Dietary Planning Across the Lifespan – NMDD221

Session 5

Dietary Planning for Pregnancy and Lactation

Nutritional Medicine Department
Overview

- Nutrition and dietary planning in pregnancy
- Healthy weight gain during pregnancy
- Food safety measures during pregnancy and lactation
- Dietary management of:
  - Pre-eclampsia
  - Gestational diabetes
  - Anaemia
- Dietary approaches for optimising breast milk supply in lactation
- Mastitis
Dietary Planning
Pregnancy – What’s happening?

Some of the physiological changes throughout pregnancy

• One of the first symptoms that women notice is an increase in the size and tenderness of their breasts.
• As the uterus grows, the ligaments that support breast tissue stretch and may become sore. This may also translate into lower back pain.
• Blood volume expands by approximately 50% by the end of pregnancy.
• Haemoglobin, serum albumin and water soluble vitamins decrease in the blood.
• The heart will increase in size by approximately 12%.

(Mahan, 2012)
Dietary Planning
Pregnancy – What’s happening?

Some of the physiological changes throughout pregnancy (Continued)

- Motility of the GIT is often affected (due to the rising levels of progesterone)
- The gallbladder becomes less efficient at releasing bile → constipation
- Vaginal secretions increase, changing vaginal pH → increased tendency for thrush to develop.
- The GFR will increase by approximately 50%, however renal tubular reabsorption is less efficient than non-pregnant women.

(Mahan, 2012)
Dietary Planning
The role of diet during pregnancy

Foetal Programming

• The Foetal Origins Hypothesis states that “impaired intrauterine growth and development may be the root cause of many diseases later in life. It is postulated that this occurs through the mechanism of foetal programming, whereby a stimulus or insult at a critical period in early life development has a permanent effect on the structure, physiology or function of different organs and tissues”

(Williamson, 2006)
Dietary Planning

The role of diet during pregnancy

Foetal Programming

“The foetal origins hypothesis proposed that these associations reflect permanent metabolic and structural changes resulting from undernutrition during critical periods of early development”

(Williamson, 2006)
Dietary Planning

The role of diet during pregnancy

Epigenetics and the implications of maternal diet

• **Epigenetics:** changes in genetic expression through the way the surrounding environment effects the expression of the gene in question. It is not through changes in the DNA sequence.

• Numerous studies have shown links between alterations in DNA methylation and early-life environmental factors.

(Drake et al., 2012)
Dietary Planning

The role of diet during pregnancy

• Epidemiological studies show an association between exposure to an adverse early-life environment and subsequent cardiometabolic disease.

• Glucocorticoids play a crucial role in tissue development and maturation and have well-described effects on metabolism. Increased activation of the hypothalamic-pituitary-adrenal (HPA) axis is a recognised association of exposure to adverse environment in early life.

(Drake et al., 2012)
Dietary Planning

The role of diet during pregnancy

• A cohort study conducted by Drake et al. (2012), measured DNA methylation in individuals aged 40, whose mothers ate an unbalanced diet during pregnancy (that had previously been linked with high blood pressure and cortisol in adult offspring).

Results

• The adult off-spring of mothers who ate the most unbalanced diets have higher blood pressures, higher cortisol levels and heightened HPA axis responses to stress.

(Drake et al., 2012)
Dietary Planning
The role of diet during pregnancy

Associations of percentage mean methylation at glucocorticoid receptor (GR) in the offspring with maternal diet (portions of food per week) during late pregnancy. Significant correlations (P < 0.05) of percentage mean methylation at glucocorticoid receptor in the offspring with maternal diet according to the specific dietary advice to increase protein intake and reduce carbohydrate intake.

Figure shows portions of food eaten per week during ‘late’ pregnancy (>20 weeks gestation).
(a) meat portions/week, (b) fish portions/week, (c) vegetable portions/week, (d) bread portions/week, (e) potato portions/week.

(Drake et al., 2012)
Dietary Planning

The role of diet during pregnancy

• Alterations in DNA methylation are present in adulthood in association with both early-life parameters and cardiometabolic risk factors. These alterations are present at genes important in regulating:
  – circulating cortisol levels
  – tissue glucocorticoid action
  – blood pressure
  – foetal growth.

• Specific components of maternal diet can impact on DNA methylation and disease risk later in life.

• The findings suggest a role for epigenetic alterations in the programming of cardiovascular disease risk in humans.

(Drake et al., 2012)
Dietary Planning
Pregnancy

Do mothers really need to eat for 2?
Dietary Planning
Pregnancy

• Women don’t need to eat for 2, although changes in appetite are common throughout pregnancy (either increase or decreased).
  – The way food tastes, smells and feels affects 2 out of 3 women in their pregnancy.
  – Increased preference for foods such as sweets, fruits, salty foods, and dairy products are common.
  – The odours of meat being cooked, coffee, perfume, cigarette smoke and petrol are common nasal offenders and may stimulate episodes of nausea.

(Brown, 2011)
Dietary Planning

Nutritional and Energy Requirements in Pregnancy

Additional energy is required as follows:

- First trimester = no additional energy
- Second trimester = + 1400 kJ per day
- Third trimester = + 1900 kJ per day

(www.nrv.gov.au)
Dietary Planning

Nutritional and Energy Requirements in Pregnancy

Basal Metabolic Rate Requirements (kJ) and Recommended Daily Kilojoule Intake Throughout Pregnancy

(Williamson, 2012)
Dietary Planning

Nutritional and Energy Requirements in Pregnancy

• The diet throughout pregnancy needs to be nutritionally complete so that enough energy is supplied to ensure the delivery of a healthy, full term baby – as well as provide nourishment and promote healing for the mother.

• General physical activity requires more energy during pregnancy due to an overall increase in body mass

  – i.e. women tend to expend more energy carrying out the same activities

(Williamson, 2012)
Micronutrient intake levels were optimised with intermediate protein (18 – 20%) intermediate fat (28 – 30%) and intermediate carbohydrate (50 – 55%) intakes.

Results suggest that a moderate protein intake may support pregnant women to consume the largest variety of nutrients across all food groups”

(Blumfield et al., 2012)
Dietary Planning
Pregnancy – *Individualised Nutrient Requirements*

- Protein needs increase during the 2\textsuperscript{nd} and 3\textsuperscript{rd} trimester from 0.75 g/kg bw → 1.0 g/kg bw.

