

# Healthy eating for diabetes and pregnancy

**Apart from a higher level of folic acid supplementation being recommended and the need for maintenance of optimal glycaemic control, women with gestational or type 2 diabetes have similar nutritional requirements during pregnancy as women without diabetes.**

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Pregnancy is an exciting time but also presents a number of challenges. A pregnant woman undergoes a number of tests and procedures and may also need to make major lifestyle changes, including quitting smoking, avoiding alcohol and changing her diet. Her food intake must now meet the needs of her growing fetus as well as the extra demands of her pregnancy. Adding diabetes to the equation adds an extra challenge.

This article outlines the healthy eating guidelines and nutritional supplement requirements before and during pregnancy that optimise glycaemic control and pregnancy outcomes for women with type 2 diabetes and gestational diabetes. The management of type 1 diabetes during pregnancy is challenging, and beyond the scope of this article.<sup>1</sup>

*The Australian Guide to Healthy Eating* helps pregnant women understand the foods they need

(see the Figure). The *Nutrient Reference Values for Australia and New Zealand* provides information on adequate intakes (AIs) and recommended daily intakes (RDIs) of macronutrients, micronutrients, vitamins and minerals during pregnancy.<sup>2,3</sup> Information on healthy eating for pregnant women is summarised on the Australian Government Department of Health and Ageing website at <http://www.health.gov.au/internet/healthyactive/publishing.nsf/Content/pregnant-women>.<sup>4</sup>

Generally, the nutritional requirements during pregnancy are the same for women who have diabetes as those without the condition. The recommended levels of folic acid supplementation are higher in women with diabetes, however, and women with diabetes need to pay particular attention to the types and amounts of carbohydrate they eat.

## IN SUMMARY

- General healthy eating guidelines based on *The Australian Guide to Healthy Eating* apply for women with and without diabetes who are pregnant or planning to become pregnant.<sup>2</sup> Women with diabetes should pay particular attention to optimal glycaemic control.
- Recommendations for preconception folic acid supplementation to prevent neural tube defects are higher for women with known diabetes than for those without diabetes (5 mg/day compared with 0.4 mg/day). The supplement should be continued for the first trimester.
- Dietary requirements for iron, iodine, essential fatty acids, folate and vitamins B<sub>6</sub> and B<sub>12</sub> increase during pregnancy for all women, and supplements may be required.
- Calcium and vitamin D dietary requirements do not increase in pregnancy. However, calcium supplements and vitamin D supplements may be required by some women.
- Pregnant women and those planning pregnancy should avoid drinking alcohol and eating foods at high risk of being contaminated with *Listeria*, and limit caffeine consumption.
- During lactation, requirements for energy and some nutrients increase further. For women on insulin therapy, breastfeeding can increase the risk of hypoglycaemic episodes.

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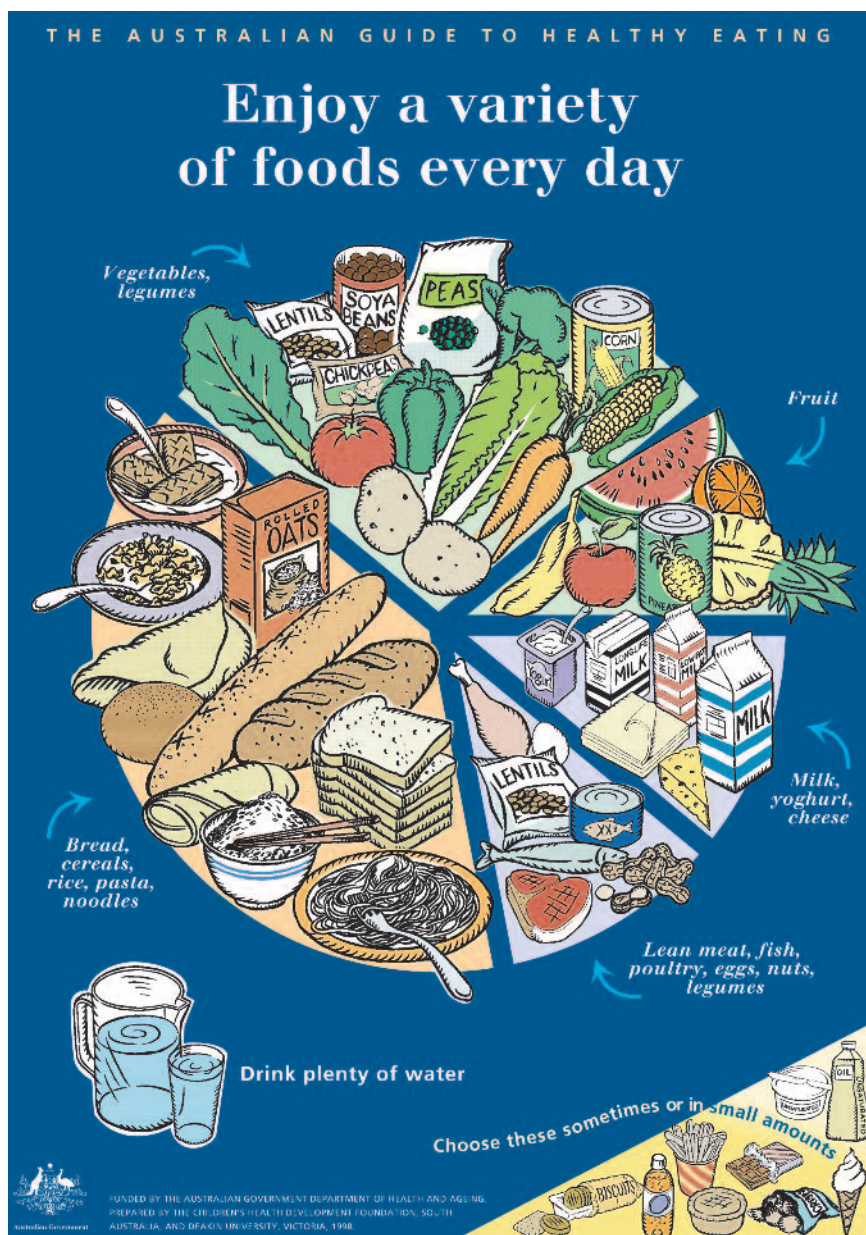


