Japanese Journal of Comprehensive Rehabilitation Science (2022)

Secondary Publication

The Japanese Dysphagia Diet of 2021 by the Japanese Society of Dysphagia Rehabilitation

The Dysphagia Diet Committee of the Japanese Society of Dysphagia Rehabilitation, Jun Kayashita, RD, PhD,[1] Ichiro Fujishima, MD, PhD,[2] Junko Fujitani, MD, PhD,[3] Shouji Hironaka, DDS, PhD,[4] Akiko Kojo, RD, PhD,[5] Miki Mizukami, DH, PhD,[6] Naoyuki Senda, MD,[7] Motoki Moriwaki, SLP,[8] Emi Watanabe, RD, PhD[9]

[1]Department of Health Sciences, Faculty of Regional Development, Prefectural University of Hiroshima
[2]Department of Rehabilitation, Hamamatsu City Rehabilitation Hospital
[3]Department of Rehabilitation, National Center for Global Health and Medicine
[4]Department of Special Needs Dentistry, Division of Hygiene and Oral Health, School of Dentistry, Showa University
[5]Division of Medical Nutrition, Faculty of Healthcare, Tokyo Healthcare University
[6]The Nippon Dental University Tama Oral Rehabilitation Clinic
[7]Department of Otorhinolaryngology, Matsue-seikyo General Hospital
[8]Department of Rehabilitation, Seirei Mikatahara General Hospital
[9]Department of Food and Nutrition, Faculty of Contemporary Human Life Science, Tezukayama University

In response to new findings and comments from the members and the public, the Dysphagia Diet Committee of the Medical Review Committee of the Japanese Society of Dysphagia Rehabilitation, which was established in April 2010, has discussed and made regular improvements to the Japanese Dysphagia Diet of 2013 (JDD2013) [1, 2] since its creation eight years ago. As a result, the JDD2013 was revised and "the Japanese Dysphagia Diet of 2021 by the Japanese Society of Dysphagia Rehabilitation" was drawn up. In the future, the Board of Directors will discuss how to deal with additional opinions and the necessity of reviewing the classification.

This article is a translation of "the Japanese Dysphagia Diet of 2021 by the Japanese Society of Dysphagia Rehabilitation [3]" published in Japanese in August 2021.

Correspondence: Jun Kayashita, RD, PhD
Department of Health Sciences, Faculty of Regional Development, Prefectural University of Hiroshima, 1−1−71, Ujinahigashi, Minami-ku, Hiroshima-shi, Hiroshima 734−0015, Japan.
E-mail: kayashita@pu-hiroshima.ac.jp
This article is secondary publication from the Jpn J Dysphagia Rehabil 2021; 25: 135−49.
Conflict of Interest: The authors declare that there are no conflicts of interest.

I. Overview and General Remarks

1. Name

The name of the classification is the Japanese Dysphagia Diet of 2021 of the Japanese Society of Dysphagia Rehabilitation (JDD2021). The JDD2021 describes the classification of meals and the classification of thickened liquid and is referred to as the JDD2021 (meal) and the JDD2021 (thickened liquid), respectively. To simplify this, we created a quick reference table for the JDD2021 (meal) and the JDD2021 (thickened liquid); however, this explanation should be read carefully before use (refer to Table 1 and 2).

2. Purpose of establishment

In Japan, since there was no unified stage of dysphagia diet, such as the National Dysphagia Diet (2002) [4] in the United States, many names and stages of dysphagia diet were used inconsistently in each region and facility. Moreover, the lack of consensus and standard classification contributed to the delay in the listing of medical fees.

These factors are disadvantages for patients with dysphagia and people involved in the care of such patients, for example, those involved in the transfer of dysphagia patients from acute hospitals to convalescent hospitals, or from hospitals to facilities or homes. Therefore, the JDD2013 shows the graded classification of meals and thickened liquids that are

doi.org/10.11336/jjcrs.13.64

Table 1. JDD2021 (meal) quick reference table.

Code		Title	Texture	Purpose and property	Example of staple food	Required masticating ability	Correspondence with other classification
0	j	Dysphagia rehabilitation food 0j	Homogeneous jelly which is considered to have adhesion, cohesiveness, hardness and syneresis. Can slice and scoop easily.	Use for assessment and rehabilitation for serious dysphagia. Swallow without masticating. It contains less protein.		(Transferring in the oral cavity)	DDP L0 FPD permission criteria I
	t	Dysphagia rehabilitation food 0t	Homogeneous thickened liquid which is considered to have adhesion, cohesiveness and hardness.	Use for assessment and rehabilitation for serious dysphagia. It contains less protein.		(Transferring in the oral cavity)	DDP Part of L3 (Thickened liquid)
1	j	Dysphagia diet 1j	Homogeneous jelly, pudding and mousse which are considered to have adhesion, cohesiveness, hardness and syneresis.	Form bolus out of the oral cavity. Tongue and palate must be used to transfer foods.	Jelly made from rice slurry	(Holding bolus and transferring)	DDP L1, L2 FPD permission criteria II UDF No need to chew (jelly)
2	1	Dysphagia diet 2–1	Homogeneous purees, pastes and blended food which are smooth, not sticky and easily cohesive. Can eat with a spoon.	Form bolus easily in the oral cavity.	Rice gruel without grains	(Forming and holding bolus)	DDP L3 FPD permission criteria III UDF No need to chew
	2	Dysphagia diet 2–2	Heterogeneous purees, pastes and blended foods which are smooth, not sticky and easily cohesive. Can eat with a spoon.		Soft rice gruel with less syneresis	(Forming and holding bolus)	DDP L3 FPD permission criteria III UDF No need to chew
3		Dysphagia diet 3	Easily mashed formed foods. Form and transfer bolus easily. Swallow easily without scattering in the pharynx. No large amount of syneresis.	Mash easily by the tongue and palate. Reducing aspiration is required.	Rice gruel with less syneresis	Mashing by the tongue and palate	DDP L4 UDF Crushable with tongue
4		Dysphagia diet 4	Not hard and sticky. Can cut easily using chopsticks or a spoon.	Reducing aspiration and choking is required. Mashed easily by the gums.	Soft rice	Mashing by the gums	DDP L4 UDF Crushable with tongue, Crushable with gums, Easy to chew

DDP, Dysphagia Diet Pyramid; FPD, Foods for people with dysphagia; UDF, Universal Design Food.

Table 2. JDD2021 (thickened liquid) quick reference table.

