

NUTRITIONAL GUIDE FOR LIPODYSTROPHY



Thyroid and Metabolic Diseases Unit
University of Santiago de Compostela



- María González-Rodríguez
- Antía Fernández-Pombo
- Sofía Sánchez-Iglesias
- David Araújo-Vilar



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Authors: María González-Rodríguez, Antía Fernández-Pombo, Sofía Sánchez-Iglesias, David Araújo-Vilar.

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María González-Rodríguez has a degree in Human Nutrition, Dietetics and Food Science and Technology and a PhD from the University of Santiago de Compostela (USC). She is a member of the Thyroid and Metabolic Diseases Unit at USC Centre for Research in Molecular Medicine and Chronic Diseases (CiMUS).

Antía Fernández-Pombo is a consultant in Endocrinology and Nutrition at the University Clinical Hospital of Santiago de Compostela, and a pre-doctoral research fellow within the Thyroid and Metabolic Diseases Unit at USC Centre for Research in Molecular Medicine and Chronic Diseases (CiMUS).

Sofía Sánchez-Iglesias has a degree in Biochemistry from the University of Geneva, Switzerland, as well as a PhD from USC. She is the Laboratory Manager within the Thyroid and Metabolic Diseases Unit at USC Centre for Research in Molecular Medicine and Chronic Diseases (CiMUS).

David Araújo-Vilar is an Associate Professor of Medicine at USC and a senior consultant in Endocrinology and Nutrition in the University Clinical Hospital of Santiago de Compostela. He is also the Head of the Lipodystrophy Unit within the Thyroid and Metabolic Diseases Unit at USC Centre for Research in Molecular Medicine and Chronic Diseases (CiMUS).

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1.- INTRODUCTION

Lipodystrophies are a heterogeneous group of disorders which are characterised by fat loss and are diagnosed after, first of all, discarding possible nutritional deprivation and weight loss due to other causes. They can be generalised, if the loss of fat affects the whole body, or partial, if only certain parts are affected. It is also possible, in the latter case, for there to be an abnormal accumulation of fat in other areas.

With the exception of the lipodystrophy caused by infection with the human immunodeficiency virus (HIV), lipodystrophies are extremely infrequent conditions. However, they bring serious consequences for patients, both in terms of the distress caused with regard to their physical appearance and for the **serious complications which may occur** (see Table 1). Fat loss frequently results in a fall in leptin levels, which interferes with hunger and fullness cues and often leads to an excessive increase in appetite sensation and, as a consequence, to uncontrolled food intake, which is known as hyperphagia. This excess of calories is stored as fat in the liver and skeletal and cardiac muscle, resulting in insulin resistance (and the subsequent development of diabetes mellitus) and an increase in triglyceride levels or the presence of a fatty liver.

Table 1. Main complications associated with lipodystrophy.

- Hypertriglyceridemia
- Diabetes Mellitus
- Fatty liver disease
- Cardiovascular disease
- Acute pancreatitis
- Kidney disease
- Alterations in reproductive function



There is currently no cure for lipodystrophy. However, the morbidity and mortality of these conditions improve with **early intervention** and, therefore, their treatment must be fundamentally oriented towards the control of the afore-mentioned anomalies. In this regard, **the cornerstone of therapy directed at these complications is diet, which, along with physical exercise, is an integral part of this treatment plan.**

This guide aims to be a useful tool which, from a practical point of view, advises patients and their families on observing an appropriate diet, one which is adapted to the comorbidities associated to lipodystrophy and is in accordance with the eating habits and culinary traditions of different countries. However, it should be remembered that there is no data from clinical trials and that there are very few studies on dietary intervention in lipodystrophy. Therefore, these recommendations are based on clinical experience and we advise that they should be taken with caution and always following the recommendations of the patient's medical team.

2.- GENERAL DIETARY GUIDELINES

Below are a series of recommendations which may help to prevent or delay the appearance of metabolic complications:

- 1. Eliminate all types of alcoholic drinks**, as they increase the levels of triglycerides in the blood and can bring on the appearance of acute pancreatitis.
- 2. Use simple cooking techniques** which do not require a lot of oil: steaming, boiling, grill, oven, microwave and pressure cooking.
- 3. Restrict foods which are rich in simple carbohydrates** (table sugar, honey, sweet drinks, juices, etc.). Rather, preference should be given to foods rich in complex carbohydrates (wholegrain cereals, legumes, greens, etc.), which should be distributed in a balanced and proportionate way throughout the day in different meals. Avoid the consumption of cakes, industrial bakery products, desserts, and of creamy ice-creams (which are rich in simple sugars and saturated fats).
- 4. Increase the intake of foods rich in fibre**, such as vegetables



(2 portions per day, preferably one of them raw) and fruit (3 portions per day, preferably raw and unpeeled if possible), wholegrain cereals, flours and legumes.

5. Attempt **not to consume fats in excess**, particularly **avoiding saturated fats** (fatty meats, full-fat dairy products, cheeses, baked products, pre-cooked food, coconut and palm oil, etc.). Give preference to foods which are rich in unsaturated fats, particularly omega-3 fatty acids (seed oils, walnuts, blue fish, etc.).

6. Select **lean meats** (breast, sirloin, tenderloin, etc.), remove the skin from poultry and any visible fat. Avoid meats with more fat (Lamb, other cuts of pork and beef, such as ribs, offal and cold cuts).

7. Eat **fish more frequently** than meat (a minimum of 4 times per week), particularly blue fish (salmon, mackerel, sardine, anchovy, etc.), which have a high amount of omega-3 fatty acids.

8. Omega-3 fatty acids can also be obtained from foods such as walnuts, chia, flax and pumpkin seeds, flax oil, soybean oil, canola oil, chickpeas, spinach, and mussels.