Figure. The 'Healthy food plate' in *The Australian Guide to Healthy Eating* presents the five food groups in recommended proportions of the whole.

SOURCE: THE AUSTRALIAN GUIDE TO HEALTHY EATING. © 1998, COMMONWEALTH OF AUSTRALIA. REPRODUCED WITH PERMISSION OF THE AUSTRALIAN GOVERNMENT DEPARTMENT OF HEALTH AND AGEING, 2008.<sup>2</sup>

The incidence of diabetes in pregnancy is increasing (currently one in 20 pregnancies) but the proportions of gestational and pre-existing diabetes are remaining similar at about 90% and 10% respectively.<sup>5,6</sup>

Gestational diabetes is defined as carbohydrate intolerance of variable severity

with onset or first recognition during pregnancy.<sup>7</sup> All pregnant women are screened for gestational diabetes at 26 to 28 weeks' gestation by a nonfasting modified oral glucose tolerance test.<sup>8</sup> If the screen is positive, a full 75 g two-hour oral glucose tolerance test is carried out. If gestational

diabetes is diagnosed, it is managed by ensuring a healthy lifestyle is followed and initiating insulin therapy if required.

Type 2 diabetes can be known or unknown before pregnancy, and is particularly common in Aboriginal and Torres Strait Islander women and those from the Pacific Islands, Asia (particularly the Indian subcontinent) and the Middle East.<sup>1</sup> This type of diabetes is usually managed during pregnancy by lifestyle measures and insulin therapy if needed. Oral hypoglycaemic agents are usually ceased.<sup>19</sup>

### Diet and supplements before pregnancy

A healthy eating plan and a healthy weight are important for fertility in all women. For women with diabetes, healthy eating is also important to optimise glycaemic control. Maternal nutritional status at the time of conception affects embryonic and fetal growth and pregnancy outcome well before the woman realises she is pregnant. As well as being advised about their diet, women planning to conceive should also be advised to avoid or limit alcohol and caffeine intake and to stop smoking.

Women of reproductive age at high risk of type 2 diabetes or who have impaired fasting glucose or glucose intolerance should be screened for diabetes if they are considering becoming pregnant. For women with known type 2 diabetes, preconception counselling should identify the benefits of optimal nutrition and glycaemic control before conception to reduce the risk of miscarriages, congenital malformations, perinatal mortality and other complications.<sup>1</sup> Those women taking oral hypoglycaemic agents should consider replacing them with insulin.

Folic acid supplementation for at least one month before pregnancy and for the first three months of pregnancy substantially reduces the risk of neural tube defects.<sup>10</sup> Therefore, to reduce the risk of neural tube defects, it is recommended

that all women planning a pregnancy take a folic acid supplement (Blackmores For Women Folic Acid, Megafol, Nature's Own Folic Acid 500 mcg; Table 1).<sup>1,3</sup> Women with pre-existing diabetes have an increased risk of neural tube defects and therefore the recommended amount of supplementation for these women is 5 mg per day, rather than the usual 0.4 mg per day.<sup>1,3,11</sup> Women at increased risk of folate deficiency, such as those with multiple pregnancies or haemolytic anaemia, should take 5 mg per day of folic acid throughout the pregnancy.<sup>11</sup> There is a case for all women of reproductive age to take folic acid supplements because not all women know about the need for preconception folic acid supplementation and also pregnancies are often unplanned and women may therefore miss the opportunity to take the supplement.

