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International Dysphagia Diet Standardisation Initiative
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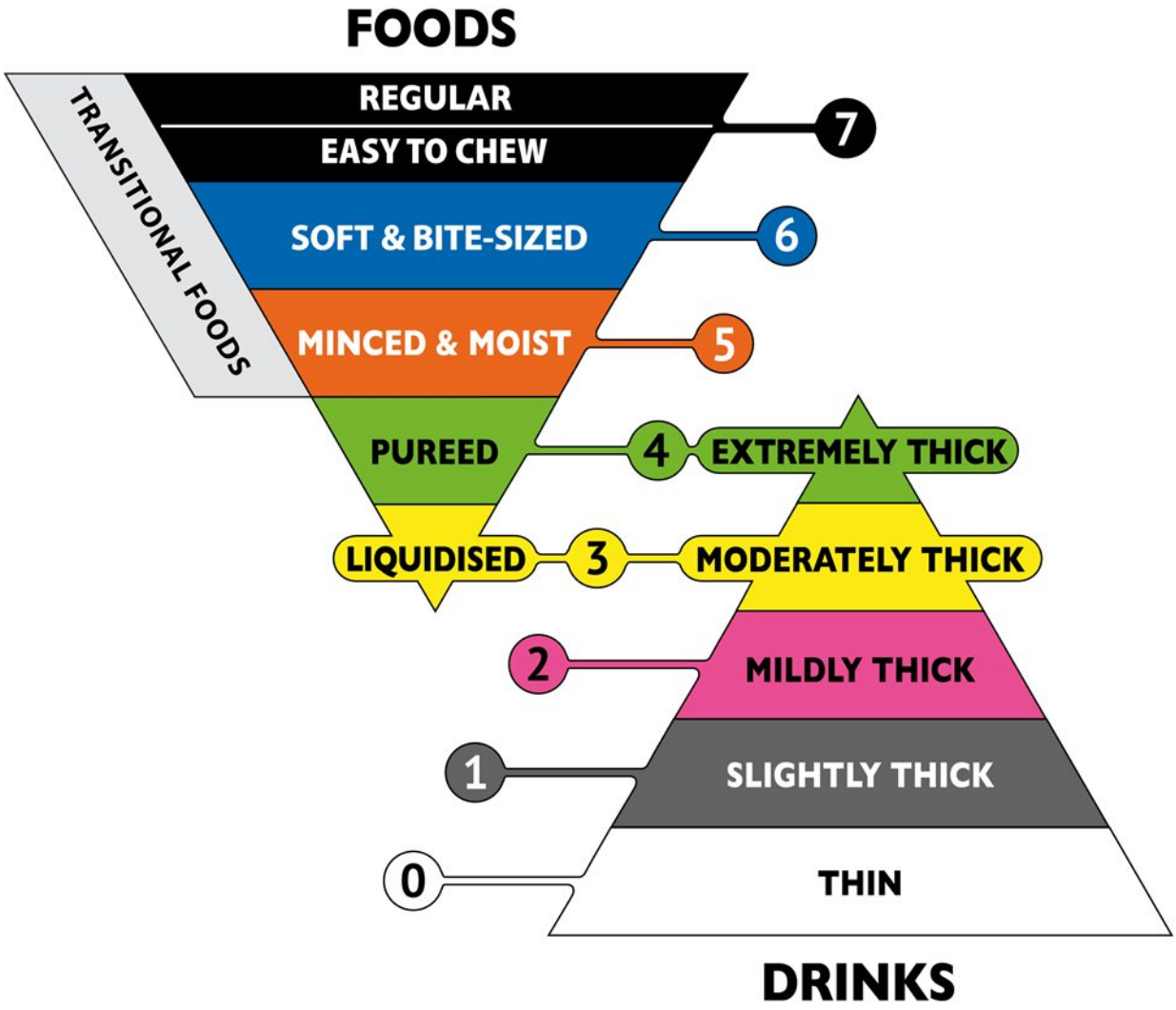


IDDSI Framework Testing Methods 2.0 | 2019

IDDSI 2.0 |July 2019

INTRODUCTION

The International Dysphagia Diet Standardisation Initiative (IDDSI) was founded in 2013 with the goal of developing new international standardised terminology and definitions to describe texture modified foods and thickened liquids used for individuals with dysphagia of all ages, in all care settings, and all cultures.