9. As far as possible, eat foods which are **unprocessed, fresh and in season**.

Food labelling

Food labelling provides information regarding the ingredients and their quality and nutritional value. Therefore, it is recommended that the labels be consulted.

The nutritional information is stated per 100 g or 100 ml of the product in question, although the calculation of nutrients per portion of normal consumption is occasionally shown. Therefore, by consulting the label, it is possible to know the energetic value of the food, the total amount of fat (and the amount of saturated fat), the amount of carbohydrates, the amount of proteins and salt.

It is also important to read the list of ingredients, taking special care with oils as a product containing olive oil (rich in unsaturated fats) is not the same as one containing vegetable oils (rich in saturated fats). Therefore, if the label mentions the presence of “**vegetable oils/fats**” or “**hydrogenated or partially**



hydrogenated oils/fats", it means that the food in question contains "trans" fats, which increase cholesterol and, therefore, **should be avoided**.

Figure 1. Example of labelling and the information it provides.

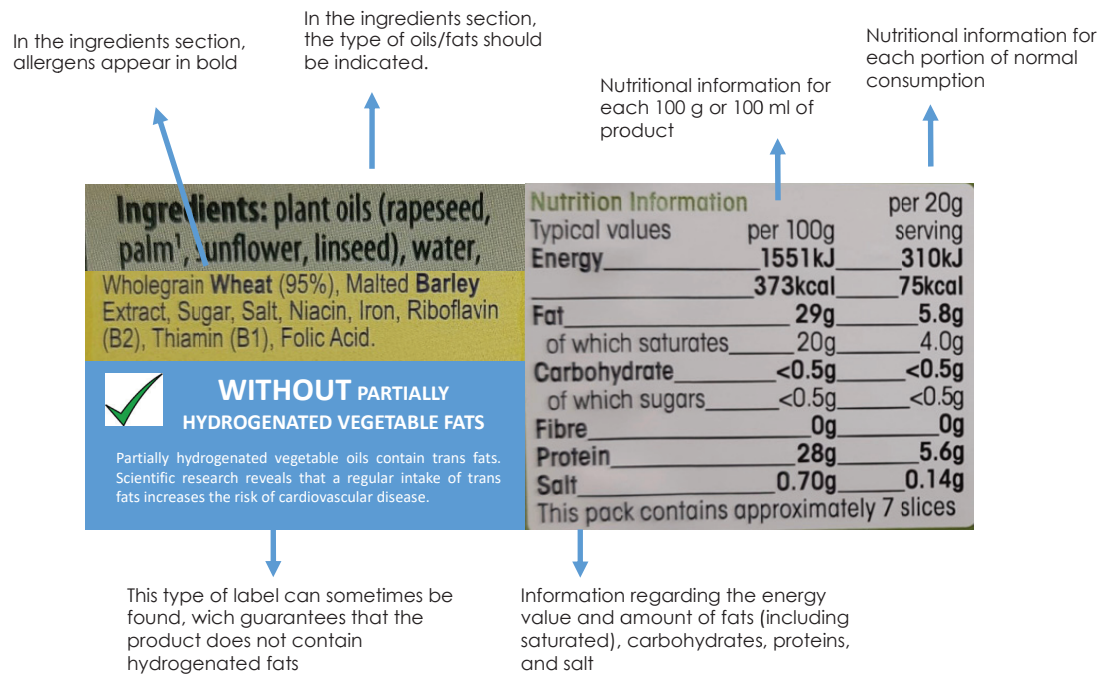
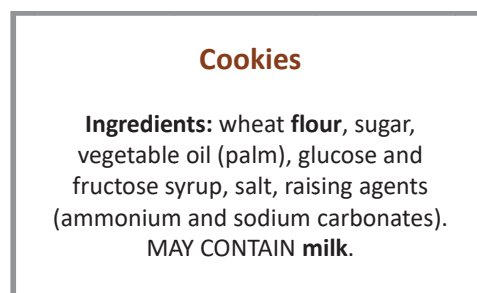


Figure 2. Example of the label of a box of biscuits which contain vegetable oils.



It is necessary to avoid foods which are made with vegetable oils as these are normally coconut and/or palm oil, which are saturated, or "trans" fat and, therefore, are not beneficial from the cardiometabolic point of view.



Use of sweeteners

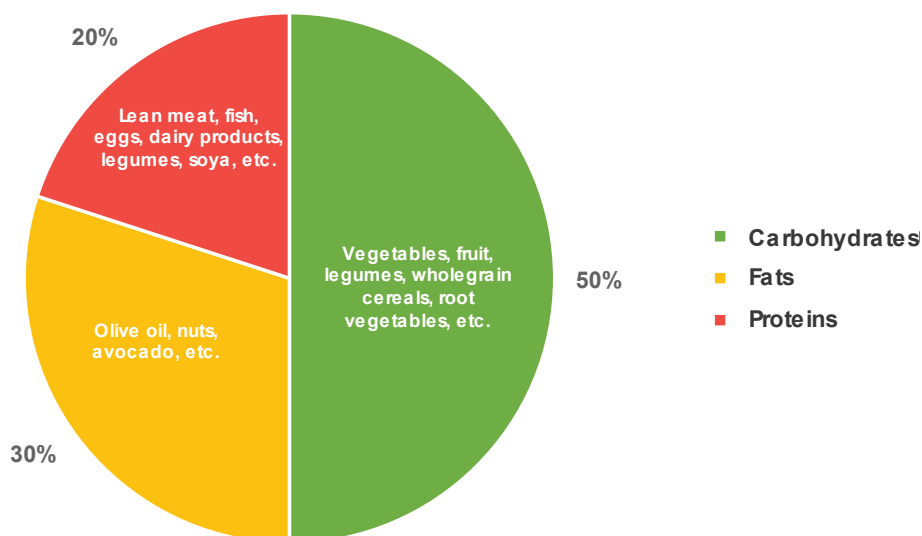
If some kind of sweetener is desired, non-caloric sweeteners may be used as they do not contain calories and, therefore, do not alter the levels of blood glucose. Some examples are: saccharin (E-954), sucralose (E-955), sodium cyclamate (E-952), aspartame (E-951), acesulfame K (E-950), steviol glycoside (E-960, "stevia").

