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# KEY NUTRIENTS IN EARLY CHILDHOOD

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# Outline

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- Focus on 0-5years
- Current research/studies
- Findings of 2007 Australian National Children's Nutrition and Physical Activity Survey
- What's new and emerging
  - Iodine
  - Vitamin D
- What's still important
  - Iron
  - Calcium
- New Food Guidance System for Australia – Foundation and Total Diets

# Research/Studies

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- Conn JA 2009<sup>1</sup>, longitudinal study of child growth and development
  - Infant diet assessed through an interview and 4 day diet diary
  - Set in Adelaide-included 161 girls and 180 boys 9 months old infants
  - Inadequate intake of:
    - zinc in <1% of infants
    - iron in 9% of infants
      - Particularly evident during weaning period
  - 5% main drink was cow's milk
  
- Webb K 2008<sup>2</sup>, data collected as part of an asthma study
  - Western Sydney area, carers of 429 children completed a three-day weighed food records
  - 5% of children where below the EAR for vitamin A, calcium, vitamin C, iron
  - Sodium intakes exceeded upper levels for 62% of children
  - Fibre only met 50% of AI

1. Conn JA, Davies MJ, Walker RB, Moore VM. Food and nutrient intakes of 9-month-old infants in Adelaide Australia. *Public Health Nutrition* 2009; 12: 2448-2456.

2. Webb K, Rutishauser I, Knezevic. Foods nutrients and portions consumed by a sample of Australian children aged 16-24 months. *Nutr Diet* 2008; 65: 56-65.

# Findings of 2007 Australian National Children's Nutrition and Physical Activity Survey

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- ❑ Selected nutrients were thiamin, niacin, vitamin A, C, D, E, calcium, iron, zinc, iodine
- ❑ Iodine: 7% of children between 2-3 years and 4-8 years did not meet the EAR
- ❑ Calcium: 11% children between 4-8 years did not meet EAR  
1% children between 2-3 years did not meet EAR
- ❑ Vitamin C: 4% all children between 2-3 years did not meet EAR
- ❑ Iron: Only 1% of children 2-3 year did not meet EAR

# Iodine

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## □ Why Iodine is needed?

- The body needs very small quantities of iodine regularly
- Iodine is stored in the thyroid and any excess excreted
- Synthesis of thyroid hormones T4 (Thyroxine) and T3 (3,5,5'-tri-iodothyronine) by the thyroid gland
- The hormones T3 and T4 are needed for:
  - foetal development
  - normal brain and physical development in infancy
    - Adverse effects on early brain and nervous system are usually irreversible

Gordon RC, Rose MC, Skeaff SA et al. Iodine supplementation improves cognition in mildly iodine deficient children. *Am J Clin Nutr* 2009; 1-8.

# Iodine

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## □ Sources of Iodine

- Found in soil and the sea
- Best sources are ocean fish, seafood and fortified bread
- Iodised salt
- Smaller amounts in other foods such as dairy and eggs
- Infants stores accumulate in utero and from breast milk or infant formula

## □ Mandatory Iodine Fortification Standards by FSANZ (Foods Standards Australia and New Zealand)

- From 9<sup>th</sup> October 2009 all salt added to bread is iodised salt with exception of organic breads

# Iodine

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- At risk infants and children
  - Infants of iodine deficient mothers
  - Breastfed infants and toddlers of iodine deficient mothers
  
- Recommendations
  - Include having fortified bread, dairy and seafood in diet
  - Additional requirements needed for women who are pregnant, breastfeeding or considering pregnancy<sup>1</sup>
    - Important to consult with doctor

1. NHMRC Public Statement January 2010: Iodine Supplementation  
[www.nhmrc.gov.au/\\_files\\_nhmrc/file/publications/synopses/new45\\_statement.pdf](http://www.nhmrc.gov.au/_files_nhmrc/file/publications/synopses/new45_statement.pdf)

Li M, Eastman CJ, Waite KV, et al. Are Australian children iodine deficient? Results of the Australian National Iodine Nutrition Study. *Med J Aust* 2006; 184: 165-169.

