DIETARY REFERENCE INTAKES FOR JAPANESE (2005)

(THE REPORT FROM THE SCIENTIFIC COMMITTEE OF "DIETARY REFERENCE INTAKES FOR JAPANESE -- RECOMMENDED DIETARY ALLOWANCE --")

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NOTE

This English translation was a part* of the report.

(*General Theories, Energy, and Outline)

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CONTENTS

I. GENERAL THEORIES

1. Characteristics of Designing Policies

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. DRIs have been prepared not only to prevent energy or nutrient deficiency that may be caused by inadequate nutrient intake: it is also designed for the primary prevention of lifestyle-related diseases and illnesses caused by excess consumption of energy and nutrients.

The current DRIs have followed an approach of DRIs-J' concept which was introduced in the prior revision (the 6th revised Recommended Dietary Allowance and Dietary Reference Intake for Japanese, 1999) and the concept was thoroughly implemented in this revision. It is desired that those who use this DRIs-J should not become too preoccupied with the values presented; but should understand the concept of the DRIs-J thoroughly and apply them correctly.

The DRIs-J were prepared on a scientific basis as much as possible. Domestic and overseas academic papers and obtainable scientific data were utilized to the maximum. Furthermore, those dissertations and academic materials that were used in the revision of the prior edition were also reevaluated.

2. Basic Concept

2-1. General Concept

The traditional approach based on the concept of providing only the minimum requirements to avoid nutrient deficiencies is not sufficient to respond to the aim of prevention of lifestyle-related diseases and dysfunctions due to excess intake of nutrients. It is necessary to indicate a “range of intake” and introduce an idea that ones intake should stay within the range. It must also be shown clearly that if one were to consume any of the nutrients in excess of its range, it may lead to a risk of disease due to the excessive intake. This is the first basic concept in establishing DRIs-J.

In reality, “true” optimal intake varies among individuals and within an individual. Therefore, the ‘true’ optimal intake cannot be measured or estimated. This fact leads to a need of a probability approach in their computation or application. This is the second basic concept behind the DRIs-J, which uniquely characterizes this revision.

Based on these two concepts, one index for energy and five indices for nutrients are presented below. These indices are comprehensively called “Dietary Reference Intakes (DRIs-J).”

2-2. 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 consumption are balanced, causing no changes in body weight.

The double-labeled water (DLW) method is 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 cost of the DLW (150,000 yen/person) and urine cell analyzer and the technical skill for the operation, sufficient numbers of samples are not available to compute Estimated Energy Requirement (EER) in Japan. For this reversion, the EER for an adult was computed from his/her Basal Metabolic Rate (BMR) (= reference Basal Metabolic Rate x reference body weight) and Physical Activity Level (PAL).

EER for adults (kcal/day) = BMR x PAL

Based on the data of DLW studies, the PAL was divided into 3 levels for an adult: level I (low, 1.50), level II, (normal, 1.75), and level III (high, 2.00).

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 nursing mothers, additional energy values due to fetal growth and lactating were added to complete the EER.

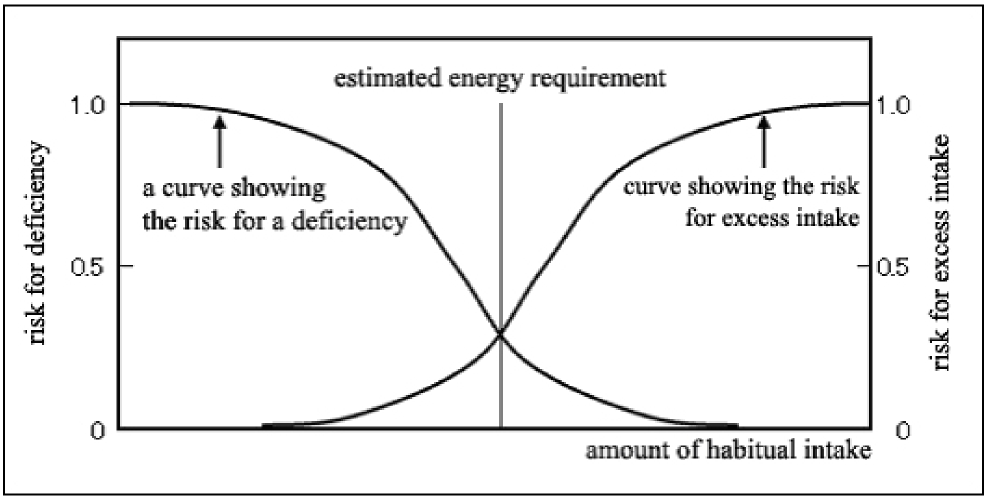

Fig. 1 A model to aid in the comprehension of Estimated Energy Requirement (EER)
With an increase in habitual intake, the risk for insufficiency is reduced and that for excessive intake increases. The intake at which both of these risks are the lowest is EER.

2-3 Nutrients

2-3-1. Indices

For the 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.

Adequate Intake (AI) was computed for nutrients that were unable to determine EAR and RDA. For certain nutrients, DRIs-J have been defined for the primary prevention of lifestyle-related diseases. For these, “the quantity that the modern Japanese must consume for the primary prevention of lifestyle-related diseases” is indicated: it is called Tentative Dietary Goal for Preventing Life-style Related Diseases (DG).

Upper Intake Level (UL) was set to prevent diseases that would be caused by an excessive intake of certain nutrients. However, there are nutrients refrained from setting UL due to a lack of sufficient scientific data. Fig. 2 represents the general concept of these indices.

Table 1 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.

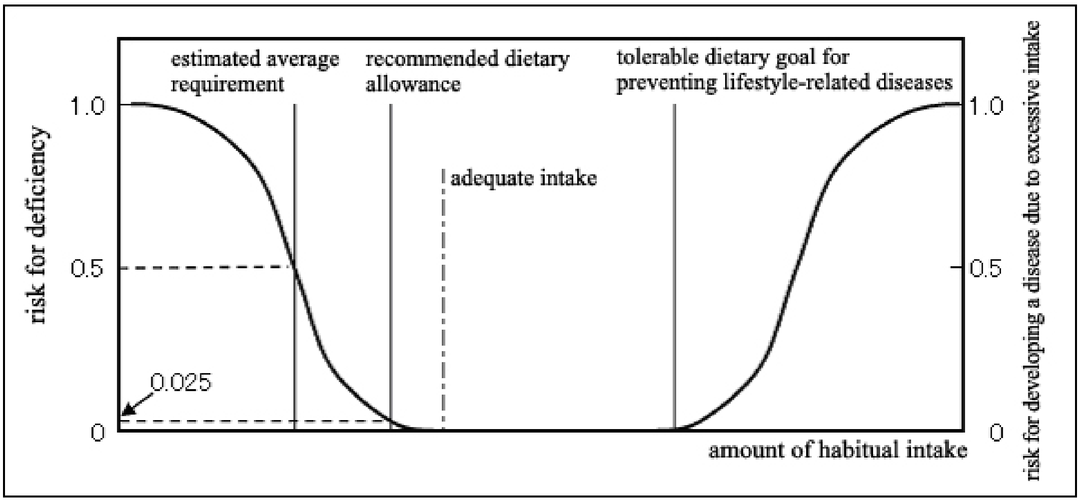

Fig. 2 A model to aid in understanding the indices for DRIs-J (Estimated Average Requirement, Recommended Daily Allowance, Adequate Intake and Tolerable Upper Intake Level)

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 1 Nutrients for which DRIs-J have been established and its indices (ages 1 year and over)[1]

		EAR	RDA	AI	DG	UL
Proteins		○	○	-	○	-
Lipids	Total fats	-	-	-	○	-
	Saturated fatty acids	-	-	-	○	-
	n-6 fatty acids	-	-	○	○	-
	n-3 fatty acids	-	-	○	○	-
	Cholesterol	-	-	-	○	-
Carbohydrates		-	-	-	○	-
Dietary fibers		-	-	○	○	-
Water-soluble vitamins	Vitamin B_1	○	○	-	-	-
	Vitamin B_2	○	○	-	-	-
	Niacin	○	○	-	-	○
	Vitamin B_6	○	○	-	-	○
	Folic acid	○	○	-	-	○[2]
	Vitamin B_{12}	○	○	-	-	-
	Biotin	-	-	○	-	-
	Pantothenic acid	-	-	○	-	-
	Vitamin C	○	○	-	-	-
Oil-soluble vitamins	Vitamin A	○	○	-	-	○
	Vitamin E	-	-	○	-	○
	Vitamin D	-	-	○	-	○
	Vitamin K	-	-	○	-	-
Minerals	Magnesium	○	○	-	-	○[2]
	Calcium	-	-	○	○	○
	Phosphorus	-	-	○	-	○
Trace elements	Chromium	○	○	-	-	-
	Molybdenum	○	○	-	-	○
	Manganese	-	-	○	-	○
	Iron	○	○	-	-	○
	Copper	○	○	-	-	○
	Zinc	○	○	-	-	○
	Selenium	○	○	-	-	○
	Iodine	○	○	-	-	○
Electrolytes	Sodium	○	-	-	○	-
	Potassium	-	-	○	○	-

DRIs-J, Dietary Reference Intakes for Japanese; 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

[1] Including when the DRIs-J were defined for only certain age groups.

[2] Defined as intake from other than normal food.

2-3-2. Estimated Average Requirement (EAR)

Estimated Average Requirement (EAR) is defined as estimated mean value of requirement of a general population (e.g., men ages 30 through 49 years) computed based on date of distribution of the “requirement” determined in a certain group. In other words, it is defined as estimated requirement which would fulfill 50 percent of the group.