- Vitamin B6 RDI 1.5 mg → 1.9 mg/day.
- Folate RDI 400 mcg/day → 600 mcg/day.
- Vitamin B12 RDI 2.4 mcg → 2.6 mcg.
- Choline AI 425 mg → 440 mg/day.
- Vitamin A RDI 700 mcg → 800 mcg/day.
- Vitamin C RDI 45 mg → 60 mg/day.
- EPA/DHA/DPA AI 90 mg → 115 mg/day.
Dietary Planning
Pregnancy – Individualised Nutrient Requirements

- Chromium AI 25 mcg → 30 mcg/day.
- Iodine RDI 150 mcg → 220 mg/day.
- Iron RDI 18 mg → 27 mg/day.
- Magnesium RDI 320 mg → 350 mg/day.
- Zinc RDI 8 mg → 11 mg/day.

- There are no increases in RDI/AIs for sodium, potassium, calcium, vitamin D, vitamin K and vitamin E.  
  (National Health and Medical Research Council [NHMRC], 2006)
Food Safety in Dietary Planning for Pregnancy
Food Safety in Dietary Planning

Food Borne Contaminants: Listeria

- Adequate food handling, preparation and storage is vital for the safety of the mother and unborn child during pregnancy.

Listeria
- A harmful bacteria that effects the developing foetus.
- The mother can contract the bacteria and pass it on to their child without feeling sick.
  - Prevention of ‘Listeriosis’ is therefore, important.
Food Safety in Dietary Planning

Food Borne Contaminants: Listeria

- Listeria survives at refrigerated temperatures – most other bacteria would not continue to grow.
- Found in ready-to-eat foods (meats, poultry, seafood and dairy products)
- Listeria can also be found on fruits and vegetables that are contaminated from the soil or manure of other infected mammals.
  - Always wash fruits and vegetable thoroughly.

(US FDA, 2014)
Food Safety in Dietary Planning

Food Borne Contaminants: Listeria

- Pregnant women are 10 times more likely to get listeriosis than other healthy adults.
- If contracted in the first trimester of pregnancy, it may cause miscarriage.
- If contracted in the third trimester, Listeriosis can lead to premature labour, low birth weight or infant death.
- Infection has also been associated with mental retardation, paralysis, seizures, blindness and impairments of the heart, brain or kidneys.

(US FDA, 2014)
Food Safety in Dietary Planning
Food Borne Contaminants: Salmonella

Salmonella

• A bacteria, commonly responsible for food borne illnesses that results in gastroenteritis.
• Salmonella can cross the placenta and cause severe disease, multi-system organ failure and foetal death.
• The antibiotic that is commonly prescribed to deal with Salmonella cannot be used in pregnancy as it is associated with birth defects.

(US FDA, 2014)
Food Safety in Dietary Planning
Food Borne Contaminants: Toxoplasmosis

Toxoplasmosis

• Caused by parasite *Toxoplasma gondii* that is found in:
  – Raw and undercooked meats
  – Unwashed fruits and vegetables
  – Contaminated water
  – Contaminated dust, dirt and soil
  – Kitty litter boxes (or other outdoor places where cat faeces can be found)

(US FDA, 2014)
Food Safety in Dietary Planning
Food Borne Contaminants: Toxoplasmosis

Toxoplasmosis

• The symptoms of toxoplasmosis can include:
  – Swollen glands
  – Fever
  – Headaches
  – Muscular pain or a stiff neck
• Only around 10% of infected women have noticeable symptoms.

(US FDA, 2014)
Food Safety in Dietary Planning
Food Borne Contaminants: Methylmercury

Methylmercury

- Most commonly found in large, predatory fish like shark, marlin, swordfish, mackerel and tilefish. It is found in lower concentrations in tuna.
- Methylmercury is highly toxic compound to a developing nervous system.
- Mercury toxicity can cause blindness, cerebral palsy, deafness, growth problems, intellectual disabilities, impaired lung function and microcephaly (small head).

(Williamson, 2012)
Food Safety in Dietary Planning
General Guidelines for Pregnancy

<table>
<thead>
<tr>
<th>Food</th>
<th>Form</th>
<th>What to do</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processed meats</td>
<td>Ham, salami, luncheon, chicken meat etc</td>
<td>DON’T EAT unless thoroughly cooked to at least 75°C and eaten soon afterwards</td>
</tr>
<tr>
<td>Raw meat</td>
<td>Any raw meat, raw chicken or other poultry, beef, pork etc</td>
<td>DON’T EAT</td>
</tr>
<tr>
<td>Poultry</td>
<td>Cold chicken or turkey, eg used in sandwich bars</td>
<td>DON’T EAT</td>
</tr>
<tr>
<td></td>
<td>Hot take-away chicken</td>
<td>Purchase freshly cooked and eat while hot. Store leftovers in fridge to reheat to at least 60°C and use within a day of cooking</td>
</tr>
<tr>
<td></td>
<td>Home cooked</td>
<td>Ensure chicken is cooked thoroughly to at least 74°C and eat while hot. Store any leftovers in fridge to reheat to at least 60°C and use within a day of cooking</td>
</tr>
</tbody>
</table>

(Adapted from Food Authority NSW, 2014)
## Food Safety in Dietary Planning

### General Guidelines for Pregnancy

(Adapted from Food Authority NSW, 2014)

<table>
<thead>
<tr>
<th>Category</th>
<th>Example</th>
<th>Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pâté</strong></td>
<td>Refrigerated pâté or meat spreads</td>
<td><strong>DON’T EAT</strong></td>
</tr>
<tr>
<td><strong>Seafood</strong></td>
<td>Raw seafood</td>
<td><strong>DON’T EAT</strong></td>
</tr>
<tr>
<td></td>
<td>Ready-to-eat chilled peeled prawns</td>
<td><strong>DON’T EAT</strong></td>
</tr>
<tr>
<td><strong>Cooked fish and seafood</strong></td>
<td></td>
<td>Cook thoroughly to at least 63°C and eat while hot. Store leftovers in the fridge to reheat to at least 60°C and use within a day of cooking</td>
</tr>
<tr>
<td><strong>Sushi</strong></td>
<td>Store-bought</td>
<td><strong>DON’T EAT</strong></td>
</tr>
<tr>
<td></td>
<td>Home-made</td>
<td>Don’t use raw meat or seafood, eat immediately</td>
</tr>
<tr>
<td><strong>Cooked meats</strong></td>
<td>Beef, pork, chicken, mince</td>
<td>Cook thoroughly to at least 71°C (medium), eat while hot</td>
</tr>
</tbody>
</table>
# Food Safety in Dietary Planning