Three years of work by the International Dysphagia Diet Standardisation Committee culminated in the 2016 release and 2017 publication of the IDDSI Framework consisting of a continuum of 8 levels (0-7) Levels are identified by numbers, text labels and colour codes. [*Reference:* Cichero JAY, Lam P, Steele CM, Hanson B, Chen J, Dantas RO, Duivestein J, Kayashita J, Lecko C, Murray J, Pillay M, Riquelme L, Stanschus S. (2017) Development of international terminology and definitions for texture-modified foods and thickened fluids used in dysphagia management: The IDDSI Framework. *Dysphagia*, 32:293-314. https://link.springer.com/article/10.1007/s00455-016-9758-y]

The IDDSI Framework Testing Methods 2019 is an update to the 2016 document and provides details regarding Testing Methods for use with the IDDSI Framework.

This document is to be read in conjunction with the Complete IDDSI Framework 2019, IDDSI Evidence 2016 and IDDSI Frequently Asked Questions (FAQs) documents (https://iddsi.org/framework/).

The IDDSI Framework provides a common terminology to describe food textures and drink thickness. IDDSI tests are intended to confirm the flow or textural characteristics of a particular product at the time of testing. Testing should be done on foods and drinks under the *intended serving conditions* (especially temperature). The clinician has the responsibility to make recommendations for foods or drinks for a particular patient based on their comprehensive clinical assessment.

IDDSI would like to acknowledge the interest and participation of the global community including patients, caregivers, health professionals, industry, professional associations and researchers. We would also like to thank our sponsors for their generous support.

Please visit https://iddsi.org/ for further information.

The IDDSI Board:

The IDDSI Board are a group of volunteers who do not draw a salary from IDDSI. They offer their knowledge, expertise and time for the benefit of the international community.

The International Dysphagia Diet Standardisation Initiative Inc. (IDDSI) is independent and operates as a not-for-profit entity. IDDSI is grateful to a large number of agencies, organizations and industry partners for financial and other support. Sponsors have not been involved with the design or development of the IDDSI framework.

Implementation of the IDDSI framework is in progress. IDDSI is extremely grateful to all sponsors supporting implementation https://iddsi.org/about-us/sponsors/

Testing Methods for use with the IDDSI Framework

The IDDSI systematic review suggested that liquids and food should be classified in the context of the physiological processes involved in oral processing, oral transport and flow initiation (Steele et al., 2015). To this end, different devices are needed to best describe the behaviour of the bolus.

Drinks and other liquids

Accurate measurement of fluid flow properties is a complex task. To date, both research and existing national terminologies, have studied or recommended the classification of drinks based on viscosity. However, viscosity measurement is not accessible to most clinicians or caregivers.

Furthermore, viscosity is not the only relevant parameter: the flow of a drink as it is consumed is influenced by many other variables including density, yield stress, temperature, propulsion pressure and fat content (O'Leary et al., 2010; Sopade et al., 2007, Sopade et al., 2008a,b; Hadde et al.2015a,b). The systematic review demonstrated wide variability in testing techniques used and found that other key parameters such as shear rates, sample temperature, density and yield stress were rarely reported (Steele et al., 2015; Cichero et al., 2013). Drinks thickened with different thickening agents may have the same measurement of apparent viscosity at one particular shear rate, and yet have very different flow characteristics in practice (Steele et al. 2015; O'Leary et al.,2010; Funami et al., 2012; Ashida et al., 2007; Garcia et al., 2005). In addition to variations in flow associated with drink characteristics, flow rates during swallowing are expected to differ depending on a person's age and level of impairment of swallowing function (O'Leary et al., 2010).