	Stage 1 Mildly thick	Stage 2 Moderately thick	Stage 3 Extremely thick
Drinking properties	It is a level of thickness where the term "drink" is appropriate. When it is put into the mouth, it spreads freely. It is very easy to swallow without any viscous sensation. It can be sucked up easily with a straw.	The increased thickness is obvious; it is a level of thickness where the term "drink" is appropriate. When it is put into the mouth, it spreads slowly. It is easily controlled by the tongue. It requires some effort to suck through a thin straw.	The thickness is visually obvious; it has good cohesiveness and requires strength to initiate the swallow. The expression "eat" with a spoon is appropriate here. The use of a straw is not appropriate.
Visual properties	When the spoon is tilted, it runs down quickly. If the cup is tilted, an impression of a slight decrease in the speed of the liquid falling may be sensed.	When the spoon is tilted, it runs down slowly. When it is scooped with a fork, it falls between the tines. If the cup is tilted, it is coated with the thickened liquid.	Even when the cup is tilted, the liquid does not flow to the edge so rapidly. It does not fall between the tines of a fork.
Viscosity (mPa・s)	50–150	150–300	300–500
LST (mm)	36–43	32–36	30–32
Syringe residual amount test (ml)	2.2–7.0	7.0–9.5	9.5–10.0

commonly used by domestic hospitals, facilities, home medical care, and welfare personnel.

Further, it has a basic classification structure, which is widely used. While a quick reference table is shown for convenience, there are some aspects that cannot be shown in such tables. Therefore, this explanation needs to be carefully read first.

3. Coverage of people with dysphagia

In the JDD2021, as in the JDD2013 (meal), 0j (jelly) and 0t (thickened liquid) are added to Code 0 in order to display a wider range of dysphagia cases, mostly due to mid-career incidence in adults. However, cases of dysphagia due to organic stenosis, and the developmental process of children with dysphagia [5] are mainly exempted. The code number does not mean the diet that corresponds to the improvement process (or severity) for the selection of an appropriate diet for each case. Selecting an appropriate diet form for each case permits a common understanding when using this classification.

4. Reasons for not showing the regulation of quantity and nutritional components

In the JDD2021, as in the JDD2013 (meal), the stages are shown only in diet form, and the amount and nutritional components are not specified. The conventional classification of therapeutic diets, such as in cases of liver disease, kidney disease, and diabetes, is based on the type and amount of nutrients. If the classification of these nutrients falls along the vertical axis, the diet form is matched to the swallowing function on the horizontal axis.

During the recovery period of dysphagia due to cerebrovascular disease, endurance is low and the amount that can be ingested is smaller than when eating at a less difficult dietary stage. In many cases, the tolerance of both the diet form and quantity improves with recovery. Therefore, it is often possible to gradually specify the basic amount. However, even if the highly difficult diet form is difficult to ingest, the easier diet form may be ingested in large quantities. Thus, the form and amount should be specified individually.

This classification is based on the dysphagia diet and not the food type. Even in a regular diet, the amounts of nutrients from staple foods, main dishes, side dishes, and soups vary depending on their preparation. Therefore, it is impossible to specify the nutritional amount for each code.

Thus, in the JDD2021, only the diet form is shown and not the nutritional amount. However, meals with extremely low energy densities are not recommended because nutritional intake is one of the purposes of Codes 1j to 4 of the JDD2021 (meal). Considering the amount that can be ingested according to the pathological condition and nutritional requirement of each person, an appropriate amount of nutrition should be included. Nevertheless, if the intake is insufficient to comply with nutritional requirements, it is important to supplement with between-meals or tube feeding. The exception is Code 0, which indicates dysphagia "rehabilitation food." The statement that "it is desirable that the protein content be low" to manage the risk of aspiration, means that this cannot be classified as a meal by itself in terms of quantity.

5. Reasons for showing descriptions of food texture instead of physical property measurements

In the JDD2021, the physical property measurements were not described in the classification rules of the stages, as in the JDD2013 (meal) for the following reasons. First, as mentioned previously, the JDD2021 aims to be widely used among facilities in Japan; however, there are not many institutions that can measure physical properties. Second, a method for measuring the physical properties of a mixture of uneven food has not yet been established, and there is little evidence on its measurements and medical effects.

The JDD2021 (meal) clarifies the corresponding existing classifications, and some of them indicate the criteria using physical property measurements; thus, we can refer to their physical property measurements.

In the JDD2021 (meal), the texture properties are written in plain Japanese. Since there are several differences in the images of the food texture, we attempted to express this in a manner that would allow individuals to recall the same food texture. To use this classification correctly, it is necessary to comprehensively read and understand this commentary, as well as the terms in the quick reference tables.

"Jelly" refers to a jelly-like form and not the confectionery jelly. The classification of the JDD2021 (meal) is based on texture. It is desirable to provide meals according to the disease, pathology, and taste of each person with dysphagia.

6. Number of stages

Similar to the JDD2013 (meal), the JDD2021 has five major stages, which is consistent with the existing classification and aims to be suitable for use in many facilities. It is possible to create and use finer divisions in each facility or region.

7. Correspondence with various existing classifications

In the JDD2021, the correspondence with various existing classifications of the dysphagia diet is also shown as in the JDD2013 (meal). Each of these existing classifications has different development backgrounds, such as being devised based on experience targeting the recovery period of cerebrovascular disease or in facilities for the elderly. Therefore, the JDD2021 (meal) and existing classifications do not entirely complement each other.

However, by showing the correspondence with

various existing classifications, it is expected that the compatibility will be recognized, and that the understanding of this classification will be improved. In the JDD2021, some compatibilities were revised based on the treatise [6].

8. Code number, name, and determination of the code number

In the JDD2021, the code number was used as the stage name, as in the JDD2013 (meal).

The reason is that previous treatises and public comments have pointed out that the images of food forms, such as purees and pastes, depended on personal experience, and it is difficult to obtain a common understanding.

The JDD2021 (meal) stage consists of Codes 0j, 0t, 1j, 2−1, 2−2, 3, and 4. Refer to Chapter II for further details.

However, the code number does not always match the difficulty level. The user should consider the most appropriate food form at a specific time in each case by referring to the code numbers. A gradual diet that "goes to the next stage if the patient can eat enough of the diet provided as a code" is a basic method. Although it is applicable in many cases (especially during the period from the acute stage of stroke to recovery), it might not be recommended for some. For example, if a meal with a low code number does not stimulate the appetite or increase the motivation for eating, or if it is difficult to swallow due to improper adhesion or viscosity, it may not be suitable. If the risk of aspiration and the circumstances of not being able to eat a larger amount of food do not change even after increasing the code of the dysphagia diet, a higher number code may still help increase the patient's quality of life. It is not always necessary to start from Code 0 or 1; instead, the starting code should be evaluated individually in all cases.