Caloric sweeteners must be avoided, given that they contain calories and transform into glucose in the body. Some examples are: sucrose (table sugar), honey, fructose, corn syrup, inverted sugar, agave syrup, panela, glucose, dextrose, lactose, maltose and polyols (sorbitol E-420, xylitol E-967, mannitol E-421, isomalt E-953, maltitol E-965, lactitol E-966).

Distribution of macronutrients in the diet

Most patients should follow a diet with a balanced distribution of macronutrients (see Figure 3), taking into account that this may vary depending on the metabolic complications of the individual.

Figure 3. Distribution of macronutrients in the diet.





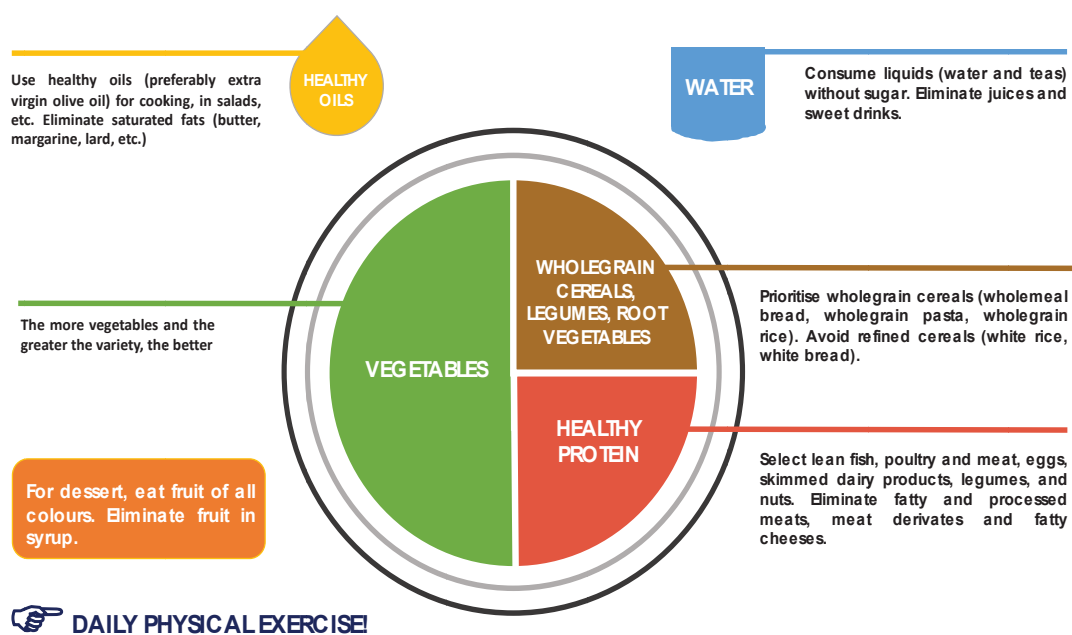
Low-calorie diets help to improve metabolic anomalies and can be suitable for adults.

When there are special dietary needs, particularly in the case of babies and small children, the patient's medical team must be consulted.

How to plan healthy meals

One simple method for creating healthy meals and planning balanced meals is shown in Figure 4. In this way, there is no need to weigh the food or to count its calories. It is only necessary to use the plate in the image as a guide for calculating the amount of each of the foods to be eaten.

Figure 4. The plate method for healthy eating.



Version of the *Healthy Eating Plate*, University of Harvard. For more information, please visit the Nutrition Source, Department of Nutrition, Harvard School of Public Health, <http://www.thenutritionsource.org> and Harvard Health Publications, health.harvard.edu.



3. HOW TO TACKLE HYPERPHAGIA

Hyperphagia is defined as the uncontrolled intake of food due to an excessive increase in the sensation of appetite. Thus, patients with lipodystrophy, particularly the generalised forms, are typically hyperphagic due to leptin deficiency, which, when appetite is stimulated, leads to the massive consumption of food. Hypocaloric diets (those which are low in energy) achieve a reduction in the peripheral accumulation of fat and improve metabolic complications by reducing the levels of triglycerides and glucose. However, it is difficult to maintain this restriction over a long period of time. Furthermore, in the case of teenagers and children, there is the additional challenge of ensuring a correct rate of growth and development.

Therefore, below is a list of strategies which may help to avoid excessive intake:

1. Avoid distractions when eating (telephone, tablet, television, music, etc.)
2. Attempt to exercise self-control (or, in the case of children, that of the person responsible) regarding the size of the portion on the plate. If a third person is serving, it is probable that bigger portions and/or a greater proportion of foods with greater energetic content will be given.
3. Add vegetables to each meal, as a side or a main dish, thereby increasing the sensation of fullness.
4. Reduce the variety of food available in a meal, unless it is due to the addition of a salad or vegetables.
5. Avoid prolonged fasting, eating little by little throughout the day.
6. Eat slowly and chew. In this way, the fullness signal will be perceived in time.
7. Consider the need to eat a snack in the middle of the night.
8. Some studies have shown that protein-rich diets can increase fullness and diet-induced thermogenesis and decrease hunger. In any case, it should be taken into account that some foods which are rich in protein also contain a high amount of saturated fats and, therefore, it is advisable to consume foods rich in protein of vegetable and animal origin which are low in fat.



