

HUMAN NUTRITION III BRE302

SUBJECT GUIDE

Course Aim

To describe and explain the management of human food intake to optimise health

CONTENT

Emphasis is placed on understanding the body, the food we eat & it's affects, our mental, emotional health (state of mind), and physical health.

There are eight lessons in this course, each requiring about 12 hours work by the student. The content of each lesson is outlined below:

1. Nutrient Imbalance and Disease (Food Related Problems)
2. Dental Problems
3. Fibre & Bowel Diseases
4. Different Ways of Eating
5. Food Toxicity: Sensitivity
6. Food Toxicity: Poisoning
7. Detoxification/Body Cleansing
8. Consulting/ Giving Advice

Lesson 1

NUTRIENT IMBALANCE AND DISEASE (Problems with Eating)

Aim

Explain different food related health problems.

Some people seem to be able to eat anything, without suffering any signs of ill health. They always appear fit, never get sick, don't get over weight, and they still eat junk food and other things which others simply cannot tolerate. The healthy body has a remarkable ability to process and eliminate unwanted chemicals. If a person is in peak condition, any excesses or unwanted components of food are likely to be eliminated through the urinary or excretory system, or even through sweat. Very few people, however, are in such a good state of health; and even those who are, are unlikely to continue disposing of unwelcome chemical compounds year after year for their entire lifespan. Sooner or later their ability to tolerate undesirable foods will decrease, and problems will develop.

FOOD RISK FACTORS

The following characteristics of nutrition are a risk to health, if their intake varies too far from desired levels (for the individual concerned):

- Amount of saturated fats and cholesterol
- Number of kilojoules (or calories)
- Amount of fibre (should not be too low)
- Quantity of total fat
- Amount of carbohydrate
- Quantity of salt
- Amount of alcohol
- Contaminants (e.g. chemical pollutants, pesticides)
- Vitamins & Minerals
- Protein (vegetarians need to be careful to receive adequate variety)

Nutrient Imbalance	Increased health risks
Excess of saturated fat and cholesterol	Atherosclerosis, Heart attack, Stroke, Diabetes
Excess of calories	Obesity, Type II Diabetes, Heart disease, Prostate Cancer
Lack of fibre	Bowel cancers, Constipation, Haemorrhoids, Diverticulitis, Irritable Bowel Syndrome
Too much fat	Bowel cancer, Obesity, Metabolic disorders
Excess carbohydrate, particularly sugar	Dental cavities, Fatigue (mood and energy ups and downs), Type II Diabetes, Obesity
Excess salt (sodium)	Hypertension, Stroke, Dehydration, Electrolyte Imbalances, Problems with blood and lymph volume and chemistry (oedema), osteoporosis
Too much alcohol	Dehydration, Cirrhosis of the liver, Obesity
Food contaminants-toxins	Poisoning, Allergic reactions, Cancers, Organ Damage
Vitamin or mineral deficiency	Variable, typically immune system function is compromised and in children growth and development is hampered (failure to thrive)
Vitamin or mineral excess	Poisoning
Lack of variety of protein (NB: Plant protein does not supply the variety in animal foods)	Dermatitis, Muscle wasting, Poor hair texture, Loss of body fat (not as likely in lacto vegetarians), Gastro intestinal disorders.

For some of these diseases there is a clear and well-established link between the nutrient imbalance and disease risk. In some cases, the magnitude of the increased risk is very high, in others it is not so. For example, the risk of obesity is well known to be higher if you have a high calorie diet, and the risk is significant. But the chances of a man developing prostate cancer due to high calorie diet is only just being established and the relationship being the nutrient excess and the magnitude of increased risk is not yet clear. It is important to keep an eye on current research, and to be familiar with releases from professional nutrition bodies regarding diet and health implications. The more you read the more familiar you will become with studies and their relevance. For those planning on entering into nutrition/health as a profession, medical journals and articles are an excellent reference, for those interested in improving their own health or that of their families or the public in other roles, websites like Nutrition Australia provide up to the minute, easy to read information and opinion.

