NMDM121
MEDICINAL FOOD SCIENCE
Session 1
Introduction to
Medicinal Food Science
Nutritional Medicine Department
Session Summary

• Dietetic principles in Nutritional Medicine
• Review of RDI and underpinning principles
• Food as medicine concepts and principles
“The food you eat can be either the safest and most powerful form of medicine, or the slowest form of poison.”
- Dr. Ann Wigmore, N.D.
Dietetic Principles

Even though there are different approaches to nutrition they all share the similar belief that proper nutrition is needed to achieve optimal health.

• Western dietetic approach (based primarily on a reductionist paradigm).
• Eastern dietetic approach (based primarily on a holistic paradigm).
• Nutritional medicine dietetic approach (based on a combination of reductionism and holism).
Western Dietetics

Western Dietetics

• In Australia, the profession of dietetics contributes to the promotion of health and the prevention and treatment of illness by optimising the nutrition of populations, communities and individuals. It utilises scientific principles and methods in the study of nutrition and dietetics, applying these results to influence the wider environment affecting food intake and eating behaviour.

  (Dietitians Association of Australia, 2013)
Eastern Dietetics

- Eastern Dietetics such as Traditional Chinese Medicine and Ayurveda take a holistic approach to restoring balance. The key message of Eastern nutrition is the fact that an optimal universal diet does not exist. Rather, an individual diet must be designed for each person based on his or her constitution, lifestyle, environment, climate and season. The main goal of Eastern nutrition is to use food as a means to restore harmony and balance within the body.

(Wongvibulsin et al., 2012)
Nutritional Medicine

- **Nutritional Medicine** involves a holistic approach to medical care that emphasises the study of all aspects of a person's health, including physical, psychological, social, economic, and cultural factors. Nutritional medicine practitioners apply knowledge of the therapeutic and preventive potential of food, diet and micronutrients (vitamins, minerals and trace elements) to maintain and promote clients' health.

(Di Stephano, 2006, p. 108)
Dietetic Principles

The dietetic principles that underpin Western nutrition practice include:

• Adequacy
• Balance
• Energy (kilojoule) control
• Nutrient density
• Moderation
• Variety

(Whitney et al., 2016, pp. 40-43)
Holistic Dietetic Principles

Additional holistic dietetic principles include:

- Aim to optimise intake of beneficial substances and minimise exposure to potentially harmful substances.
- A preference for foods in their whole, natural state with minimal additives, minimal processing and minimal packaging.
- Consider the emotional and social needs met by food as well as physiological needs.
- Consider the environmental sustainability of various food choices.
Naturopathic Principles that underpin Holistic Nutrition Practice

Vitalism
We are animated by a coherent life force that regulates and governs the growth, repair and regeneration of the body and its diverse systems.

Vis medicatrix naturae – The healing power of nature

First do no harm

Docere - Doctor as teacher

Treat the cause not the symptoms

Prevention is better than cure

Treat the whole person

(Di Stephano, 2006)
Dietetic Principles

• Holistic nutritional medicine dietetic principles are more closely aligned to the Greek concept of *diaita*, meaning ‘way of living’.

• The present-day usage of the word ‘diet’ generally covers only aspects of eating and drinking and is a symptom of the reductionist paradigm.
Holism

• The term ‘holism’ was coined by Jan Christian Smuts in 1925. He used it to describe a philosophical position that was directed towards an understanding of whole systems, rather than particular events or phenomena.

• Holism carries the synergetic understanding that wholes are greater than the sum of their parts.

• Holism can be seen as complementary to that of reductionism, which holds that phenomena can be understood by an analysis of their individual components.

(Di Stephano, 2006, pp. xviii-xix)
Reductionism vs Holism

• Despite an initially holistic view of health, the development of medicine and physiology in Western cultures progressively advanced toward a more reductionist perspective.

• Whilst this reductionist approach has led to some revolutionary discoveries in medicine and nutrition, the reductionist approach has a number of limitations.

• Reality is complex and researchers are currently returning to a more holistic view of nutrition – e.g. considering dietary patterns rather than isolated food compounds.

(Fardet & Rock, 2014)
Reductionism

• The reductionist paradigm views a complex system as being nothing but the sum of its parts.

• Food scientists and researchers in human nutrition have decomposed food into nutrients and compounds and have focused on studying the metabolic and physiologic effects of each food constituent in cells, animals and humans.

• This has led to the understanding of associations between single compounds and single physiologic effects and an understanding of mechanistic effects.