2-3-3. Recommended Dietary Allowance (RDA)

Recommended Dietary Allowance (RDA) is defined as the amount that would fulfill almost all (97 to 98 percent) of the individuals in the general population which is computed based on the distribution of the “requirement” determined in subject groups.

By using the standard deviation (SD) of person-to-person variation in the experimentally derived requirements as the estimated standard deviation of inter-individual differences of the requirement in the general group, the RDA can be theoretically computed as the “mean of estimated requirement + 2 x SD of estimated requirement.” In actual practice, however, an accurate standard deviation for the estimated requirement is rarely obtained from experimental data. In many instances, one has to rely on the estimated value. The standard deviations used in computing the recommended dietary allowance in the current updated version are listed as coefficients of variation (CV: standard deviation/average value) in Table 2.

RDA = EAR x coefficient for RDA

Table 2 Coefficients of variation (CV) for person-to-person variations used to estimate the Recommended Dietary Allowance (RDA) from Estimated Average Requirements (EAR)

Variation coefficient	Coefficient for calculating RDA	Nutrients
10%	1.2	Vitamin B_1, vitamin B_2, vitamin B_6, niacin, folic acid, vitamin C, magnesium, iron (for adults and 15-17 years old), molybdenum, zinc, selenium
12.5%	1.25	Proteins
15%	1.3	Copper
20%	1.4	Vitamin A, iron (for 1-14 years old), iodine

2-3-4. Adequate Intake (AI)

Adequate Intake (AI) is defined as a sufficient quantity to maintain a certain nutritional state in a specific group. It is set at the level which only a few would develop a deficiency. It is set only when the RDA cannot be established. In general, AI is decided based on epidemiological studies worked on nutritional intake of healthy individuals.

AI is based on one of the following three concepts, depending on the nutrients or an individual's gender or age group.

(1) Established based on a value which is estimated intake level that shows nearly no deficiency, based on health status from biological and other indices and intake survey of the concerned nutrient conducted simultaneously. The median of the nutrient intake is used as AI when there is only a few individual with deficiency.

(2) Established based on the median for the nutrient intake when health status cannot be confirmed by using biological markers and similar indicators but representative nutrient distribution among Japanese can be obtained.

(3) Established based on intake level of healthy infants fed by human milk. The product of nutrient concentration of human milk and volume of consumed is used as AI.

2-3-5 Tentative Dietary Goal for Preventing Lifestyle-related Diseases (DG) for Modern Japanese

DG is set mainly for the primary prevention of lifestyle-related diseases. The quantity is designed to achieve that nutritional state at which the risk of developing diseases or the biological markers (substitute markers) are reduced. It is based on knowledge from epidemiological studies with some input from the findings obtained in experimental nutritional studies. However, the relationship between nutritional intake and the risk for developing lifestyle-related diseases is continuous in nature and quite often there is no threshold. In such an instance, it is difficult to propose a certain quantity or threshold as an optimum value. Therefore, considering intake, food composition, and food preferences of the modern Japanese, as well as foreign dietary reference intakes and guidelines for disease prevention, it was decided putting emphasis on feasibility.

In the DRIs-J, 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.

Regarding calcium, DG is not set as a prevention of lifestyle-related disease. Its AI was set by another method and DG was based on the AI. The calcium balance was determined by a factorial method. Because of this difference in computation, special attention is required in its application. Specifically, it is not intended simply to prevent a lifestyle-related disease: it is for the maintenance of each nutrient in the body.

Protein, lipids, and carbohydrates are nutrients that generate energy. Because the balance (ratios) among them is important, their percentage to energy (% energy) was used as intake units. The DG was designed only for adults.

The DG may be set to bring one's habitual intake as close to this dietary goal as possible or it may be within the indicated threshold. The relationship between the type of DG vis-à-vis the content and nutrients is shown in Table 3.

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	Total fats, saturated fatty acids, carbohydrates
EAR, RDA, or AI are given but only UL is listed for DG	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

2-3-6. Tolerable Upper Intake Level (UL)

UL is defined as the quantity that shows the 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 (Fig. 3). One should be reminded that the disease in this section is that caused by excessive intake of nutrients (an excess intake disease) and not a disease due to insufficient intake (deficiency disease).

Theoretically speaking, the true "UL" is the maximum value (no observed adverse effect level: NOAEL) of "the quantity that is known not to cause a disease," according to studies that were conducted on humans (Fig. 3). However, studies of NOAEL on humans are extremely limited or conducted on specific populations. To be on the safe side, therefore, the UL was obtained by subtracting the "uncertain factor (UF)" from NOAEL in many instances (Fig. 3). In doing so, an appropriate number between 1 and 5 was selected as UF.

On the other hand, when minimum of the “amount that is known to cause health problem” (lowest observed adverse effect level: LOAEL) is obtained from specific populations known to have consumed excessive amounts of certain nutrient or on cases that developed a health problem due to excessive intake of certain supplements or similar sources, UF is set at 10 and the estimated NOAEL is obtained by subtracting 10 from LOAEL. Considering occurrence frequency and extent of health problems due to excessive intake, UF was exceptionally set low for magnesium, calcium and zinc.

Diseases in humans caused by excessive intake of nutrients are rarely reported. Needless to add, one cannot conduct studies on humans to find the dose-response relationship and other details to establish NOAEL or LOAEL. The UL must be estimated from NOAEL or LOAEL that is obtained from animal experiments in which a disease (intoxication) is induced or in some instances from *in vitro* experiments. If only the LOAEL is reported, NOAEL is estimated as a rule by subtracting a UF of 10 from this LOAEL. If NOAEL obtained from animal experiments is to be extrapolated to estimate UL in humans, such NOAEL is usually subtracted by UF 10.

There is not sufficient scientific data to set UF and therefore has not necessarily reached consensus among professionals. Consequently, as described above, an appropriate number for UF was selected in range of 1 to 5 for reports based on humans, and in range of 10 to 100 for those based on animals. When NOAEL is used for computation, a smaller UF is chosen and when LOAEL is used, a larger value was selected. Furthermore, UF was determined by giving due consideration to the characteristics of each nutrient, severity of the projected disease caused by excessive intake, quality and number of the studies reporting on NOAEL and LOAEL, characteristics of the subjects or cohorts observed (sex, age, and health status), group characteristics, and the number of subjects. UF used in the computation is shown in Table 4 for nutrients that have UL.

The details for computing UL differ in each nutrient and it is suggested to refer to the particular chapters. For some nutrients, reports that offer a solid basis for computation were scarce and for those nutrients, either the computation was postponed or only tentative values have been indicated.

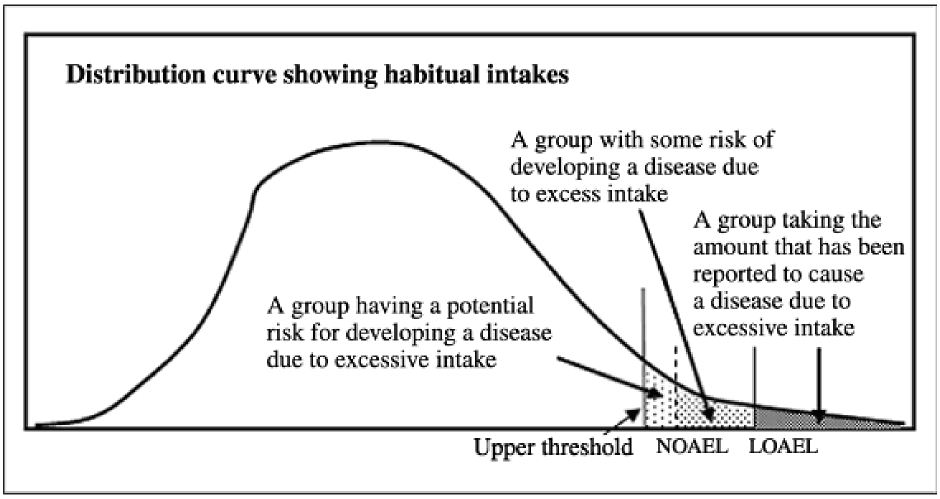

Fig. 3 A model to aid in understanding a cohort that has a risk for developing diseases due to excessive intake

The group of individuals who habitually consume quantities above the upper threshold has a potential risk for developing health problems from excessive intake; those in the group consuming nutrients over LOAEL are in fact consuming the amounts that have been confirmed to produce diseases due to excessive amount of the nutrients in question.

LOAEL, lowest observed adverse effect level; NOAEL, no observed adverse effect level

Table 4 Uncertain factor (UF) used for calculation of tolerable upper intake level

UF	Nutrients
1	Vitamin D (infants), vitamin E, magnesium, phosphorus, manganese, copper, iodine
1.2	Calcium
1.5	Vitamin A (pregnant women), zinc
2	Vitamin D (adults, children), selenium
5	Vitamin B_6, niacin, folic acid, vitamin A (adults, children)
10	Vitamin A (infants), molybdenum
30	Iron

3. Basic Parameters That Were Noted in Designing the DRIs-J

3-1. Age Groups

The age groups employed in the current design are shown in Table 5. 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.

3-2. Reference Physiques

For 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 corresponding gender and age that were obtained at the 2001 National Nutrition Survey in Japan[1)] 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 Childhood[2)] were used. These are called the “reference physiques” (reference heights and reference weights) (Table 5).

Table 5 Reference physique (reference height and reference weights)

Sex	Males		Females[1]	
Age	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.

3-3. Nutrient Intakes Used to Establish AI and DG

In certain instances, the baseline of the state of nutrient intake for the population is needed to compute AI and DG. In the DRIs-J, the median and percentile of intake for each gender and age group (ages one year and over) according to the 2001 National Nutrition Survey[1)] were used for computation. During the process of setting the DRIs, the results of the 2002 National Nutrition Survey were made public.[3)] The results were not used as the base materials: it was confirmed that the use of the 2001 Survey data constituted no problem.

