
50-69	8	9	-	30	6	7	-	30
≥ 70	7	8	-	30	6	7	-	30
Pregnant women (amount to be added)					-	+3	-	-
Lactating women (amount to be added)					-	+3	-	-

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level

Dietary Reference Intakes (DRIs) for selenium (µg/day)

Sex Age	Males				Females			
	EAR	RDA	AI	UL	EAR	RDA	AI	UL
0-5 months	—	—	16	—	—	—	16	—
6-11	—	—	19	—	—	—	19	—
1-2 years	7	9	—	100	7	8	—	50
3-5	10	10	—	100	10	10	—	100
6-7	10	15	—	150	10	15	—	150
8-9	15	15	—	200	15	15	—	200
10-11	15	20	—	250	15	20	—	250
12-14	20	25	—	350	20	25	—	300
15-17	25	30	—	400	20	25	—	350
18-29	25	30	—	450	20	25	—	350
30-49	30	35	—	450	20	25	—	350
50-69	25	30	—	450	20	25	—	350
≥ 70	25	30	—	400	20	25	—	350
Pregnant women (amount to be added)					+4	+4	—	—
Lactating women (amount to be added)					+16	+20	—	—

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level

Dietary Reference Intakes (DRIs) for iodine ($\mu\text{g}/\text{day}$)

Sex Age	Males				Females			
	EAR	RDA	AI	UL	EAR	RDA	AI	UL
0-5 months	-	-	130	-	-	-	130	-
6-11	-	-	170	-	-	-	170	-
1-2 years	40	60	-	-	40	60	-	-
3-5	50	70	-	-	50	70	-	-
6-7	60	80	-	-	60	80	-	-
8-9	70	100	-	-	70	100	-	-
10-11	80	120	-	-	80	120	-	-
12-14	95 ¹	140	-	-	95 ¹	140	-	-
15-17	95 ¹	140	-	-	95 ¹	140 ¹	-	-
18-29	95	150	-	3,000	95	150	-	3,000
30-49	95	150	-	3,000	95	150	-	3,000
50-69	95	150	-	3,000	95	150	-	3,000
≥ 70	95	150	-	3,000	95	150	-	3,000
Pregnant women (amount to be added)					+75	+110	-	-
Lactating women (amount to be added)					+130	+190	-	-

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level. ¹ The value was smoothed in relation to those of the preceding and succeeding age groups.

Dietary Reference Intakes (DRIs) for sodium (mg/day , the value in parentheses is equivalent to table salt [g/day])

Sex Age	Males				Females			
	EAR	AI	DG ¹	UL	EAR	AI	DG ¹	UL
0-5 months	-	100 (0.26)	-	-	-	100 (0.26)	-	-
6-11	-	600 (1.5)	-	-	-	600 (1.5)	-	-
1-2 years	-	-	(<4)	-	-	-	(<3)	-
3-5	-	-	(<5)	-	-	-	(<5)	-
6-7	-	-	(<6)	-	-	-	(<6)	-
8-9	-	-	(<7)	-	-	-	(<7)	-
10-11	-	-	(<9)	-	-	-	(<8)	-
12-14	-	-	(<10)	-	-	-	(<8)	-
15-17	-	-	(<10)	-	-	-	(<8)	-
18-29	600 (1.5)	-	(<10)	-	600 (1.5)	-	(<8)	-
30-49	600 (1.5)	-	(<10)	-	600 (1.5)	-	(<8)	-
50-69	600 (1.5)	-	(<10)	-	600 (1.5)	-	(<8)	-
≥ 70	600 (1.5)	-	(<10)	-	600 (1.5)	-	(<8)	-
Pregnant women (amount to be added)					-	-	-	-
Lactating women (amount to be added)					-	-	-	-

EAR, estimated average requirement; AI, adequate intake; DG, tentative dietary goal for preventing life-style related diseases; UL, tolerable upper intake level. ¹ When energy intake can be measured, it is set at less than 4.5 g/1,000 kcal for those between 1~69 years (for both genders). Make an exception of males between 12 and 17 years, it is set at less than 4 g/1,000 kcal.

Dietary Reference Intakes (DRIs) for potassium: Adequate Intakes (AIs) (mg/day)¹

Sex Age	Males				Females			
	EAR	RDA	AI	UL	EAR	RDA	AI	UL
0-5 months	-	-	400	-	-	-	400	-
6-11	-	-	800	-	-	-	800	-
1-2 years	-	-	800 ¹	-	-	-	800 ¹	-
3-5	-	-	800	-	-	-	800	-
6-7	-	-	1,100	-	-	-	1,000	-
8-9	-	-	1,200	-	-	-	1,200	-
10-11	-	-	1,500	-	-	-	1,400	-
12-14	-	-	1,900	-	-	-	1,700	-
15-17	-	-	2,200	-	-	-	1,600	-
18-29	-	-	2,000	-	-	-	1,600	-
30-49	-	-	2,000	-	-	-	1,600	-
50-69	-	-	2,000	-	-	-	1,600	-
≥ 70	-	-	2,000	-	-	-	1,600	-
Pregnant women (amount to be added)					-	-	+0	-
Lactating women (amount to be added)					-	-	+370	-

EAR, estimated average requirement; RDA, recommended dietary allowance; AI, adequate intake; UL, tolerable upper intake level. ¹The value that is considered appropriate to maintain *in vivo* potassium balance was used as the adequate intake. ²The value was smoothed in relation to those of the preceding and succeeding age groups.

Dietary Reference Intakes (DRIs) for potassium to prevent hypertension: Tentative Dietary Goal for Preventing Lifestyle-related Diseases (DGs) (mg/day)

Sex Age	Males		Females	
	Optimum value to prevent lifestyle-related diseases ¹	DG	Optimum value to prevent lifestyle-related diseases ¹	DG
0-5 months	-	-	-	-
6-11	-	-	-	-
1-2 years	-	-	-	-
3-5	-	-	-	-
6-7	-	-	-	-
8-9	-	-	-	-
10-11	-	-	-	-
12-14	-	-	-	-
15-17	-	-	-	-
18-29	3,500	2,800	3,500	2,700
30-49	3,500	2,900	3,500	2,800
50-69	3,500	3,100	3,500	3,100
≥ 70	3,500	3,000	3,500	2,900
Pregnant women (amount to be added)			-	-
Lactating women (amount to be added)			-	-

DG, tentative dietary goal for preventing lifestyle-related diseases. ¹The 6th Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (The JNC 6 Report) states that the intake of 3,500 mg/day is desirable to prevent hypertension. This value is supported for active primary prevention of hypertension.