For these reasons, a measurement of viscosity has *not* been included in the IDDSI descriptors. Instead, a gravity flow test using a 10 mL slip tip syringe is recommended to quantify the liquid's flow category (sample remaining from 10 mL after 10 sec of flow). The controlled conditions are broadly representative of the way a liquid moves when swallowed, such as flow through a syringe or funnel.

The IDDSI Flow test is also similar in design and measurement principles to the Posthumus Funnel that is used in the dairy industry to measure liquid thickness (van Vliet, 2002; Kutter et al., 2011). In fact the Posthumus funnel looks like a large syringe (van Vliet, 2002; Kutter et al., 2011). Measures taken using the Posthumus funnel include the time for a specified amount of sample to flow, and mass left after a defined period of flow. Van Vliet (2002) notes that the geometry of the Posthumus funnel contains a shear and elongation component that more closely matches flow conditions within the oral cavity (Hanson et al., 2019).

Although the syringe chosen for use with the IDDSI Flow test is simple, the test has been found to categorise a wide range of liquids reliably, and in agreement with currently existing laboratory tests and expert judgement (Hanson et al., 2019). It has also been found to be sensitive enough to demonstrate small changes in thickness associated with change in serving temperature.

IDDSI Flow Test

The IDDSI Flow test uses a 10 mL slip tip hypodermic syringe, as shown in the image below.

Although 10 mL syringes were initially thought to be identical throughout the world based on reference to an ISO standard (ISO 7886-1), it has subsequently been determined that the ISO document refers only to the nozzle of the syringe and that variability in barrel length and dimensions may exist between brands. Specifically, the IDDSI Flow test uses a reference syringe with a measured length of 61.5 mm from the zero line to the 10 mL line (BD™ syringes were used for the development of the tests – manufacturer code North America 303134, Australia 302143). IDDSI is aware that there are some syringes that are labeled as 10 mL but have different dimensions or in fact have a 12 mL capacity. Using a syringe of different dimensions to that described here or a 12 mL syringe will give results that cannot reliably be used with the IDDSI Framework. As a result, it is important to check the barrel length as shown on the diagram on page 5. Details for conducting the test are shown below. In the near future funnels that have been specifically designed for IDDSI testing may be available.

Videos showing the IDDSI Flow Test can also be viewed at: https://iddsi.org/framework/drink-testing-methods/

Testing tips:

- When using commercial thickener products, follow the manufacturer's instructions and mix thoroughly, watching closely that there are no lumps or air bubbles present. Be sure to allow the recommended time for the fluid to thicken completely.
- Use a clean, dry syringe of the correct type each time you test.
- Check the nozzle of the syringe is completely clear and free from any plastic residue or manufacturing defects that may occasionally occur.
- Test twice or more to ensure more reliable results.
- Check for lumps – especially if flow suddenly stops. In this case the fluid may not be suitable for dysphagia use.
- Ensure to test the liquid at the ***intended serving temperature***

NOTE:

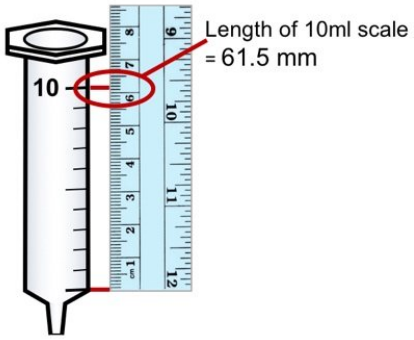
Drinks and liquids such as gravy, sauces and nutritional supplements are best assessed using the IDDSI Flow Test (Levels 0-3). Note that all products should be thoroughly stirred as non-homogenous liquids may give inconsistent results. Foams found in carbonated drinks may appear thick on the flow test as they are less liable to flow under their own weight, as their density is lower. Foams may also be unstable over time and release thinner liquids as the carbonated bubbles burst.