The age groups for children age 6 through 11 differs between the DRIs-J and the National Nutrition Survey (the age groups of 6 through 7 years, 8 through 9 years, and 10 through 11 years for the former, and the age groups of 6 through 8 years and 9 through 11 years for the latter). Therefore the data reported by the National Nutrition Survey for the age group 6 through 8 years were used for the DRIs-J for the age group 6 through 7 years; the mean of the age groups of 6 through 8 years and 9 through 11 years reported by the National Nutrition Survey was used for the age group of 8 through 9 years for the DRIs-J; and the results of the age group 9 through 11 years of the National Nutrition Survey was used for the age group of 10 through 11 years for the DRIs.

It is known that almost all nutritional surveys (including dietary recording method) are plagued with the problem of underreporting. Although varied depending on survey method and subjects, 5 to 15% underreporting of energy intake has been reported by studies conducted in the western world.[4)] Among Japanese also, underreporting of approximately 8% has been reported as a group mean.[5)] The extent of underreporting that occurred in the 2001 National Nutrition Survey, the main data source of the current revision, is unknown. No logical or practical solutions to this problem have been proposed in the western world. In the DRIs-J, it was decided that the values obtained from the 2001 National Nutrition Survey and other related survey would be used as they were.

In establishing AL and DG for the DRIs-J, intake data were used for the following nutrients (Table 6).

Table 6 Nutrients with intake data used to compute their AI and DG

	Nutrients
AI	n-6 fatty acids, n-3 fatty acids, pantothenic acid, biotin[1], vitamin E, vitamin D, phosphorus, manganese[1]
DG	Total fats, saturated fatty acids, n-3 fatty acids, calcium, sodium, potassium

AI, adequate intake; DG, tentative dietary goal for preventing life-style related diseases
[1] Study data other than those from the National Nutrition Survey in Japan were used for references.

3-4. Method to Integrate the Research Results

The DRIs-J were based on the results of as many reliable studies as possible. In doing so, the results were integrated in accordance with the approach that is introduced in Table 7.

Table 7 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	

3-5. Notes for Each Life Stage

3-5-1. Infants

Experiments cannot be conducted on infants less then 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-J, 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.[6)] Therefore the standard quantity consumed by a healthy infant was set at 0.78 L/day for the DRIs-J.

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. But relevant information is scarce. The values for infants aged 0 through 5 months and/or those 1 through 2 years were extrapolated. For the method of extrapolation, refer to section (3-6) for the “basic approach of the extrapolation method.”

3-5-2. Children

Very few studies are available that would be sufficient to set children’s DRIs-J. When sufficient data were not extant, the values were estimated by employing the extrapolation method to those values of adults. A basic approach for extrapolation is shown in 3-6.

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.

3-5-3. Aged

For aged, weakening of their masticatory function, deterioration of digestive and absorptive fraction, and a reduction in food intake due to less physical activities exist. One characteristic of this age group is that their individual intake varies widely; another is that many aged individuals are affected by an illness. Sufficient attention should be directed not only to the age but also to individual characteristics.

3-5-4. Pregnant and Lactating Women

First, the DRIs-J for non-pregnant and non-lactating are computed for their specific age category, and then certain amount is added for pregnant and lactating women.

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)[6)] 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; but a lack of any consideration about the effect of the fetus during pregnancy or the milk during the lactating period may be associated with a certain risk. A close attention should be paid to the UL for these women. Because the scientific basis related to these problems is not available, the quantitative reference was forced to be omitted.

3-6. Method for Extrapolation

The DRIs-J (EAR, RDA, AI, DG, and UL) were obtained through observation of certain gender and at certain age group. Thus they are called “references” and used as a basis for extrapolation. An extrapolation procedure is necessary to create DRIs-J for each genders and age group.

References for EAR and AI are often based on the intake per day (weight/day), while the reference for UL is obtained as a quantity per kg of body weight. Therefore extrapolation methods were prepared individually.

For RDA, the EAR for each gender and age level is computed by extrapolating from the reference value for EAR; then each resulting EAR was multiplied by the RDA computing coefficient shown in Table 2. For DG, the AI for both genders and all age levels was computed by extrapolating from the reference AI; then the corresponding DG were obtained by using each extrapolated AI and the median of the intake of the respective gender and age groups.

3-6-1. Extrapolation Methods of EAR and AI

3-6-1-1. Adults and Children

It is difficult to decide on the method of extrapolation with due consideration given to the characteristics of each nutrient. It has been noted that there is a significant correlation between efficiency in energy metabolism and body surface area. Formulas to estimate the body surface area from body height and/or body weight were developed and are now widely used.[7] There are a number of formulas and for the DRIs have adopted which was proposed by Kleiber, et al. in 1947 and uses 0.75th power of the weight ratio.[8] Further studies have been conducted in recent years and it has been reported that the method is useful in estimating the organ weights of a number of organisms (including cardiovascular and respiratory organs of mammals).[9]

When the reference for EAR or AI is given in intake per day (weight/day) and the representative value (median or mean) of the body weight in a given group of the study from which the reference has been obtained is clear-cut, extrapolation was effected by using the following:

$$X = X_0 \text{ x } (W/W_0)^{0.76} \text{ x } (1 + G)$$

Where

X = EAR or AI (intake per day) of the specific age group

W = reference weight of the specific age group

X_0 = Reference (intake per day) for EAR or AI

W_0 = mean or median representative weight of the studied subjects that provided EAR or AI reference

G = growth factor (refer to Table 8 for data)

In some studies, the reference for EAR or AI may be given as a number per kg of body weight. If so, extrapolation was conducted as follows:

$X = X_0 \times W \times (1 + G)$

Where

X = EAR or AI (intake per day) of the desired age group

W = reference weight of the age group in question

X_0 = reference for EAR or AI (intake per kg body weight)

G = growth factor (refer to Table 8 for data)

For children, the following should be taken into consideration: (1) quantity that is needed for growth; and (2) the quantity that is accumulated in the body during the growth stage. For the growth factors for the DRIs, the values that have been adopted by WHO/UNA[10)] and the United States/Canada in their dietary reference intake were modified to suit the Japanese at each age group (Table 8).

Table 8 Growth factors used in setting the EAR or AI (age one year old and over)

Age groups	Growth factors
1-2 years	0.30
3-14	0.15
15-17（boys）	0.15
15-17（girls）	0
≥ 18 years and above	0

EAR, estimated average requirement; AI, adequate intake

3-6-1-2. Infants (aged 6 through 11 months)

Two methods for extrapolation were considered to the DRIs-J for infants 6 through 11 months: (1) extrapolate based on the value for infants (aged 0 through 5 months); and (2) use the median values of infants (aged 0 through 5 months) and those of 1 to 2-years-old. As a rule, it was decided that either of the following two formulas could be applied.

When extrapolating form infants 0 through 5 months' DRIs-J, the following formula has been suggested: [7)]

(reference weight of infants 6 through 11 months / reference weight of infants 0 through 5 months)$^{0.75}$

However, infants 0 through 5 months are in the growth stage and their DRIs-J probably make allowance for the growth factor. So the formula given above does not take the growth factor into consideration. When the weight of reference physique is substituted, the products for boys and girls are $(8.8/6.6)^{0.75}$ and $(8.2/6.1)^{0.75}$ or 1.24 and 1.25, respectively. This formula produces values for extrapolation that are slightly different for boys and girls. Therefore the mean of these values was computed and used as the common AI for both genders.

3-6-2. UL

Like EAR and AI, there are no methods for extrapolating UL that are logical and sufficiently reliable. For those age groups with insufficient evidence, computations were not made for those ages under 18 years. As a rule, either of the following two methods was used for those aged 18 years and over.

If the reference value for UL is given per kg of body weight:

$X = X_0 \text{ x } W$

Where X = UL (intake per day) for the specific age level

W = reference weight for the specific age group

X_0 = Reference for UL (intake per kg of body weight)

If the reference for UL is given as a value per day:

$X = X_0 \times (W/W_0)$

Where X = UL for the specific age level (intake per day)

X_0 = reference for UL (intake per day)

W = reference weight for the specific age group

W_0 = mean or median representative weight of the studied subjects that provided UL reference

3-7. Rounding

In view of the convenience of use and reliability of the values, EAR, RDA, AI, DG and UL were routinely rounded off according to the rule shown in Table 9. For children, adults, and aged, a single rule applied for each nutrient, regardless of their gender. For infants, pregnant and lactating women, the value to be added was rounded to the same number of digits as that used for the other gender or the corresponding age groups.

After the rounding operation, the numbers were smoothed if necessary to remove excessive ups and downs among age groups. Refer to the section on each nutrient for the method and practice of smoothing.

Also refer to the respective section for the nutrients for which the numbers were rounded by methods other than that shown here.

Table 9 Basic formulas for rounding numbers

Approximate median value	Method	The digit that is shown[1]
0.5	Rounded to the nearest tenth fraction.	0.X
1.0	Rounded to the nearest tenth fraction.	X.X
5	Rounded so that the 10th fraction will be 0 or 5.	X.Y
10	Rounded to the nearest whole number.	XX
50	Rounded so that the first digit will be 0 or 5.	XY
100	The first digit is rounded off.	XX0
500	Rounded off so that the second digit will be 0 or 5	XY0
1,000	Rounded to the nearest hundred.	X,X00
5,000	Rounded so that the third digit will be 0 or 5.	X,Y00

[1] (X or Y is replaced with a number: X, a number; Y, 0 or 5)

4. Basic Approach for Application

4-1. Individuals or Groups

The subjects to whom the DRIs-J are applied are, as a rule, healthy individuals or groups that is 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.