# Vitamin D

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- Why vitamin D is important?
  - Aids in absorption of calcium and phosphate
  - Maintains calcium homeostasis
  - Promotes skeletal mineralisation
  - May have a role within the immune system and maintenance of healthy skin
  
- Sources of Vitamin D
  - Vitamin D2 (ergocalciferol): small amounts found in food
  - Vitamin D3 (cholecalciferol): main source from sunlight
  - Breast milk
  - Infant formula
  
- Deficiency in infants and children
  - Serum levels of 25-OHD is a good indicator of Vitamin D status
  - Common presentations of vitamin D deficiency
    - Hypocalcaemic seizures
    - Rickets

# Vitamin D

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## □ At risk groups

- Dark skin colour
- Reduced sun exposure (veiled women)
- Newborns of Vitamin D deficient mothers
- Infants or toddlers who are exclusively or partially breastfed by vitamin D deficient mothers
- Medical conditions such as small bowel disorders, pancreatic insufficiency, chronic liver/renal disease
- Children on some medications such as anticonvulsants

# Vitamin D

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## □ Current Recommendations

- Be aware of at risk groups
- Mandatory fortification of Vitamin D in margarine
- Voluntary fortification in skim milks, powdered milk, yoghurts, cheese and other dairy produces<sup>1</sup>
- Sun exposure<sup>2,3</sup>
- No increased requirements during pregnancy or lactation

1. Nowson CA, Margerison C. Vitamin D intake and vitamin d status of Australians. *Med J Aust* 2002; 177: 149-152.
2. Munns C, Zacharin MR, Rodda CP et al. Prevention and treatment of infant and childhood vitamin D deficiency in Australia and New Zealand: a consensus statement. *Med J Aust* 2006; 185: 268-272.
3. [www.cancer.org.au/policy/positionstatements/sunsmart/sunprotectionandinfants.htm](http://www.cancer.org.au/policy/positionstatements/sunsmart/sunprotectionandinfants.htm)

# Iron

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- Why Iron is important?
  - Red blood cell production
  - Transportation of oxygen around the body
  - Brain development, growth and has a role in preventing infections
  
- Sources of Iron
  - Breast milk
  - Infant formula
  - 2 forms of iron found in foods haem and non-haem iron
    - Best source of dietary iron is red meats ie beef/lamb.
    - Moderate amounts found in fish/chicken.
    - Other foods include fortified breakfast cereals, eggs, legumes, wholegrain breads and cereals, and some vegetables.
  - Foods rich in Vitamin C, such as oranges and tomatoes enhance absorption

# Iron

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- ❑ Deficiency in infants and children
  - Low iron stores, iron deficiency, iron deficiency anaemia
  - Symptoms of iron deficiency can include:
    - ❑ Lethargy, loss of appetite
    - ❑ Poor growth and development
    - ❑ Mental delay, reduced immune function.
  - A large number of iron deficient children will have no symptoms at all.
  
- ❑ At risk infants and children
  - Premature births
  - Low birth weight
  - Exclusive breastfeeding beyond 6 months
  - Introduction of cow's milk as the main drink before 12 months
  - High intake of cow's milk
  - Delayed introduction of solids
  - Inadequate iron in diet ie vegetarian or inadequate meat intake

# Iron

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## □ Current recommendations

- Iron is toxic in large doses-supplement with caution
- 1-7 years ½ to 1 serve of meat or meat alternatives
  - One Serve is equal to 65–100 g cooked meat (1/2 cup lean mince)  
1/2 cup cooked (dried) beans, lentils, chick peas, split peas,  
2 small eggs
- Include vitamin C containing foods with non-haem iron sources
- Ensure cow's milk/toddler formula does not exceed 600mls
- Increased requirements during pregnancy and lactation

# Calcium

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- Why Calcium is important?
  - Around 99% of the calcium in the body is found in the skeleton
  - Calcium is required for the normal development and maintenance of the skeleton, neuromuscular and cardiac function
  - Bone mass increases rapidly from birth to adolescence and then remains stable
  - Long-term consequences of low intake of calcium is associated with osteoporosis
  
- Sources of Calcium
  - Milk and dairy products
  - Require daily intake of calcium

# Calcium

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- Deficiency in infants and children
  - Small stature
  - Poor bone health
  - Not achieving peak bone mass
- Requirements
  - 1-3 years 1½ serves of dairy
  - 4-7 years 2-3 serves of dairy
    - 1 serve=250mls milk or equiv.
- Soy products
  - Ensure calcium fortified >100mg/100g
- Supplementation maybe needed, discuss this with doctor/dietitian

Black RE, Williams SM, Jones IE, Goulding A. Children who avoid drinking cow milk have low dietary calcium intakes and poor bone health. *Am J Clin Nutr* 2002; 76: 675-680.

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- A New Food Guidance System for Australia  
– Foundation and Total Diets