Similarly, it is not necessary to unify the dysphagia diet provided at the facility or at home into one code with one meal. Although this may be necessary for Codes 1 and 2, if Codes 3 and 4 can be ingested, it is common to include other code foods in one meal. If the swallowing function is being improved, it may be better to have 0t, 0j, and 1j foods that are "easily ingested" for the alternate swallowing and reduction of load.

Though it is easy to understand that the food type name in the facility is linked to the code (for example, the dysphagia diet 3 [food of Code 3 + food of Codes 1 and 2]), it is provided under different names (for example "sofuto-syoku" which means "soft diet"); therefore, it is not possible to regulate the names in each facility. However, because inconveniences occur at the time of discharge or when providing information on the cooperation between facilities, the code of the food that is formed from the food type (e.g., staple food is Code 3, side dish is Code 2 to 4) should be specified.

9. Thickened liquid

For individuals with dysphagia, both the texture of meals and thickened liquid levels are important; JDD2021 (thickened liquid) is shown (refer to Chapter III).

The classification levels are "Stage 1 Mildly thick," "Stage 2 Moderately thick," and "Stage 3 Extremely thick." For each, the visual properties and measured values of the physical properties are shown together.

When thickening, in addition to general foods such as potato starch and arrowroot powder, commercially available thickening agents that do not require heating may be used.

In the JDD2021 (meal), the quick reference table does not indicate whether or not to thicken when ingesting liquid; however, in principle, it is assumed that soup should be thickened.

10. Dysphagia diet and masticatory ability

Similar to the JDD2013 (meal), the JDD2021 also has a column for "Required masticatory ability" in the quick reference table. Even though this is the "dysphagia" diet, when consuming a diet for mild disabilities (a diet close to the normal diet), a certain level of masticatory ability is also required.

Masticating is the process of forming a bolus, that is, a form that can be swallowed by mixing food with saliva while biting, crushing, and mashing food. The term "masticatory ability" used in this study is of a broad sense, as it does not only signify the use of teeth and prostheses but also includes the ability to crush the alveolar ridge (gingiva) of the upper and lower jaws and between the tongue and palate.

Even if such masticatory ability is not required, the ability to adjust the shape, hold, or feed the bolus is necessary. Although it is not strictly "masticatory ability," it is described in the column of "Required masticatory ability."

However, there are cases where swallowing is not possible even with high masticatory ability (Wallenberg syndrome, etc.), and cases where swallowing is possible even with low masticatory ability (opposite occlusion and open bite by acromegaly). It should be noted that the "Required masticatory ability" in the table does not mean that swallowing is possible with that ability [2].

II. The JDD2021 (meal)

1. Overview

In the JDD2021, as in the JDD2013, five levels of codes (0, 1, 2, 3, and 4) were specified as categories. Code 3, according to this classification, is indicated as "Code 3 (JDD2021)."

The quick reference table shows the code and title, explanation of food texture, purpose and property,

example of staple food, required masticating ability, and correspondence with other classifications. Please read the following commentary before using the quick reference tables.

2. j and t in Codes 0 and 1

The concept of the JDD2021 is the same as that of the JDD2013.

In Codes 0 and 1, j and t were set as subclassifications, where j represents jelly and t represents thickening. The reasons for setting j and t correspond to cases where jelly-like and thick-like foods are recommended, respectively. For the low jelly-like code number and high thick-like code number, it is easy for beginners to misunderstand that a "jelly-like code is more suitable for all cases." Cases where the jelly-like texture or thick-like texture is suitable when starting new oral intake are specified to aid medical staff in decision-making (refer to Figure 1).

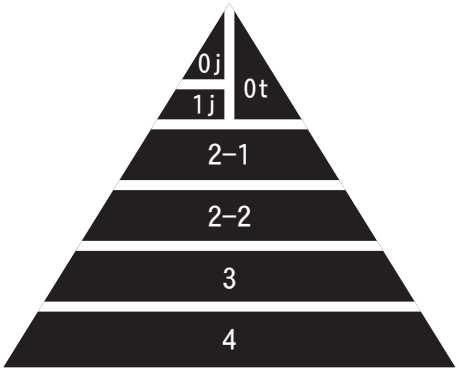

Figure 1. Structure of the JDD2021 (meal).

As the next step of Code 0j, Code 1j, which is a jelly pudding-like food, was specified. The next step after 0t is Code 2−1 as a pasty food.

The reason for having Codes 0j and 1j is that the difficulty of swallowing jelly-like foods has been examined, and they are also defined numerically as the permission criteria I and II for foods for people with dysphagia. Moreover, the codes can distinguish between a small amount of jelly with very little protein for rehabilitation and a large amount of jelly with more protein for meals.

However, if it is made in the next stage of Code 0t thickened water, it becomes a food with a smooth paste-like texture, which is the same as the food group in the next stage of Code 1j. Therefore, they were not provided. Since there are many paste-like foods in Code 2, they are subdivided into Codes 2−1 and 2−2 according to their inhomogeneity.

In practice, a case in which the oral intake commenced in Code 0j can progress to a small amount of Code 1j. Therefore, when the number of items increases with the quantity, it proceeds to Code 2. In the cases that start at Code 0t, it is assumed that Code 1j can be consumed before and after eating Code 2.

3. Code 0j (Dysphagia rehabilitation food 0j)

Code 0j is a type of dysphagia rehabilitation food. It is a jelly that is homogeneous and has low adhesion, high cohesiveness, softness and minimal water separation. It is easy to scoop into slices and forms an appropriate bolus.

The purpose of Code 0j is to cut the jelly into a sliced bolus of approximately 2 cm in length × 2 cm in width × 5 mm in thickness (about 2 to 3 g), using a thin and flat spoon to swallow (being able to swallow) without crushing or chewing. It is soft and can be easily sucked even if it remains in the pharynx.

Considering tissue reactions and infections when swallowed, it is desirable that the protein content be low. With regard to the values of hardness, adhesiveness, and cohesiveness, the reference values are those of the permission criteria I for foods for people with dysphagia.

It is desirable to prepare a Code 0j or Code 0t equivalent as a candidate for the test food that is most easily swallowed during the videofluoroscopic and videoendoscopic evaluations of swallowing. This includes tea jelly and fruit juice jelly with a consideration for texture, and commercially available jelly for dysphagia rehabilitation. The posture of the trunk and neck is also important for food intake at this stage, and it is necessary to consider how to scoop and place it in the mouth [2].