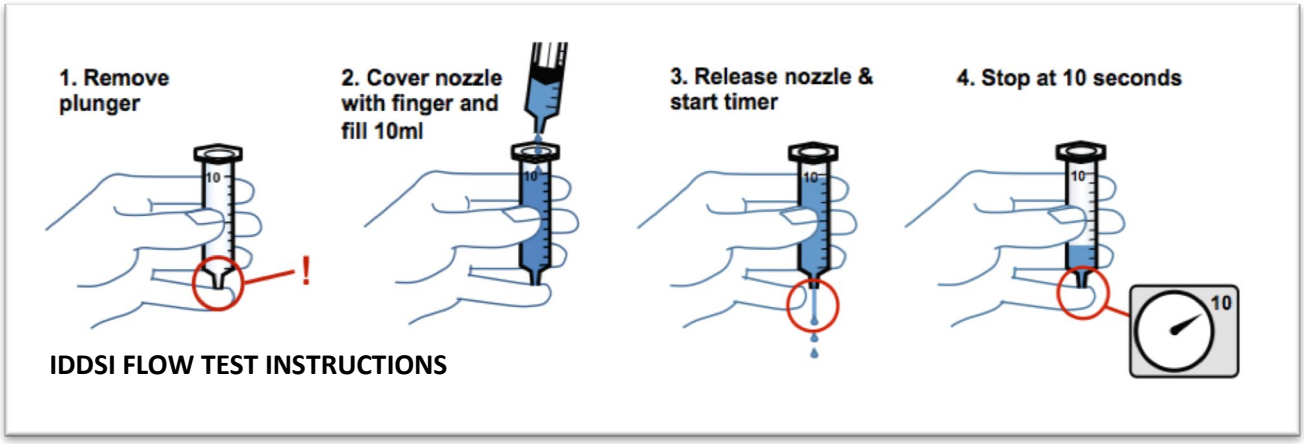
For extremely thick drinks (Level 4), that do not flow through a 10 mL syringe in 10 seconds and are best consumed with a spoon, the IDDSI Fork Drip Test and/or Spoon Tilt Test are recommended as methods for determining consistency.

THE IDDSI Flow Test is used to classify liquid thickness

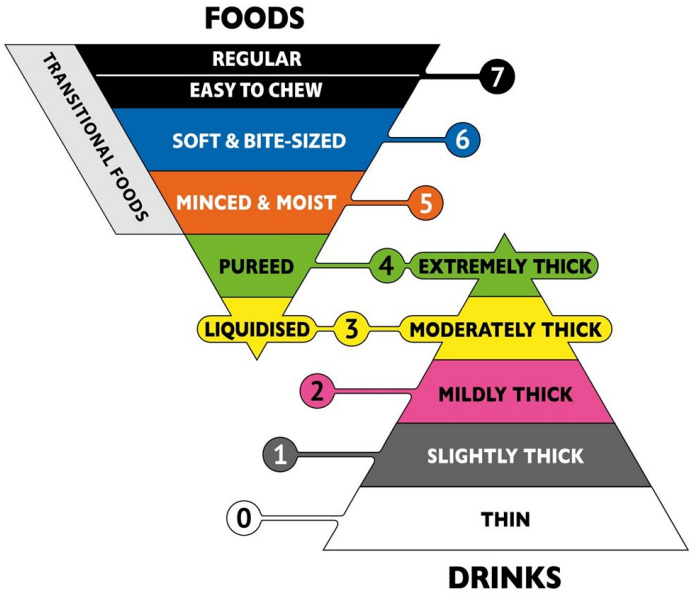
IDDSI uses an objective measurement tool for liquid thickness, 10 mL syringe. In the near future funnels that have been specifically designed for IDDSI testing may be available.