(Fardet & Rock, 2014)
Reductionism

Some of the weaknesses of the reductionist approach are:

• It has led to a culture of associating a food with only one single nutrient – e.g. dairy products and calcium.

• Oversimplification associated with the reductionist approach has resulted in foods being classified as good or bad based on one constituent – e.g. “red wine contains resveratrol so it must be good”.

• It has led to the aggressive marketing of functional foods, nutritional supplements and nutraceuticals for which the long term health potential is not well known.

(Fardet & Rock, 2014)
Functional Foods and Nutraceuticals

Table 1: Definitions and examples of functional foods and nutraceuticals

A functional food

- “is similar in appearance to, or may be, a conventional food, is consumed as part of a usual diet, and is demonstrated to have physiological benefits and/or reduce the risk of chronic disease beyond basic nutritional functions.”¹
- is “a food or beverage that imparts a physiological benefit that enhances overall health, helps prevent or treat a disease/condition, or improves physical or mental performance via an added functional ingredient, processing modification, or biotechnology.”²

Examples include tomatoes that are rich in lycopene, spreads containing plant sterols and eggs enriched in omega-3 fatty acids.

A nutraceutical

- “is a product isolated or purified from foods that is generally sold in medicinal forms not usually associated with food. A nutraceutical is demonstrated to have a physiological benefit or provide protection against chronic disease.”¹

Examples include capsules containing bioflavonoids or gamma-linoleic acid.

Taken from: Jones, 2002
From Holism to Reductionism

- Human and environment (genes + diet + lifestyle + occupation + climate + education + .......... etc.)
  - Dietary pattern (e.g. Western, Mediterranean, etc.)
    - Food group (e.g. whole grains, meat, dairy, etc.)
      - Food ingredient (e.g. saturated fat, fibre, etc.)
        - Food compound (e.g. butyric acid, resveratrol, vitamin C, etc.)
# Commercialisation of Nutrition

<table>
<thead>
<tr>
<th>Nutrition as a commercial product</th>
<th>Nutrition as part of holistic health</th>
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</thead>
<tbody>
<tr>
<td>Seeks profit as the end goal</td>
<td>Seeks nourishment as the end goal</td>
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<tr>
<td>Success is selling the most products</td>
<td>Success is the most effective and efficient achievement of optimal health</td>
</tr>
<tr>
<td>Food is most valuable broken into “nutritional” parts</td>
<td>Food is most nourishing when eaten whole</td>
</tr>
<tr>
<td>Nutrition parts and pieces extracted and consumed in isolation are just as effective as its natural state</td>
<td>Nutrition works best in its natural state and organic context</td>
</tr>
<tr>
<td>Nutrition is a one-size-fits all checklist</td>
<td>Nutrition is unique to individuals</td>
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<tr>
<td>Nutrition is a static formula with discrete components</td>
<td>Nutrition is an input to a continuous process – getting healthy</td>
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(Churchill & Churchill, 2013)
Australian Recommendations

The National Health and Medical Research Council has published the following nutrient and dietary guidelines based on the dietetic principles of adequacy, balance, energy control, nutrient density, moderation and variety:

- Nutrient Reference Values for Australia and New Zealand (www.nrv.gov.au)
Nutrient Reference Values

- **Estimated Average Requirement (EAR):** A daily nutrient level estimated to meet the requirements of half the healthy individuals in a particular life stage and gender group.

- **Recommended Dietary Intake (RDI):** The average daily dietary intake level that is sufficient to meet the nutrient requirements of nearly all (97–98 per cent) healthy individuals in a particular life stage and gender group.

- **Adequate Intake (AI) (used when an RDI cannot be determined):** The average daily nutrient intake level based on observed or experimentally-determined approximations or estimates of nutrient intake by a group (or groups) of apparently healthy people that are assumed to be adequate.

  (National Health and Medical Research Council, 2006)
Nutrient Reference Values

• **Acceptable Macronutrient Distribution Range (AMDR):** The AMDR is an estimate of the range of intake for each macronutrient for individuals (expressed as per cent contribution to energy), which would allow for an adequate intake of all the other nutrients whilst maximising general health outcome.

• **Suggested Dietary Target (SDT):** A daily average intake from food and beverages for certain nutrients that may help in prevention of chronic disease.

   (National Health and Medical Research Council, 2006)
Using Nutrient Reference Values

- NRVs apply to *healthy people* thus need to be adjusted for malnourished people or those with medical problems who may require supplemented or restricted intakes.

