



Narodowe Centrum Edukacji Żywieniowej



# GESTATIONAL DIABETES MELLITUS

Gestational diabetes mellitus (GDM) is a condition in which the tolerance for carbohydrates has been disturbed. The disorder occurs or is diagnosed for the first time during pregnancy (i.e. existed before pregnancy but was undiagnosed). In the majority of cases, glucose concentration returns to normal after delivery, but some women will develop type 2 diabetes within the next couple of years. It is estimated that the total risk of developing type 2 diabetes is nearly 10-times higher in women with a history of GDM compared to the healthy population. GDM usually occurs in the second or third trimester, and the risk factors include:

- overweight and obesity,
- low physical activity,
- age 35 years or older,
- giving birth to a baby with macrosomia, i.e. birth weight higher than the 90th percentile for the baby's gestational age and sex,
- history of GDM,
- history of type 2 diabetes in close family,
- coexisting metabolic diseases and disorders, such as hypertension, lipid disorders, polycystic ovary syndrome (PCOS).

If left untreated, GDM may lead to a number of metabolic complications in the newborn, including excessive birth weight, hypoglycaemia, jaundice or perinatal injuries. Complications in adult life may include obesity, type 2 diabetes, and cardiovascular diseases.



## Diet

Diet modification plays a crucial role in the treatment of GDM. Adhering to healthy diet rules is recommended in diet-based therapy, i.e. regular consumption of balanced meals, increased consumption of whole grain cereal products, vegetables and fruit. Simple sugars and animal fats should be limited. In addition to that, the demand for energy and nutrients becomes higher during pregnancy. In the first trimester, the demand for energy increases only marginally, but then it rises in the second trimester due to maternal tissue development and reaches the highest level in the third trimester due to the intensive growth of the foetus. Paying attention to the high quality of products and the proper composition of meals is crucial to avoid nutrient deficiencies. The diet should match the individual needs of the patient. Therefore, consider consulting a dietitian who will help change your eating habits.

## Key nutritional guidelines

1

Eat regularly, approx. every 3 hours, and have your last meal 2 to 3 hours before bedtime at the latest. Do not skip breakfast. The number of meals should be decided on individually, depending on the amount of calories, glycaemia and your needs. Patients are often advised to have 6 meals a day (breakfast, lunch, dinner, afternoon snack, supper and evening snack) to help maintain the constant concentration of glucose in the blood.

2

Avoid eating snacks in between meals. This also applies to energy drinks, such as coffee with milk and/or sugar, sweet teas and beverages or juices. Every sugar-containing snack or beverage will increase glucose concentration in the blood, increasing insulin levels. Constant hyperinsulinemia exposes your tissues to insulin, which negatively affects their sensitivity and the foetus, leading to developmental complications and increasing the risk of cardiometabolic diseases later in life.

3

Try to compose your meals as presented on the **Healthy Eating Plate**. Make sure that half of the plate is occupied by vegetables and fruit which are the source of fiber, vitamins and antioxidants. Their daily intake should be at least 400 g (3/4 of vegetables and 1/4 of fruit). Eat varied vegetables as often as you can, preferably raw or cooked al dente (let them be only slightly hard).

4

Consume fruits in smaller amounts, as they contain more simple sugars. Avoid overripe fruit, as it is more sweet and eat it raw, if you can. Berries are especially recommended, e.g. blueberries, raspberries, strawberries. You do not need to eliminate fruit such as banana, mango or melon from your diet. But try to combine fruit with products containing proteins and/or fat, as they delay the emptying of the stomach, thus prolonging the time of digestion and preventing rapid increase in glucose and insulin levels in the blood after a meal. For example, a handful of raspberries with natural yogurt and sprinkle of nuts/seeds or some peaches with curd cheese wrapped in a whole grain pancake. Alternatively, fruit may constitute a healthy dessert served immediately after a large balanced meal.

5

Eat two portions of natural dairy products daily, preferably fermented, as they are a rich source of protein and calcium (e.g. 1 portion equals 1 small cup of yogurt). Choose products containing up to 3% fat. Make sure they contain no sweet fruit mousses or chocolate.