4. DIETARY GUIDELINES FOR CONTROLLING HYPERTRIGLYCERIDEMIA

In addition to the general dietary guidelines mentioned above (particularly as far as alcohol and sugars are concerned), in patients presenting high triglycerides, it is advisable to **reduce fat in the diet as much as possible**. At the same time, it must be guaranteed that the diet is palatable (tasty) and that the patient adheres to it.

In patients with **severe hypertriglyceridemia (>500 mg/dl)**, a balanced diet is recommended with a **low intake of fat (<15% of the total calorific value)**.

The following strategies can help to reduce the amount of fat when cooking without losing flavour:

1. Add herbs and aromatic spices: bay leaf, parsley, thyme, sage, oregano, rosemary, dill, basil, nutmeg, pepper, curry powder, cinnamon, etc.
2. Dress with lemon juice, garlic, and onion.
3. Use culinary techniques which require little oil: steaming, papillote, wok, etc.
4. Use an oil sprayer to dress salads.
5. Use homemade vegetable stock or alcoholic drinks (wine or beer) to make sauces and lend succulence to dishes.

Table 2. List of recommended and prohibited foods for hypertriglyceridemia.

Recommended foods
- Vegetables
- Fruit
- Wholegrain cereals
- Legumes
- Fish (especially blue fish)
- Seed oils
- Nuts



Prohibited foods
- Alcoholic drinks
- Sweet drinks
- Table sugar
- Industrial bakery products
- Full-fat cheeses and dairy products
- Fatty meats and meat derivatives
- Pre-cooked foods

It is extremely important to follow the previously mentioned recommendations in order to attempt to avoid episodes of acute pancreatitis, one of the main causes of which is hypertriglyceridemia.

***An example of 3 menus which are low in saturated fat and rich in omega-3**

MENU N° 1	MENU N° 2	MENU N° 3
Breakfast	Breakfast	Breakfast
1 glass of skimmed milk Wholemeal traditionally-baked bread 1 kiwi	1 skimmed yoghurt Strawberries Whole grain oatmeal	1 orange Wholemeal bread with fromage frais
Mid-morning	Mid-morning	Mid-morning
1 skimmed yoghurt with flax seeds	1 handful of walnuts	1 coffee with almond milk
Lunch	Lunch	Lunch
Wholegrain pasta with mushrooms Garlic chicken Wholemeal bread 1 medium-sized orange	Grilled green asparagus Wholegrain rice with mussels Wholemeal bread 1 pear	Salad of lamb's lettuce and chickpeas Plain tuna Wholemeal bread 1 slice of melon
Afternoon snack	Afternoon snack	Afternoon snack
1 medium-sized banana	Wholemeal bread with tomato	1 soya yoghurt with flax seeds
Dinner	Dinner	Dinner
Oven-baked trout Vegetable stew (potatoes, peas, carrots, green beans) Wholemeal bread 1 skimmed yoghurt	Scrambled eggs with spinach and boiled ham Wholemeal bread Pineapple	Pumpkin, potato, and leek soup Beef sirloin, grilled Wholemeal bread 1 apple



5. DIETARY GUIDELINES FOR CONTROLLING DIABETES

Carbohydrates (CHO) and sugars are responsible for increasing postprandial glycaemia (sugar levels after meals).

Carbohydrates can be classified into 2 groups:

- 1.- Simple: glucose, fructose, lactose, sucrose, and maltose. These rapidly increase postprandial glycaemia and should not provide more than 10% of the daily intake of calories. They are found in soft drinks, milk, yogurts, juices, fruit, etc.
- 2.- Complex: starch. If they are accompanied by fibre and/or fat, they are absorbed more slowly, and glycaemia increases more slowly. They are found in legumes, rice, pasta, potatoes, etc.

It is essential that the person with diabetes also knows the amount of CHO that he/she will consume in each meal. Therefore, it is necessary to control the amount of CHO in each food separately. If treatment with insulin is required, the adjustment of the dose depending on the planned intake of CHO improves metabolic control and quality of life of the patient.

The method of counting CHO may vary from one country to another. In Spain and the United Kingdom, the most commonly used method is that of counting the servings of CHO.

Servings of carbohydrates

One serving of carbohydrates is the amount of a food which contains **10 g of CHO**.

Below we show some examples of foods which contain carbohydrates and the amount which contains one serving of CHO.

Table 3. Examples of carbohydrate servings.

FOOD	AMOUNT
White bread, wholemeal bread, sliced bread, lentils, chickpeas, beans	20g
Rice, pasta, corn flakes, biscuits, flour	15g
Raw potato, boiled potato, fanned sweetcorn	50g
Tomato, lettuce, spinach, chard, broccoli, cauliflower, lamb's lettuce, endives, rocket, courgette, aubergine, wild mushrooms, mushrooms, celery, asparagus, cucumber, radish, pepper	300g
Cabbage, green beans, turnips, leek	
Carrot, beetroot, Brussels sprouts, onion, artichoke	100g
Banana, grapes, cherries, figs, persimmon, cherimoya, nectarine, loquat	50g
Orange, apple, pear, peach, kiwi, tangerine, plum, pomegranate, papaya, pineapple	100g
Strawberry, raspberry, blackberry, gooseberry, melon, grapefruit, watermelon	
Skimmed milk	200ml
Natural yoghurt	250g

It is also important to examine the nutritional information of each food which is bought and consumed. In this way, it is possible to be aware of the total amount of CHO contained in each food and, thus, the number of servings.

Figure 5. Example of the label of a box of biscuits showing the amount of carbohydrates they contain.