4-2. Nutrient Sources

Nutrients sources include the energy and nutrients that are contained in substances normally taken in meals. They also include those energy and nutrients that are contained in tonic drinks, nutritional aids, food fortified with nutrients, specified health food, functional food, so-called “health food”, and dietary supplements, which are not intended for the treatment of any specific disease but are used to promote one’s general health. Note that the ULs for folic acid and magnesium were created only for sources other than normal food.

4-3. Habitual Intake

The DRIs-J give standards for habitual intake but do not constitute standards for meals taken over a short period (e.g., one day). This is because nutrient intake varies widely from day to day[12-15] and DRIs are references for habitual intake of energy and nutrients.

It is difficult to specify a duration for one's "habitual intake" but based on the results obtained from observations of daily variations in the intake of energy and nutrients,[12-15] approximately one month appears to be reasonable. Because of the difficulty associated with dietary surveys over extended periods, diet-recording or diet recall is employed for assessment. In such a case it is desirable that surveys be conducted for least 2 days (preferably 2 non-consecutive days) and use the mean of the results.

Except for vitamin C, there is no seasonal difference in intake for Japanese; [13, 16, 17] therefore there is no need for special consideration.

DRIs do not indicate the quantity that should be included in a specific meal for a day or that included in a particular meal (e.g., breakfast, lunch or dinner). If a specific meal (such as lunch) is to be supplied for a group, it is desirable that due consideration be given to the intake by the group at all meals and a plan made for the specific meal.

4-4. Basic Method of Application

4-4-1. Basic Concept of DRIs-J Use

DRIs-J are used for various purposes but its 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."

Excluding energy requirements, basic handling of all nutrients is shown in Table 10 (dietary assessment) and Table 11 (dietary planning). In preparing these, the concept adopted in the DRIs of the United States and Canada was used as a reference.[19)]

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 not necessarily the amount that should be applied accomplished in real life.

For energy requirements, refer to the section (2-2) on energy.

Table 10 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 11 Concept of Dietary Reference Intakes for Japanese uses for dietary planning[1] (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.

4-4-2. Priority

DRIs-J show the standards for the intake of energy and nutrients but that do not mean that the reliability of presented indices or the importance in the use is necessarily same between nutrients.

For EAR, RDA, AI and DG, a high priority is placed on those nutrients that are essential to the maintenance of life and health and to promote healthy growth; and those nutrients that are selected to prevent lifestyle-related diseases are considered when the supply of those with a high priority is assured. Lower priority is assigned to those nutrients the deficiency of which is not well-established in humans or the intake or supply of which cannot be estimated. Specific priority is given in the following order: (1) protein and energy, (2) carbohydrates (% energy) and total lipids (% energy); (3) other nutrients (those in which the DRIs-J are given as EAR, RDA or AI) with their content indicated in the Standard Tables of Food Composition in Japan, 5th Revised Edition,[21)] as well as calcium and dietary fiber; (4) other nutrients (those with their dietary reference intake listed as DG) the nutritional content of which is listed in the aforementioned Standard Tables;[21)] (5) those nutrients, the nutritional content of which is not listed in the aforementioned Standard Tables.[21)]

4-5. Notes on Correlation with Food Composition Tables

In dietary assessment or planning, one may estimate the intake from the weight of the food consumed or determine the amount of food to be offered based on the nutrient content of that food. In such instances, the Standard Tables of Food Composition in Japan 5th Revised Edition[21)] is used most frequently. For the definition of nutrients, however, there is a slight inconsistency in the DRIs and the aforementioned Standard Tables[21)] that were published in 2000. Those nutrients that require special attention are listed in Table 12.

Table 12 Nutrients that are divergent and their details according to Dietary Reference Intakes for Japanese (DRIs-J) and Standard Tables of Food Composition in Japan, 5th Revised Edition (edited by The Resources Council of the Science and Technology Agency of Japan, November 22, 2000)

Nutrients	Cause for inconsistency		Notes when the intake or the amount given is estimated by using the Standard Tables of Food Composition in Japan, 5th Revised Edition and compared against the DRIs
	DRIs	Standard Tables of Food Composition in Japan, 5th Revised Edition	
Vitamin A	1/12 is used for the coefficient of β-carotene equivalent in computing retinol equivalents.	For the coefficient of β-carotene equivalents, 1/6 is used in computing retinol equivalent.	(Retinol + carotene/12) is used in computing the retinol equivalents.
Vitamin E	This is meant to be α-tocopherol only.	The α-tocopherol equivalent computed by using α-, β-, γ- and δ-tocopherol.	The total vitamin E (α-tocopherol equivalent) is interpreted to be α-tocopherol. （Neither β-, γ-, nor δ-tocophenol is converted to α-tocopherol; therefore α-tocopherol equivalent is not used.）
Niacin	Niacin equivalents（Nicotinamide [mg] +nicotinic acid [mg] +tryptophan [mg]/60）is used for niacin equivalents.)	Nicotinic acid equivalent is indicated（niacin that is synthesized in the body from tryptophan is not included）.	This is expressed in the form, Niacin [mg] + protein (mg)/6,000. It is not accurate in a strict sense but the assumption that the quantity of tryptophan in food roughly amounts to 1/100 of protein does not appear to cause a problem in the application.

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II. PARTICULAR TOPICS
[ENERGY]

1. Basic Points

The role of energy [unit: kcal or MJ (M joule), 1.00 kcal = 4/18 kJ, M (mega)=10^6] in an adult is to provide basal metabolism—synthesis and degradation of body components, maintenance of body temperature, and minimal conservation of organ activities—and to resynthesis of ATP that is consumed in association with muscular activities during physical activity. In adults with no changes in body weight, energy expenditure and energy intake are equal. The energy that has not been consumed accumulates in the form of fat, mainly in fat cells. In the musculoskeletal system, the energy is stored as glycogen and triglyceride but the amount stored in the system is very scarce than that stored in the fat cells. A proliferation of fat cells takes the form of obesity, which constitutes a risk factor for many lifestyle-related diseases. If energy expenditure exceeds energy intake, on the other hand, the amount of fat that has accumulated in one's fat cells and the proteins in one's muscles are depleted, resulting in a deterioration of physical functions and quality of life. Therefore it is desirable for adults to take in the amount of energy that corresponds to the amount that is consumed.

Children and infants who are in the growth stage require energy not only to meet their daily needs but also to form tissues for their growth. Estimated Energy Requirement (EER) should be determined with the consideration. Pregnant and lactating women need energy for themselves, as well as for the growth of the fetus or production of milk.

2. Estimated Energy Requirement

2-1. Definition of the Estimated Energy Requirement (EER)

The concept of Dietary Reference Intakes for Japanese (DRIs-J) that is used for other nutrients cannot be applied to determine the dietary reference intake for the energy. Like the practice in the United States and Canada in preparing their dietary reference intakes,[1, 2] the concept of Estimated Energy Requirement (EER) is applied. Therefore, the concept of EER was applied which is also the concept used in the United State and Canada's dietary reference intakes. EER is defined as "the energy intake that is estimated to have the highest probability for energy balance (for adults, energy expenditure – energy intake) to become zero (0)." Unlike the DRIs-J for other nutrients, the probability of achieving the appropriate energy balance is lower whenever the energy intake is excessive or insufficient. In other words, when the energy intake exceeds the EER for the specific gender or age group, the probability for weight gain increases; if the intake is inadequate, the probability for weight loss increases.

2-2. Basic Approach in Computation

As a rule, EER is computed as follows:

Basal Metabolic Rate (BMR, kcal/day) x PAL

Energy deposition is added for children considering increases of body tissue due to growth.

For pregnant women, the energy required for changes in tissue of the fetus and maternal body is added. For lactating women, the energy needed for lactation is added.

The BMR is computed as follows:

Reference BMR (kcal/kg weight/day) x reference weight (kg)

The BMR is measured early in the morning (before breakfast) while the subject is resting in the supine position in a comfortable indoor environment. A representative value for BMR per kg is based on a number of reports. This is called the reference BMR.

The adequacy of the reference BMR (Table 1) adopted by the 6th revision was reevaluated. Specifically, the reference BMR was compared against those in recent 5 reports (on 6 groups) where the determinations were known to be accurate (Table 2).[4-8] It was confirmed that the mean (kcal/day) of the “reference BMR” or the “reference BMR x reference weight” of Table 1 is within –5.5 ~ +4.2% of the mean of the “BMR per kg weight” or the “BMR (kcal/day)” given in the aforementioned 5 reports (Table 2). Therefore it was decided that the basic metabolic rate of Table 1 that was used in the previous revision was used as it is in the current revision.

The Physical Activity Level (PAL) is an index derived by subtracting the BMR per day from the energy expenditure per day.[9-11] The daily energy expenditure of a subject who engages in normal daily activities is determined most accurately by a doubly labeled water (DLW).[1, 2, 10] Based on the reports that accurately determined the energy expenditure (by DLW method) and the BMR, the reference value for PAL was established as follows.

2-3 Adults

Using the data (from “2003 project to estimate energy consumption by DLW method” the National Institute of Health and Nutrition) to determine the PAL of Japanese adults (n=139, 20 to 59 years), the group was divided into 3, using the 25th and 75th percentile values (1.60 and 1.90, respectively) (Table 3). Based on the results of stratification, the groups were labeled starting from the lowest activity level as level I (low, physical activity representative value = 1.50); level II (normal, physical activity, representative value = 1.75); and level III (high, physical activity representative value = 2.00). According to this classification, the numbers of individuals allocated to each level were roughly represented by ratios of 1: 2: 1.