## General Guidelines for Pregnancy

(Adapted from Food Authority NSW, 2014)

<table>
<thead>
<tr>
<th>Dairy &amp; Eggs</th>
<th></th>
<th>What to do</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cheese</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soft and semi-soft cheese, eg brie, camembert, ricotta, feta, blue etc</td>
<td><strong>DON'T EAT</strong> unless thoroughly cooked to at least 75°C and eaten soon afterwards</td>
<td></td>
</tr>
<tr>
<td>Processed cheese, cheese spreads, cottage cheese, cream cheese etc</td>
<td>Store in the fridge, eat within two days of opening pack</td>
<td></td>
</tr>
<tr>
<td>Hard cheese, eg cheddar, tasty cheese</td>
<td>Store in the fridge</td>
<td></td>
</tr>
<tr>
<td><strong>Ice-cream</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soft serve</td>
<td><strong>DON'T EAT</strong></td>
<td></td>
</tr>
<tr>
<td>Fried ice-cream</td>
<td><strong>DON'T EAT</strong></td>
<td></td>
</tr>
<tr>
<td>Packaged frozen ice-cream</td>
<td>Keep and eat frozen</td>
<td></td>
</tr>
<tr>
<td><strong>Dairy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unpasteurised (raw)</td>
<td><strong>DON'T DRINK OR USE</strong></td>
<td></td>
</tr>
<tr>
<td>Pasteurised, eg milk, cream, yoghurt</td>
<td>Check 'best before' or 'use-by' date. Follow storage instructions</td>
<td></td>
</tr>
</tbody>
</table>
# Food Safety in Dietary Planning

## General Guidelines for Pregnancy

(Adapted from Food Authority NSW, 2014)

<table>
<thead>
<tr>
<th>Custard</th>
<th>Store-bought</th>
<th>Can be eaten cold if freshly opened. Store in fridge to reheat to at least 60°C and use within a day of opening. Check 'best before' or 'use-by' date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home-made</td>
<td></td>
<td>Cook thoroughly to at least 71°C and eat while hot. Store in fridge. Always reheat to at least 60°C and use within a day of making</td>
</tr>
<tr>
<td>Eggs</td>
<td>Cooked egg dished eg fried eggs, scrambled eggs, quiche</td>
<td>Cook thoroughly to at least 71°C. Don't use cracked or dirty eggs</td>
</tr>
<tr>
<td></td>
<td>Raw in food eg home-made mayonnaise, chocolate mousse, aioli</td>
<td>DON'T EAT</td>
</tr>
<tr>
<td></td>
<td>In non-refrigerated commercial products eg mayonnaise, aioli</td>
<td>Check 'best-before' or use-by' date. Follow storage instructions</td>
</tr>
</tbody>
</table>
## Food Safety in Dietary Planning

### General Guidelines for Pregnancy

(Adapted from Food Authority NSW, 2014)

<table>
<thead>
<tr>
<th>Food</th>
<th>Form</th>
<th>What to do</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salads</td>
<td>Pre-prepared or pre-packaged salads including fruit salad, eg from salad bars, smorgasbords</td>
<td>DON'T EAT</td>
</tr>
<tr>
<td>Home-made</td>
<td></td>
<td>Wash salad ingredients well just before making and eating salads, store any leftover salads in fridge and use within a day of preparation</td>
</tr>
<tr>
<td>Fruit</td>
<td>Whole fresh fruits</td>
<td>Wash well before eating</td>
</tr>
<tr>
<td>Vegetables and herbs</td>
<td>Fresh vegetables and herbs</td>
<td>Wash well just before eating raw or wash before cooking</td>
</tr>
<tr>
<td>Frozen vegetables</td>
<td></td>
<td>Cook, don't eat uncooked</td>
</tr>
<tr>
<td>Bean sprouts</td>
<td>Alfalfa sprouts, broccoli sprouts, onion sprouts, sunflower sprouts, clover sprouts, radish sprouts, snowpea sprouts, mung beans and soybean sprouts</td>
<td>DON'T EAT raw or lightly cooked</td>
</tr>
</tbody>
</table>
### Food Safety in Dietary Planning

#### General Guidelines for Pregnancy

(Adapted from Food Authority NSW, 2014)

<table>
<thead>
<tr>
<th>Food</th>
<th>Form</th>
<th>What to do</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leftovers</td>
<td>Cooked foods</td>
<td>Store leftovers covered in the fridge, eat within a day and always reheat to at least 60°C</td>
</tr>
<tr>
<td>Canned foods</td>
<td>Tinned fruit, vegetables, fish etc</td>
<td>Store unused portions in the fridge in clean, sealed containers and use within a day</td>
</tr>
<tr>
<td>Stuffing</td>
<td>Stuffing from chicken or poultry</td>
<td>DON'T EAT unless cooked separately and eat hot</td>
</tr>
<tr>
<td>Hommus</td>
<td>Store-bought or home-made</td>
<td>Store in fridge, eat within two days of opening or making</td>
</tr>
<tr>
<td>Soy</td>
<td>All soy products, eg tofu, soy milk, soy yoghurt etc</td>
<td>Check 'best before' or 'use-by' date. Follow storage instructions</td>
</tr>
</tbody>
</table>
Alcohol, Tobacco and Caffeine in Pregnancy
Alcohol in Pregnancy

• There is currently a lack of consensus around what is a ‘safe level’ of alcohol to consume during pregnancy – this is why currently, the safest option is ‘not drinking’.
• Heavy alcohol intake (\(> 80 \text{ g of alcohol per day} = \text{around 10 standard units}\)) is linked with an increased risk of Foetal Alcohol Syndrome.