## Diet and supplements during pregnancy

Nutritional requirements during pregnancy are similar for women with or without diabetes. Energy requirements increase during the second and third trimesters to cover the needs of the growing fetus, the placenta and expanding maternal tissues and the additional maternal effort at rest and in physical activity.<sup>3</sup> An additional 1.4 MJ per day is required in the second trimester and an additional 1.9 MJ per day in the third trimester. Requirements for nutrients such as folate, iron, vitamin D, essential fatty acids, iodine and B vitamins are increased in pregnancy and women may require specific supplements. For most other nutrients there is no extra requirement as the body adapts to make more efficient use of available nutrients.

*The Australian Guide to Healthy Eating* contains information on healthy eating for people at all stages of life.<sup>2</sup> In this publication's 'Healthy food plate', the five food groups are easily distinguishable and presented in recommended proportions of the whole (Figure). People are

**Table 1. Commonly used folic acid supplements**

Folic acid supplement	Folic acid content per tablet
Blackmores For Women Folic Acid	Folic acid 0.5 mg
Megafol*	Two strengths: folic acid 0.5 mg and folic acid 5 mg
Nature's Own Folic Acid 500 mcg	Folic acid 0.5 mg

\* Megafol is the only folic acid supplement available as 5 mg tablets in Australia.

advised to include in their diet mostly wholegrain breads and cereals, vegetables and fruit, with moderate amounts of reduced-fat dairy products and lean meat, skinless chicken and fish.

## Macronutrients

### Carbohydrate

Optimal glycaemic control during pregnancy is one of the most important factors in ensuring a healthy outcome for women with diabetes and their babies. High blood glucose levels can lead to high fetal weight and child obesity. As carbohydrate foods have a direct impact on blood glucose levels, the amount and type of carbohydrate consumed should be monitored. Regular meals and a regular spread of carbohydrate foods across the day can help to stabilise blood glucose. Including three meals daily and small snacks between meals is often a good way to spread carbohydrate requirements across the day and prevent 'overload' at mealtimes. Some women, when they learn about the effect of carbohydrate foods on blood glucose levels, might be inclined to severely limit their intake. However, many carbohydrate foods, including milk, yoghurt, wholegrain breads and cereals and fruit, are important sources of nutrients during pregnancy. An Accredited Practising Dietitian can provide specific advice on recommended amounts of carbohydrate and the best sources.

Including carbohydrate foods that have a low glycaemic index (GI) can help improve postprandial hyperglycaemia. Examples of low-GI carbohydrate choices

are low-fat milk, wholegrain and multi-grain breads (e.g. Tip Top 9 Grain, Burgen Mixed Grain and Baker's Delight Wholemeal Country Grain bread), some mueslis and other breakfast cereals (e.g. Burgen Muesli, Kellogg's Guardian cereal and porridge oats), SunRice Doongara Clever Rice and many fruits (e.g. apples, pears and oranges).

### Fat

Although requirements for essential fatty acids increase during pregnancy (as discussed in the next section), it is important for pregnant women to moderate their total fat intake and limit their saturated fat intake. A high fat intake can contribute to excessive maternal weight gain during pregnancy, and a high saturated fat intake can contribute to cardiovascular complications (for which women with diabetes are already at an increased risk).

### Protein

Protein requirements increase during the second and third trimesters of pregnancy to reflect maternal weight gain. Major sources of protein in the Australian diet are meat, poultry and fish, followed by cereals and cereal-based foods, then dairy foods. Vegetables provide smaller amounts of protein. *The Australian Guide to Healthy Eating* suggests an extra serve from the vegetables, legumes food group and an extra half serve from the meat, fish, poultry, eggs, nuts food group for pregnant women (see the Figure).<sup>2,4</sup>

The RDIs of protein for pregnant and nonpregnant women are listed in Table 2.<sup>3</sup>

continued

**Table 2. RDIs of protein for pregnant and nonpregnant women<sup>3\*</sup>**

Age (years)	Protein RDI (g/kg)	
	Pregnant women <sup>†</sup>	Nonpregnant women
14 to 18	1.02	0.77
19 to 30	1.00	0.75
31 to 50	1.00	0.75

\* Recommended daily intakes of protein are the same for women with and without diabetes. † In second and third trimesters only.