6

Products that are the source of carbohydrates (bread, groats, rice, pasta, cereal flakes and potatoes) should be added to the majority of your meals and occupy approximately 1/4 of the plate. Choose whole grain cereals, as they are the source of fiber, B vitamins and minerals. Wholemeal cereals are digested slowly, which prevents rapid increase in glucose and insulin levels in the blood.

7

Products that are the source of protein (meat, fish, eggs, milk and dairy products, legumes) should occupy approximately 1/4 of your plate and be an element of every meal. Choose lean meats and skimmed dairy products. Substitute meat with fish once or twice a week and with legumes at least once a week. Choose fish with low content of mercury compounds, such as salmon (mainly Norwegian), Atlantic mackerel, pollock, sardines, sprat, cod, trout, hake, and flounder. Eat red meat only occasionally, not more than 350-500 g per week, and cut down on meat products (cold cuts, sausages, pâtés, offal products, etc.) to the bare minimum. Eliminate liver from your menu, as it has a very high content of vitamin A, which may cause developmental malformations, if consumed in excess.

8

Products that are the source of fat can also be an element of a balanced meal, but should be used in smaller amounts. Choose mainly plant oils (canola oil, linseed oil, olive oil), nuts, seeds, avocado. So, in other words, products that are rich in anti-inflammatory unsaturated fatty acids. Limit the amount of products that are the source of saturated fatty acids, such as fat meat, full-fat dairy products, butter.

9

Limit the amount of sweets and products containing sugar. Read product labels and pick products with reduced or zero sugar content. Using fructose as a sugar substitute is not recommended. Studies have shown that sweeteners may negatively affect the course of pregnancy.

10

Food may be the source of pathogenic micro-organisms that can be harmful to the foetus (e.g. *Listeria monocytogenes*, *Toxoplasma gondii*, *Salmonella* sp., *Campylobacter jejuni*). Therefore, make sure to wash raw products such as vegetables and fruit thoroughly before eating them. Choose pickled vegetables that have been prepared and stored properly. Eliminate unpasteurized products from your diet, such as juices, milk and other dairy products (see whether unpasteurized milk is listed as an ingredient on the product label), as well as raw or undercooked meat, fish and eggs.

11

The daily demand for fluids increases during pregnancy by 300 ml on average. Preferably, drink mainly water. Replace sweetened drinks with sugar-free drinks, as well as light tea and herbal infusions. Reduce the amount of coffee and strong tea, as large quantities of caffeine may negatively affect foetal development. Make sure to keep your body well hydrated by drinking small amounts of fluids more often.

12

The rate of digestion, and therefore, the rate of glucose and insulin levels increase in the blood after a meal will depend on how you prepare and compose your meals. For that reason, you should avoid overcooking food. On the other hand, the following tips will help you positively affect the rate of postprandial glycaemia:

- compose your meals in accordance with the Healthy Eating Plate,
- introduce fermented products into your menu,
- cooling down the products that are the source of complex carbohydrates (groats, rice, potatoes) after cooking them results in the production of resistant starch,
- eat your meals slowly in a peaceful atmosphere.



## Physical activity

- 1 As long as there are no contraindications and the pregnancy is healthy, introduce physical activity of low to moderate intensity to your daily routine to engage large muscle groups (walking, Nordic walking, swimming, aqua-aerobic, aerobic exercises, cycling, yoga). Physical activity positively affects the course of pregnancy and glycaemia management.
- 2 The optimal duration of exercises should be 30 minutes a day for the bigger part of the week (150 minutes weekly). Women who were not physically active before pregnancy should start by exercising 10 minutes daily and gradually increase the duration of exercises.

## Other elements of lifestyle

- 1 Eliminate alcohol from your diet entirely. Even the smallest amount of alcohol may lead to serious health consequences to the baby, such as central nervous system developmental defects, organ damage, psychomotor delay, as well as premature birth and stillbirth.
- 2 Quit smoking. Both active smoking and passive tobacco smoke exposure, the so-called passive smoking, during pregnancy increases the risk of serious consequences in the newborn, such as low birth mass, premature birth, sudden death syndrome, nervous system dysfunctions or impaired lung development.
- 3 If you are under stress, learn how to manage it effectively. Some relaxation techniques based on mindfulness and meditation may help, as well as breathing techniques or yoga.
- 4 Get enough good quality sleep (at least 7-8 hours a day). Try to go to sleep and wake up at about the same time every day. Avoid using electronic devices (smartphone, tablet, computer, TV) one hour before bedtime.









