

Infant Nutrition – Nutrient Focus

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Diet by D'Zyne

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Key Nutrients During Early Childhood



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Session Outline

- Nutrient content of breastmilk
- Folate
- Vitamin D
- Iron
- Iodine
 - Nutrient function
 - Nutrient Status of Australian infants and children
 - Nutrient Deficiency
 - NRV
 - Dietary Food Sources

Nutritional Content of Breastmilk

- **FOLATE**

- 85µg/L

- **VITAMIN D**

- Breastmilk content ↓
- High bioavailability
- Fat-rich hindmilk ↑ amounts
 - Feed long enough to allow intake of hindmilk
- Sunlight important for formation of vitamin D
 - Few minutes exposure daily
 - Whole body exposure unnecessary (arms and face)

Nutritional Content of Breastmilk

- **IRON**

- Breastmilk content ↓ (0.3 mg/litre)
 - Highly bioavailable

- **IODINE**

- Amount varies
- Dependent on dietary intake
- Low in areas of iodine deficiency
- Iodine deficiencies in mothers → infants inadequate iodine status

Folate

- Folate ('folic acid')
- B group vitamin
- Main function - synthesize and repair DNA
- Important during periods of rapid cell division and growth
- Produce healthy red blood cells, prevent anaemia
- Folate levels ↓
 - Cooking (heat sensitive)
 - Prolonged storage of certain foods

Folate Status

- Status affected
 - Bioavailability
 - Food preparation
- Status improvement
 - Mandatory fortification of bread flour

Folate Deficiency

- Symptoms
 - Weight loss, tiredness, fatigue, weakness, megaloblastic anaemia
- During pregnancy - NTD

Folate NRV

Age	<u>Adequate intake</u> (As dietary folate equivalents)
0-6 months	65 µg/day (as folate)
7-12 months	80 µg/day

Source NHMRC

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Folate NRV

Age	Estimated average requirement (As dietary folate equivalents)	Recommended dietary intake (As dietary folate equivalents)
1-3 yr	120 µg/day	150 µg/day
4-8 yr	160 µg/day	200 µg/day

Source NHMRC



Folate NRV – Upper Level of Intake

Age	<u>Upper level of intake</u> (from fortified foods or supplements)
0-12 months	Not possible to establish for supplemental folic acid. Source of intake should be milk, formula and food only
1-3 yr	300 µg/day as folic acid
4-8 yr	400 µg/day as folic acid

Source NHMRC



Dietary sources of Folate

- Excellent
 - Asparagus, Spinach, Broccoli, Brussels Spouts, Legumes, Lentils, Bran flakes, Bovril/Bonox
- Very good
 - Cabbage, Cauliflower, Leek, Parsley, Peas, Oranges, Orange Juice, Wheatgerm, Wholegrain-bread
- Good
 - Bananas, Strawberries, Tomato, Beetroot, Green Beans, Parsnips, Potato, Cashews, Hazelnuts, Peanuts, Walnuts, Vegemite, Salmon

Fortification with Folate

- Mandatory fortification from September 2009
 - Australian millers required to add folic acid to wheat flour for bread-making
 - Most bread in Australia will contain added folic acid
- Organic flour exempt from mandatory fortification



Vitamin D

- Vitamin D
- Fat-soluble vitamin
- 2 major forms
 - vitamin D2 (ergocalciferol) and vitamin D3 (cholecalciferol)
- Produced in the skin after exposure to sunlight
- Occurs naturally in a small range of foods
- Aids in the absorption of calcium

Vitamin D Status

- Good status in Australian infants and children
 - Status of infant dependent on status of mother
 - Bioavailability from breastmilk
 - Sunlight 1⁰ source
 - Restricted to housebound/intititutionalised people (esp. elderly)
- Poor status
 - Exposure to sunlight ↓
 - Poor dietary intake of vitamin D rich foods

Vitamin D Deficiency

- Low vitamin D / vitamin D deficiency may have no obvious symptoms
 - significant health effects if not treated
- ↑ risk of musculoskeletal conditions - rickets in children
- Babies get initial store of vitamin D from their mothers
 - At risk of low vitamin D if mother has low vitamin D



Vitamin D NRV

Age	<u>Adequate intake</u>
0-6 months	5.0µg/day
7-12 months	5.0 µg/day
1-3 yr	5.0 µg/day
4-8 yr	5.0µg/day

Source NHMRC

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Vitamin D NRV – Upper Level of Intake

Age	<u>Upper level of intake</u>
0-12 months	25 µg /day
1-3 yr	80 µg/day
4-8 yr	80 µg/day

Source NHMRC

Dietary sources of Vitamin D

- Few foods contain significant amounts of vitamin D
- Excellent
 - fish, esp. fish with high fat content - sardines, salmon, herring and mackerel
- Moderate
 - meat, milk, eggs, fortified foods such as margarine
- Main source of vitamin D for Australians is exposure to sunlight

Iron



- Iron - several functions
 - Incl. transport of oxygen in the blood
- Iron deficiency → less oxygen delivered to cells → fatigue, tiredness & ↓ immunity

Iron Status

- Most common nutrient deficiency
- Infants born with adequate iron status → 6 months
 - Thereafter iron ↑ requirements
- Status affected by:
 - Pre-term infants
 - Early introduction of cow's milk (not recommended before 12 months)
 - +++ intake of cow's milk for toddlers
 - Delayed introduction of solids
 - Complimentary feeding introduced at 4-6 months improves iron status
 - Iron fortified infant cereal, veg, fruit
 - Followed by meat