(Williamson, 2006)
Alcohol in Pregnancy

Foetal Alcohol Syndrome

FAS Facial Characteristics:
small eye openings
smooth philtrum
thin upper lip

(Williamson, 2006)
Alcohol in Pregnancy

Alcohol

• Alcohol causes depletion, impaired absorption and increased excretion of folate and other key minerals.

• The Royal College of Obstetricians and Gynaecologists have concluded that:

   “More than 3 drinks per week during the first trimester of pregnancy leads to an increased risk of spontaneous abortion and intakes over 15 units per week may have a negative effect on birth weight”

(Williamson, 2006)
Alcohol in Pregnancy

The Australian Guidelines to Reduce Health Risks from Drinking Alcohol:

Guideline 4: Pregnancy and breastfeeding
Maternal alcohol consumption can harm the developing foetus or breastfeeding baby.

A. For women who are pregnant or planning a pregnancy, not drinking is the safest option.
B. For women who are breastfeeding, not drinking is the safest option.

(NHMRC, 2009)
The term “Foetal Alcohol Spectrum Disorder” (FASD) is used to describe the range of effects of foetal alcohol exposure on mental development and physical growth. This range includes:

- Behavioural problems
- Mental retardation
- Aggressiveness
- Nervousness
- Short attention span
- Growth stunting
- Birth defects

(Brown, 2011)
Alcohol in Pregnancy
Combining with tobacco

• Smoking and alcohol have been shown in human and animal studies to reduce foetal growth and increase risk of adverse birth outcomes.

• Levels of vitamin C, beta carotene, B12, B6 and folate are all reduced by tobacco and alcohol consumption during pregnancy.

(Cogswell, 2003)
Smoking in Pregnancy

• Smoking during pregnancy:
  – Reduces the growth of the baby/babies
  – Increases the risk of complications for the baby and mother
  – Increases the risk of premature birth, still birth and increased infant mortality.

• The toxic chemicals found in cigarettes pass through the placenta and directly affect the developing baby.

• The baby’s lungs are particularly susceptible to damage.

(‘Quit Now’ Australian Government, 2012)
Smoking in Pregnancy

• Women who smoke have a:
  – 60% higher risk of having a preterm baby than non-smoking mothers.
  – On average, will be more likely to have a low birth weight baby, one of the leading causes of infant death.
  – 50% higher chance of giving birth to a still born baby
  – 3 times higher chance that their baby will die from SIDS.
  – 20% of Australian women report that they smoke while pregnant.

(‘Quit Now’ Australian Government, 2012)
Smoking in Pregnancy

Smoking during pregnancy reduces the flow of blood in the placenta and limits the oxygen and nutrients that reach the growing baby. This increases the risk of miscarriage, stillbirth, premature birth, complications during birth or the baby having a smaller brain and body. You CAN quit smoking. Call Quitline 131 848, talk to your doctor or pharmacist, or visit www.quitnow.info.au

(‘Quit Now’ Australian Government, 2012)
Caffeine Consumption in Pregnancy

• The Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment have stated that:

“there is plausible evidence of an association between caffeine intakes above 300 mg per day and low birth weight as well as spontaneous abortions”
Caffeine Consumption in Pregnancy

- Caffeine is present in a variety of foods, as well as some prescription and over the counter medicines.

<table>
<thead>
<tr>
<th>Beverage or food</th>
<th>Serving size</th>
<th>Caffeine content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instant coffee</td>
<td>190 ml cup</td>
<td>Approximately 75 mg</td>
</tr>
<tr>
<td>Brewed coffee (filter or percolated)</td>
<td>190 ml cup</td>
<td>Approximately 100–115 mg</td>
</tr>
<tr>
<td>Decaffeinated coffee (instant or brewed)</td>
<td>190 ml cup</td>
<td>Approximately 4 mg</td>
</tr>
<tr>
<td>Tea</td>
<td>190 ml cup</td>
<td>Approximately 50 mg</td>
</tr>
<tr>
<td>Drinking chocolate</td>
<td>200 ml</td>
<td>1.1–8.2 mg when made up as per manufacturers’ instructions</td>
</tr>
<tr>
<td>Energy drinks (containing either added caffeine or guarana)</td>
<td>250 ml</td>
<td>28–87 mg</td>
</tr>
<tr>
<td>Cola (regular and diet)</td>
<td>330 ml can</td>
<td>11–70 mg</td>
</tr>
<tr>
<td>Chocolate</td>
<td>50 g bar</td>
<td>5.5–35.5 mg</td>
</tr>
</tbody>
</table>

Healthy Weight Gain During Pregnancy
Healthy Weight Gain During Pregnancy

• For a healthy-weight woman, weight gain ideally follows a pattern of approximately 1 to 2 kg during the first trimester and around 400 grams per week thereafter.

• Most of the weight gain supports the growth and development of the placenta, uterus, blood and breasts, the increase in blood supply and fluid volume, as well as the weight of the infant.
## Healthy Weight Gain During Pregnancy

<table>
<thead>
<tr>
<th>Pre-pregnancy weight</th>
<th>Recommended weight gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight BMI &lt; 18.5</td>
<td>12.5-18 kg</td>
</tr>
<tr>
<td>Healthy weight BMI 18.5 to 24.9</td>
<td>11.5 to 16 kg</td>
</tr>
<tr>
<td>Overweight BMI 25 to 29.9</td>
<td>7 to 11.5 kg</td>
</tr>
<tr>
<td>Obese BMI ≥ 30</td>
<td>5 to 9 kg</td>
</tr>
</tbody>
</table>

(Whitney et al., 2011)
Healthy Weight Gain During Pregnancy

• Low weight gain is associated with increased risk of intrauterine growth retardation and perinatal mortality.

• High weight gain is associated with high birth weight and secondarily with increased risk of complications related to foetopelvic disproportion.