### References:

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## Recommended and not recommended products in gestational diabetes

Remember that the overall profile of your diet, the composition of individual meals and the quality of individual products are all important aspects. In the table below you will find examples of products that should be the basis of your diet as well as those which you should limit to the bare minimum. Treat it as a guide to changing your dietary habits to healthier ones.

Group of products	Recommended	Not recommended
<b>Vegetables</b> 	<ul style="list-style-type: none"> <li>all fresh and frozen</li> <li>pickled vegetables (prepared and stored properly)</li> </ul>	<ul style="list-style-type: none"> <li>vegetables served with greasy sauces, roux</li> <li>raw vegetable sprouts</li> </ul>
<b>Fruit</b> 	<ul style="list-style-type: none"> <li>all fresh and frozen</li> <li>dried fruit in moderate quantities</li> </ul>	<ul style="list-style-type: none"> <li>candied fruit</li> <li>fruit syrups</li> </ul>
<b>Grain products</b> 	<ul style="list-style-type: none"> <li>wholegrain flour</li> <li>whole grain bread and graham bread</li> <li>natural cereal flakes, e.g. oats, barley, spelt, rye</li> <li>wheat, rye and oat bran</li> <li>groats: buckwheat, hulled barley, bulgur, quinoa</li> <li>rice: brown, wild, red</li> <li>wholegrain pasta: wheat, rye, buckwheat, spelt</li> </ul>	<ul style="list-style-type: none"> <li>refined flour</li> <li>confectionery breads, light bread (toast bread, Kaiser roll, white bread, butter rolls)</li> <li>sweetened breakfast cereals (cornflakes, chocolate flakes, muesli, crunchy flakes)</li> <li>fine groats: farina, couscous, cornmeal</li> <li>white rice</li> <li>light pasta: wheat pasta, rice noodles</li> </ul>
<b>Potatoes</b> 	<ul style="list-style-type: none"> <li>cooked</li> <li>baked</li> </ul>	<ul style="list-style-type: none"> <li>potatoes with fatty additives like cream or butter</li> <li>fried potatoes</li> <li>French fries, chips</li> <li>fried potato pancakes with fat</li> </ul>
<b>Milk and dairy products</b> 	<ul style="list-style-type: none"> <li>reduced-fat milk (up to 2% fat)</li> <li>dairy products: natural (sugar-free), fermented, with up to 3% fat (e.g. yogurt, kefir, buttermilk, skyr, cottage cheese, soured milk)</li> <li>skimmed and semi-skimmed cottage cheese</li> <li>mozzarella light</li> <li>cheese for sandwiches in moderate quantities</li> </ul>	<ul style="list-style-type: none"> <li>unpasteurised milk and dairy products (certain types of soft cheese)</li> <li>whole milk</li> <li>condensed milk</li> <li>sour cream, coffee cream</li> <li>sweetened fruit yogurts, dairy desserts</li> <li>cheese: full-fat cheese, processed cheese, feta cheese, soft cheese, e.g. brie, camembert, roquefort, full-fat mozzarella cheese, mascarpone</li> </ul>
<b>Eggs</b> 	<ul style="list-style-type: none"> <li>soft-boiled eggs, hard-boiled eggs, poached eggs, scrambled eggs and omelettes fried without fat or with a small amount of fat</li> </ul>	<ul style="list-style-type: none"> <li>raw or undercooked eggs</li> <li>eggs fried in a large amount of fat, e.g. butter, bacon, lard or salo (slanina)</li> <li>eggs served with mayonnaise</li> </ul>
<b>Meat and meat products</b> 	<ul style="list-style-type: none"> <li>lean skinless meat, e.g. veal, chicken, turkey, rabbit</li> <li>lean beef and pork (pork loin, tenderloin) in moderate quantities</li> <li>lean cold cuts, preferably home-made e.g. tenderloin, cooked ham, poultry cold cuts, roasted pork loin, roasted turkey/chicken breast</li> </ul>	<ul style="list-style-type: none"> <li>raw meat (e.g. tartar steak)</li> <li>undercooked meat (raw steak)</li> <li>fatty meats such as beef, pork, mutton, goose, duck</li> <li>fatty processed meats e.g. gammon, salami, brawn, bacon, spam</li> <li>canned meat, offal cold cuts, pâtés, hot dogs, kabanos sausages, sausage</li> <li>raw and maturing cold cuts (Parma ham, serrano ham, chorizo)</li> </ul>
<b>Fish, fish products and seafoods</b> 	<ul style="list-style-type: none"> <li>lean or fatty sea fish and freshwater fish (Norwegian farmed salmon, sprat, sardines, wels catfish, farmed trout, flounder, cod, butter fish, Atlantic mackerel, hake)</li> <li>shrimps, scallops, oyster, crab, lobster, anchovies, spiny lobster</li> <li>herring* and sardines in plant oil, hot smoked fish in moderate quantities</li> <li>carp, halibut, perch, marlin, monkfish, Spanish mackerel, herring in limited amounts (max. 1 portion/week)</li> </ul> <p>*Baltic fish is not recommended due to water contamination with heavy metals.</p>	<ul style="list-style-type: none"> <li>raw or undercooked fish and seafood (e.g. sushi, tartar steak)</li> <li>predatory fish (e.g. swordfish, shark, king mackerel, tuna, American eel, tilefish, pike, pangasius, tilapia, orange roughy)</li> <li>salmon and Baltic herring</li> <li>smoked sprat</li> <li>cold smoked fish</li> <li>canned fish</li> </ul>