**Table 3. RDIs of iron for pregnant and nonpregnant women<sup>3\*</sup>**

	Age (years)	Iron RDI (mg)
Pregnant women	14 to 50	27
Nonpregnant women	14 to 18	15
	19 to 50	18

\* Recommended daily intakes of iron are the same for women with and without diabetes.

**Micronutrients**

**Folate/folic acid**

Folic acid is a water-soluble vitamin essential for healthy growth and development. Folate is the form found naturally in foods; folic acid is the form used in the fortification of foods such as breads and breakfast cereals and in dietary supplements. Foods rich in folate include green leafy vegetables (e.g. broccoli and spinach), nuts, chickpeas and liver (beef and chicken). The increased requirements for folate during pregnancy cannot be met by diet alone and, as mentioned previously, folic acid supplements of 5 mg per day for women with diabetes or 0.4 mg per day for women without diabetes should be taken for at least one month before conception and for the first three months of pregnancy.<sup>3,10</sup>

**Iron**

Iron requirements increase during pregnancy for the production of more maternal red blood cells and to supply the growing fetus and placenta. Iron requirements during pregnancy are the same for women with or without diabetes (Table 3).

Anaemia during pregnancy can increase the risk of having a low birthweight baby and of the infant developing iron deficiency anaemia during the first years of life.<sup>12</sup> Higher risk situations for iron deficiency include vegetarianism, successive births, teenage pregnancies and women from lower socioeconomic backgrounds. All women should have their haemoglobin level checked at the first antenatal visit and again at about 28 weeks' gestation. Anaemia needs to be investigated and treated.<sup>11</sup>

Meat, fish, poultry and wholegrain cereals are the main sources of iron in the Australian diet. There are two types of iron in food – haem iron, which is from animal sources, and nonhaem iron, which is from plant sources. Of these, haem iron is more bioavailable to humans.<sup>3</sup> As iron absorption from vegetarian diets is lower than from mixed animal and plant diets, intakes from vegetarian diets need to be up to 80% higher.

Pregnant women and women planning pregnancy who are intending to increase their dietary iron intake by eating more fish should be aware that some fish contain

high levels of mercury and that the unborn baby is particularly vulnerable to mercury toxicity.<sup>13</sup> Such women should generally choose fish low down in the food chain as those higher up will have higher concentrations of accumulated mercury. Some tips for increasing dietary iron intake and the appropriate numbers of serves of various fish are listed in the boxes on page 52.

Vitamin C enhances absorption of nonhaem iron from bread, cereals, nuts, legumes and other plant products and hence eating fruit or vegetables rich in vitamin C (such as rockmelon, strawberries, citrus fruits, kiwi fruit and tomato, and broccoli, capsicum, cauliflower and brussel sprouts, respectively) at the same meal is recommended. Co-consumption of animal sources of iron (haem iron) also increases absorption of nonhaem iron from plant foods. On the other hand, iron absorption from any source is decreased by co-consumption of food or drink high in calcium. Therefore, women requiring iron supplements should take them with a small glass of orange juice and avoid taking calcium supplements, milk and milk products more than two hours before and after the iron supplements.

**Calcium**

Calcium is required for the normal development and maintenance of the skeleton and teeth and for cardiac and neuromuscular function. Requirements (RDIs) are 1300 mg per day for girls aged 14 to 18 years and 1000 mg per day for women aged 19 to 50, and do not differ during pregnancy.<sup>3</sup> Although calcium demands increase during pregnancy, particularly during the later stages, physiological adaptations increase the efficiency of uptake and utilisation of calcium.<sup>12</sup> The increased demands during pregnancy are similar for women with and without diabetes.

The main sources of calcium are the dairy foods milk, yoghurt and cheese. Calcium-fortified soy products are valuable sources for those who consume little

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### Tips for increasing iron intake and absorption before and during pregnancy

Advise pregnant women or women planning pregnancy to:

- eat red meat three to four times per week
- eat a variety of lean meats (e.g. beef, lamb, pork, chicken, turkey and kangaroo) and fish\*
- eat more legumes
- if a vegetarian, eat legumes, nuts, seeds, eggs or iron-fortified breads and cereals each day
- choose low-GI wholegrain or wholemeal breads and cereals†
- drink a small glass (120 mL) of fruit juice or have a piece of fruit with meals to enhance iron absorption‡
- if unsure about getting enough iron from foods, discuss with doctor or dietitian.

\* The consumption of fish varieties known to contain high levels of mercury should be limited because of potential mercury toxicity in the fetus.

† GI = glycaemic index.