- *Recommendations* are not minimum requirements, nor are they necessarily optimal intakes for all individuals. Recommendations can only target “most” of the people and cannot account for individual variations in nutrient needs.

(Whitney et al., 2016, p. 21)
Using Nutrient Reference Values

• Recommendations apply *to average* daily intakes - trying to meet the recommendations for every nutrient every day is difficult and unnecessary.

• Each of the NRV categories serves a unique purpose. For example EAR are most appropriately used to develop and evaluate nutritional programs for *groups* such as school children, whereas RDI (or AI if an RDI is not available) can be used to set goals for *individuals*.

  (Whitney et al., 2016, pp.21-22)
Australian Guide to Healthy Eating

Enjoy a wide variety of nutritious foods from these five food groups every day. Drink plenty of water.

- Grain (cereal) foods, mostly wholegrain and/or high cereal fibre varieties
- Fruit
- Vegetables and legumes/beans
- Milk, yoghurt, cheese and/or alternatives, mostly reduced fat
- Lean meats and poultry, fish, eggs, tofu, nuts and seeds and legumes/beans

Use small amounts

Only sometimes and in small amounts
Discussion/Reflection

1. What does personalised nutrition mean from a Western perspective compared to an Eastern perspective?
2. How has the food industry used reductionist nutrition research to increase profits without necessarily improving people’s health?
Food as Medicine

What does it mean to use food as medicine?
"The doctor of the future will no longer treat the human frame with drugs, but rather will cure and prevent disease with nutrition."

-Thomas Edison
Origins of Food as Medicine

• Holistic nutritional medicine therapy has its origins in ancient systems of medicine such as Traditional Chinese Medicine, Ayurvedic (traditional Indian) medicine and ancient Greek medicine as used by Hippocrates.

• In these traditions, food was recognised as an important part of health and specific foods and diets were used for illness prevention and healing purposes.

• Evidence-based practice, which emerged in the 1990s, has become the dominant model in Western medicine and has had a significant influence on holistic nutritional medicine therapy in the 21st century.
Origins of Food as Medicine

- Medicinal use of foods dating back to antiquity include:
  - 3500 years old Egyptian papyrus list 22 specific uses of garlic.
  - Chinese physicians used pure honey, tea, ginger, sea vegetables.
  - Ancient Greek physicians praised the medicine values of onions and wine.
  - Romans revered cabbage and walnuts as food medicine.
Hippocrates

- The father of Western Medicine

- Hippocrates Key Emphasis:
  - Prevention
  - A balanced diet
  - A sensible, moderate lifestyle

- Hippocrates believed that his main instruments were his eyes (the power of observation) and his thoughtful mind.

https://graygreece.wikispaces.com/Hippocrates
Hippocrates

- Hippocrates’ awareness of factors contributing to disease:
  - Climate
  - Unbalanced diet
  - Nutritional deficiencies
  - Nutritional excesses
  - Elimination of metabolic wastes
  - Events and emotions
  - Biochemical individuality
  - Food selection and timing of nourishment
Hippocrates: Teachings

“Let food be your medicine and medicine be your food”

• Therapy must be consistent with nature and the human body’s needs.
• Diseases that arise from excess are rectified by the removal of certain foods.
• Diseases arising from deficiencies are re-balanced by re-nourishment.
• Everything in excess is opposed to nature.
Holistic Nutritional Medicine

• The modern naturopathic movement began in Germany about 200 years ago where natural therapists began using therapies such as the following to restore health:
  – Hydrotherapy
  – Hygiene
  – Fasting
  – Exercise
  – Colonic irrigation
  – Diet
  – Sunlight exposure
Max Bircher-Benner

- Dr Max Bircher-Benner (1867-1939) was a Swiss doctor.
- The father of “Raw Foods”.
- The medical thinking on nutrition at that time was that cooking made food more digestible and that a good diet consisted of protein, preferably from meat.
- Dr Bircher-Benner believed that raw foods had curative qualities that were lost during cooking and referred to these foods as ‘living foods’.
- He opened a Sanatorium in 1904 called ‘Vital Force’.
- He created the breakfast dish called Bircher Muesli.