## Recommended and not recommended products in gestational diabetes

Group of products	Recommended	Not recommended
<b>Legumes and legume products</b> 	<ul style="list-style-type: none"> <li>all, e.g. soybeans, chickpeas, peas, lentils, beans, broad beans</li> <li>legume spreads</li> <li>soy flour, sugar-free soy drinks, soy products: tofu, tempeh</li> <li>legume pastas (e.g. from beans or peas)</li> </ul>	<ul style="list-style-type: none"> <li>low-quality, ready-made legume products, e.g. soy sausages, breaded soy cutlets, soy pates, vege burgers</li> </ul>
<b>Fats</b> 	<ul style="list-style-type: none"> <li>olive oil, canola oil, linseed oil</li> <li>butter and vegetable oils mix</li> <li>soft margarines</li> </ul>	<ul style="list-style-type: none"> <li>butter and clarified butter</li> <li>lard, сало (slanina), tallow</li> <li>hard margarine (blocks)</li> <li>tropical oils: palm, coconut</li> <li>mayonnaise</li> </ul>
<b>Nuts and seeds</b> 	<ul style="list-style-type: none"> <li>nuts (e.g. walnuts, hazelnuts) and almonds</li> <li>seeds (e.g. pumpkin, sunflower)</li> </ul>	<ul style="list-style-type: none"> <li>nuts and seeds: salted, in chocolate, in caramel, honey, sprinkled, breaded</li> </ul>
<b>Sugar, sweets and salty snacks</b> 	<ul style="list-style-type: none"> <li>dark chocolate, at least 70% cocoa</li> <li>natural yogurt with fresh fruit</li> <li>fruit purees, mousses and sorbets, jams with no added sugar in limited quantities as an element of a meal</li> <li>kissel and jellies without added sugar</li> <li>home-made pies and cakes without added sugar</li> </ul>	<ul style="list-style-type: none"> <li>sugar, e.g. white, cane, brown, coconut</li> <li>honey, maple syrup, date syrup, agave syrup</li> <li>sweets high in sugar and fat, e.g. cakes, cookies, chocolate bars, milk and white chocolate, halva, doughnuts, Angel wings, candies</li> <li>high-sugar jam</li> <li>salty snacks, e.g. chips, salty sticks, crispy flakes, crackers, nachos, crisps</li> <li>sweeteners (e.g. saccharine, xylitol, stevia, erythrol)</li> </ul>
<b>Beverages</b> 	<ul style="list-style-type: none"> <li>water</li> <li>sugar-free beverages, e.g. coffee, cereal coffee, tea, herbal and fruit infusions, kompots, cocoa</li> <li>vegetable and fruit juices in limited quantities as an element of a meal</li> <li>home-made lemonade with no sugar</li> </ul>	<ul style="list-style-type: none"> <li>alcohol drinks</li> <li>sweet sparkling and still beverages</li> <li>energy drinks</li> <li>nectars, high-sugar fruit syrups</li> <li>unpasteurised juice</li> <li>drinking chocolate</li> </ul>
<b>Spices and sauces</b> 	<ul style="list-style-type: none"> <li>fresh and dried single-ingredient herbs, e.g. basil, oregano, turmeric, cinnamon, ginger</li> <li>salt-free spice mixtures (e.g. herbs de Provence)</li> <li>home-made salad dressings based on a small amount of oil or yogurt, herbs, lemon</li> </ul>	<ul style="list-style-type: none"> <li>salt (e.g. table salt, Himalayan salt, sea salt)</li> <li>spice mixtures containing large amounts of salt</li> <li>bouillon cubes</li> <li>liquid spices to enhance flavour</li> <li>ready-made sauces/dressings</li> </ul>