‡ Vitamin C-rich fruit, e.g. orange, strawberries, kiwi fruit, rockmelon.

or no dairy foods. Other good sources include fish with edible bones (e.g. canned salmon or sardines) and, although they contain lesser amounts, nuts, pulses and green leafy vegetables. Three or four serves of dairy food per day should provide adequate calcium to meet the recommended dietary intake. One serve is 250 mL milk, 200 g yoghurt or 40 g cheese. Low- or reduced-fat and high-calcium choices are recommended.

Women who are likely to have inadequate calcium intakes include those who consume little or no dairy food, such as Asian and Indian women, and those who have a vegan diet. Calcium supplements may be required in these groups. Women

### Fish and potential mercury toxicity<sup>13</sup>

Although good sources of iron and other nutrients, some fish varieties also contain relatively high levels of mercury. Pregnant women and women planning pregnancy should consume fish varieties known to generally contain low levels of mercury as the unborn baby is particularly vulnerable to mercury toxicity. The risk of mercury exposure from the diet depends on the environment, the type of fish commonly caught and eaten, the patterns of fish consumption and the consumption of other foods that may also contain mercury. Generally, fish higher up the food chain will contain higher concentrations of mercury.

For women who are pregnant or planning to become pregnant, appropriate numbers of serves of various fish are:\*

- two to three serves per week of any fish and seafood not listed below, OR
- one serve per week of orange roughy (also known as deep sea perch) or catfish, and no other fish that week, OR
- one serve per fortnight of shark (also known as flake) or billfish such as swordfish and marlin, and no other fish that fortnight.

\* One serve of fish is 150 g.

should be guided by the amounts of elemental calcium in the supplement rather than the amount of calcium formulations (e.g. 100 mg of calcium carbonate contains 40 mg of elemental calcium); this information is given on the supplement container labels. There are numerous supplements containing calcium and other minerals and vitamins; supplements containing calcium alone include Caltrate Tablets, which is calcium carbonate, and CitraCal, which is calcium citrate (Table 4).

#### Vitamin D

Vitamin D is important for maternal calcium status and for the calcification of the fetal skeleton.<sup>12</sup> The vitamin D status of a pregnant woman predicts the vitamin D status of her newborn child and the bone mass of the child later in life.

Most vitamin D is made available by skin exposure to sunlight rather than through the diet. Although vitamin D is available in some foods (e.g. eggs, meat, oily fish and vitamin D-fortified margarine), dietary vitamin D intake is usually minimal.

Despite a sunny climate, vitamin D deficiency is prevalent among people in Australia. Less vitamin D is synthesised

during the winter months, in those who have dark skins or are older, in those who use ultraviolet blockers and in those with little skin exposure to sunlight (e.g. those confined indoors or wearing clothing that limits skin sun exposure for cultural reasons).<sup>14</sup> The adequate intake value (AI) is 5 µg/day (200 IU) for pregnant and nonpregnant women aged 14 to 50 years, regardless of exposure to sunlight.<sup>3</sup> Diabetes has no effect on a woman's requirement for vitamin D.

Some pregnant women will require supplements. Blood tests should be performed in those women in whom vitamin D deficiency is a risk, and adequate supplementation instituted where needed.<sup>11</sup>

A number of pregnancy nutritional supplements now contain vitamin D<sub>3</sub> (cholecalciferol) in their formulations, such as Blackmores Pregnancy and Breast-Feeding Gold and Elevit (Table 5). There are also several supplements containing cholecalciferol and calcium (see Table 4).

#### Essential fatty acids

Adequate intakes of omega-3 and omega-6 fatty acids are important during pregnancy because these fatty acids are important structural components of cells

and are required for the formation of new tissues.<sup>12</sup> Alpha linolenic acid (the major plant-derived omega-3 fatty acid) and linoleic acid (the primary omega-6 fatty acid) are found in canola oil, sunflower oil and walnuts. Oily fish such as Atlantic salmon, tuna, mullet and swordfish are the best sources of the long-chain omega-3 fatty acids. Two to three serves of oily fish per week is recommended for pregnant women, which is the same as for other adults. However, women who are pregnant or planning to become pregnant need to consider potential mercury toxicity from eating fish (see the box on page 52).<sup>13</sup>

The AI value for long-chain omega-3 fatty acids is higher for women who are pregnant than for those who are not, although no RDIs have been set. The AIs for pregnant women are 110 mg per day for those aged 14 to 18 years and 115 mg per day for those aged 19 years and older, compared with 85 mg per day and 90 mg per day respectively for nonpregnant women.<sup>3</sup>

The potential benefit of fatty acid supplements during pregnancy is a topic of active research. Fatty acid supplements during pregnancy are not currently recommended in Australia but a number of popular pregnancy supplements now