Nutrition Information		
Typical Values	per 100g	per biscuit (8.2g)
Energy	2064kJ	169kJ
	493kcal	40kcal
Fat	23g	1.9g
of which saturates	13g	1.1g
Carbohydrate	64g	5.2g
of which sugars	20g	1.6g
Fibre	2.5g	<0.5g
Protein	6.2g	0.5g
Salt	0.3g	0.02g

Each biscuit contains 5.2 g of carbohydrates, which makes half a serving.



The amount and distribution of CHO servings throughout the day will depend on treatment, lifestyle and the needs, tastes, and preferences of the patient.

Patients with hypoglycaemia on an empty stomach and in the postprandial period, in relation with their hyperinsulinemia, may benefit from the intake of carbohydrates with a low glycaemic index (wholegrain cereals, oatmeal, legumes, nuts, fruits, vegetables).

Glycaemic index

The glycaemic index (GI) indicates the speed at which foods increase blood glucose; a food with a high GI increases glucose more quickly than a food with a low GI.

Therefore, the ideal situation in a meal would be to choose foods with a low glycaemic index. However, if the decision is taken to consume foods with a high GI, they may be combined with others with a low GI in order to balance out the meal.

Table 4. Classification of foods according to their glycaemic index.

Foods with low GI	Foods with high GI
- Milk	- Rice
- Yoghurts	- White bread, sliced bread or breadcrumbs, biscotti
- Wild or wholegrain rice	- Breakfast cereals
- Pasta	- Wheat and corn flour
- Oats, barley, rye, quinoa	- Biscuits
- Chickpeas, lentils, beans, peas	- Tinned sweetcorn
- Wholemeal bread	- Crisps
- All fruit and nuts with the exception of watermelon and dates	- Potato purée
- All vegetables with the exception of pumpkin and boiled carrot	- Isotonic drinks and sweet fizzy drinks
- Soy milk	- Beer
	- Industrial bakery products
	- White and Brown sugar, honey



Adapted from: www.fundaciondiabetes.org

***An example of 3 menus which are rich in fibre and have a low glycaemic index for diabetics**

MENU N° 1	MENU N° 2	MENU N° 3
Breakfast	Breakfast	Breakfast
1 glass of skimmed milk Wholemeal bread with olive oil, sliced tomato, and ham	1 handful of strawberries and blueberries 1 skimmed yoghurt Whole grain oatmeal	1 orange Wholemeal bread with skimmed fromage frais and avocado
Mid-morning	Mid-morning	Mid-morning
1 skimmed yoghurt with nuts	1 glass of plant milk	1 kiwi
Lunch	Lunch	Lunch
Wild rice with stir-fried vegetables and beef Wholemeal bread 1 pear	Oven-baked salmon with baked potatoes and aubergine Wholemeal bread 2 plums	Variety of salad leaves, quinoa, and grilled chicken Wholemeal bread 1 apple
Afternoon snack	Afternoon snack	Afternoon snack
2 tangerines	1 wholemeal slice of toast with hummus	1 skimmed yoghurt with nuts
Dinner	Dinner	Dinner
Lentil salad Wholemeal bread 1 apricot	Ratatouille Omelette Wholemeal bread 1 slice of pineapple	Boiled cauliflower with cod Wholemeal bread 1 peach

6.- DIETARY GUIDELINES FOR HEART FAILURE AND/OR HEART DISEASE

The main dietary aims in patients with heart failure and/or heart disease are as follows:

1. Reduce salt intake
2. Reduce saturated fat intake
3. Maintain a healthy weight or lose weight in patients who are overweight or obese
4. Eliminate tobacco
5. Avoid stimulants (coffee, tea, etc.)



Advice for reducing salt in the diet

1. Do not add salt to meals.
2. Choose fresh foods rather than processed/pre-cooked foods due to their lower salt content.
3. Drink water with low mineral content.
4. Do not use salt substitutes (novosal, potassium salt) as they have a high content of potassium (some drugs for heart failure increase the potassium in the blood).
5. Avoid foods which use salt in their production (pickles, marinades, brines, salted, cured, and smoked foods).
6. If it is necessary to make severe restrictions of sodium in the diet, food can be soaked for a long period of time (more than ten hours, changing the water twice) or boiled twice (changing the water) in the case of tinned vegetables and legumes, frozen fish, etc. (Do not consume the water used for boiling).
7. The following can be used as salt substitutes: vinegar, garlic, onion, lemon juice, herbs (bay leaves, thyme, rosemary, parsley, basil, etc.) and aromatic spices (nutmeg, cinnamon, curry powder, pepper, etc.).

Table 5. List of foods with high salt content.

Prohibited foods
Cheeses, cold cuts, soft drinks, water with high sodium content, concentrated stock cubes, pre-cooked food, processed food, commercial sauces, packet soups, olives, pickles, canned goods, salted foods, smoked foods, salted snacks/appetizers.



Advice for the reduction of saturated fats in the diet

1. Reduce the consumption of full-fat dairy products, meats, etc.
2. Increase the intake of fish
3. Avoid trans and partially hydrogenated fats
4. Meat should be lean (chicken and turkey with no skin, rabbit, tenderloin and sirloin pork, beef steak, etc.).
5. Avoid the consumption of industrially produced cakes and bakery products.
6. Consume skimmed dairy products.
7. Let chicken and meat stock cool so that the fat solidifies and can easily be removed from the surface.
8. Increase the intake of foods rich in fibre.

Table 6. List of foods with high fat content.

Prohibited foods
Full-fat milk and derivatives, dairy desserts, ice-creams, butter, cream, fatty, cured, and semi-cured cheeses, fatty meats, offal, cold cuts, industrial bakery and dessert products, pâtés, processed foods, pre-cooked foods, fried snacks.