<b>Soups</b> 	<ul style="list-style-type: none"> <li>soups based on vegetable or lean meat broths</li> <li>soups whitened with yogurt or milk up to 2% fat</li> </ul>	<ul style="list-style-type: none"> <li>soups based on fatty meat broths</li> <li>soups whitened with sour cream and thickened with roux</li> <li>instant soups</li> </ul>
<b>Prepared meals</b> 	<ul style="list-style-type: none"> <li>frozen stir-fry vegetables mix, frozen fruit mix</li> <li>groats and legume blends</li> <li>cream soups</li> <li>ready-made vegetable stir-fry foods</li> <li>salt-free vegetable pastes and purees</li> </ul> <p>*Read the labels, compare ingredients and pay attention to added sugar, salt and fat content</p>	<ul style="list-style-type: none"> <li>fast food, e.g. toasted open-faced sandwiches, hot dogs, hamburgers, kebab</li> <li>frozen pizzas, toasted open-faced sandwiches</li> <li>ready-made food products in breadcrumbs, fatty sauces, from refined flour</li> <li>instant oatmeal</li> <li>instant meals, e.g. sauces, soups</li> </ul>
<b>Technological processing of food</b> 	<ul style="list-style-type: none"> <li>boiling, steaming (cereals, vegetables cooked al dente)</li> <li>grilling (electric grill, grill pans)</li> <li>baking in foil, parchment paper, roasting bags, heat-resistant dish</li> <li>no-fat frying*</li> <li>stewing without pre-frying</li> </ul> <p>* Small amounts of the recommended vegetable fat, e.g. olive oil or canola oil are acceptable, if used occasionally.</p>	<ul style="list-style-type: none"> <li>deep frying</li> <li>stewing with prior deep-frying</li> <li>baking in large amounts of fat</li> <li>breadding</li> </ul>





## Quality menu ideas in gestational diabetes

### BREAKFAST:

#### Egg spread and vegetable sandwiches

- graham roll
- egg spread: hard-boiled egg, avocado, dried tomatoes, sunflower seeds
- bell pepper

### LUNCH:

#### Fruit cocktail

- natural kefir or buttermilk
- berries (blueberries, raspberries, blackberries)
- flaxseed
- oat flakes

### AFTERNOON SNACK:

#### Natural yogurt with crunchy flakes, almonds and apple

- natural yogurt
- flakes (oat or spelt flakes) fried on a dry frying pan
- almonds
- apple

### SUPPER:

#### Pasta salad with chicken

- whole grain pasta
- grilled chicken breast
- grilled zucchini
- cocktail tomatoes
- dried tomatoes
- olive oil
- lemon juice
- herbs de Provence, garlic, pepper

### DINNER:

#### Green groats risotto with salmon

- hulled barley
- salmon fillet
- spinach
- broccoli
- green peas
- pumpkin seeds
- canola oil
- lemon juice
- herbs de Provence



### II SUPPER:

#### Red beans paste and vegetable sandwiches

- rye sourdough bread
- red beans paste: red beans, black olives, sunflower seeds, olive oil, lemon juice
- parsley
- cucumber, turnip cabbage