According to the previous revision, the intensity of life activities was stratified into 4 levels. In the DRIs-J, however, we considered the fact that only a few exhibited a very high physical activity level (e.g., engaging in intense physical training or employed in work that require heavy physical exertion) and chose a 3-level classification omitting the fourth, heavy physical activity level. The United States and Canadian's dietary reference intakes, which is referenced frequently,[1,2] has 4 physical activity levels - 3 levels generally corresponding to the results of the current reversion plus a level for a "very low physical activity for those who rarely leave the house."

As shown in Table 3, the mean ± standard deviation (SD) for the physical activities of all subjects was 1.75 ± 0.22. The representative value (or mean) for Level I generally corresponds to "the mean − 1 x SD" for the entire group and the representative value (or mean) for Level III, "the mean + 1 x SD."

The results of studies on physical activities of relatively sedentary Japanese adults by employing a highly reliable method were compared against those of recent studies on Chinese and Americans. The outcome of these comparisons is shown in Table 4.[1, 5, 6, 12] Among the studies on Japanese, one had a special emphasis on the life activities of people who spent most of their time sitting[5] and was therefore excluded from the comparisons. The weighted average of the PAL for the remainder of the studies was 1.78 for men and 1.77 for women. According to the DRIs in the United States and Canada,[1] the corresponding figures were 1.75 for men and 1.78 for women (19 to 70 years). Furthermore, according to the record on the urban population in China (33 men and 40 women), the figures were 1.69 for men and 1.65 for women.[12] In addition to these statistical results, the data that have been reported[1, 10, 13] led to an estimate of the representative value for PAL for both men and women: 1.75, which corresponded to the mean for the subjects shown in Table 3.

Compared with the younger subjects, the PAL is lower in older people (aged 70 years and over), the mean being around 1.50 (SD, 0.2).[14-17] Considering such reductions in PAL due to aging, values of 1.3, 1.5, and 1.7, were set for those over 70 years (Table 5).

EER was computed for each PAL that has been described above.

2-4. Children

Children in the growth stage require energy not only for physical activities but also need to intake additional energy for tissue synthesis and for increased tissue (hereafter called energy deposition). The energy used for tissue synthesis is included in the amount of the total energy consumed. Therefore EER (kcal/day) can be computed as follows:

BMR (kcal/day) x PAL + energy deposition

Because PAL differs according to the age group, a systemic review was conducted on the reports for the determination of the PAL specific to children by employing the DLW technique (Fig. 1). It was found that the means for PALs were 1.4, 1.5, 1.7, 1.7, 1.7, and 1.75 for ages 1 through 2 years, 3 through 5 years, 8 through 9 years, 10 through 11 years, 12 through 14 years, and 15 through 17 years, respectively, showing a tendency for increases as they grow older. There were no reports on ages 6 through 7 years but it was assumed that the figure is most likely intermediate (i.e., 1.6) between the two preceding and succeeding age groups. The figures given above were used as the representative values for PALs of children (Table 5). A meta-analysis of 17 studies on the relationship between the age and PAL also concluded that the latter increases as children grow older.[18)]

Ages 1 through 2 years, 3 through 5 years, as well as 6 through 7 years, individual differences in PAL is considered to be relatively insignificant. Therefore it was decided not to make a distinction in PAL for these age categories. For age over 8 years, there are some children with a very high PAL because of extracurricular and club activities. Therefore their PALs were set at 1.7 and 1.9. The PALs for ages 15 through 17 years were set at 3 levels as in adults.

For the energy required for increased tissue, the increase in body weight per day was computed from the reference weight and multiplied by the energy density for increased tissue(Table 6).[20-22)] Refer to Table 6 for the details on the computation method.

2-5. Infants

Like young children, infants require an extra energy for tissue synthesis and energy deposition, in addition to that necessary for physical activities. The energy that is consumed in tissue formation is included in the total energy expenditure; therefore EER is computed as follows:

Total energy expenditure + energy deposition

Based on the results from an earlier study in which a DLW was used, FAO[23] conducted studies on the relationships among gender, age (months), body weight, body height, and the total energy expenditure by infants. Subsequently, they reported that the last can be explained by the following regression equation, where body weight is the only variable:

Breastfed infants:

Total energy expenditure (kcal/day) = 92.8 x reference weight (kg) – 152.0

Formula-fed infants:

Total energy expenditure (kcal/day) = 82.6 x reference weight (kg) – 29.0

No reports on total energy expenditure of Japanese infants that was determined by employing a sufficiently reliable method are available; therefore, in the DRIs-J, the reference body weight for Japanese was used in these regression equations to compute the total energy expenditure (kcal/day).

For the energy deposition, like children, the increase in body weight per day was calculated from the reference weight, which was multiplied by the energy density for tissue proliferation (Table 6).[20] Refer to Table 6 for the computational details.

Compared with breast-fed infants, total energy consumption is greater for formula-fed infants. Therefore EER was computed separately for these two groups of infants.

In addition, the energy content of human milk is 661kcal/L and multiplied by 0.78L/day, the mean volume of milk consumed by infant is estimated as 516kcal/day.

2-6. Pregnant and Lactating Women

For EER for pregnant women, FAO[23] took the total energy expenditure of women of comparable age as well as its changes due to pregnancy and energy deposition into consideration and added a certain amount to each stage of pregnancy. Cross-sectional studies revealed that PAL is reduced during the early and late stages of pregnancy while the BMR markedly increases at the late stage of pregnancy.[23-26] Consequently, the increases in total energy expenditure for early, middle, and late stage of pregnancy were expressed as 1%, 6%, and 17%, respectively, which generally correspond to the increases in body weight (2%, 8%, and 18%, respectively). Throughout pregnancy, the total energy expenditure per kg body weight generally remains constant; therefore based on the weight gain in each stage of pregnancy, the following adjustments were made for the changes in total energy consumption: early stage, +20kcal/day; mid-stage, +85kcal/day; late stage, +310kcal/day.[23] The energy deposition was computed as the sum of energy deposition of protein and fat which are estimated from amount of protein and fat stored during each stage of pregnancy. [23] Thus the following figures were found to represent the energy deposition for each stage of pregnancy: early stage, 48kcal/day; mid-stage, 182kcal/day; late stage, 185kcal/day.[23] Ultimately, the amount of energy to be added at each stage of pregnancy was interpreted to be the sum of total energy expenditure plus the energy deposition (affected by pregnancy), which was rounded to 50kcal units as follows: early stage, 50kcal/day; mid-stage, 250kcal/day; late stage, 500kcal/day.

EER for lactating women was computed as follows: [23]

Total energy expenditure + equivalent of milk secreted - amount of weight loss

It is believed that the total energy expenditure during the lactating period is similar to non-pregnant period.[23-27] The amount of milk secreted was assumed to be equal to the amount suckled by the infant (0.78L/day); [28] the energy of the human milk is set at 661kcal/L; and the energy conversion efficiency is assumed to be 80%.[23] Under these conditions, the following was formulated:

$$0.78\text{L/day} \times 661\text{kcal/L} \div 0.80 \approx 644\text{kcal/day}$$

The energy corresponding to the body weight reduction was set at 6,500kcal/kg and the amount of body weight lost at 0.8kg/month[23] and the energy to be subtracted in the equation shown above was computed as:

$$6{,}500\text{kcal/kg body weight} \times 0.8\text{kg/month} \div 30\text{ days} \approx 173\text{kcal/day}$$

Thus the amount to be added for breast-feeding was computed to be 644 – 173 = 471kcal/day, which was rounded in 50kcal units to 450kcal/day.

3. Basic Approach in Application

3-1. Assessment of Energy Intake

As a rule, BMI is used for the assessment of energy intake. In other words, when BMI is within an appropriate range (over 18.5 and under 25.0),[29, 30] the energy intake is generally considered to be appropriate.

The energy intake data obtained from dietary surveys is rather not recommended to use as a main index for an assessment, but recommended to use as an auxiliary index. Two reasons are pointed out and those are the problem of underreporting and the difficulty in detecting one's habitual intake.

Although its extent may vary depending on the subjects or the survey method, foreign studies have estimated the underreporting to be between 5 to 20%.[31] In Japan, it is reported to be about 8%.[32] It is also known that this tendency is exaggerated among obese individuals.[31, 33, 34] The extent of underreporting has not been sufficiently elucidated.

Although, it is difficult to indicate a specific survey period needed to assess the "habitual intake" of energy, approximately one week is needed for habitual energy intake according to studies that observed day-to-day variations.[35-38] However, in view of the difficulty in conducting a survey for such a long period, it is more practical to research at least two days (preferably non-consecutive two days) and use the mean of the intake data when dietary record or recall methods is used.[39]

For the assessment of energy intake of a group, the percentage by which BMI is in an appropriate range (over 18.5 and under 25.0) is used as an index.

3-2. Planning of Energy Intake

When BMI is in an appropriate range (between 18.5 and 25.0), the basis of energy intake planning would be to maintain his/her current body weight. More specifically, it is to take EER.

For those BMI is over 25.0, the basic approach will be to cut down the energy intake and reduce the body weight by stepped-up physical activities. Of the two approaches to reduce body weight, the latter is considered to be more important. Placing limitations on energy intake is associated with a risk of reducing one’s intake of various nutrients so this should not be regarded as the main instrument of weight reduction. Increase of physical activities increases one’s energy requirement, while weight reduction causes reduction of the energy requirement. Energy intake is to be adjusted while observing these changes. Physical activities have effect not only through reduction of BMI but independently reduce the risk for various lifestyle-related diseases—especially myocardial infarction,[40] diabetes mellitus,[41] and colorectal cancer.[42, 43] Therefore, increase of physical activities is highly recommended.

When BMI is less than 18.5, the intake of energy is raised to increase the body weight, while the level of physical activity is maintained ‘as is’ (or increased). The increase in body weight is followed by an increase in the energy requirement. The energy intake is adjusted while these changes are being observed.