**Table 4. Some calcium and calcium plus vitamin D supplements commonly used in pregnancy\***

Calcium/calcium plus vitamin D supplement†	Calcium, cholecalciferol content per tablet
Caltrate Tablets	Elemental calcium 600 mg
Caltrate 600 mg with Vitamin D Tablets	Elemental calcium 600 mg, cholecalciferol 5 µg (200 IU)
Citracal	Elemental calcium 250 mg
Citracal + D	Elemental calcium 315 mg, cholecalciferol 12.5 µg (500 IU)

\* Recommended daily intakes of calcium are 1300 mg per day for 14 to 18-year-old girls and 1000 mg per day for 19 to 50-year-old women, and do not differ during pregnancy or if there is diabetes.<sup>3</sup> † The adequate intake of vitamin D is 5 µg/day for 14 to 50-year-old women, and does not differ during pregnancy or if there is diabetes; the upper limit of vitamin D intake during pregnancy is 80 µg per day.

include essential fatty acids in their formulations (see Table 5). However, the Royal Australian and New Zealand College of Obstetrics and Gynaecology statement on vitamin and mineral supplementation in pregnancy says that in the absence of evidence to support the use of omega-3 fatty acid supplements, best advice would be to avoid the use of such supplements during pregnancy, particularly in the first trimester.<sup>11</sup> Cod liver oil supplements should be avoided during pregnancy because they can contain high levels of vitamin A that may be teratogenic.

#### Iodine

Iodine is essential for normal thyroid function and for fetal growth and development. Intake of iodine is deficient in some regions of Australia. An enlarged thyroid (goitre) is an obvious sign of iodine deficiency, but less obvious and more serious consequences can occur. Severe iodine deficiency during pregnancy can cause abortion or stillbirth, congenital abnormality, increased perinatal and infant mortality, neurological damage and mental deficiency. In addition, fetal hypothyroidism and impaired mental and

**Table 5. Two commonly used multivitamin pregnancy formulations**

Nutrient content per capsule/tablet*	Blackmores Pregnancy and Breast-Feeding Gold (Recommended dosage: 2 capsules daily)	Elevit (Recommended dosage: 1 tablet daily)
Calcium	59 mg	125 mg
Essential fatty acids	Tuna oil 500 mg, containing omega-3 triglycerides 160 mg (DHA 125 mg, EPA 25 mg)†	Nil
Folic acid	250 µg	800 µg
Iodine	125 µg	Nil
Iron	Elemental 5 mg	Elemental 60 mg
Vitamin B <sub>6</sub> (pyridoxine)	750 µg	2.6 mg
Vitamin B <sub>12</sub> (cyanocobalamin)	1.5 µg	4 µg
Vitamin D (cholecalciferol)	6.3 µg (250 IU)	12.5 µg (500 IU)

\*Nutrients listed are those mentioned in article only; see manufacturer's details for full listings. † DHA = docosahexaenoic acid; EPA = eicosapentaenoic acid.

continued

**Table 6. RDIs of iodine for pregnant and nonpregnant women<sup>3\*</sup>**

Age (years)	Iodine RDI (µg)	
	Pregnant women	Nonpregnant women
14 to 18	220	150
19 to 30	220	150
31 to 50	220	150

\* Recommended daily intakes of iodine are the same for women with and without diabetes.

physical development can occur. World-wide, mild-to-moderate and severe iodine deficiency during pregnancy is the most common cause of preventable intellectual impairment.

Iodine is found in low concentrations in seawater and soil. Most soils in Australia are low in iodine, resulting in low concentrations of iodine in locally grown foods. Seafoods are the major food sources of iodine, although iodised salt is often the most common source in the western diet.

Iodine deficiency is well recognised in some areas of Australia (e.g. Tasmania) but it is becoming clear that deficiency may be more widespread than previously realised. Most Australian households and food industries do not use iodised salt at the table or for cooking. In addition, milk products that were once a major source of iodine because of the use of iodine-containing sanitisers now, with changes in practice, contain little iodine.

The requirements for iodine are increased during pregnancy similarly for women with and without diabetes (Table 6).<sup>3</sup> Although there is no standard recommendation for iodine supplementation during pregnancy in Australia, many pregnancy supplements now contain iodine (see Table 5). Patients with thyroid conditions may have different iodine requirements to other patients.