Note: Gelatin-based jelly melts at body temperature and becomes liquid when it stays in the oral cavity or pharynx for several seconds or longer. However, although there is a risk that it will become liquid and lead to aspiration, it may still enable spitting and aspirating during such instances.

4. Code 0t (Dysphagia rehabilitation food 0t)

Code 0t represents dysphagia rehabilitation food, which includes thickened liquids that are homogeneous, highly cohesive, have low adhesion, and have appropriate viscosities.

Along with Code 0j, it is one of the recommended forms at the stage of training, including evaluation of the most severe dysphagia. It can also be applied to people who have a limited range of swallowable bolus because of easy residual or aspiration with poor masticatory ability (low ability to form bolus), insufficient pressure balance during swallowing (insufficient pharyngeal pressure formation, insufficient dilation of esophageal entrance). The purpose is to scoop with a spoon, place it in the mouth, and swallow it without chewing (swallowing) while considering the amount. In the case of aspiration or melting in the mouth, 0t is more suitable than 0j. Considering infections during aspiration, it is desirable that the protein content be low.

With regard to the degree of thickening, either moderately or extremely thick is suitable (refer to Chapter III). Thickened tea or fruit juice is also used.

It is desirable to prepare Codes 0t or Code 0j as

candidates for the test food that is most easily swallowed in videofluoroscopic and videoendoscopic swallowing evaluations.

Code 2 is for foods that contain a lot of protein or are made into a paste. Those that easily spread in the mouth and those that easily separate from water are more difficult, and thus are included in Code 4.

5. Code 1j (Dysphagia diet 1j)

These are jelly, pudding, and mousse-like foods that do not require chewing-related abilities and are in the form of an appropriate bolus when scooped with a spoon. This includes those that require the tongue to be pressed against the palate with some consciousness. Although it has a wider range of textures than Code 0j, consideration must be given to adhesion and cohesiveness. Unlike Code 0j, the protein content may be disregarded.

Individuals recommended Code 1j have low masticatory and bolus formation ability, and there is a risk of aspiration during swallowing, but it is assumed that the texture of a bolus suitable for passage through the pharynx can be swallowed. Therefore, the standard amount is 5 g or less, which does not require chewing, but it is assumed that it need not be made into slices every time it is placed in the mouth. With regard to the range of physical property values, the permission criteria II for foods for people with dysphagia and the Dysphagia Diet Pyramid L1 and L2 are reference values. Tofu made from eggs, jelly of rice porridge, blender porridge, jelly, and mousse, which are commercially available as nursing care foods, are used. However, it should be noted that some commercially available products are hard and need to be crushed with the tongue and palate, and these are Code 3. Food with a large amount of water separated in the oral cavity is Code 4.

Even if swallowing is possible at this stage, it is often necessary to consider endurance and fatigue. Therefore, it is assumed that the amount of food to be provided as a dysphagia diet will be set appropriately at each facility. Therefore, supplemental nutrition should be considered.

Among the various foods classified as Code 1j, there may be transitional foods that become Code 2−1 when broken and stirred.

Note: Refer to the note in Section 3 on the risks and benefits of gelatin jelly.

6. Code 2 (Dysphagia diet 2) (Codes 2−1 and 2−2)

These are scooped with a spoon and formed together into an appropriate bolus by a simple movement in the oral cavity, and it requires pressing of the tongue against the palate with some consciousness. Although these have a wider range of texture than those of Code 0t, consideration must be given to adhesion and cohesiveness. Unlike in Code 0t, the protein content may be disregarded. Since it serves to dilute the nutrition during the adjustment process, it is desirable to combine the materials used to provide sufficient nutrition. It should be noted that some of the foods called blender, puree, and paste foods simply based on the preparation process do not correspond to this code. The code should be assessed based on texture and properties, regardless of the preparation method.

In Code 2, smooth and homogeneous foods are classified as 2−1 and inhomogeneous foods containing soft grains as 2−2.

Code 2 is indicated for those who have the ability to transfer food that is placed in the mouth without spreading, and with a swallowing function that can cope with a slight range of adhesion even when there is no masticatory ability.

The preparation method involves blending to achieve smoothness and adding cohesiveness. Liquids that pass through a tube are described as “drink”; that is, the ease of disintegration when passing through the pharynx, and the excessive passing speed that causes aspiration before and during swallowing, are not included. Even what is called a blender meal should be eaten by scooping with a spoon and not by injecting into the stomach through a tube.

Typical examples of staple foods are rice porridge with a thickening agent, blender porridge treated to prevent high adhesion, and food made from rice flour. In the case of a blender porridge, it is Code 2−2 if the grains remain. Most blender foods on the market as long-term care foods apply Code 2. Among them, 2−2 includes those that feel to have graininess or inhomogeneity. Chopped foods with thickened sauce are not applicable to Code 2−2. (Refer to the Q & A in Chapter IV.)

Even if swallowing is possible at this stage, it is often necessary to consider endurance and fatigue. Therefore, it is assumed that the amount of food to be provided as a dysphagia diet will be set appropriately at each facility. Therefore, supplemental nutrition should be considered.

Note: Cooking porridge in a blender will increase its viscosity over time and it will become “paste-like,” making it unsuitable for Code 2. By treating it with an enzyme or the like, it can be adjusted so that the viscosity or adhesiveness does not increase with time. (Refer to the Q & A in Chapter IV.)

7. Code 3 (Dysphagia diet 3)

Although this has a shape, it can be crushed without teeth or prostheses, it is easy to form a bolus, and it does not require a large amount of water separation during the oral operation. It has a certain cohesiveness and does not easily disperse when passing through the pharynx. Therefore, it is often referred to as a soft meal.

Code 3 may be indicated for those who can crush food between the tongue and palate, wherein bolus is formed and transported by the tongue, and for individuals with better swallowing function than those

of Code 2. Furthermore, we assume that a person can swallow food with a wide range of textures without aspiration.

Mastication requires more than the ability to squeeze between the tongue and palate; however, there are cases in which a Code 3 dysphagia diet is required due to dysphagia, even if the person has a high masticatory ability.

With regard to Codes 1j and 2, it is assumed that solid foods such as meat and vegetables are mixed or ground and then remolded; however in Code 3, crushing, reforming, and uniformity are not essential. If the requirements are met, general dishes that take into consideration the selection of ingredients and cooking methods, such as stewed hamburgers with foodstuff for softening, soft stewed radish and wax gourd with thickened sauce, and soft-finished egg dishes, are included. In addition, chopped, bite-sized, or loosened food poured with thickened sauce is often included in Code 3, but simply chopped "hard" food poured with thickened sauce may not be applicable for Code 3. The original ingredients before chopping must be soft enough. (Refer to the Q & A in Chapter IV.)