When an increase or reduction in body weight is desired, it is recommended that the body weight be monitored about every 4 weeks and the subject is followed-up for over 16 weeks. According to a meta-analysis on 493 interventional studies that were conducted to reduce body weight by restricting one's dietary intake, exercising or both (for example) the mean BMI was found to be 33.2, mean interventional period, 16 weeks, and the mean body weight loss, 11 kg.[44)] The same study noted that the intervention by both dietary restrictions and exercise was more effective than dieting or exercise alone. The importance of weight control by employing both regimens is indicated.

In planning the intake of energy for a group, one should strive to maximize the percentage of those with their BMI in an optimum range (over 18.5 and below 25.0).

Table 1 Basal Metabolic Rate (BMR)

Sex	Males			Females		
Age (years)	Reference BMR (kcal/kg weight/day)	Reference weights (kg)	BMR (kcal/day)	Reference BMR (kcal/kg weight/day)	Reference weights (kg)	BMR (kcal/day)
1-2	61.0	11.9	730	59.7	11.0	660
3-5	54.8	16.7	920	52.2	16.0	840
6-7	44.3	23.0	1020	41.9	21.6	910
8-9	40.8	28.0	1140	38.3	27.2	1040
10-11	37.4	35.5	1330	34.8	35.7	1240
12-14	31.0	50.0	1550	29.6	45.6	1350
15-17	27.0	58.3	1570	25.3	50.0	1270
18v29	24.0	63.5	1520	23.6	50.0	1180
30-49	22.3	68.0	1520	21.7	52.7	1140
50-69	21.5	64.0	1380	20.7	53.2	1100
≥70	21.5	57.2	1230	20.7	49.7	1030

BMR, basal metabolic rate

Table 2 Recently reported data on Basal Metabolic Rate (BMR) of Japanese (mean±SD)

Ref No.	Subjects	Sex (n)	Age (years)	BMR：actual value	BMR：estimated value	Gap between actual and estimated values[1]
4)	Adolescents (non-exercising group)	F (19)	20.1±0.7	23.3±2.3 (kcal/kg weight/day)	23.6 (kcal/kg weight/day)[2]	+1.3
5)	Adults	M (21)	30±11	1586±257 (kcal/day)	1649±261 (kcal/day)	+4.0
		F (20)	32±10	1155±123 (kcal/day)	1203±145 (kcal/day)	+4.2
6)	Adults	M (40)	50±12 (30-69)	1459±181 (kcal/day)	1435 (kcal/day)[2]	-1.7
7)	Adults	F (70)	60.6±4.2 (53-69)	21.9±2.2 (kcal/kg weight/day)	20.7 (kcal/kg weight/day)[2]	-5.5
8)	Aged	F (130)	79.5±7.0	20.9±3.8 (kcal/kg weight/day)	20.7 (kcal/kg weight/day)	-1.0

[1] (Estimated value – actual value)/actual value (%)

[2] Value estimated from the reported mean age and mean weight (not given in the text).

BMR, basal metabolic rate; M, male; F, female

Table 3 Attributes of subjects according to physical activity level and physical activity (mean±SD) (Project of the National Institute of Health and Nutrition, 2003)

PAL (range)	N	Sex ratio (% male)	Age (years)	BMI (kg/m^2)	PAL
Level I (<1.6)	38	55	40±11	23.9±2.5	1.50±0.08
Level II (≥1.6, ≤1.9)	65	52	39±11	22.8±3.1	1.74±0.08
Level III (>1.9)	36	39	40±9	21.3±2.6	2.03±0.13
Total	139	50	39±10	22.7±2.9	1.75±0.22

N, number; BMI, body mass index; PAL, physical activity level

Table 4 Reports on cases with known PAL[1] (mean±SD)

Ref No.	Subjects	Gender (n)	Age (years)	BMR (kcal/day)	Energy expenditure (kcal/day)	PAL
6)	Japanese	M (40)	50±12 (30-69)	1459±181	2672±369	1.85±0.28
5)	Japanese (reproducing the sedentary lifestyles)	M (21)	30±11	1586±257	2343±298 [1]	1.49±0.11
		F (20)	32±10	1155±123	1772±151 [1]	1.54±0.12
Foot-note[5]	Japanese	M (70)	39±11 (20-59)	1525±225[2]	2634±396	1.74±0.20
		F (69)	39±10 (20-56)	1189±175[2]	2083±270	1.77±0.23
12)	Chinese (residing in the urban district of Beijing)	M (33)	43.1±0.7	1649±24[3]	2892±72	1.69±0.04
		F (40)	42.6±0.6	1362±24[3]	2270±48	1.65±0.03
1)	American	M (48)	19-30	1769	3081	1.74
		M (59)	31-50	1675	3021	1.81
		M (24)	51-70	1524	2469	1.63
		M (38)	70+	1480	2238	1.52
		F (82)	19-30	1361	2436	1.80
		F (61)	31-50	1322	2404	1.83
		F (71)	51-70	1226	2066	1.70
		F (24)	70+	1183	1564	1.33

[1] Limited to those adults for whom energy expenditure was determined by doubly labeled water method or a human calorimeter

[2] Determination by a human calorimeter.

[3] Estimated from gender, age, body weight and basal metabolic rate reference value.

[4] Estimated from gender, age, body weight, and body height.

[5] Project of the National Institute of Health and Nutrition "Estimation of the Energy Expenditure by Doubly Labeled Water Method," 2003.

PAL, physical activity level; BMR, basal metabolic rate; M, male; F, female

Table 5 Grouping of PAL at each age group（both sexes）

Age (year) \ PAL	Level I	Level II	Level III
1-2 years	-	1.40	-
3-5	-	1.50	-
6-7	-	1.60	-
8-9	-	1.70	1.90
10-11	-	1.70	1.90
12-14	-	1.70	1.90
15-17	1.50	1.75	2.00
18-29	1.50	1.75	2.00
30-49	1.50	1.75	2.00
50-69	1.50	1.75	2.00
≥ 70	1.30	1.50	1.70

PAL, Physical activity level

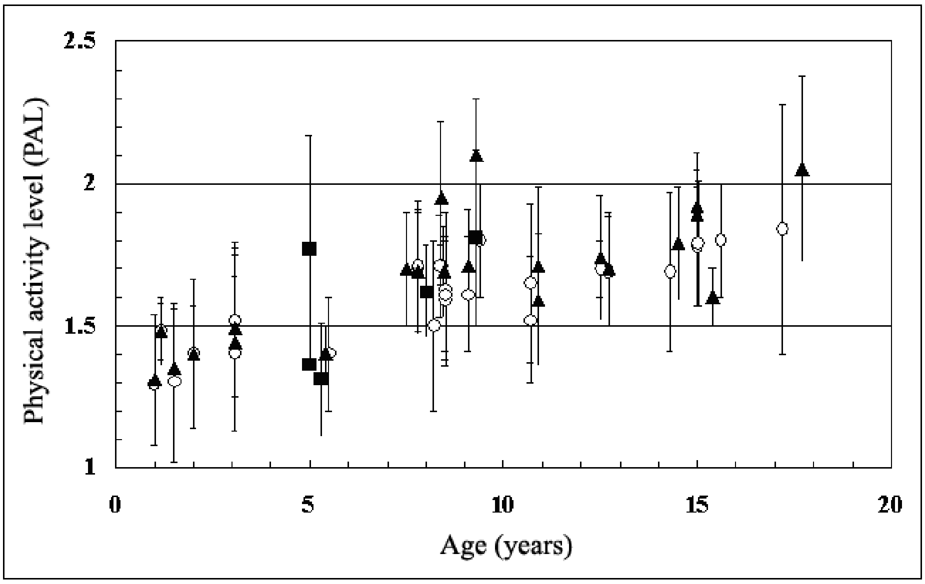

Fig. 1 Result of a systemic review of studies on PAL of infants and young children using a doubly labeled water method（▲, boys; ○, girls; ■, boys and girls; mean±SD）

Table 6 Energy for tissue increase associated with growth (energy deposition)

Sex	Males				Females			
Age	A. Reference weights (kg)	B. Weight increase (kg/yr)	Tissue increase		A. Reference weights (kg)	B. Weight increase (kg/yr)	Tissue increase	
			C. Energy density (kcal/g)	D. Energy deposition (kcal/day)			C. Energy density (kcal/g)	D. Energy deposition (kcal/day)
0-5 months	6.6	9.4	4.4[22]	115	6.1	8.4	5.0[22]	115
6-11	8.8	3.4	2.1[22]	20	8.2	3.2	2.1[22]	20
1-2 years	11.9	2.2	3.5[22]	20	11	2.1	2.4[22]	15
3-5	16.7	2.2	1.5[23]	10	16	2.1	2.0[23]	10
6-7	23	2.5	2.1[23]	15	21.6	2.5	2.8[23]	20
8-9	28	3.1	2.5[23]	20	27.2	3.5	3.2[23]	30
10-11	35.5	4.8	3.0[24]	40	35.7	4.1	2.6[24]	30
12-14	50	4.3	1.5[24]	20	45.6	2.7	3.0[24]	20
15-17	58.3	1.7	1.9[24]	10	50	0.7	4.7[24]	10

Weight increase (B) was computed from the reference body weight (A) based on proportional distribution as follows:

Example：weight increase (kg/year) in females from 6 to 11 months

X= [(reference weight between 6 and 11 months) - (reference weight between 0 and 5 months)] / [0.75 (years) - 0.25 (years)]

＋[(reference weight between 1 and 2 years) - (reference weight between 6 and 11 months)] / [2 (years) - 0.75 (year)]

Weight increase = X/2

= [(8.2 - 6.1) / 0.5＋(11.0 - 8.2) / 1.25] / 2

≈ 3.2

The energy density for tissue increase (C) was computed according to Butte et al.,[20] Fomon et al.[21] and Haschke et al.[22]

The energy deposition for tissue increase (D) was computed as the product of weight increase (B) and energy density of tissue increase (C).

