

Macronutrients in Pregnancy: Carbohydrates

•**Function:** primary energy source for the brain, least expensive nutrient to produce

•**Dietary sources:**

- starch** (corn, potatoes, rice, grains)
- sugars** (fruits and juices)
- added sugars**

•**RDA:** 175grams/day

•**AMDR:** 45-65% of intake (25% or less from added sugars)

•**Inadequate intake:** bone mineral loss, hypercholesterolemia, impaired development and function of the central nervous system

•**Excess intake:** dental caries, behavioral changes, cancer, risk of obesity, risk of hyperlipidemia

•**Key messages:**

Make at least half of your grains whole grains

Drink water instead of sugary drinks

Choose foods and drinks with little or no added sugars

Macronutrients in Pregnancy: Protein

•**Function:** major structural component of cells, functions as enzymes, transport carriers, hormones, in membranes, etc.

•**Dietary sources:**

- complete proteins** (provide all 9 essential amino acids) meat, poultry, fish, eggs, milk, soy milk, cheese, yogurt tofu)
- incomplete proteins** (deficient in one or more amino acids) legumes, grains, nuts, seeds, vegetables

•**RDA** (only for the second half of pregnancy): 71grams/day

•**AMDR:** 10-35%

•**Inadequate intake:** protein deficiency affects all of the body's organs and many systems

Macronutrients in Pregnancy: Fats

•**Total Fat** (energy source, increases absorption of fat soluble vitamins)

-butter, margarine, vegetable oils, whole milk, visible fat on meat, invisible fat in fish, seeds, nuts

•**DRI:** not determined

•**AMDR:** 20-35%

•**Inadequate intake:** impaired growth, increased risk of chronic disease, rough scaly skin and dermatitis

•**Excess intake:** obesity, increased risk of CHD, cancer, and insulin resistance

•**Key messages**

Choose plant based oils for cooking

Choose plant sources that are a source of protein and healthy fats (nuts, avocados)

Choose lean or low-fat meat and poultry

Choose fat-free or low-fat milk, yogurt, and cheese

Select some seafood that is rich in omega-3 fatty acids

Unsaturated fats

•**OMEGA-6 POLYUNSATURATED FATTY ACIDS** (COMPONENT OF MEMBRANE LIPIDS, INVOLVED WITH CELL SIGNALING, SKIN FUNCTIONING)

-NUTS, SEEDS, VEGETABLE OILS

•**AI:** 13 GRAMS/DAY

•**AMDR:** 5-10%

•**OMEGA-3 POLYUNSATURATED FATTY ACIDS** (NEUROLOGICAL DEVELOPMENT)

-VEGETABLE OILS, SOYBEANS, FLAX, FISH OIL, FATTY FISH, MEATS, EGGS

•**AI:** 1.4 GRAMS/DAY

•**AMDR:** 0.6-1.2%

Saturated Fats

SATURATED AND TRANS FATTY ACIDS (NO HEALTH BENEFITS AND NOT REQUIRED)

DRI AND AMDR: NOT DETERMINED (MINIMIZE INTAKE TO REDUCE RISK OF CHD)

FOODS HIGH IN TRANS FATS: FRENCH FRIES, CHEESEBURGER, PIES, CHICKEN NUGGETS, VANASPATI GHEE, DONUTS

Macronutrients in Pregnancy: Fiber

•**Function:** improves laxation, reduces risk of coronary artery disease, maintains normal blood glucose levels

•**Dietary sources:**

-**dietary fiber** (fruits, vegetables, nuts, legumes, grains)

-**functional fiber** (isolated, extracted, or synthetic fiber, such as pectin, chitin, polydextrose)

•**AI:** 28 grams/day

•**Key messages:** Make half your plate fruits and vegetables. Make at least half of your grains whole grains.

Omega-3 Fatty Acids

Three types of omega-3 polyunsaturated fatty acids:

ALA found in plant oils (flax seed, walnuts, soybeans, hemp seed, etc.)