(Picciano, 2003)
Healthy Weight Gain During Pregnancy

<table>
<thead>
<tr>
<th>Item</th>
<th>Weight gain (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in breast size</td>
<td>0.9</td>
</tr>
<tr>
<td>Increase in mother’s fluid volume</td>
<td>1.8</td>
</tr>
<tr>
<td>Placenta</td>
<td>0.7</td>
</tr>
<tr>
<td>Increase in blood supply to the placenta</td>
<td>1.8</td>
</tr>
<tr>
<td>Amniotic fluid</td>
<td>0.9</td>
</tr>
<tr>
<td>Infant at birth</td>
<td>3.4</td>
</tr>
<tr>
<td>Increase in size of uterus and supporting muscles</td>
<td>0.9</td>
</tr>
<tr>
<td>Increase in mother’s necessary fat stores</td>
<td>3.2</td>
</tr>
<tr>
<td>Total</td>
<td>13.6</td>
</tr>
</tbody>
</table>

(Whitney et al., 2011)
Dietary Management of Pregnancy Related Conditions
Pre-eclampsia
Dietary Management of Pregnancy Related Conditions: Pre-eclampsia

• A pregnancy-induced condition, that can occur from 20 weeks, but more commonly presents towards the end of the pregnancy.

• Aetiology is unknown, however obesity is a major risk factor.

• Characterised by high blood pressure, sudden swelling, rapid weight gain (mostly due to the fluid retention) and **proteinuria**.
  – Different from **pregnancy – induced hypertension** which does not have proteinuria.
Dietary Management of Pregnancy Related Conditions:  

Pre-eclampsia

• An inflammatory condition that involves endothelial dysfunction and inadequate antioxidant defences.
• Increased platelet aggregation and blood coagulation
• Blood vessel spasms and constrictions
• Increased blood pressure
• Insulin resistance
• Adverse maternal immune response to the placenta
• Elevated blood levels of triglycerides, free fatty acids, and cholesterol.

(Brown, 2011)
Dietary Management of Pregnancy Related Conditions: Pre-eclampsia

- Affects the placenta and may affect the mother’s kidney, liver, and brain.
- Leading cause of foetal complications, such as low birth weight, premature birth, and stillbirth
- Eclampsia – when pre-eclampsia causes seizures
Dietary Management of Pregnancy Related Conditions: Pre-eclampsia

Activity: Reading 2

• Based on the information in the reading, create a list of 10 dietary recommendations that you would advise a newly pregnant woman to help her avoid getting preeclampsia.
Gestational Diabetes
Dietary Management of Pregnancy Related Conditions: 
Gestational Diabetes

- Gestational diabetes mellitus (GDM) is a form of diabetes diagnosed during pregnancy that lasts the duration of the pregnancy.
- Increases risk of developing Type 2 diabetes
- Babies more likely to have a high birth weight and suffer birth trauma.
- 2005-06, 4.6% of women aged 15-49 years who gave birth in hospital were diagnosed with GDM.
  - Occurs in 2% of all pregnancies, usually in the last trimester

(Gestational diabetes mellitus in Australia, 2005-06, Australian Institute of Health and Welfare (2008), Cat. no. CVD 44; 49pp)
Dietary Management of Pregnancy Related Conditions: Gestational Diabetes

Management

- Dietary management is usually sufficient, but occasionally insulin will be required.

Dietary management guidelines (Diabetes Australia)

- “Eat small amounts often and maintain a healthy weight.
- Include some carbohydrate in every meal or snack.
- Choose foods that are varied and enjoyable that provide the nutrients you especially need during pregnancy.
- Avoid foods and drinks that contain large amounts of sugar.
- Choose Basmati or Doongara rice – they have a lower GI and will help you feel fuller for longer.”
- The Guidelines suggest that people “see a dietitian who can provide expert advice on the proper nutrients for you and your baby, as well as helping you make healthy food choices.”
Dietary Management of Pregnancy Related Conditions: Gestational Diabetes

Naturopathic/ Holistic Nutritional Management

• Low GI Dietary plans
  – Both prior to and during pregnancy
• Saturated fats should be replaced with essential fatty acids, especially omega-3.
• A high fibre diet is associated with a significantly reduced blood sugar levels.
  – AIM: 28 g per day

(Hechtman 2012)
Dietary Management of Pregnancy Related Conditions: Gestational Diabetes

Naturopathic/Holistic Nutritional Management

- Exercise, both before and during pregnancy can help prevent/treat gestational diabetes
  - 15 minutes at least 3 times per week has been shown to be beneficial, however 30 minutes 3 times per week is preferable (after getting medical clearance). It may take between 2-4 weeks to see glycaemic improvements.

(Hechtman 2012)
Dietary Management of Pregnancy Related Conditions:

Gestational Diabetes

- Gestational diabetes is more likely to occur in women who have PCOS and are overweight.
- Address early in pregnancy so it does not become an issue later on in the pregnancy.

“Nutrient deficiencies of chromium, magnesium, potassium and pyridoxine may potentiate the tendency towards hyperglycemia in gestational diabetic women because each of these four deficiencies causes impairment of pancreatic insulin production”

(Jovanovic-Peterson, 1996)
Dietary Management of Pregnancy Related Conditions: 
Gestational Diabetes

**Chromium**
- Improves insulin sensitivity, blood glucose control and blood lipid levels.
- Increases insulin binding to cells, insulin receptor numbers and activates insulin receptor kinase.

(Anderon, 2000)

**Lipoic Acid**
- Improves insulin sensitivity by stabilising the intracellular redox state and supporting mitochondrial ATP synthesis.
Dietary Management of Pregnancy Related Conditions: 
Gestational Diabetes

**Magnesium**
- Acts as a co-factor in glucose metabolism.
- Women with GDM have lower intracellular magnesium levels compared to both non-pregnant and normal pregnant individuals.
- Dosage: 200 – 400 mg per day

**Vitamin D**
- Deficiency is a major risk factor for developing glucose intolerance during pregnancy.
- Dosage: 1000 – 4000 IU per day (to correct deficiency)

(Hechtman, 2012)
Morning Sickness

(nausea and vomiting associated with pregnancy [NVP])
Dietary Management of Pregnancy Related Conditions: 
Morning Sickness

• Nausea occurs in approximately 80% of pregnancies and vomiting in approximately 50%.
• Symptoms usually begin around week 5 of gestation and generally disappear by week 12.
  – Typically peak at week 9.
  – 13% of women continue to experience sickness beyond week 30.
• Up to 15% of pregnant women experience some nausea and vomiting throughout pregnancy.
• Approximately 1-2% of pregnant women with nausea and vomiting develop hyperemesis gravidarum (severe nausea and vomiting throughout the pregnancy) (Brown, 2011)
Dietary Management of Pregnancy Related Conditions: Morning Sickness

• Despite being significantly unpleasant for women, those who experience morning sickness tend to have significantly lower rates of miscarriage than those who don’t experience any morning sickness at all.