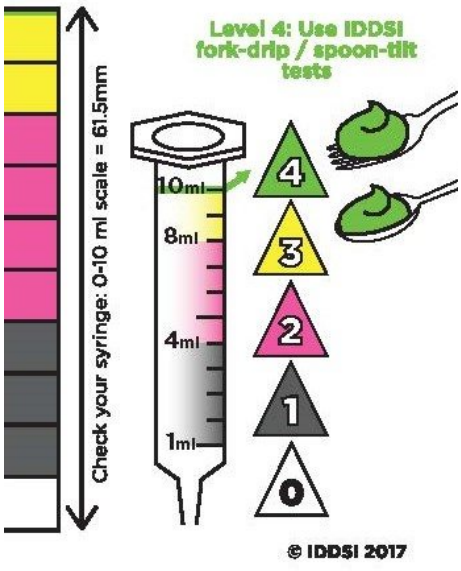
#Before you test…
You *must check* your syringe length because there are differences in syringe lengths. Your syringe should look like this





NOTE: Before use, check the nozzle is clear and free from any plastic residue or manufacturing defects that very occasionally occur.





Foods

Research to date in the area of food texture measurement requires complex and expensive machinery such as Food Texture Analysers. Given the difficulty with access to such equipment and the expertise required for testing and interpretation, many existing national terminologies have used detailed descriptors to describe food texture instead.

The systematic review demonstrated that the properties of hardness, cohesiveness and slipperiness were important factors for consideration (Steele et al., 2015). In addition, size and shape of food samples have been identified as relevant factors for choking risk (Kennedy et al., 2014; Chapin et al., 2013; Japanese Food Safety Commission, 2010; Morley et al., 2004; Mu et al., 1991; Berzlanovich et al. 1999; Wolach et al., 1994; Centre for Disease Control and Prevention, 2002, Rimmell et al., 1995; Seidel et al., 2002).

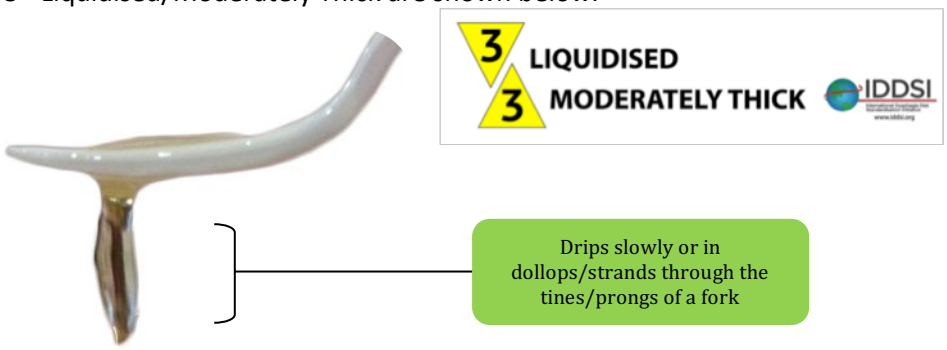
In view of this information, measurement of foods needs to capture both the mechanical properties (e.g. hardness, cohesiveness, adhesiveness etc.) and the geometrical or shape attributes of the food. The IDDSI descriptions of food texture and characteristics, food texture requirements and restrictions have been generated from existing national terminologies and the literature describing properties that increase risk for choking.

IDDSI provides testing methods that use forks and spoons to minimize the need for subjectivity that often accompanies description based methods. Forks and spoons were chosen as they are inexpensive, easily accessible and available in most food preparation and dining environments. A combination of tests may be required to determine which level a food fits into. Testing methods for purees, soft, firm and solid foods include: The Fork Drip test, Spoon Tilt test, Fork or Spoon Pressure Test, Chopstick Test and Finger test. Videos showing examples of these testing methods can be found at:
https://iddsi.org/framework/food-testing-methods/