EPA and **DHA** fatty fish--salmon, tuna, trout, sardines, and mackerel; DHA eggs or fortified foods)

-EPA and DHA may protect against heart disease, metabolic syndrome, type 2 diabetes, and depression by lowering inflammation

-DHA is the most abundant fatty acid in the brain, where it accumulates rapidly in the third trimester and neonatal period--maternal nutrition may affect the amount of DHA deposited in the growing brain

-because the benefits of DHA during pregnancy have not been proven, not enough evidence to recommend supplementation

-many expert groups suggest 200mg of DHA intake daily (2 meals of fish per week)

MICRONUTRIENTS: Vitamin A

•**Function:** a fat-soluble vitamin that is important for normal vision, gene expression, reproduction, embryonic development, growth, and immune function

•**Dietary sources:**

-Preformed Vitamin A (Retinol): animal-based foods (liver, dairy products, and fish)

-Dietary carotenoids (converted to vitamin A in the body): oils, fruits, and vegetables (b-carotene found in carrots, broccoli, squash, peas, spinach, and cantaloupe)

•**RDA:** 750-770mcg/day

•**UL:** 2,800-3,000mcg/day

•**Inadequate intake:** dietary intake appears to be adequate in the US and routine supplementation during pregnancy is not recommended; xerophthalmia (an irreversible drying of the conjunctiva and cornea that can lead to night blindness, etc.), decreased immune function, increased risk of infectious morbidity and mortality

•**Excess intake:** Vitamin A toxicity can only be produced by preformed Vitamin A (nausea, vomiting, headache, vertigo, blurred vision, muscular incoordination, bulging fontanel in infants, liver abnormalities, reduced bone mineral density, disorders of the central nervous system, teratogenic effects (doses >7,800mcg/day), such as craniofacial malformations and abnormalities of the CNS, thymus, and heart)

Vitamin B12

•**Function:** involved in normal blood formation and neurological function

•**Dietary Sources:** foods of animal origin (meat, dairy); fortified cereal

•**RDA:** 2.6mcg/day

•**UL:** not determined d/t insufficient data

•**Inadequate intake:** major cause of vitamin B12 deficiency is pernicious anemia, a condition in which the gastric mucosa of the stomach does not produce intrinsic factor; other people at risk, who need supplementation, include individuals with malabsorption syndrome, Crohn's disease, atrophic gastritis, or gastric bypass surgery, people who are HIV-positive with chronic Diarrhea, vegans, and infants of vegan mothers; hematological effects (weakness, fatigue, shortness of breath, and palpitations), neurological effects (tingling and numbness in the extremities, gait disturbances, cognitive changes such as loss of concentration, memory loss, disorientation, and dementia, with or without mood changes, visual disturbances, insomnia, impotency, and impaired bowel and bladder control), and GI effects (sore tongue, loss of appetite, flatulence, constipation)

•**Excess intake:** no adverse effects have been associated with excess vitamin B12 intake from food or supplements in healthy individuals

Post-gastric resection-follow B12 levels monthly

Vitamin C

•**Function:** antioxidant and cofactor in enzymatic and hormonal processes, modulates the absorption, transport, and storage of iron

•**Dietary Sources:** fruits and vegetables (citrus fruits, tomatoes, potatoes, strawberries, spinach, and cruciferous vegetables)

•**RDA:** 80-85mg/day

•**UL:** 1,800-2,000mg/day

•**Inadequate intake:** dietary intake appears to be adequate in the US; scurvy (inflamed and bleeding gums, impaired wound healing, dyspnea, edema, dry eyes and mouth, weakness, fatigue, depression); pregnant women who smoke or abuse drugs or alcohol may have increased requirements for vitamin C

•**Excess intake:** Vitamin C is not teratogenic and the risk of adverse effects from excess intake of Vitamin C appears to be low; diarrhea and GI disturbances

Vitamin D

•**Function:** involved in bone health, aids in the absorption of calcium and phosphorus

•**Dietary Sources:** synthesized in the skin through exposure to sunlight, found in fish, fish-liver oils, eggs from hens fed vitamin D, fortified milk products, and breakfast cereals

•**RDA:** 15mcg/day or 600IU/day

•**UL:** 100mcg/day or 4,000IU/day

•**Inadequate intake:** At risk individuals include older adults, especially those who live in far-northern latitudes, people with liver failure or Crohn's disease, people taking glucocorticoids or anti-seizure medications, breastfed infants who live in far-northern latitudes or whose sunlight exposure is restricted, and people with darker skin or heavy sunscreen use; inadequate bone mineralization or demineralization of the skeleton (rickets/osteomalacia, elevated serum parathyroid hormone, decreased serum phosphorus, osteoporosis)

•**Excess intake:** Vitamin D toxicity cannot occur from excess sun exposure; polyuria, polydipsia, hypercalciuria, calcification of soft tissues (including the kidneys, blood vessels, heart, and lungs), anorexia, nausea, vomiting, reduced renal function

Calcium

•**Function:** plays a key role in bone health, involved in vascular, neuromuscular, and glandular functions