(Zurich Development Centre, 2006)
Food as Medicine: 21st Century

Food as medicine in the 21st century weaves together:

• Traditional food wisdom handed down through the generations;
• Modern evidence-based nutrition knowledge (often based on reductionist principles); and
• Clinical practice knowledge developed by holistic nutritionists over time.
Food as Medicine: 21st Century

- Therapeutic diets are developed by understanding the pathophysiology of different health conditions and understanding the potential effects of particular food constituents on human biochemistry and physiology.

- For example, some food constituents (e.g. nutrients and phytochemicals) have the potential to be pro-inflammatory while others have the potential to be anti-inflammatory. If a health condition includes inflammation as part of its presentation then an “anti-inflammatory diet” that emphasises foods with anti-inflammatory potential, whilst reducing foods with pro-inflammatory potential, could be used.
Examples of therapeutic diets that could be constructed include:

- An antioxidant-rich diet
- An immune-enhancing diet
- A diet to support healthy liver function
- A diet to promote healthy sleep
Food as Medicine: 21\textsuperscript{st} Century

- Therapeutic diets may also include recommendations about how particular foods should be prepared in order to maximise their therapeutic potential (e.g. raw foods have higher levels of vitamin C; carotenoids have greater bioavailability if consumed together with fat).

- Therapeutic diets may also include recommendations about what time of day particular foods should be consumed. Chrononutrition refers to the ability of foods or nutrients to promote or hinder the normal functioning of the circadian cycle control systems (i.e. biological rhythms).
Circadian rhythms of melatonin and serotonin. Black lines represent normal circadian patterns of melatonin and serotonin secretion, while grey lines show a disturbed pattern due to ageing process. Source: Garrido et al., 2013
Food as Medicine

• Nutritional medicine is not only concerned with *what* we eat but also with *when, where, how, why* and *with whom* we eat.

(http://commons.wikimedia.org/wiki/Category:Eating#mediaviewer/File:Gori_reis_08_(7).jpg)
Food As Medicine

Many public health agencies and government bodies have recognised the importance of good nutritional practices to keep populations healthy.

“Insufficient fruit and vegetable intake is estimated to cause around 40% of gastrointestinal cancer deaths, around 11% of ischemic heart disease deaths and about 9% of stroke deaths globally”

(Global Strategy on Diet, Physical Activity and Health, WHO, 2003)
Food As Medicine

“Vegetables and fruits are clearly an important part of a good diet. Almost everyone can benefit from eating more of them, but variety is as important as quantity. No single fruit or vegetable provides all of the nutrients you need to be healthy. The key lies in the variety of different vegetables and fruits that you eat.”

(Harvard School of Public Health, 2014)
We are what we eat

The way we eat influences our health

Eat whole, real foods

Food is the original and best medicine

Eat to live, not live to eat

Food can affect all aspects of our being, not just physical

Medicinal Food Concepts
Food As Medicine

We are what we eat

• The *Human Genome Project* was completed in April 2003 and provided the ability for the complete genetic blueprint of a human being to be read.

• This has subsequently led to the investigation of the impact of many factors (such as *nutrition, environmental exposures, lifestyle, exercise etc.*.) on gene expression, health conditions and disease prevention/progression.

(Human Genome Project, 2014)
Food As Medicine

We are what we eat  

continued

• Many different studies have investigated the links with  
  **epigenetics** (changes within an organism due to 
  alteration in gene expression, rather than alteration to 
  genetic code) and  
  **nutrigenomics** (a branch of 
  genomics that assesses the impacts of food and food 
  constituents on gene expression).

• These studies are revealing that we are what we eat!

  (Fenech M et al., 2011, Human Genome Project, 2014)
Evolution of Western Diet - Summary

SICK CARE vs. HEALTH CARE

WHICH WILL YOU CHOOSE?

www.livelovefruit.com
Discussion/Reflection

1. Drawing on your own personal experience can you recall any examples of different people having different responses to the same foods or dietary pattern?

2. What does it mean to use food as medicine? Does it mean that if you eat a punnet of blueberries every day you will never get sick, never get dementia, never get wrinkles and never suffer from heart disease? Or is it more complex than this?
Session Summary

• There are differing dietetic approaches that all have the same aim; however, some rely more on a reductionist paradigm, some on a holistic paradigm and some aim to combine reductionism and holism.

• The Western dietetic approach has led to the development of nutrient reference values and dietary guidelines to provide guidance on nutritional adequacy, balance, energy control, variety and moderation.

• Using food as medicine draws on traditional food wisdom, evidence-based knowledge and clinical nutritional experience to develop personalised dietary plans to prevent and treat disease.
References


References


References


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