Definitions of textures such as hardness are more extensive than those of Codes 1j and 2. If it is hard jelly, it is considered Code 3 instead of Code 1j.

Many commercially available products, such as softened meat, fish, and vegetables, using various technologies, are also included in this stage. Porridge is an example of a staple food.

8. Code 4 (Dysphagia diet 4)

This is a dysphagia diet in which the ingredients and cooking method are appropriately selected for individuals with a slight decrease in swallowing and masticatory functions or those who are at risk of aspiration and suffocation. However, it is different from foods that improve masticatory function. It does not easily stick or come apart and has the softness to be cut using chopsticks or a spoon. Of the masticatory abilities, the presence of teeth and prostheses is not essential; however, more than the crushing ability between the upper and lower alveolar ridges (which can be crushed with the pad of the finger) is required, and crushing between the tongue and palate is difficult.

On the other hand, because of their high liquidity, those that are not included in Code 2 (mildly thickened liquid) also apply in Code 4.

Examples of staple foods are porridge and soft rice.

There are many general meals that are used in this stage, such as Japanese, Western, and Chinese stewed dishes and egg dishes. Soft ingredients and foods that have been cut or loosened and poured with thickened sauce to reduce stickiness and spreadability are included in Code 4. (Refer to the Q & A in Chapter IV.)

This content is quite similar to that of dietary considerations for elderly people requiring long-term care, those with digestive disorders, and those who have undergone surgery; however, special consideration is given to the absence of teeth and prostheses, digestion, and risk of aspiration and choking.

9. Major pathological conditions in which the code number of the JDD2021 (meal) does not match the severity

If the risk of aspiration is low, diets close to a liquid (part of Code 4) or liquids are the most appropriate; these are used mainly when there is an impaired passage of the oral cavity and esophagus (oral trauma, oral surgery, otolaryngology, head and neck surgery, esophageal stricture).

There are four difficulty levels of meals according to the developmental stage of infants [7], which are widely used. In the case of developmental disorders, the dysphagia diet classification 2018 for children (persons) with dysphagia during the developmental stage[3)] has been reported.

In all cases of patients with dysphagia, not only the texture but also the appearance, taste, preference, and environment at the time of eating should be considered. This is also applicable to patients with dementia, wherein the stimulus of surface texture when placed in the mouth may increase appetite (homogeneous and monotonous textures have a negative effect).

10. Concept of thickening of liquid in the JDD2021 (meal)

Generally, liquids should be thickened when eating diets according to the JDD2021 (meal).

However, if only Code 0j and Code 1j can be swallowed, there is a high risk of aspiration even if the liquid is thickened. In the case of the dysphagia diet Code 0t, Code 2, Code 3, or Code 4 is eaten, as it is assumed that the thickened liquids can be ingested. In Code 4, liquids may or may not need to be thickened.

The presence or absence and degree of thickening should be evaluated and determined for each individual with dysphagia. Please also refer to the JDD2021 (thickened liquid) in Chapter III and the Q & A in Chapter IV. Refer to Chapter III for drink jelly.

11. Relationship between the JDD2021 (meal) and nutrition and the clinical course of dysphagia

The JDD2021 (meal) is a dietary form classification. Generally, for middle-aged patients, it starts with a small amount of Code 0 (j or t) and improves according to swallowing function from Code 1 to Codes 2, 3, and 4, and consequently increases the amount of meal consumed orally (durability of swallowing movement). However, in some cases, Code 2 or 3 may be retained, and it may be necessary to increase the amount of meal in the code.

In progressive pathological conditions, such as aging, dementia, amyotrophic lateral sclerosis, and Parkinson's disease, the dietary form will be selected

with a decrease in the number of codes. There may be clinical types in which the patient appreciates a high degree of dietary form while the oral intake is small, due to the pathological condition consisting mainly of impaired appetite and endurance.

In each case, the guidance on the dietary form, amount, and selection of supplemental nutrition should be examined individually. This policy is also followed in the JDD2021 from the JDD2013.

III. The JDD021 (thickened liquid)

1. Overview

The JDD2021 (thickened liquid), as in JDD2013 (thickened liquid) [8], follows three stages of thickened liquid for people with dysphagia: mildly thick (stage 1), moderately thick (stage 2), and extremely thick (stage 3). A lower stage indicates lesser use of thickening agents and not the level of difficulty. We do not recommend thickened liquid if it is thinner or thicker than the three stages.

For thickened liquids, the properties are expressed in the text, and the viscosity is measured with a viscometer. The value of the line spread test (LST) and the residual amount by the syringe method are shown in Table 2. Similar to those of the JDD2021 (meal), the properties are written in the text in Table 2 for users who do not have measuring equipment. Additionally, the viscosity is shown so that commercially available thickening agents can be used by referring to the instruction manual of the thickening agents. As a simple test method that can be performed without a viscosity measuring device, the LST value is shown (refer to Sections 5 and 6 for the viscosity measurement and LST method). In the JDD2021, the value of a new syringe test, which is the residual amount of syringe filled with 10 mL of thickened liquid after 10 s, is shown (refer to Section 7).

The viscosity was measured using a cone plate-type rotational viscometer, and a xanthan gum-based thickening agent was used. Please note that it is not possible to make a simple comparison based on the viscosity value with mixed food (Codes 2−1 and 2−2). In the following section, the thickening stages are discussed, starting from the basic (Stage 2).

2. Stage 2: Moderately thick

Moderately thick is assumed to be the first degree of thickening for dysphagia after stroke. The increased thickness is obvious; however, it is a level where the term “drink” is appropriate. When placed in the mouth, it spreads slowly and it is easily controlled by the tongue.

When the spoon is tilted, thickened liquid slows down. Spillage is reduced even if the food is scooped using a spoon. When it is scooped with a fork, it falls between the tines. Some effort is required to suck through a thin straw.

As a thickened liquid for videofluoroscopic and videoendoscopic swallowing evaluations, it is basically the optimal degree of thickening to prepare. It is assumed that a spoon will be used when it is ingested as 0t of the JDD2021 (meal) at the time of dysphagia evaluation and treatment initiation. The viscosity is 150−300 mPa · s and the LST value is 32−36 mm (refer to Sections 5 and 6 for the viscosity and LST values). The residual amount after 10 s using a 10 mL syringe is 7.0−9.5 mL (refer to Section 7).

3. Stage 1: Mildly thick

Mildly thick is intended for cases in which aspiration does not occur even if the degree of thickening is not the same as that of moderately thick cases (cases with milder dysphagia). It is a level of thickness where the term “drink” is appropriate, and when it is placed in the mouth, it spreads freely. It is easy to swallow without a viscous sensation.