• A systematic review found a consistent favourable effect of nausea and vomiting of pregnancy on rates of miscarriages, congenital malformations, prematurity, and developmental achievements.

• Nausea and vomiting of pregnancy was associated with clinically significant effects on IQ, language and behaviours.

• The effect size was clinically important for miscarriage, malformations and prematurity (Koren et al., 2015).
Dietary Management of Pregnancy Related Conditions: 
Morning Sickness: Ginger

• Ginger has a long traditional history for use with nausea and vomiting. 
• A systematic review and meta-analysis suggests the potential benefits of ginger in reducing nausea symptoms in pregnancy. 
• However, ginger did not significantly reduce the number of vomiting episodes during nausea and vomiting associated with pregnancy, when compared to placebo, although there was a trend towards improvement ($p = 0.06$). 
• Ginger did not pose a risk for side effects or adverse events during pregnancy. 
• Ginger can increase gastric contractility, speeding up gastric emptying, and therefore increasing the gastro-intestinal transit time of meals, which can decrease the feeling of nausea (Viljoen et al., 2014).
Dietary Management of Pregnancy Related Conditions: Morning Sickness

**Ginger Preparations that may be useful**

- Fresh ginger root added to cooking
- Ginger tea and/or decoctions
- Liquid extract (1ml)
- Ginger ale
- Crystalline ginger
- Ginger syrup

(Hechtman, 2012)
Dietary Management of Pregnancy Related Conditions: Morning Sickness: Vitamin B6

• Numerous studies (including RCTs) have shown that vitamin B6 is effective in reducing the severity of nausea and vomiting in pregnancy.
  – 10 mg X 3 times a day for 3 days (Sripramote & Lekhyananda, 2003)
  – 25 mg X 3 times a day for 4 days (Chittumma et al., 2007)
  – 40 mg X once daily for 4 days (Ensiyeh & Sakineh, 2009)
  – 40 mg X 2 times a day for 4 days (Javadi et al., 2013)
  – 75 mg per day for 3 weeks (Smith et al., 2004 – Australian study)
Iron Deficiency and Iron Deficiency Anaemia
Dietary Management of Pregnancy Related Conditions: Iron Deficiency and Anaemia

• Anaemia can be defined as:
  – a reduction in the oxygen-carrying capacity of the blood which may be due to a reduced number of blood cells,
  – a low concentration of haemoglobin
  – or a combination of both.

**Foetal Implications of Anaemia in the Mother**

• Intrauterine hypoxia
• Growth retardation
• Neurological and cognitive deficits (lower IQ)

(Williamson, 2006)
Dietary Management of Pregnancy Related Conditions: Iron Deficiency and Anaemia

• According to the WHO, 22% of pregnant women in industrialised countries and 52% of women in non-industrialised countries are affected by iron-deficiency anaemia.

• Iron requirements increase in pregnancy due to increased maternal red blood cell mass.

• Preconception ferritin levels are an important predictor in whether anaemia developments later in pregnancy.
  – < 20 mcg/L has a more than a doubled risk of developing anaemia by 20 weeks gestation.

(Hechtman, 2012)
Dietary Management of Pregnancy Related Conditions: 
Iron Deficiency and Anaemia

Making sure the blood test results are what they seem!

- During pregnancy, total blood volume, plasma volume and red blood cell mass changes. This can alter the way we interpret biochemical reports.
  - *Haemoglobin decreases due to haemodilution.*
    - Anaemia is commonly diagnosed if the haemoglobin levels are <110 g/L in the first or third trimester and < 105 g/L in the second trimester.
  - *Ferritin*
    - The most accurate measure of iron reserves.
    - Levels also decrease due to haemodilution and the increased mobilisation of iron from iron stores.
    - < 15 mcg/L indicates iron deficiency.

(Hechtman, 2012)
Dietary Management of Pregnancy Related Conditions: Iron Deficiency and Anaemia

Clinical Management

• Assessment of iron status in the preconception period is the best strategy to avoiding iron deficiency and/or anaemia.

<table>
<thead>
<tr>
<th>Ferritin Level (pre-conception)</th>
<th>Dosage of ferrous iron to consider</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 30 μ/L</td>
<td>80 – 100 mg/day</td>
</tr>
<tr>
<td>30 – 70 μ/L</td>
<td>40 mg/day</td>
</tr>
<tr>
<td>70 – 100 μ/L</td>
<td>No Supplementation needed</td>
</tr>
<tr>
<td>&gt; 150 μ/L</td>
<td>May indicate haemochromatosis – refer for appropriate testing</td>
</tr>
</tbody>
</table>

(Hechtman, 2012)
Dietary Management of Pregnancy Related Conditions: Iron Deficiency and Anaemia

Clinical Management

- **Increase Iron Intake**
  - “Supplementation with 20 mg ferrous iron from 18 weeks onwards prevents iron deficiency in 70% of women at term and iron deficiency anaemia in 10%.
  - 40 mg of ferrous iron prevents iron deficiency in 90% of women and iron deficiency anaemia in 95% of women.”

- **Increase Iron Absorption**

<table>
<thead>
<tr>
<th>Absorption Promoters</th>
<th>Absorption Inhibitors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sugars</strong> – concurrent consumption of fructose and sorbitol contain foods (fruit)</td>
<td><strong>Polyphenols</strong> (tea, coffee, red wine)</td>
</tr>
<tr>
<td><strong>Acids</strong> (especially ascorbic acid) increases solubility and chelating of non-haem iron</td>
<td><strong>Other divalent minerals</strong> (calcium, zinc and manganese) may compete for absorption</td>
</tr>
<tr>
<td><strong>Animal protein</strong> – enhances non-haem iron absorption</td>
<td><strong>Phytates and oxylates</strong> (legumes, grains, soya, wheatgerm, nuts) can bind to non-haem iron to reduce absorption</td>
</tr>
</tbody>
</table>

(Hechtman, 2012)
Dietary Management of Pregnancy Related Conditions: 
Iron Deficiency and Anaemia