*An example of 3 menus for a healthy heart

MENU N° 1	MENU N° 2	MENU N° 3
Breakfast	Breakfast	Breakfast
Decaffeinated coffee with skimmed milk Wholemeal bread with extra virgin olive oil and sliced tomato	1 piece of fruit 1 glass of plant milk with no added sugar 2 wholemeal biscotti	1 skimmed yoghurt Oatmeal Red fruits
Mid-morning	Mid-morning	Mid-morning
2 pieces of wholemeal toast with low-salt ham	1 skimmed yoghurt 1 spoonful of flax seeds	1 coffee with skimmed milk 2 pieces of wholemeal toast
Lunch	Lunch	Lunch
Tomato and cucumber salad Meatballs with wholegrain rice Wholemeal bread 1 piece of fruit	Aubergine Wholegrain pasta with clams Wholemeal bread 1 piece of fruit	Mixed salad Chicken breast with potato purée Wholemeal bread 1 piece of fruit
Afternoon snack	Afternoon snack	Afternoon snack
1 piece of fruit 1 handful of unsalted nuts	1 piece of fruit 4-5 wholemeal breadsticks	Skimmed fromage frais 1 handful of unsalted nuts
Dinner	Dinner	Dinner
Vegetable stew Oven-baked salmon Wholemeal bread 1 skimmed yoghurt	Pumpkin soup Boiled potato omelette Wholemeal bread 1 glass of skimmed milk	Chickpea salad Grilled tuna Wholemeal bread 1 piece of fruit

7.- DIETARY GUIDELINES FOR FATTY LIVER DISEASE

- Maintain a healthy weight. If the individual is overweight or obese, gradual and controlled weight loss is advised.
- Substitute saturated and trans fats in the diet for monounsaturated and polyunsaturated fats, particularly omega-3 fatty acids.
- Consume foods with a low glycaemic index (most fruits, vegetables, legumes, and wholegrain cereals) which have a lesser effect on blood sugar levels.
- Avoid food and drink with high amounts of simple sugars, particularly fructose.
- Eliminate alcohol.
- Slightly reduce the consumption of foods rich in carbohydrates. If they are eaten, choose wholegrain varieties.



- Eliminate commercial juices, soft drinks with sugar, table sugar, biscuits, pastries, etc.

8.- DIETARY GUIDELINES FOR CHRONIC KIDNEY DISEASE

The diet of patients with kidney disease varies according to the stage of the illness.

Dietary guidelines for patients with kidney disease before dialysis

- **Foods rich in proteins:** it is advisable to restrict proteins in the diet (meats, fish, and eggs). Thus, it is recommended not to eat more than 100 g of meat or fish per day. 50 g of meat can be substituted by one egg.

Avoid foods which are rich in animal fats (bacon, cold cuts, meat, fats, offal, cured cheese, etc.), giving preference to vegetable fats (olive oil, seed oils).

- **Dairy products:** the consumption of dairy products should be restricted to 1-2 portions per day: 125 ml milk, 1 yoghurt (125 g) or 30 g low-fat cheese. Skimmed dairy products, chocolate milkshakes, enriched milks and egg custard should be avoided. Semi-skimmed milk is recommended as it has a lower ratio of phosphorous/protein and a lower potassium content compared with whole or skimmed milk and it provides an appropriate supply of liposoluble vitamins. Patients with high levels of phosphorous should reduce their consumption to 1 portion per day.

- **Fruit:** two per day, one raw and the other cooked, in compote or canned in its juice. *If potassium levels must be controlled, the recommendations for reducing potassium in the diet will be taken into account.

- **Vegetables:** two per day. *If potassium levels must be controlled, the recommendations for reducing potassium in the diet will be taken into account.

- **Legumes:** chickpeas, lentils, beans, peas. These foods must be eaten once per week.

- **Cereals and root vegetables:** bread, potatoes, pasta, rice, tapioca, semolina, wheat flour. These must be consumed 1-2 times per day. The consumption of all



kinds of wholegrain products, oatmeal and muesli, egg pasta, savoury appetisers and dry soya is not recommended.

- **Liquids:** the recommendations of the nephrologist should be followed.

Recommendations for reducing potassium in the diet

1. All vegetables, potatoes and legumes should be soaked and boiled twice.
2. Choose vegetables and fruits with low potassium content. We recommend that the following guides be consulted:

<https://www.ouh.nhs.uk/patient-guide/leaflets/files/50835Ppotassium.pdf>

https://www.kidney.org/sites/default/files/NKF_Guide_to_Low_Potassium_Diet_Final_0.pdf

3. Put legumes, potatoes, and vegetables to soak the night before cooking them, changing the water several times.
4. Double boiling: boil from cold and, once the water begins to boil, remove the food and place it in another pan with boiling water in order to cook it completely.
5. Do not use the boiled water to make stock, soups, or sauces.
6. Slicing food also favours the reduction of potassium.

Recommendations for reducing phosphorous in the diet

1. Restrict dairy products, particularly skimmed products.
2. Avoid red meat (beef, pork, horse) and blue fish (salmon, sardines, tuna, etc.).
3. Consume bread in moderation.
4. Eliminate wholegrain products.
5. Avoid processed products,
6. Avoid nuts.



9.- DIETARY GUIDELINES FOR ACUTE PANCREATITIS

Acute pancreatitis is a medical emergency which requires hospitalisation for treatment. Therefore, at the outset, part of the hospital treatment consists of fasting and the administration of a considerable amount of intravenous fluids. Then, oral tolerance is tested before the recommendation of a soft (easily digested) diet as part of the progression towards a full diet once the acute phase of the illness has passed.

The diet is made up of foods of varying consistency, excluding cooking techniques which make digestion more difficult and avoiding raw foods (with the exception of very ripe fruit). Intake of fats and fibre should also be reduced.

