Week 1: Introduction to the unit

Assessment

Item	Due Date	Weighting
Assignment 1: Frequently Asked Questions	Week 6, 15th March	30%
Quiz 1: Week 1 to 6 Material	Week 7	20%
Assignment 2 (UG): Nutrition Resource	Week 12	30%
Quiz 2: Week 7 to 12 Material	Week 13	20%

- Students must complete all assessment items and achieve 50% overall to pass the unit.

How will the unit run?

- You are expected to read prescribed readings.
- At times independent study will be scheduled in place of classes
- Lecture notes will be available on Canvas.
- Lectures available before 12:30pm Monday
- You are encouraged to participate in tutorials.

Preconception

Nutritional factors related to altered fertility.

Females & Males	Females	Males
- Weight loss >15% of normal weight - Inadequate antioxidant status - Inadequate body fat - Excessive body fat - High alcohol	- Poor iron status	- Inadequate zinc status

Energy Availability

- The amount of energy available for all other metabolic processes after accounting for energy expended from exercise.
- ENERGY AVAILABILITY = ENERGY INTAKE – EXERCISE ENERGY EXPENDITURE
- When energy availability is low, physiological mechanism reduce the amount of energy used for reproduction.
- Can be in energy balance even though energy availability is low.

Fertility

- Zinc
    - Important for sperm maturation and testosterone synthesis
    - Lower zinc status in men associated with poor sperm quality and concentration.
    - Zinc supplementation (alone and in combination with antioxidants) found to improve sperm quality.

- Iron
    - Iron status may impact on ovulation.
    - Women with higher iron intake less likely to develop ovulatory infertility.
    - Many females at risk of poor iron status in Australia and worldwide
    - Females encouraged to optimize iron stores prior to conception – dietary modification prioritized over supplementation.
- Alcohol
    - High alcohol consumption (5+ drinks per week) linked to infertility in men and women in some studies.
    - Possible mechanisms – decreased oestrogen, testosterone, and other reproductive hormones
    - Previous Australian Alcohol Guidelines (2009):
        - For healthy men and women, drinking no more than two standard drinks on any day reduces your risk of harm from alcohol-related disease or injury over a lifetime.
        - Drinking no more than four standard drinks on a single occasion reduces the risk of alcohol-related injury arising from that occasion.
- Caffeine
    - High intakes of caffeine can increase the time to conception and increase the risk of miscarriage and stillbirth.
    - Inability to conceive and miscarriage are more common in women with higher caffeine intake (consumption of more than 100mg a day)
    - High intake (500 mg/day) linked to miscarriage, premature delivery, and low birth weight.
- Heavy Metal Exposure
    - Exposure to heavy metals such as lead, and mercury may impact on fertility.
- Folate
    - Inadequate folate availability between 17-30 days post-conception linked to Neural Tube Defects (NTDs)
        - Spina bifida
        - Anencephaly
        - Encephalocele
    - Supplements can prevent NTDs, it is recommended that the supplements contain 400ug.
    - Main sources of folate in Australian diet:
        - Vegetables, breads, cereals, fruit, juice

Preconception Advice

1. Achieve and maintain a healthy body weight.
2. Choose an adequate and balanced diet.
3. Be physically active.
4. Receive regular medical care.
5. Manage chronic conditions.
6. Avoid harmful influences.

Week 2: Pregnancy

Maternal Physiology

- Blood volume expansion
    - Blood (20%) and plasma volume (50%) increase
- Hemodilution
    - Blood concentration of most vitamins and minerals decrease.
- Maternal organ and tissue enlargement
    - Heart, thyroid, liver, kidneys, uterus, etc.
- Gastrointestinal chances
    - Progesterone reduces GIT activity, increases transit time.
- Kidneys
    - Increased sodium conservation
- Immune system
    - Suppressed immunity so foetus not treated as foreign body – more vulnerable to dietary pathogens.

Why is Nutrition Important?

- Nutrition important throughout pregnancy to support foetal development and growth without depleting mother's reserve.

Foetal Origins of Disease

- 'Barker Hypothesis'
    - Foetus adapts to its environments therefore nutrient deficiencies and/or excesses in utero determine how the foetus will develop immediately and in adulthood.
        - E.g., poor glucose availability during pregnancy suppresses genes that produce insulin receptors.

Foetal Growth

- Infant birth weight of 3000-4000g considered optimal.
- WHO defines low birth weight as <2599g.
- Low birth weight babies more likely to:
    - Die within first year of life.
    - Have lower mental development.
    - Develop disorders such as heart disease, hypertension, diabetes in later life.
- Factors associated with reduced foetal growth.
    - Pre=pregnancy underweight
    - Low weight gain during pregnancy
    - Poor dietary intake
    - Smoking
    - Drug abuse
    - Illness during pregnancy
    - Alcohol intake

Maternal Weight Gain

- Energy requirements for pregnancy

1st trimester	No additional requirement
2nd trimester	+ 1400kj
3rd trimester	+ 1900kj

Nutrient Needs in Pregnancy

Protein	+ 14g/day
Folate	+ 200ug/day
B12	+ 0.2ug/day
Iron	+ 9mg/day - Required to carry oxygen to tissues - RDI increases from 18mg/day to 27mg/day - Foetal needs for iron appear to take priority over maternal needs
Zinc	+ 3g/day - Required for DNA and RNA synthesis for protein and cellular synthesis - RDI increases from 8mg/day to 11mg/day
Iodine	+ 70ug/day - Required for production of thyroid hormones - RDI increases from 250ug/day to 220ug/day
Calcium	No chance - Adaptive mechanisms provide for additional calcium needs of foetus
Vitamin D	No change -

- High doses vitamin A in form or retinol or retinoic acid associated with birth defects.

Issues in Pregnancy

- Australian Guidelines to Reduce Health Risks from Drinking Alcohol
    - Maternal alcohol consumption can harm the developing foetus or breastfeeding baby.
        - For women who are not pregnancy or planning a pregnancy, not drinking is the safest option.
        - For women who are breastfeeding, not drinking is the safest option.

Food-borne illness

- Increased progesterone levels can affect immunity and increase susceptibility to food-borne infection.
- Food poisoning in pregnant women can be debilitating and dangerous, mostly due to dehydration that results.
    - Listeriosis: can cause mild flu-like symptoms to miscarriage, stillbirth or brain infection in the foetus.

High risk foods	
Unpasteurized dairy products Soft, semi-soft and surface-ripened cheeses Soft serve ice cream pate	Processed meats Cold cooked chicken Chilled seafood Pre-prepared and packaged salads

    - Salmonellosis: may trigger miscarriage
    - Toxoplasmosis: can cause brain damage, blindness, miscarriage