Studies of mice showed that marginal iron intake by pregnant mice lead to several changes in offspring:

• Lower brain iron levels
• Reduced grip strength and cognition function
• Enhanced startle response
• These changes were not corrected by post natal iron supplementation

(Kwik-Uribe, 2000)
Iodine Deficiency
Dietary Management of Pregnancy Related Conditions: Iodine Deficiency

Epidemiological criteria from the World Health Organisation for assessment of iodine nutrition in pregnancy and lactating women, and infants based on median or range of urinary iodine concentrations

<table>
<thead>
<tr>
<th></th>
<th>Iodine intake</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pregnant women</strong></td>
<td></td>
</tr>
<tr>
<td>&lt;150 µg/L</td>
<td>Insufficient</td>
</tr>
<tr>
<td>150–249 µg/L</td>
<td>Adequate</td>
</tr>
<tr>
<td>250–499 µg/L</td>
<td>More than adequate</td>
</tr>
<tr>
<td>≥500 µg/L</td>
<td>Excessive</td>
</tr>
<tr>
<td><strong>Lactating women</strong></td>
<td></td>
</tr>
<tr>
<td>&lt;100 µg/L</td>
<td>Insufficient</td>
</tr>
<tr>
<td>≥100 µg/L</td>
<td>Adequate</td>
</tr>
<tr>
<td><strong>Children less than 2 years of age</strong></td>
<td></td>
</tr>
<tr>
<td>&lt;100 µg/L</td>
<td>Insufficient</td>
</tr>
<tr>
<td>≥100 µg/L</td>
<td>Adequate</td>
</tr>
</tbody>
</table>
Dietary Management of Pregnancy Related Conditions: Iodine Deficiency

- The WHO now recommends iodine intake during pregnancy is 250 µg/day (previously it was 200 µg/day).
  - The NHMRC (2010) recommends that ‘all women who are pregnant, breastfeeding or considering pregnancy, take an iodine supplement of 150µg/day’
- A median urinary iodine concentration for pregnant women should be 150 – 249 µg/L.
- Iodine requirements during pregnancy increase by approximately 50% due to:
  - An increase requirement (50%) for maternal thyroxine production to maintain euthyroidism
  - Greater migration of iodine to the foetus for adequate production of foetal thyroid hormone (especially in later gestation)
  - Probable increased renal iodine clearance

(Zimmermann, 2012)
Dietary Management of Pregnancy Related Conditions: Iodine Deficiency

- Thyroid hormone is required for normal neuronal migration and myelination of the brain during foetal and early postnatal life.
- Low levels of thyroid hormone during this critical time can result in Cretinism.
  - Irreversible brain damage with mental retardation and neurological abnormalities.
  - Supplementing with iodine post-birth does not correct this

(Zimmermann, 2012)
Dietary Management of Pregnancy Related Conditions: Iodine Deficiency

“To ensure an adequate iodine supply during pregnancy, women should ideally be provided with an ample iodine intake (≥ 150 µg/day) for long periods of time before conception to ensure plentiful intrathyroidal iodine stores.”

“An adequate iodine supply should continue after parturition, because the iodine requirement of a woman who is fully breastfeeding her infant is likely even higher than that during pregnancy”
Dietary planning and management during lactation

http://www.twinlifemagazine.com/2012/02/breastfeeding
Dietary planning and management during lactation

Stages of Lactation

Three stages of breast milk production (lactogenesis):

- **Stage 1** – begins during the last trimester of pregnancy. Milk begins to form and the lactose and protein content of milk increase. This stage continues through the first few days postpartum.

- **Stage 2** – begins 2-5 days postpartum and is marked by increased blood flow to the mammary gland. Onset of copious milk secretion (“when the milk comes in”). Significant changes in quantity and composition.

- **Stage 3** – begins about 10 days after birth and is the stage in which composition becomes stable.

(Brown, 2011)
Dietary planning and management during lactation

Energy and Nutrient Needs

- A nursing mother produces approximately 750 ml of milk per day with considerable variation from woman to woman and in the same woman from time to time.
- A woman needs to consume an extra 2000-2100 kJ/day (approximately) during lactation.
- Carbohydrate and dietary fibre requirements increase
- Protein and fatty acid requirements also increase
- A lactating woman needs an additional 500 ml of fluid each day (preferably water).

(Whitney et al., 2011)
Dietary planning and management during lactation

### Daily Nutrient Needs

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Female 19-50 years</th>
<th>Lactating female 19-50 years</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dietary fibre</td>
<td>25 g</td>
<td>30 g</td>
<td>+ 5 g</td>
</tr>
<tr>
<td>Linoleic acid</td>
<td>8 g</td>
<td>12 g</td>
<td>+ 4 g</td>
</tr>
<tr>
<td>Alpha-linolenic acid</td>
<td>0.8 g</td>
<td>1.2 g</td>
<td>+ 0.4 g</td>
</tr>
<tr>
<td>Long chain omega-3 FA (EPA/DHA/DPA)</td>
<td>90 mg</td>
<td>145 mg</td>
<td>+ 55 mg</td>
</tr>
<tr>
<td>Protein</td>
<td>46 g (0.75 g/kg)</td>
<td>67 g (1.1 g/kg)</td>
<td>+ 21 g</td>
</tr>
</tbody>
</table>

(Source: NHMRC, 2006)
Dietary planning and management during lactation
Vitamins RDI/AI

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Female 19-50 years</th>
<th>Lactating female 19-50 years</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thiamine</td>
<td>1.1 mg</td>
<td>1.4 mg</td>
<td>+ 0.3 mg</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>1.1 mg</td>
<td>1.6 mg</td>
<td>+ 0.5 mg</td>
</tr>
<tr>
<td>Niacin</td>
<td>14 mg</td>
<td>17 mg</td>
<td>+ 3 mg</td>
</tr>
<tr>
<td>Pantothenic acid</td>
<td>4 mg</td>
<td>6 mg</td>
<td>+ 2 mg</td>
</tr>
<tr>
<td>Vitamin B6</td>
<td>1.5 mg</td>
<td>2.0 mg</td>
<td>+ 0.5 mg</td>
</tr>
<tr>
<td>Folate</td>
<td>400 mcg</td>
<td>500 mcg</td>
<td>+ 100 mcg</td>
</tr>
<tr>
<td>Vitamin B12</td>
<td>2.4 mcg</td>
<td>2.8 mcg</td>
<td>+ 0.4 mcg</td>
</tr>
<tr>
<td>Choline</td>
<td>425 mg</td>
<td>550 mg</td>
<td>+ 125 mg</td>
</tr>
<tr>
<td>Biotin</td>
<td>25 mcg</td>
<td>35 mcg</td>
<td>+ 10 mcg</td>
</tr>
</tbody>
</table>

(Source: NHMRC, 2006)
Dietary planning and management during lactation

Vitamins RDI/AI (cont.)