**Vitamins B<sub>6</sub> and B<sub>12</sub>**

The requirements for both these vitamins increase during pregnancy similarly for women with and without diabetes. Vitamin B<sub>6</sub> is found in a wide range of foods

including organ meats, muscle meats, breakfast cereals, vegetables and fruits, and the daily requirements for this vitamin are generally easy to meet. Vitamin B<sub>12</sub> mainly comes from animal foods (meat, milk and dairy products). Women following a vegan diet generally require vitamin B<sub>12</sub> supplements during pregnancy and lactation to ensure adequate supplies for themselves and their child.<sup>3</sup> In addition, women taking metformin may have low vitamin B<sub>12</sub> levels and some authorities recommend vitamin B<sub>12</sub> supplements during pregnancy.

**Additional issues for pregnancy**

**Alcohol**

Alcohol passes through the placenta to the fetus and can affect fetal development, particularly during early pregnancy. The exact level of alcohol intake posing a risk to the fetus is unclear and the safest recommendation, therefore, is for all women to avoid alcohol during pregnancy. Women planning pregnancy also should consider avoiding alcohol, because the first weeks after conception are the most critical for fetal development.

**Caffeine**

Caffeine is one of the most frequently ingested pharmacologically active substances in the world. The associations between high caffeine intake during pregnancy and low birthweight and spontaneous abortion have been known for many years. However, the level of caffeine intake posing a risk for the fetus has not been clear. A recent study has shown that a caffeine intake

**Table 7. Caffeine content of various beverages and chocolate<sup>16</sup>**

Drink or food, one serve	Caffeine content per serve (mg)
Coffee, instant, medium, 1 rounded tsp	60
Coffee, decaffeinated, 1 rounded tsp	2
Coffee, brewed, percolator/drip, 200 mL cup	140
Cappuccino, 1 cup	80
Café latte, 1 cup	55
Hot chocolate, 1 cup	10
Mocha, 1 cup	90
Espresso, regular	80
Iced coffee, 1 cup (café style)	80
Coffee mixes, average (e.g. Jarrow, Nestle, Maxwell House), 1 serve/sachet	50
Caro, Ecco (coffee substitutes)	0
Tea (black/green), medium strength, 1 cup	40
Herbal teas	0
Coca Cola, Diet Coke, 375 mL can	50
Energy drinks with caffeine (e.g. Red Bull, V Energy), 250 mL	80
Milk chocolate, 50 g	10
Dark chocolate, 50 g	30
Cooking chocolate, 50 g	40
Cocoa, 1 tsp	5

continued

**Table 8. Listeria contamination of food: high-risk foods and safer alternatives<sup>17</sup>**

Food type	High risk	Safer alternatives	Comments
Cold meats	Unpackaged ready-to-eat, e.g. from delicatessen counters and sandwich bars Packaged, sliced, ready-to-eat	Home-cooked	Store in fridge; use within a day of cooking
Cold cooked chicken	Purchased ready-to-eat (whole, portions or diced)	Home-cooked Hot take-away chicken (whole, portions)	Store in fridge; use within a day of cooking
Pate	Refrigerated pate or meat spreads	–	Store in fridge
Salads (fruit and vegetables)	Pre-prepared or prepackaged salads, e.g. from salad bars and smorgasbords	Homemade, freshly prepared	Wash thoroughly; store in fridge; use within a day of preparation
Seafood	Raw (e.g. oysters, sashimi or sushi) Smoked ready-to-eat Ready-to-eat peeled prawns (cooked), e.g. in sandwich fillings and prawn salads	Freshly cooked	Store in fridge; use within a day of cooking
Cheese	Soft, semisoft and surface-ripened cheeses (prepackaged and delicatessen), e.g. brie, camembert, ricotta, feta and blue	Hard cheeses, e.g. cheddar, tasty Processed cheeses, cheese spreads, plain cream cheese, plain cottage cheese	Store in fridge; purchase cheeses packaged by manufacturer
Ice cream	Soft serve	Packaged frozen ice cream	Keep frozen
Other dairy products	Unpasteurised dairy products, e.g. raw goat's milk	Pasteurised dairy products, e.g. pasteurised milk, yoghurt, custard, dairy dessert	Store in fridge

exceeding 200 mg per day (about three cups of instant coffee) increases the risk of miscarriage.<sup>15</sup> Pregnant women, regardless of whether they have diabetes, should be advised to limit their caffeine intake.

Caffeine is present in coffee, tea, chocolate, cola drinks and some energy drinks; the approximate caffeine contents of some foods and drinks are given in Table 7.<sup>16</sup>

### Food safety

Infection with *Listeria monocytogenes* (listeriosis) is one of the most serious foodborne illnesses to which pregnant women may be exposed. *Listeria* may be present in raw foods and may contaminate food after it has been cooked or processed. The consequences of infection are generally mild but can include miscarriage, premature birth or, in rare cases, stillbirth.<sup>17</sup>

All pregnant women should be advised against consuming foods at high risk of being contaminated with *Listeria* – that is,

ready-to-eat foods and refrigerated foods stored for long periods of time (Table 8).<sup>17</sup>

### Weight gain

Low gestational weight gain has been associated with a higher risk of having a low birthweight infant. Excessive weight gain during pregnancy has been associated with a range of complications including increased blood pressure and maternal overweight and obesity following the birth.