Example：Energy (kcal/day) for tissue increase for females between 6 and 11 months

= [(3.2 kg/yr) x 1000/365] x 2.1 (kcal/g)

= 18

≈ 20

Table 7 Typical examples of the description and duration of physical activities classified by activity levels (age 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, interactions 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)[3]	Sleeping (1.0)	8	7-8	7
	Sedentary or being still while standing (1.5： 1.1-1.9)	13-14	11-12	10
	Slow walking or low-intensity activities such as housekeeping (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 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

[1] Prepared using Black[10)] as a reference and, in particular, giving due consideration to the significant effects of occupation on PAL.[12)]

[2] Representative values. The range is shown in parentheses.

[3] 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).

PAL, Physical activity level

Table 8 Examples of physical activity classifications

Classification of physical activity (within the range of Af[1])	Examples of physical activity
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)	Use a train or bus where no seats are available. Walk slowly for shopping or just enjoy a walk (45 m/min.). Doing laundry (using an electrically operated washer). House cleaning (using an electrically operated 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 (71m/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 (95m/min). Gymnastics (following radio or TV instruction).
High-intensity activities such as exercise or labor that require frequent rest (>6.0)	Muscle training, aerobic dancing (active), rowing, jogging (120m/min), tennis, badminton, volleyball, skiing, basketball, soccer, skating, jogging (160m/min), swimming, running (200m/min).

[1] Activity factor (Af) is computed from the relative metabolic rate cited by Numajiri[45)] 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.

Table 9 Dietary Reference Intakes for Japanese for Energy: Estimated Energy Requirement (kcal/day)

Sex	Males			Females		
PAL	I	II	III	I	II	III
0-5 months infants Breastfed Formula-fed	 - -	 600 650	 - -	 - -	 550 600	 - -
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

[1] For adults, the following formula was used for computation: estimated energy requirement=basal metabolic rate (kcal/day) x 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 years group is mostly explained by this.

PAL: Physical activity level.

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DIETARY REFERENCE INTAKES FOR JAPANESE, 2005

[OUTLINE]

1. Purpose

Dietary Reference Intakes for Japanese, 2005 (DRIs-J) was prepared for health individuals and groups and designed to present reference of intake values of energy and each nutrient to maintain and promote health and to prevent lifestyle-related diseases and illness due to excessive consumption of energy and nutrients.

2. Effective Duration

It is intended to be effective for 5 years: from April 2005 to March 2010.

3. Principles

1) Basic concepts

DRIs-J were decided to be established based on scientific basis, utilizing domestic and foreign academic theses and data that are available.

DRIs were based on the following three basic concepts:

i) "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 along nutritional approach in computation or application of optimal intake values.

ii) Emphasize 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 rage could reduce the risk of lifestyle-related diseases.

iii) Clearly indicate that excessive intake beyond the range increases the risk of developing health problems due to overconsumption.

2) Indices

DRIs-J have one index for energy and 5 for nutrients.

[Energy]

Estimated Energy Requirement (EER)

EER is defined as the intake value at which the risks of both deficiency and excess intake are minimized.

[Nutrients]

To maintain and promote health and prevent deficiencies, two indices, “Estimated Average Requirement (EAR)” and “Recommended Dietary Allowance (RDA)” were specified. For those nutrients that were unable to determine these 2 indices, “Adequate Intake (AI)” was provided. For those nutrients for which DRIs were established mainly to prevent lifestyle-related diseases, a “Tentative Dietary Goal for Preventing Lifestyle-related Diseases (DG)” was specified. In addition, “Tolerable Upper Intake Level (UL)” was specified to prevent health disorders due to excessive intake of 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 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. As a rule, this is “twice the EAR + standard deviation (2SD)”.

Adequate Intake (AI)

When the sufficient scientific basis to compute EAR and RDA cannot be obtained, this is a quantity that is sufficient to maintain a satisfactory nutritional status of a particular gender and age group.

Tentative Dietary Goal for Preventing Lifestyle-related Diseases (DG)

DG is defined as the intake level (or range) that Japanese should currently aim primarily to prevent lifestyle-related diseases.

Tolerable Upper Intake Level (UL)

The maximum intake level which almost all the people of a particular gender and age group may consume without incurring a disease due to excessive intake.

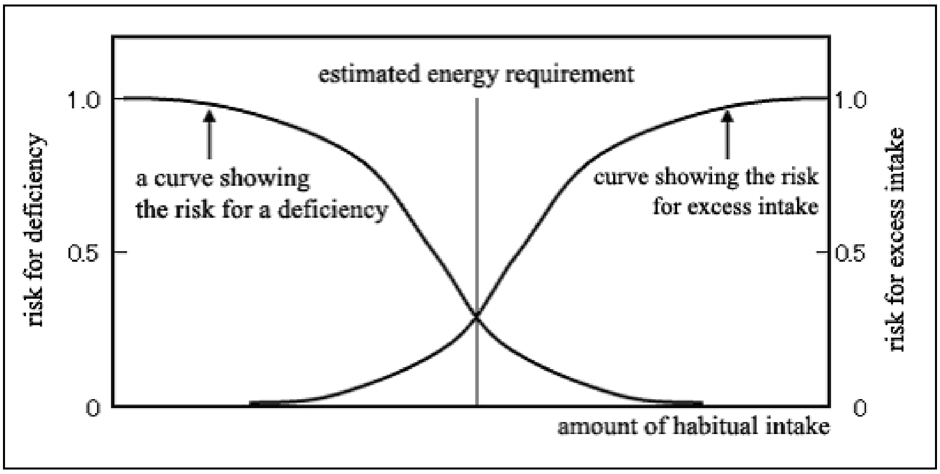

Fig. 1 A model to aid in the comprehension of Estimated Energy Requirement (EER)
With an increase in habitual intake, the risk for insufficiency is reduced and that for excessive intake increases. The intake at which both of these risks are the lowest is EER.

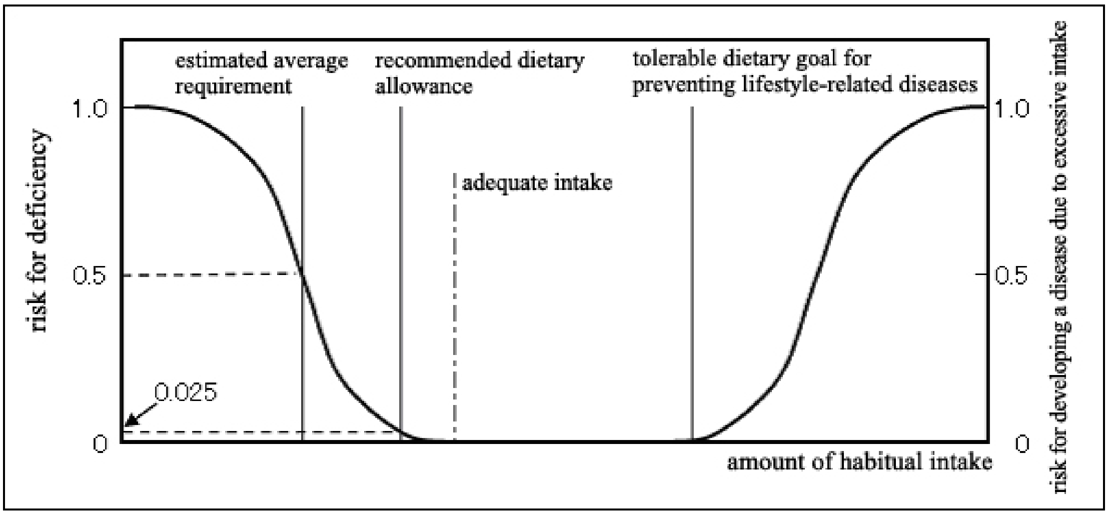

Fig. 2 A model to aid in understanding the indices for DRIs (Estimated Average Requirement, Recommended Daily Allowance, Adequate Intake and Tolerable Upper Intake Level)

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.

3) Age groups

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.

Difference between the 6th revised Recommended Dietary Allowance and Dietary Reference Intake for Japanese, 1999: the age groups were reclassified to coordinate with the school lunch programs from 6 to 8 years and 9 to 11 years to 6 to 7 years, 8 to 9 years, and 10 to 11 years.

4) Nutrients

Energy, proteins, lipids (total fats, saturated fatty acids, n-6 fatty acids, n-3 fatty acids and cholesterol), carbohydrates and dietary fibers

Water-soluble vitamins: vitamin B_1, vitamin B_2, niacin, vitamin B_6, folic acid, vitamin B_{12}, biotin, pantothenic acid and vitamin C

Oil-soluble vitamins: vitamin A, vitamin E, vitamin D and vitamin K

Minerals: magnesium, calcium, phosphorus and iron

Trace elements: chromium, molybdenum, manganese, copper, zinc, selenium and iodine

Electrolytes: sodium and potassium

4. Basic Approach for Application

The use of DRIs-J is roughly divided into two: “dietary assessment” (Table 1); and “dietary planning: including nutritional consultation and school lunch programs” (Table 2).

BMI (body mass index) should be used as an indicator for the evaluation and determination of energy intake, and body weight for monitoring. Because a restriction on energy intake may cause a nutritional deficiency, it is desirable to include increase of energy consumption, physical activities, in planning.

Table 1 Concept of Dietary Reference Intakes for Japanese 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.

[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 2 Concept of Dietary Reference Intakes for Japanese uses for dietary planning[1] (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).

[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.