Iron Deficiency

- Symptoms
 - FTT
 - Recurrent infections
 - Behavioural disturbances
 - Delayed cognitive development

Iron NRV

Age	<u>Adequate intake</u>
0-6 months	0.2 mg/day

Source NHMRC

Iron NRV

Age	<u>Estimated average requirement</u>	<u>Recommended dietary intake</u>
7-12 months	7 mg/day	11 mg/day
1-3 yr	4 mg/day	9 mg/day
4-8 yr	4 mg/day	10 mg/day

Source NHMRC

Iron NRV – Upper Level of Intake

Age	<u>Upper level of intake</u>
0-12 months	20 mg/day
1-3 yr	20 mg/day
4-8 yr	40 mg/day

Source NHMRC

Dietary sources of Iron



- Haem Sources
 - Liver, beef, lamb, pork, chicken, fish
- Non-haem sources
 - Wholemeal bread, legumes, nuts, spinach, fortified breakfast cereals, baby foods fortified with iron
- Full amount of iron is not absorbed by the body

Enhancing Iron Absorption

- Non-haem iron poorly absorbed
- ↑ absorption of non haem iron
 - Vitamin C – citrus fruits, berries, tomato, capsicum
 - Fortified baby foods with iron (e.g. rice cereal) may be fortified with vitamin C

Inhibiting Iron absorption

- Iron inhibitors
 - Phytates in wholegrains, brans and legumes
 - Tanins – tea, coffee, cola drinks (introduction of tea not recommended for toddlers)

Iodine



- Primary function is as a component of thyroid hormones
- Thyroid hormones - vital role in regulation of metabolic processes such as growth and energy expenditure
- Iodine is essential throughout childhood for normal brain and physical development
- Severe cases of iodine deficiency = irreversible mental retardation
- Mainly derived from the ocean and the soil
- Found in varying amounts in plants and animals
 - Quantity obtained from plants depends on the concentration of iodine in the soils
- Richest source is fish/seafood

Iodine Status

- Risk of mild iodine deficiency
 - South East Aust
- ↓ risk
 - QLD, WA
- Status affected by:
 - Iodine content of soils
 - Use of iodised salt



Iodine deficiency

- Spectrum of adverse health effects, iodine deficiency disorders (IDDs)
- Impact on all ages
 - most severely on the baby during pregnancy or in the period soon after birth
- Greatest impact during pregnancy
 - Devastating effects on the baby's developing brain and on physical growth
- Goitre is most commonly known, but least important of the disorders
- Mild iodine deficiency - impaired development, mild deficits in visual motor skills, hearing and intelligence
- Severe iodine deficiency - cretinism (severe mental retardation, growth stunting, apathy, and impaired movement, speech or hearing)
- Iodine deficiency - world's greatest cause of preventable brain damage

Iodine NRV

Age	<u>Adequate intake</u>
0-6 months	90 µg/day
7-12 months	110 µg/day

Source NHMRC

Iodine NRV

Age	<u>Estimated average requirement</u>	<u>Recommended dietary intake</u>
1-3 yr	65 µg/day	90 µg/day
4-8 yr	65 µg/day	90 µg/day

Source NHMRC

Iodine NRV – Upper Level of Intake

Age	<u>Upper level of intake</u>
0-12 months	Not possible to establish. Source of intake should be milk, formula and food only
1-3 yr	200 µg/day
4-8 yr	300 µg/day

Source NHMRC



Dietary sources of Iodine

- Excellent
 - Seaweed, seafood
- Moderate
 - Milk, yoghurt, cheese
 - Eggs
- Moderate – low
 - Vegetables
 - Fruit

Fortification with Iodine

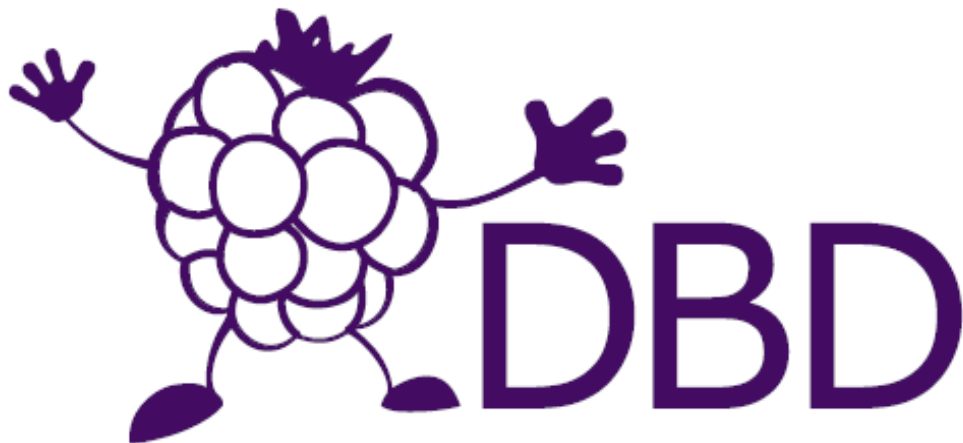
- Most bread in Australia and New Zealand will contain added iodine (from iodised salt) from October 2009
 - Replacement of non-iodised salt with iodised salt in bread
- Bread represented as 'organic' is exempt

Summary

- Nutrient content in breastmilk highly bioavailable
- Deficiency in Australia of key nutrients ↓
- Efforts to avoid deficiency – mandatory fortification
- Deficiency symptoms can range from mild to severe
- Set NRV for key nutrients
- Wide range of foods supplying key nutrients

The End

- Thank-you 😊
- Questions and Comments???



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