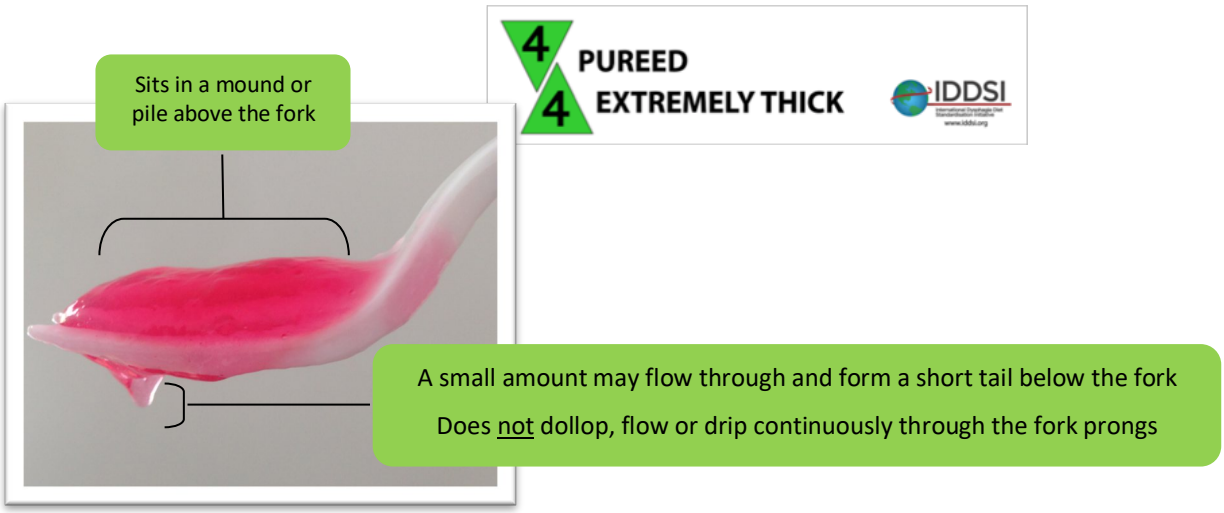
Fork Drip Test

Thick drinks and fluid foods (Levels 3 and 4) can be tested by assessing whether they flow through the tines/prongs of a fork and comparing against the detailed descriptions of each level. Fork drip tests are described in existing National terminologies in Australia, Ireland, New Zealand and the United Kingdom (Atherton et al., 2007; IASLT and Irish Nutrition & Dietetic Institute 2009; National Patient Safety Agency, Royal College Speech & Language Therapists, British Dietetic Association, National Nurses Nutrition Group, Hospital Caterers Association 2011).

Images for Level 3 - Liquidised/Moderately Thick are shown below.



Images for Level 4 - Pureed/Extremely Thick are shown below.