Subsequently, all foods are introduced progressively according to the individual's tolerance.

General dietary guidelines following hospital discharge:

1. Eliminate the consumption of alcohol and tobacco.
2. Avoid abundant meals. Eat small amounts throughout the day.
3. Eat slowly, chewing well.
4. Avoid foods with extreme temperatures, preferring warm foods.
5. Do not do excessive exercise after meals. Sit down (do not lie down) for half an hour.
6. Drink 1.5-2 litres of water per day, 30-60 minutes before or after (preferably not during) mealtimes. Avoid acidic juices and fizzy drinks.
7. Use simple cooking techniques (boiling, steaming, oven, etc.). Avoid cooking with a lot of fats and oils (fried food, batter, breading, sauces, stews, etc.).
8. To avoid flatulence produced by legumes, we recommend changing the water after they have been boiled for ten minutes and processing them in a food mill.
9. Avoid stimulants (coffee, tea, cola drinks, chocolate, alcohol, etc.) and irritants (raw fruit and vegetables, fibrous meats, wholegrain foods, etc.) and foods which are not tolerated well.

Table 7. List of prohibited foods in case of acute pancreatitis.

Prohibited foods

Full-fat milk and derivatives, dairy desserts, ice-creams, butter, cream, fatty, cured, and semi-cured cheeses, flatulent vegetables, acidic fruits, coconut, avocado, nuts, fatty fish and meat, offal, cold cuts, industrial bakery and dessert products, pâtés, processed foods, pre-cooked foods, fried snacks, sugary and fizzy drinks.

10.- SPECIAL SITUATIONS

Paediatric population

Childhood is a critical time to establish healthy lifestyle habits as, in many cases, comorbidities have not yet appeared or are in their initial stages. Therefore, it can be said that guidance from parents regarding an appropriate lifestyle which will be maintained over time is of prime importance.

Therefore, it is essential to take into account that **children should not be overfed**, in spite of the fact that some, due to their physical appearance (particularly in generalised lipodystrophies), can be wrongly considered by healthcare professionals to be undernourished. Their characteristic loss of fat will, generally, not be recovered. Thus, despite their lack of weight increase, it is not appropriate to increase food intake or to give them nutritional supplements as this may accelerate fatty liver disease and lead to a worsening of diabetes and hyperlipidaemia.

Furthermore, an excessive intake of calories, particularly at the expense of fats, will increase triglycerides and, therefore, the risk of pancreatitis. In children with severe hypertriglyceridemia, formulas with medium-chain triglycerides (MCT) may prove useful, providing energy and reducing triglyceride levels.

The fact must also be taken into consideration that adolescence is a complicated phase, not only from the medical point of view, with the appearance in many cases, of the first complications associated with



lipodystrophy (insulin resistance, etc.), but also from a psychological perspective. Thus, in many cases, constant prohibitions do nothing more than exacerbate bad eating habits. In this phase we recommend a search for alternatives, such as allowing the consumption of zero-calorie drinks.

Diets with energy restrictions are more suitable for adults as children with growth necessities may develop deficiencies. Eating restrictions to control metabolic complications must, therefore, be balanced with children's growth requirements.

The evaluation of weight per size and body mass index (BMI) in comparison with reference growth data is not appropriate, due to the fact that the body composition of people with lipodystrophy is atypical. A low weight for their height or BMI is acceptable as long as lineal growth is maintained.

Pregnancy

Pregnancy brings about a series of modifications in the mother's metabolism. During the 2nd and 3rd terms of gestation, physiologically speaking, there is a significant increase in levels of cholesterol and triglycerides. Furthermore, the medications normally used to reduce these levels are suspended at the moment that the pregnancy is discovered. Therefore, the recommendations contained in Section 4 relating to the dietary control of hypertriglyceridemia can be particularly relevant for patients who already present bad control.

The restriction of carbohydrates in the diet is also crucial in pregnant women with diabetes, be it gestational or pregestational. In this case, it is particularly important that these patients be handled by a multidisciplinary team (including a midwife, an obstetrician, an endocrinologist and a dietitian) in order to closely monitor the growth of the foetus and avoid other possible complications related with poor glycaemic control.

11.- PHYSICAL EXERCISE

Exercise, when there are no contraindications, can help to improve metabolic parameters. Therefore, it is recommended to be physically active and to attempt to spend as little time as possible sitting down.



Adults are recommended to do 150 minutes of moderately-intensive aerobic activity, or 75 minutes of vigorous exercise per week, for example, brisk walking, dancing, cycling, water sports, etc.), distributed over at least 3 days per week, with no less than 2 consecutive days without activity. In addition, 2-3 sessions per week of endurance exercise should be carried out on non-consecutive days.

Flexibility and balance training are recommended 2-3 times per week for elderly people.

Children and adolescents should do aerobic exercise of moderate-vigorous intensity for 60 minutes or more, with muscle and bone-strengthening activities, at least 3 days per week.