It can be easily sucked with a straw. If the cup is tilted, the impression of a slight decrease in the speed of the liquid falling may be sensed; however, it is easy to transfer from the cup. This does not require a significant force to swallow.

Since the degree of thickening is lighter than that of the moderately thick, it has excellent compliance. Depending on the type, taste, and temperature of the liquid, its thickness may not be particularly evident. In cases where the moderately thick is used, it is recommended to evaluate whether it is safe to drink even when it is mildly thick. As a thickened liquid for videofluoroscopic and videoendoscopic swallowing evaluations, it is the optimal degree of thickening to prepare. The viscosity is 50−150 mPa · s and the LST value is 36−43 mm (refer to Sections 5 and 6 for the viscosity and LST values). The residual amount after 10 s using a 10 mL syringe is 2.2−7.0 mL (refer to Section 7).

4. Stage 3: Extremely thick

Extremely thick is the degree of thickening in cases of severe dysphagia. Even in cases with moderately thick and risk of aspiration, it may be safe to drink. The thickness is visually obvious, cohesiveness is good, and strength is required to initiate swallowing. The expression “eat” with a spoon is appropriate here; however, the use of a straw is not appropriate. Even when the cup is tilted, the liquid does not flow rapidly to the edge, and even the tines of a fork can be used to scoop a little amount.

It can be used as 0t of the JDD2021 (meal).

When adjusting the thickening with a thickening agent, depending on the type, adhesiveness may increase, and it may become difficult to swallow. Therefore, it is necessary to select a thickening agent after tasting and confirmation, rather than simply evaluating its viscosity.

As a thickened liquid for swallowing videofluoroscopic

and videoendoscopic evaluations, it is the optimal degree of thickening to prepare.

The viscosity is 300−500 mPa·s, and the LST value is 30−32 mm (refer to Sections 5 and 6 for viscosity and LST values). The residual amount after 10 s using a 10 mL syringe is 9.5−10.0 mL (refer to Section 7).

5. Viscosity measurement method

The viscosity is the value after maintaining the rotation speed at a shear rate of 50 s^{-1} for 1 min using a cone-plate-type viscometer (E-type viscometer). The viscosity range for each stage is presented. For example, "50−150 mPa·s" indicates a viscosity above 50 mPa·s but below 150 mPa·s. The viscosity values were determined using samples of water thickened by a thickening agent based on xanthan gum. We have not examined thickened liquids that have been thickened with thickening agents that behave differently from xanthan gum, or blended foods that are applicable to Code 2−1 of the JDD2021 (meal). It is necessary to carefully interpret these values.

6. LST

The LST was performed as follows. A sheet with circumferential measurement scales (distance between the lines, 1 mm) was used. The test commenced by placing 20 mL of liquid into a ring (diameter: 30 mm; height: 28 mm). After the liquid was poured into the ring, it was left for 30 s to stabilize. The ring was then picked up, and after 30 s, the distance of the spread was measured. The sheet had measurement scales in six directions; the values of these six points were noted, and the average value was calculated. Since the spread of the liquid was being measured, it was important to measure it horizontally.

For each liquid thickness level, a range was shown. For example, "36−43 mm" indicated that it was above 36 mm, but below 43 mm. The LST values were based on samples of water thickened with xanthan-gum-based thickeners. We have not examined thickened liquids that have been thickened with thickening agents that behave differently from xanthan gum, or blended foods that are applicable to Code 2−1 of the JDD2021 (meal). It is necessary to carefully interpret these values.

7. Syringe residual amount test

A 10-mL plastic syringe (Terumo Corporation) without the pusher (plunger) was used. The tip of the syringe was closed with a finger and 10 mL of the liquid to be measured was added. The finger was removed to let the liquid drop. After 10 s, the tip of the syringe was closed again with a finger, and the amount of remaining liquid was measured. This value was the result using a xanthan gum-based thickener [9]. In the case of different sizes of syringe, it is necessary to carefully interpret these values.

8. Precautions for clinical use of thickened liquid and commercially available thickening agent

Although thickening is a safe way for people with dysphagia to consume liquids, it has been reported that the intake amount of water is often low, because it induces abdominal bloating and gives a less refreshing feeling compared to non-thickened liquids [10]. Since water intake may decrease, it is necessary to check on the water intake to prevent dehydration.

Moreover, since thickening agents often take several tens of seconds to thicken, instead of checking on the degree of thickening while mixing it may be necessary to add a predetermined amount while mixing well. After a while, the degree of thickening may be assessed for appropriateness. The viscosity may differ depending on the temperature of the liquid and the type of thickening agent used.

Thickening with a commercially available agent may cause deterioration of taste and aroma. In addition, if the organic matter content of the liquid is high, depending on the type, a large amount of thickening agent or a longer time to thicken may be required. It is necessary to select a thickening agent that suits the material. Since thickened foods have energy, it is necessary to calculate their energy when using them in large quantities for patients with energy intake control, such as those with diabetes.

Considering that properties other than viscosity (adhesiveness, etc.) differ depending on the type of thickening agent, tasting before use may be required.

In patients who use thickening for water, the viewpoint of removing thickening is also important. As a standard for such, a tool called the liquid intake protocol[2] is evaluated step-by-step based on sufficient observation while coordinating with multiple processes. There is also a free water protocol that allows people to drink water freely between meals [11].

Note: Thickening agents have been added to food for people with dysphagia of food for special dietary uses since April 1, 2018. This meets the permission criteria set by the Consumer Affairs Agency. The requirements for viscosity, solubility/dispersibility, stability over time, saliva resistance, and temperature stability are included in the permission criteria [12], which can be used as a reference for selection.

9. Jelly drinks

In cases where the swallowing function is impaired, both thickened liquids and jelly drinks may be used. Not only the drinks and products that become jelly drinks when dissolved that are commercially available for people with dysphagia, but also those that are commercially available are used by people with dysphagia. Jelly drinks are less likely to be aspirated than smooth liquids. Since the texture is also different from that of thickened liquids, such drinks may be introduced actively to increase choice and in consideration of

preferences. However, some of the commercially available jelly drinks have a large amount of water separation, and some of the separated liquids have low viscosity and are too thin. Although difficulties and hazards are expected if they are mildly thick, individual consideration is required for clinical application. Some jelly drinks that supply energy and protein for the elderly requiring long-term care have physical characteristics similar to those of Codes 2 and 3.

IV. Q & A

This Q & A answers questions from members of the Japanese Society of Dysphagia Rehabilitation.