5. Notes for Applying DRIs-J

1) The subjects to whom the DRIs-J are applied are, as a rule, healthy individuals or groups that is 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-J is "per day", it is the value which converted the habitual intake into daily intake level.

3) When applying DRIs-J to nutritional consultation, lunch programs and others, it is desirable to consider followings: 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, health disorder is not brought about just because it exceeded UL temporarily through meals by normal foods.
6) For aged, weakening of their masticatory function, deterioration of digestive and absorptive fraction, and a reduction in food intake due to less physical activities exist. One characteristic of this age group is that their individual intake varies widely; another is that many aged individuals are affected by an illness. Sufficient attention should be directed not only to the age but also to individual characteristics.

6. Dietary Reference Intakes (Tables)

See the attached tables.

Nutrients for which Dietary Reference Intakes for Japanese (DRIs-J) have been established and its indices (ages 1 year and over) [1]

		EAR	RDA	AI	DG	UL
Proteins		○	○	-	○	-
Lipids	Total fats	-	-	-	○	-
	Saturated fatty acids	-	-	-	○	-
	n-6 fatty acids	-	-	○	○	-
	n-3 fatty acids	-	-	○	○	-
	Cholesterol	-	-	-	○	-
Carbohydrates		-	-	-	○	-
Dietary fibers		-	-	○	○	-
Water-soluble vitamins	Vitamin B_1	○	○	-	-	-
	Vitamin B_2	○	○	-	-	-
	Niacin	○	○	-	-	○
	Vitamin B_6	○	○	-	-	○
	Folic acid	○	○	-	-	○[2]
	Vitamin B_{12}	○	○	-	-	-
	Biotin	-	-	○	-	-
	Pantothenic acid	-	-	○	-	-
	Vitamin C	○	○	-	-	-
Oil-soluble vitamins	Vitamin A	○	○	-	-	○
	Vitamin E	-	-	○	-	○
	Vitamin D	-	-	○	-	○
	Vitamin K	-	-	○	-	-
Minerals	Magnesium	○	○	-	-	○[2]
	Calcium	-	-	○	○	○
	Phosphorus	-	-	○	-	○
Trace elements	Chromium	○	○	-	-	-
	Molybdenum	○	○	-	-	○
	Manganese	-	-	○	-	○
	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

[1] Including when the DRIs-J were defined for only certain age groups.

[2] Defined as intake from other than normal food.

Reference physiques (reference height and reference weights)

Sex	Males		Females[1]	
Age	Reference height (cm)	Reference body weight (kg)	Reference height (cm)	Reference body weight (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.

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

Sex	Males			Females		
PAL	I	II	III	I	II	III
0-5 months infants Breastfed Formula-fed	- -	600 650	- -	- -	550 600	- -
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

[1] For adults, the following formula was used for computation: Estimated Energy Requirement=Basal Metabolic Rate (kcal/day) x 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.

PAL: Physical activity level

(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 housekeeping (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 Numajiri[45)] 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 for Japanese 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 for Japanese for total fat

[Ratio of total lipids to total energy (percentage of fat energy):% energy]

Age	Males		Females	
	AI	DG	AI	DG
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
30-49	-	20<, <25	-	20<, <25
50-69	-	20<, <25	-	20<, <25
≥70[1]	-	15<, <25	-	15<, <25
Pregnant women			-	20<, <30
Lactating women			-	20<, <30

AI, adequate intake; DG, tentative dietary goal for preventing life-style related diseases

Dietary Reference Intakes for Japanese for saturated fatty acids (% energy)

Age	Males	Females
	AI (range)	AI (range)
0-5 months	-	-
6-11	-	-
1-2 years	-	-
3-5	-	-
6-7	-	-
8-9	-	-
10-11	-	-
12-14	-	-
15-17	-	-
18-29	4.5<, <7.0	4.5<, <7.0
30-49	4.5<, <7.0	4.5<, <7.0
50-69	4.5<, <7.0	4.5<, <7.0
≥70	4.5<, <7.0	4.5<, <7.0
Pregnant women		4.5<, <7.0
Lactating women		4.5<, <7.0

AI, adequate intake

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 for Japanese for n-6 fatty acids

Age	Males		Females	
	AI (g/day)	DG (% energy)	AI (g/day)	DG (% energy)
0-5 months	4.0	-	4.0	-
6-11	5.0	-	5.0	-
1-2 years	6.0		6.0	
3-5	8.0		7.0	
6-7	9.0		8.5	
8-9	9.0		10	
10-11	11		11	
12-14	13		10	
15-17	14		11	
18-29	12	<10	10	<10
30-49	11	<10	9.5	<10
50-69	10	<10	9.0	<10
≥70	8.0	<10	7.0	<10
Pregnant women			9.0	<10
Lactating women			10	<10

AI, adequate intake; DG, tentative dietary goal for preventing lifestyle-related diseases

N-6 fatty acids: C16:3, C18:2, C18:3, C20:2, C20:3, C20:4, C22:2, C22:5.

Note: No goal was computed for children; but by using the values set for an adult, it is desirable to avoid excessive intake.

Dietary Reference Intakes for Japanese for n-3 fatty acids (g/day)

Age	Males		Females	
	AI	DG	AI	DG
0-5 months	0.9	-	0.9	-
6-11	1.0	-	1.0	-
1-2 years	1.1	-	1.0	-
3-5	1.5	-	1.5	-
6-7	1.6	-	1.6	-
8-9	1.9	-	2.0	-
10-11	2.1	-	2.1	-
12-14	2.6	-	2.1	-
15-17	2.8	-	2.3	-
18-29	-	>2.6	-	>2.2
30-49	-	>2.6	-	>2.2
50-69	-	>2.9	-	>2.5
≥70	-	>2.2	-	>2.0
Pregnant women			2.1	-
Lactating women			2.4	-

AI, adequate intake; DG, tentative dietary goal for preventing life-style related diseases

N-3 fatty acids：C18:3, C18:4, C20:4, C20:5, C22:5, C22:6.

Dietary Reference Intakes for Japanese for cholesterol (mg/day)

Age	Males	Females
	DG	DG
0-5 months	-	-
6-11	-	-
1-2 years	-	-
3-5	-	-
6-7	-	-
8-9	-	-
10-11	-	-
12-14	-	-
15-17	-	-
18-29	<750	<600
30-49	<750	<600
50-69	<750	<600
≥70	<750	<600
Pregnant women		<600
Lactating women		<600

DG, tentative dietary goal for preventing life-style related diseases

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 cholesterol intake is desired.

Dietary Reference Intakes for Japanese 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 for Japanese 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 for Japanese for vitamin B_1 (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)								
early-stage					+0	+0	-	-
mid-stage					+0.1	+0.1	-	-
late-stage					+0.2	+0.3	-	-
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 for Japanese for vitamin B_2 (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

[1] Computed using the Estimated Energy Requirement for PAL II.

Dietary Reference Intakes for Japanese 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 for Japanese for vitamin B_6 (mg/day)[1]

Sex	Males				Females			
Age	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 for Japanese for folic acid (μg/day)[1]

Sex	Males				Females			
Age	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 for Japanese for vitamin B_{12} (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

[1] The ULs were not set: even if it is taken in excess, the intrinsic factor secreted from the stomach becomes saturated and excess vitamin B_{12} is not absorbed.

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

Sex	Males				Females			
Age	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 for Japanese for vitamin C (mg/day)

Sex	Males				Females			
Age	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 for Japanese for vitamin A (µg RE/day)

Sex	Males				Females			
Age	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 µg RE=1 µg retinol=12 µg β-carotene=24 µg α-carotene=24 µg β-cryptoxanthin.

[1] Includes provitamins and carotenoids.

[2] Does not include provitamins or carotenoids.

Dietary Reference Intakes for Japanese for vitamin E (mg/day)[1]

Sex	Males				Females			
Age	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 thatn α-tocopherol are not included.

[2] The value was smoothes in relation to those for the preceding and succeeding age groups.

Dietary Reference Intakes for Japanese for vitamin D (μg/day)

Sex	Males				Females			
Age	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

[1]Adequate 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 for Japanese for vitamin K (μg/day)

Sex	Males				Females			
Age	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 for Japanese for magnesium (mg/day)

Sex	Males				Females			
Age	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

[1]When 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 for Japanese for calcium (mg/day)

Sex	Males			Females		
Age	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

[1] No 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.

[2] Because 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.

[3] Because the adequate intake and the median value of the current intake are close, the former is adopted.

[4] The value was smoothed in relation to those of the preceding and succeeding age groups.

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

Sex	Males				Females			
Age	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 for Japanese for chromium (μg/day): Provisional

Sex	Males				Females			
Age	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 for Japanese for molybdenum (μg /day): Provisional

Sex	Males				Females			
Age	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 for Japanese for manganese (mg/day)

Sex	Males				Females			
Age	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

[1] The value was smoothed in relation to those of the preceding and succeeding age groups.

Dietary Reference Intakes for Japanese for iron (mg/day)[1]

Sex	Males				Females					
Age	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 for Japanese for copper (mg/day)

Sex	Males				Females			
Age	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 for Japanese for zinc (mg/day)

Sex	Males				Females			
Age	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 for Japanese for selenium (μg/day)

Sex	Males				Females			
Age	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 for Japanese for iodine (μg/day)

Sex	Males				Females			
Age	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 for Japanese for sodium

(mg/day, the value in parentheses is equivalent to table salt [g/day])

Sex	Males				Females			
Age	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 for Japanese for potassium: Adequate Intakes (AIs) (mg/day)[1]

Sex	Males				Females			
Age	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

[1] The value that is considered appropriate to maintain *in vivo* potassium balance was used as the adequate intake.

[2] The value was smoothed in relation to those of the preceding and succeeding age groups.

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

Sex	Males		Females	
Age	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

[1] The 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.

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