Important considerations when doing exercise

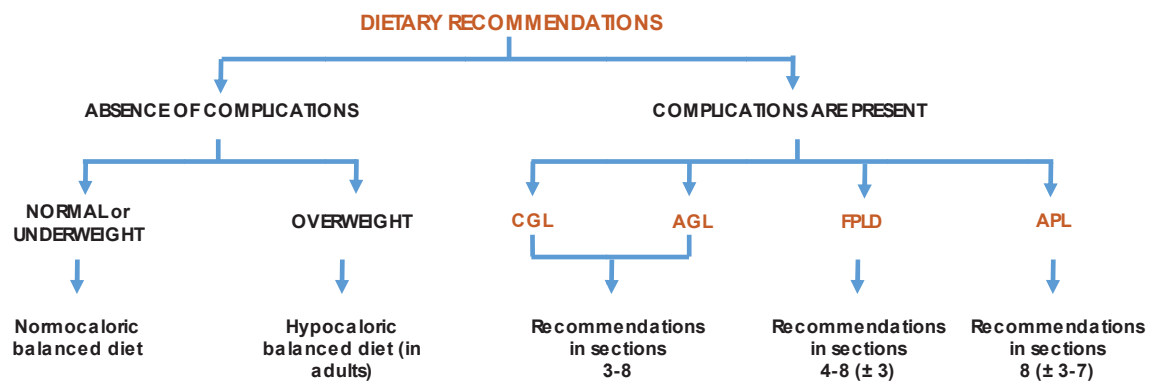
In patients with proliferative diabetic retinopathy and severe non-proliferative diabetic retinopathy, vigorous aerobic or endurance exercise may be contraindicated due to the risk of provoking a vitreous haemorrhage or retinal detachment. In this case, it may be advisable to consult an ophthalmologist before undertaking a programme of intensive exercise.

Individuals who are prone to developing cardiac arrhythmias or to presenting cardiomyopathy, as is the case of patients with congenital generalised lipodystrophy types 2 and 4, familial partial lipodystrophy type 2 and progeroid syndrome (particularly those associated with pathological variants in the *LMNA* gene), must be subjected to a cardiological assessment before beginning any physical exercise and should also avoid vigorous exercise.

In order to avoid suffering traumatic lesions, it is not recommended that patients presenting bone lesions and those with severe hepatosplenomegaly play contact sports.



12.- NOT ALL TYPES OF LIPODYSTROPHY ARE THE SAME



*CGL: congenital generalised lipodystrophy; AGL: acquired generalised lipodystrophy; FPLD: familial partial lipodystrophy; APL: acquired partial lipodystrophy.

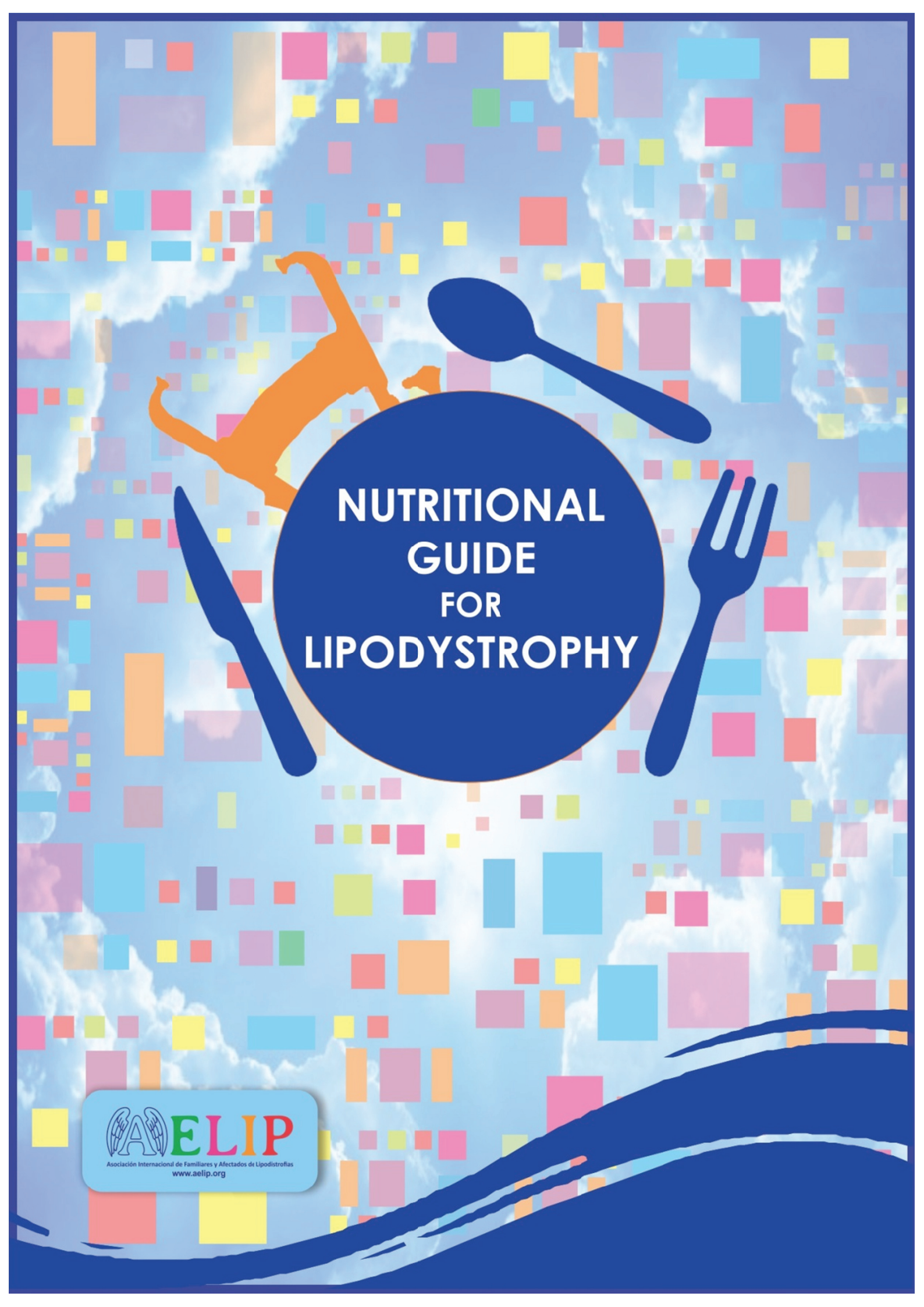


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