1. Can the dysphagia diet correspond to the Functional Oral Intake Scale (FOIS)?

The extent of oral intake depends on how the dysphagia diet is consumed (trunk angle, caregiving, rehabilitation technique used, etc.). Currently, it is difficult to clearly associate a dysphagia diet with the FOIS or the Food Intake Level Scale, which indicates the severity of dysphagia.

2. Please specify the criteria for dysphagia to avoid suffocation.

It is difficult to clearly define the criteria for dysphagia to avoid suffocation. To evaluate oral and pharyngeal functions, an appropriate dietary form must be selected and the risk of suffocation should be avoided. Moreover, it is necessary to consider fluctuations in alertness and cognitive function. In particular, if abnormal eating behaviors due to dementia, mental illness, and higher brain dysfunction (pacing, accumulation, stuffing, swallowing without chewing, etc.) are observed, any dietary form may cause suffocation. It is important to consider selecting a safer diet form and observing the eating situation closely.

3. How are medicines taken?

Medicines are administered with water, and it is a difficult task because it simultaneously involves different elements such as smooth water and small tablets. In addition, there are conditions that make it easy to aspirate, such as trying to drink with the chin raised (cervical extension position). Basic precautions include pre-wetting the oral cavity, not raising the chin, and not taking multiple (dosage form) medications at the same time.

In cases where it is difficult to drink with water, the medication may be wrapped in something that is easy to swallow. In the past, porridge or yogurt was used; however, swallowing aid jelly is now commercially available. It is also possible to thicken the water, wrap it in an oblate form, and then wet the entire wrap (it becomes jelly-like).

It has been reported that if oral disintegration tablets are taken with thickened water or swallowing aid jelly, the drug may not disintegrate and may be difficult to absorb. It is necessary to clarify whether there is such a mechanism when the effect of the drug is insufficient [13].

Re-examination of the ease of swallowing the drug may be performed. A smaller dosage form is preferable, but it is difficult to administer if it is crushed; therefore, splitting the tablet may be considered. There are also more suitable options for people with dysphagia, such as oral disintegration, syrup (liquid), drop chewable type, and jelly type preparation. Another option is to switch to patches or suppositories.

When administering medications through a feeding tube, granules that are easy to dissolve, tablets or capsules dissolved in hot water, or the simple suspension method [14], are better than those that are powdered.

4. Why does Code 0 state that the protein content is low?

Individuals with Code 0 are considered to be at a high risk of aspiration. Based on clinical experience, the protein content is set to be low considering tissue reactions and infections when aspiration occurs. However, there is no clear evidence regarding cases of aspiration of organic matter. In addition, care should be taken when creating and storing jelly to prevent bacterial growth.

5. What do you think of a drink jelly that contains jelly in a thickened liquid (mildly thick)?

It may be possible to set it to 0jt. Jelly drinks range from products for people with dysphagia to those for general consumers, and there are various products in terms of the amount of water separation, hardness of the jelly, and viscosity of water separation. Therefore, the commentary states that “the difficulty and danger of jelly drinks in general should be treated as being mildly thick.” As stated in the commentary, “individual studies are required for clinical applications.” Depending on the physical properties, some correspond to moderately thick, and there are those that can be used for Code 0t, Code 1t, and Code 2−1 of JDD2021 (meal).

With regard to jelly drinks, future research is required because knowledge on the method of measuring physical properties and the difficulty of swallowing has not yet been sufficiently accumulated.

6. What is a blender porridge that is considered not highly adhesive?

When a porridge is blended, it forms a sticky paste, thus increasing the adhesiveness over time. Such a blender porridge is not suitable as a dysphagia diet because it is both difficult to feed and swallow, as it remains in the pharynx.

This adhesiveness is due to the starch in the

porridge; thus, if you let the starch-degrading enzyme (α-amylase) act on the porridge to decompose the starch and then place it in a blender, the adhesiveness will not increase.

However, it becomes a smooth liquid by applying an enzyme and blending it; therefore, it is necessary to adjust it to an appropriate state using a jelly-forming product (for example, a commercially available gelling agent).

Gelling agents containing the enzyme are also commercially available aside from the enzyme itself. Please follow the instruction manual of each company for use, such as the amount to be added.

7. What does porridge without water separation mean?

Even if the porridge has no free water at the start of eating, it may possibly separate out in the process. This is because the starch-degrading enzyme α-amylase contained in saliva acts on the porridge through eating utensils, such as spoons. If eating time is prolonged, water separation progresses, and the meal form changes from Code 2 to Code 4. In such instances, it is necessary to prevent saliva from being mixed with the porridge by separating the porridge itself.

Alternatively, if a thickening agent is added to the porridge, the water separated by saliva will thicken, and there will be no significant change in properties. In addition, if a commercially available starch-degrading enzyme is allowed to act on the porridge in advance to decompose the starch and make it into a jelly (for example, a commercially available gelling agent), it can be adjusted to an appropriate state, thus preventing water separation during eating.

8. There are few facilities that make Codes 2−1 and 2−2 separately, and personally, it is difficult to classify them. Is it necessary to divide them into two categories?

The JDD2021 indicates jelly (0j) and thickened liquid (0t) as dysphagia rehabilitation food. Code 2 was assumed to be the next stage of the thickened liquid. A person who can drink thickened liquid proceeds to the next stage, heterogeneous Code 2−2, which imposes a high risk. Therefore, the homogeneous Code 2−1 precedes the heterogeneous Code 2−2, and is divided into two.

9. Please establish the rules for the cooking method of Code 2−2.

It has been reported that homogeneous food (Code 2−1) meant passing through a 600-μm mesh, and inhomogeneous (Code 2−2) meant not passing through [15]. In addition, we plan to post a video on the JSDR website on how to prepare the dishes.

10. During swallowing training, I feel that there is a large difference between Code 2−2 and Code 3. Can the concept of heterogeneous grains in Code 2−2 be expanded?

Code 2 is not a dysphagia rehabilitation meal, but a dysphagia diet. You may also test the next eating stage while eating Code 2. Instead of changing all meals at once, it is possible to promote recovery by mixing Codes 2 and 3.

11. Does Code 3 become Code 2 by mashing at the table?

Code 3 does not become Code 2 by simply mashing it, as Code 2 should be smooth. If the small pieces made by the mashing are not small or soft enough and cannot be swallowed, it cannot become Code 2. For example, if Code 3 is a homogeneous liquid solidified with a gelling agent, it may become Code 2 with sufficient mashing. However, Code 3 does not require homogeneity; rather, heterogeneity is preferable for obtaining a texture-based taste. Therefore, it is not realistic to adjust Code 3 to Code 2 by mashing.