The US Institute of Medicine's guidelines for weight gain during pregnancy are used in Australia, although they are currently being reviewed (Table 9).<sup>18</sup>

### After pregnancy

Although gestational diabetes usually resolves following birth of the baby, healthy eating and regular physical activity should be encouraged. Maintaining a healthy weight might reduce the woman's risk of developing gestational diabetes in

subsequent pregnancies and might prevent or delay the onset of type 2 diabetes. Likewise, a healthy lifestyle remains the cornerstone of management for women with pre-existing type 2 diabetes.

During lactation, requirements increase further for energy and some nutrients, including protein, essential fatty acids, vitamin A, riboflavin, vitamins B<sub>6</sub>, B<sub>12</sub> and C, iodine, selenium and zinc. These extra requirements can usually be met with a healthy diet, but in some cases a specific breastfeeding supplement might be indicated; referral to a dietitian may be useful. For those women who are not breastfeeding, nutritional requirements return to normal postpartum.

Breastfeeding gives the baby the best start in life and all women should be encouraged to breastfeed. The activity can help women regain their prepregnancy weight by utilising fat stores gained for milk production.



continued

**Table 9. Guidelines for total weight gain during pregnancy<sup>18</sup>**

Pre-pregnancy weight category	Ideal weight gain during pregnancy (kg)	Recommended rate of gain (kg/week) <sup>†</sup>
Underweight	13 to 18	0.5
Healthy weight	11.5 to 16	0.4
Overweight	7 to 11.5	0.3
Obese	7	[Not specified]

\* US Institute of Medicine guidelines for total weight gain during pregnancy, based on prepregnancy BMI (for singleton pregnancies), currently under review<sup>18</sup> † Rate of weight gain during second and third trimesters.

For women on insulin therapy, breastfeeding can increase the risk of hypoglycaemic episodes. Extra carbohydrate may need to be consumed, and blood glucose levels should be closely monitored.

**Conclusion**

Any form of diabetes during pregnancy has implications for both mother and baby. Prepregnancy counselling should address the importance of healthy eating, regular physical activity, achieving a healthy weight, avoiding alcohol, limiting caffeine consumption and taking folic acid supplements (0.4 mg per day for women without diabetes; 5 mg per day for women with pre-existing diabetes). For women with pre-existing diabetes, the importance of achieving optimal glycaemia preconception should not be underestimated.

General healthy eating guidelines apply for pregnant women with diabetes, based on *The Australian Guide to Healthy Eating*.<sup>2</sup> Attention to amount and type of carbohydrate assists in achieving optimal glycaemic control.

Dietary requirements for folate, iron, iodine, essential fatty acids and vitamins B<sub>6</sub> and B<sub>12</sub> increase similarly during pregnancy for women with and without diabetes, and supplements may be required. Although calcium dietary requirements do not increase in pregnancy, supplements may be required for women not achieving adequate dietary intake. Vitamin D supplements may be required for those women who have dark skin, are older,

have little skin exposure to sunlight or are using sunblocking lotions.

All pregnant women and those planning pregnancy should avoid alcohol consumption and limit caffeine intake. Listeriosis poses special risks in pregnancy and pregnant women should be advised to avoid foods at high risk of being contaminated with *Listeria*.

Nutritional requirements postpartum return to normal if the woman is not breastfeeding. Requirements for energy, protein, essential fatty acids, vitamin A, riboflavin, vitamins B<sub>6</sub>, B<sub>12</sub> and C, iodine, selenium and zinc are increased further for breastfeeding mothers, and supplements may be required. Women on insulin therapy need to be aware of the increased risk of hypoglycaemic episodes if breastfeeding. MT

**Acknowledgements**

The authors would like to thank Aaron Gaekwad, Pharmacist, The Queen Elizabeth Hospital Pharmacy

Department, and Kate Wood, Dietitian, Children, Youth and Women’s Health Service, Adelaide, for their valuable input and advice regarding nutritional supplements for pregnancy.

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*A list of references is available on request to the editorial office.*

**COMPETING INTERESTS:** Ms Carapetis and Ms Strongylos: None. Dr Phillips has received research and travel grants, acted on advisory boards and been involved with clinical trials and seminars sponsored by a range of pharmaceutical companies. He does not think these associations have influenced the content of this article.

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# Healthy eating for diabetes and pregnancy

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