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Female 19-50 years</th>
<th>Lactating female 19-50 years</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin A</td>
<td>700 mcg</td>
<td>1100 mcg</td>
<td>+ 400 mcg</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>45 mg</td>
<td>85 mg</td>
<td>+ 40 mg</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>5 mcg</td>
<td>5 mcg</td>
<td>0</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>7 mg</td>
<td>11 mg</td>
<td>+ 4 mg</td>
</tr>
<tr>
<td>Vitamin K</td>
<td>60 mcg</td>
<td>60 mcg</td>
<td>0</td>
</tr>
</tbody>
</table>

(Source: NHMRC, 2006)
Dietary planning and management during lactation
Minerals RDI/AI

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Female 19-50 years</th>
<th>Lactating female 19-50 years</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium</td>
<td>1000 mg</td>
<td>1000 mg</td>
<td>0</td>
</tr>
<tr>
<td>Chromium</td>
<td>25 mcg</td>
<td>45 mcg</td>
<td>+ 20 mcg</td>
</tr>
<tr>
<td>Copper</td>
<td>1.2 mg</td>
<td>1.5 mg</td>
<td>+ 0.3 mg</td>
</tr>
<tr>
<td>Fluoride</td>
<td>3.0 mg</td>
<td>3.0 mg</td>
<td>0</td>
</tr>
<tr>
<td>Iodine</td>
<td>150 mcg</td>
<td>270 mcg</td>
<td>+ 120 mcg</td>
</tr>
<tr>
<td>Iron</td>
<td>18 mg</td>
<td>9 mg</td>
<td>- 9 mg</td>
</tr>
<tr>
<td>Magnesium</td>
<td>310-320 mg</td>
<td>310-320 mg</td>
<td>0</td>
</tr>
</tbody>
</table>

(Source: NHMRC, 2006)
Dietary planning and management during lactation
Minerals RDI/AI (cont.)

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Female 19-50 years</th>
<th>Lactating female 19-50 years</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manganese</td>
<td>5.0 mg</td>
<td>5.0 mg</td>
<td>0</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>45 mcg</td>
<td>50 mcg</td>
<td>+ 5 mcg</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>1000 mg</td>
<td>1000 mg</td>
<td>0</td>
</tr>
<tr>
<td>Potassium</td>
<td>2800 mg</td>
<td>3200 mg</td>
<td>+ 400 mg</td>
</tr>
<tr>
<td>Selenium</td>
<td>60 mcg</td>
<td>75 mcg</td>
<td>+ 15 mcg</td>
</tr>
<tr>
<td>Sodium</td>
<td>460-920 mg</td>
<td>460-920 mg</td>
<td>0</td>
</tr>
<tr>
<td>Zinc</td>
<td>8 mg</td>
<td>12 mg</td>
<td>+ 4 mg</td>
</tr>
</tbody>
</table>

(Source: NHMRC, 2006)
Dietary planning and management during lactation

General Diet Planning Considerations

<table>
<thead>
<tr>
<th>Food Group</th>
<th>≤ 18 years No. of serves/day</th>
<th>19-50 yrs No. of serves/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetables and legumes/beans</td>
<td>5 ½</td>
<td>7 ½</td>
</tr>
<tr>
<td>Fruit</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Grain (cereal) foods</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Lean meats and poultry, fish, eggs, tofu, nuts and</td>
<td>2 ½</td>
<td>2 ½</td>
</tr>
<tr>
<td>seeds, and legumes/beans</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk, yoghurt, cheese and/or alternatives, mostly</td>
<td>4</td>
<td>2 ½</td>
</tr>
<tr>
<td>reduced fat</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Source: NHMRC, 2013)
Mastitis
Mastitis

• Inflammation of the breast tissue that occurs in approximately 10% of lactating women.

• Contributing factors:
  – infection
  – breast engorgement
  – blocked milk ducts
  – or nipple problems.

• Effective treatment of mastitis involves lifestyle modification and practices, as well as nutritional guidance.
Mastitis

• Apply hot compresses over the affected area on the breast to help relieve pain and promote effective drainage from milk ducts.
• Bruise cabbage leaves and wear in the bra to help prevent engorgement.
  – Application should be for at least 20 minutes.
• Massage the breast tissue towards the nipple to help with drainage and milk flow.
• Topical application of aloe vera gel, calendula or chickweed can help provide relief.
• Maintain nutritional status, especially of vitamin A, zinc, vitamin C and vitamin E.
• Treat candidiasis if necessary (both the mother and the infant)
Tutorial Activities
Dietary planning in pregnancy

Activity:

One of your patient’s tells that you she has recently become pregnant and she would like some advice about how to modify her food intake to ensure both she and her baby receive optimal nutrition and avoid preventable conditions.

Create a **fact sheet** outlining the main points your pregnant clients should be aware of. Provide some practical meal suggestions to help get your clients inspired.
Dietary planning in pregnancy

Activity continued:

• Use the questions in your Fact Sheet assignment spec to help you design your fact sheet.

• Work in pairs or small groups and post your completed Fact Sheet on The Loop.
References


References (cont.)


References (cont.)


References (cont.)


COMMONWEALTH OF AUSTRALIA

Copyright Regulations 1969

WARNING

This material has been reproduced and communicated to you by or on behalf of the Australian College of Natural Medicine Pty Ltd (ACNM) trading as Endeavour College of Natural Health, FIAFitnation, College of Natural Beauty, Wellnation - Pursuant Part VB of the Copyright Act 1968 (the Act).

The material in this communication may be subject to copyright under the Act. Any further reproduction or communication of this material by you may be the subject of copyright protection under the Act.

Do not remove this notice.