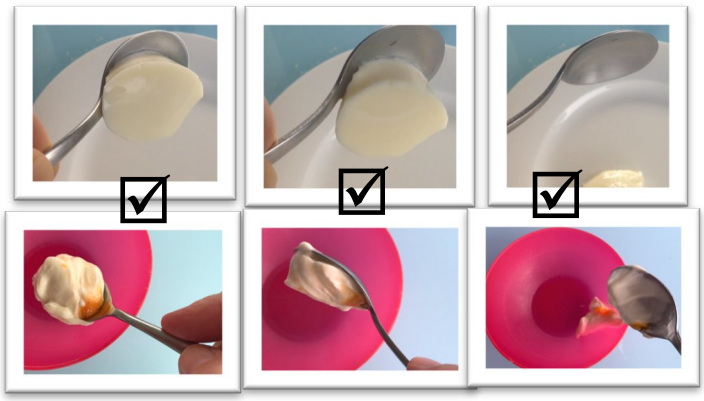


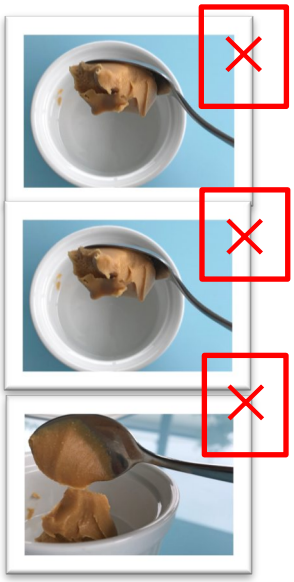
Spoon Tilt Test

The spoon tilt test is used to determine the stickiness of the sample (adhesiveness) and the ability of the sample to hold together (cohesiveness). The Spoon Tilt Test is described in existing National terminologies in Australia, Ireland, New Zealand and the United Kingdom (Atherton et al., 2007; IASLT and Irish Nutrition & Dietetic Institute 2009; National Patient Safety Agency, Royal College Speech & Language Therapists, British Dietetic Association, National Nurses Nutrition Group, Hospital Caterers Association 2011).

The Spoon Tilt Test is used predominantly for measures of samples in levels 4 and 5. The sample should:

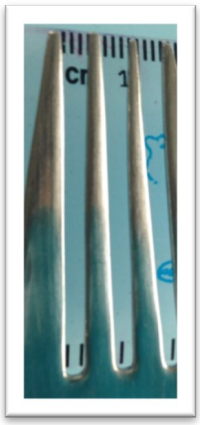
- Be cohesive enough to hold its shape on the spoon
- A full spoonful must plop off the spoon if the spoon is titled or turned sideways; a very gentle flick (using only fingers and wrist) may be necessary to dislodge the sample from the spoon, but the sample should slide off easily with very little food left on the spoon. A thin film remaining on the spoon after the Spoon Tilt Test is acceptable, however, you should still be able to see the spoon through the thin film; i.e. the sample should not be firm and sticky
- A scooped mound may spread or slump very slightly on a plate





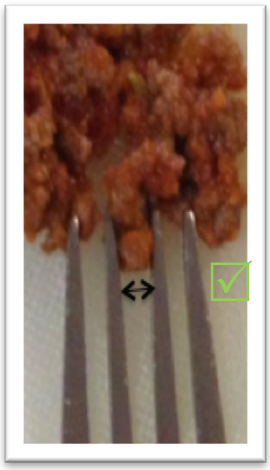
Soft, firm and hard food texture assessment

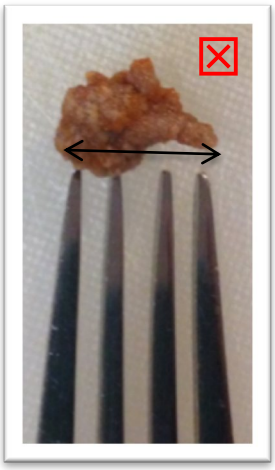
For soft, hard or firm food, the fork has been chosen to assess food texture as it can uniquely be used for assessment of mechanical properties associated with hardness, in addition to assessment of shape attributes such as particle size.



Assessing for 4mm particle size compliance

For adults, the average particle size of chewed solids foods before swallowing measures 2-4 mm (Peyron et al., 2004; Woda et al., 2010). The slots/gaps between the tines/prongs of a standard metal fork typically measure 4 mm, which provides a useful compliance measure for particle size of foods at Level 5 Minced & Moist. For determining particle size safety for infants, samples that are smaller than the maximum width of the child's fifth fingernail (littlest finger) should not cause a choking risk as this measurement is used to predict the internal diameter of an endotracheal tube in the paediatric population (Turkistani et al., 2009).

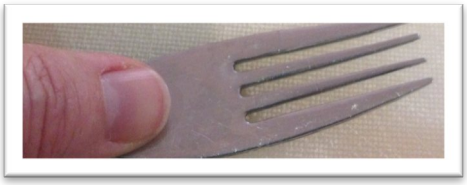




Compliance with 4mm particle size can be demonstrated with a fork as shown in the images opposite.