12. At which stage is chopped food applicable?

A sufficiently soft piece that has been chopped or loosened into small pieces with moderately thick or extremely thick sauce is applicable to Code 3 or 4; however, this does not correspond to Code 2−2. Code 3 is chopped material that can be crushed with the tongue and palate, whereas in Code 4, it can be crushed between the upper and lower alveolar ridges. If the chopped food is too hard to be crushed between the upper and lower alveolar ridges or if the degree of thickening is too thin, it is not suitable as a dysphagia diet.

The names “chopping” and “blended” are cooking techniques. This should be determined by the texture of the finished product.

13. Can Code 4 be divided into two meals, one that is mainly for dysphagia and the other that is for masticatory dysfunction?

Since Code 4 is premised on processing in the oral cavity, it is not necessary to classify it into two, as it is expected that the increase in classifications will make it complicated, thus causing confusion in practice. A meal that considers the deterioration of masticatory function is suitable for the swallowing ability of a person applicable to Code 4. Therefore, it is appropriate to leave it as is and not be divided into two.

14. Is it better for the liquid to be thicker?

If the degree of thickening is high, the taste may deteriorate and be disliked, thus decreasing the total intake. In addition, depending on the type of thickening agent, it may become sticky and difficult to swallow. The appropriate degree of thickening should be selected for the case.

In addition, thickening of the soup during meals is often necessary until a later stage of functional recovery, but drinking water between meals may not be thickened earlier [16].

Even for people who cannot eat thickened soup safely, a small amount of thickened water for taking medicines, which is indispensable for oral intake, may be permitted because there are few nutritional components that can cause pneumonia when aspirated.

15. Can "very mildly thick" be added to the stages of thickened liquid?

Based on the current three stages of thickened liquid, there may be cases where a milder thickening concentration is set at each facility. However, for example, even thickened water, which is said to be "very mildly thick" is often included in the current three stages (in this case, mildly thick) when measured by the LST method. As the number of stages increases, it becomes more complicated, thus causing confusion in practice. Therefore, the committee would like to continue using the current three stages and recommends that the operation be specified in each facility when it is necessary to stipulate a milder concentration.

16. How can the thickness of milk, concentrated liquid foods, and enteral nutritional supplements be evaluated?

The degree of thickening can be evaluated by the properties during drinking and observing. However, evaluation during drinking is easily affected by the taste and ingredients. (Please check this together with the evaluation when you observe this.) In addition, the syringe method newly adopted in the JDD2021 is an evaluation method that is not easily affected by the type of beverage. If it is mildly thick, it is also recommended to check the residual amount using the same method. When thickening these beverages with thickening agents, it takes time to achieve stable thickening, and the property is different from that of other beverages. Ensure that the thickness at the time of drinking is evaluated.

"The Japanese Dysphagia Diet of 2021 by the Japanese Society of Dysphagia Rehabilitation" consists of the above text and two quick reference tables (attached sheet).

References

1. The Dysphagia Diet Committee of the Japanese Society of Dysphagia Rehabilitation. The Japanese Dysphagia Diet 2013. Jpn J Dysphagia Rehabil 2013; 17: 255–67. Japanese.
2. Matsuo K, Fujishima I. Textural changes by mastication and proper food texture for patients with oropharyngeal dysphagia. Nutrients 2020; 12: 1613.
3. The Dysphagia Diet Committee of the Japanese Society of Dysphagia Rehabilitation. The Japanese Dysphagia Diet 2021. Jpn J Dysphagia Rehabil 2021; 25: 135–49. Japanese.
4. National Dysphagia Diet Task Force. National dysphagia diet, standardization for optimal care. Chicago: American Dietetic Association; 2002.
5. The Medical Review Committee of the Japanese Society of Dysphagia Rehabilitation. The dysphagia diet classification 2018 for children (persons) with dysphagia during the developmental stage. J Dysphagia Rehabil 2018; 22: 59–73. Japanese.
6. Yamagata Y, Itadani R, Ikarashi S, Kayashita A, Niu K, Hikino Y, et al. Evaluation of classification of universal design foods corresponding to the code of Japanese dysphagia diet 2013 by the JSDR Dysphagia Diet Committee. J Dysphagia Rehabil 2021; 25: 81–9. Japanese.
7. Ministry of Health, Labour and Welfare. Support guidance for breastfeeding and weaning: Weaning section; 2019. Available from: https://www.mhlw.go.jp/content/11908000/000496257.pdf (cited 2021 November 29). Japanese.
8. Watanabe E, Yamagata Y, Fujitani J, Fujishima I, Takahashi K, Uyama R, et al. The criteria of thickened liquid for dysphagia management in Japan. Dysphagia 2017; 33: 26–32.
9. Sato M, Yamagata Y, Kayashita J. Study of syringe test as a simple evaluation method for thickened liquid. J Dysphagia Rehabil 2021; 25: 102–3. Japanese.
10. Murray J, Miller M, Doeltgen S, Scholten I. Intake of thickened liquids by hospitalized adults with dysphagia after stroke. Int J Speech Lang Pathol 2014; 16: 486–94.
11. Carlaw C, Finlayson H, Beggs K, Visser T, Marcoux C, Coney D, et al. Outcomes of a pilot water protocol project in a rehabilitation setting. Dysphagia 2012; 27: 297–306.
12. Consumer Affairs Agency. Labeling permission criteria for foods for special purposes; 2019. Available from: https://www.caa.go.jp/policies/policy/food_labeling/foods_for_special_dietary_uses/assets/food_labeling_cms206_20210329_01.pdf (cited 2021 November 29). Japanese.
13. Tomita T, Goto H, Sumiya K, Yoshida T, Tanaka K, Kudo K, et al. Effect of food thickener on the inhibitory effect of mitiglinide tablets on post-prandial elevation of blood glucose levels. Dysphagia 2017; 32: 449–53.
14. Showa University School of Pharmacy Division of Pharmaceutics. Simple suspension method. Available from: http://www10.showa-u.ac.jp/~biopharm/kurata/kendaku/index.html (cited 2021 November 29). Japanese.
15. Kayashita J, Fujishima I. Dysphagia diet based on JDD2013. 300 of commercially available foods. Tokyo: Ishiyaku Publishers Inc; 2015. p. 35–6. Japanese.
16. Fukuyama S, Shigematsu T, Kunieda K, Ishigaki R,

Hojo K, Tanaka N, et al. Development of Liquid Intake Protocol (LIP) for dysphagia patients taking thickened liquid: Method, safety and efficacy. deglutition 2018; 7: 211−5.