•**Dietary Sources:** milk, yogurt, cheese, calcium-set tofu, calcium-fortified orange juice or soy/rice milk, Chinese cabbage, kale, broccoli

•**AI:** 1,000-1,300mg/day

•**UL:** 2,500mg/day

•**Inadequate intake:** osteopenia, osteoporosis, and an increased risk of bone fractures; the following women are at increased risk for calcium deficiency and may need supplementation: menopausal, lactose intolerant, vegan, breastfeeding multiple infants

•**Excess intake:** kidney stones, hypercalcemia with renal insufficiency, and a decreased absorption of certain minerals

Folate/folic acid

- Function:** B vitamin that functions as a coenzyme in the metabolism of nucleic and amino acids (folate is the natural form found in foods and folic acid is found in fortified foods/supplements)
- Dietary Sources:** fortified grain products, dark green vegetables, beans and legumes

- RDA:** 600mcg/day (vs. 400-500mcg/day as 1st trimester supplements, 4-5mg/day if there is diabetes, anticonvulsant medication use, or family history of neural tube defects)

- UL:** 800-1,000mcg/day

- Inadequate intake:** macrocytic anemia (weakness, fatigue, difficulty in concentrating, irritability, headache, palpitations, shortness of breath), neural tube defects; intakes of folate higher than the RDA may be needed by women with multiple gestations, mothers nursing more than one infant, chronic alcoholic use, and individuals on chronic anticonvulsant or methotrexate therapy; coexisting Vitamin B12 deficiency may interfere with the diagnosis of folate deficiency

- Excess intake:** no adverse effects have been associated with the excess consumption of the amounts of folate normally found in fortified foods; excess intake of folate in people with Vitamin B12 deficiency may exacerbate neurological complications (folate may mask Vitamin B12 deficiency and delay diagnosis)

Iodine

- Function:** essential component of thyroid hormones that are involved in the regulation of various enzymes and metabolic processes, including brain development

- Dietary Sources:** seafood has high concentrations, iodized salt

- RDA:** 220mcg/day •**UL:** 900-1,100mcg/day)

- Inadequate intake:** in the US, iodine deficiency is rare because of iodized salt; inadequate thyroid hormone production (goiter, hypothyroidism, mental disability, Cretinism (extreme form of neurological damage from fetal hypothyroidism), growth and developmental abnormalities

- Excess intake:** most people are very tolerant of excess iodine intake from food and supplements; thyroiditis, goiter, hypothyroidism, hyperthyroidism, sensitivity reactions, thyroid papillary cancer

Iron

- Function:** component of several proteins, including enzymes, cytochromes, myoglobin, and hemoglobin, which transports oxygen throughout the body; adequate iron intake is important in pregnancy to maintain the increase in red blood cell mass and meet the oxygen requirements of the uteroplacental circulation

- Dietary Sources:**
 - Heme iron (readily absorbed):** meat, fish, and poultry
 - Non-heme iron (less bioavailable):** vegetables, fruits, whole-grain breads, whole-grain pasta, fortified breads and cereals
 - *Vitamin C, meat, poultry, and fish enhance the absorption of iron, calcium inhibits absorption

- RDA:** 27mg/day •**UL:** 45mg/day

- Inadequate intake:** microcytic anemia (reduced physical work capacity, impaired cognitive function, delayed psychomotor development in infants, LBW, preterm delivery, perinatal infant mortality, increased risk for postpartum depression and infection); average American diet does not supply the increased iron requirement of pregnancy, so 30mg daily iron supplementation in pregnancy is recommended (intermittent supplementation may be acceptable)

- Excess intake:** the risk of adverse effects of excessive iron intake from dietary sources appears to be low; GI effects associated with high-dose supplements (constipation, nausea, vomiting, diarrhea); people with chronic alcoholism, liver disease, thalassemias are susceptible to the adverse effects of excess iron intake

CANADIAN SEAFOOD GUIDELINES

TUNAFISH

Limit the amount of canned 'albacore' or 'white' tuna. Eat no more than 300 grams (10 ounces) per week. This is equal to about two 170-g cans of albacore tuna per week. Health Canada has not established a maximum limit on eating light tuna such as 'skipjack', 'yellowfin' and 'tongol'; these types of tuna are low in mercury.

FISH TO AVOID (high food chain predators)

Limit the amount of fresh/frozen tuna, shark, swordfish, escolar, marlin, and orange roughy to no more than 150 g (5 ounces) per month