Assessing for 15mm (1.5cm) particle size compliance

For hard and soft solid foods, a maximum food sample size of 1.5 x 1.5 cm is recommended, which is the approximate size of the adult human thumb nail (Murdan, 2011). The entire width of a standard fork also measures approximately 1.5cm as shown in the images below. 1.5 x 1.5 cm particle size is recommended for Level 6 - Soft & Bite-sized to reduce risk associated with asphyxiation from choking on food (Berzlanovich et al., 2005; Bordsky et al., 1996; Litman et al., 2003).



Fork Pressure Test and Spoon Pressure Test

A fork can be applied to the food sample to observe its behaviour when pressure is applied. Pressure applied to the food sample has been quantified by assessment of the pressure needed to make the thumb nail blanch noticeably to white, as demonstrated by the arrows in the image at left.

The pressure applied to make the thumb nail blanch has been measured at ~ 17 kPa. This pressure is consistent with tongue force used during swallowing (Steele et al., 2014). In the image at right, pressure is being demonstrated in kilopascals using an Iowa Oral Performance Instrument. This is one device that can be used to measure tongue pressure.

Image used with permission by IOPI Medical

For assessment using the Fork Pressure Test, it is recommended that the fork be pressed onto the food sample by placing the thumb onto the bowl of the fork (just above the prongs) until blanching is observed, as shown in the image at left. It is appreciated that forks are not used/readily available in some parts of the world. Pressure applied using the base of a teaspoon may provide a useful alternative.

Chopstick Test and Finger test

Assessment with chopsticks has been included in the IDDSI. Finger tests have been incorporated in recognition that this may be the most accessible method in some countries.

Fork/Spoon Separation Test

Must be able to break food apart easily with the side of a fork or spoon

Transitional food texture assessment

Transitional food textures are those that start as one texture (e.g. firm solid) and change into another texture specifically when moisture (e.g. water or saliva) is applied, or when a change in temperature occurs (e.g. heating). This food texture is used in developmental teaching or rehabilitation of chewing skills. For example it has been used in the development of chewing in the paediatric population and developmental disability population (Gisel 1991; Dovey et al., 2013).

To assess whether a sample fits the definition of a transitional food, the following method is applied:

Use a sample the size of the thumb nail (1.5 cm x 1.5 cm), and place 1 ml of water on the sample and wait one minute. Apply fork pressure using the base of the fork until the thumbnail blanches to white. The sample is a transitional food texture if after removing the fork pressure:

- The sample has been squashed and disintegrated and no longer looks like its original state when the fork is lifted
- The sample can be easily broken apart using chopsticks with minimal pressure.
- The sample breaks apart completely by rubbing the sample between the thumb and index finger and does not return to its initial shape.
- Or it has melted significantly and no longer looks like its original state (e.g. ice chips).

TRANSITIONAL FOODS

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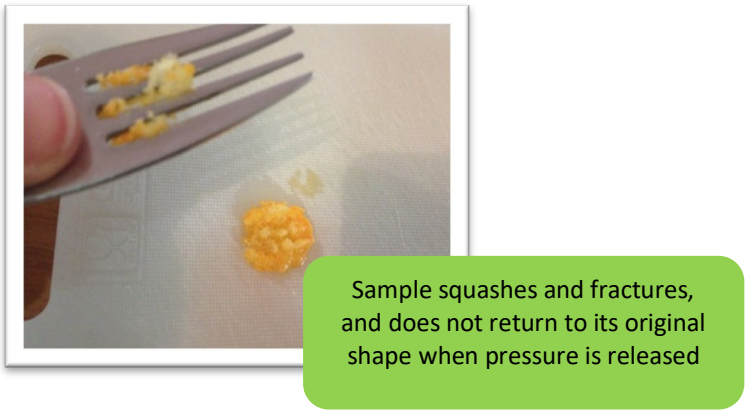
- Apply 1 ml of water to sample
- Wait 1 minute



*Accompanying documents (https://iddsi.org/framework/)

- IDDSI Detailed Definitions
- IDDSI Evidence
- IDDSI Frequently Asked Questions (FAQs)

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- Flavour Creations (2013-2015)
- Simply Thick (2015)
- Lyons (2015)