The current western diet is typically very high in salt (sodium) and low in potassium. Instead the diet should be high in potassium and low in sodium. Salt is a generic chemical term and covers a particular category of molecule. When referring to table salt, the salt we are talking about is sodium chloride. Increased sodium intake results in the increased loss of calcium in the urine, leading to osteoporosis. Potassium on the other hand provides protection against hypertension and other oedema. To correct a high sodium/low potassium diet you need to eat foods that have had as little processing as possible, as many food additives increase sodium levels and processing tends to reduce potassium levels.

Important micronutrients that are often lacking in different diets

- **Iodine**

Iodine is often lacking in the diet of people in developing countries. It is crucial for thyroid gland function and in turn, metabolic regulation, growth and development, including brain development. Associated health complications due to chronic lack of iodine in the diet include goitre, growth retardation, metabolic disorders and intellectual impairment, particularly in children of iodine-deficient mothers. In fact iodine deficiency is the number one cause of mental retardation in children. Risk of thyroid cancer is also higher and general symptoms of iodine deficiency include poor skin condition, fatigue and slowed reflex reactions.

Ocean water contains iodine, so any food from the ocean is a good source of this nutrient. Seaweed (kelp, nori) is a great source, as well as fish or shellfish.

- **Potassium**

Low potassium level is known as hypokalemia (hypo = low/reduced, kalemia refers to potassium). In chronic or severe cases you are at increased risk of serious cardiovascular and muscular problems including abnormal heart beat and rhythm, dangerously reduced blood sodium levels and muscle pain and weakness. Kidney function is impaired leading to electrolyte imbalances and dilute urine (leads to dehydration) and colon peristalsis is impaired. Potassium intake is important when you have diarrhoea or vomiting and one reason you need to seek medical advice with these conditions is because of the risk of heart attack caused by lack of potassium.

Eating foods that are not overly processed will improve your potassium intake, as well as fruit and vegetables, particularly sweet potato, tomato paste and legumes. Yoghurt and seafood also contains potassium. Eating the recommended 5 serves of vegetables a day should enable you to obtain most if not all of your daily potassium requirements.

- **Magnesium**

People are often unaware of the fact that magnesium is the fourth most abundant mineral in the body. It is important in the mineralisation of bones, as well as for muscle and nerve function and keeps the heart functioning properly. It may also boost the immune system and protects against high blood pressure, diabetes, depression and cardiovascular disease. Metabolism and protein production is hampered if magnesium levels are low. If you suffer from poor appetite, neurological symptoms such as tingling or numbness, muscle cramps heart arrhythmias or symptoms of low calcium or potassium levels, you probably aren't getting enough magnesium in your diet.

Good sources of magnesium include dark green leafy vegetables such as spinach, nuts and seeds as well as legumes and soy products including tofu. Processed bran and flours lose most of their magnesium content in the process of refinement.

- **Calcium**

Most people are well aware of the importance of calcium in the health of bones, and are also aware that dairy products are an excellent source of calcium. However many people are still not getting enough calcium in their diet – an average estimate in western countries is that 50% of people are calcium deficient! Like other minerals in the body, calcium has other important functions in the body in muscle contraction (and cardiac muscle function), blood clotting, neuron signalling and enzyme function. Effects of chronic calcium deficiency include hypertension, congenital heart defects where pregnant women are deficient, menstrual abnormalities, depression, haemorrhage, kidney stones and heart complications, as well as bone and joint diseases.

Dairy is the best source of calcium. Ensuring adequate Vitamin D levels will improve calcium absorption. For vegans, calcium can be obtained from dark green leafy vegetables and calcium fortified orange juice and soy products, molasses and tempeh. Nuts can also provide some calcium.

- Iron

Iron is found within the haemoglobin molecule and is the part that binds to oxygen. Low iron levels result in fatigue primarily because the transport of oxygen to tissues is compromised due to lack of red blood cells (that contain haemoglobin). Iron is also required for electron transport by cells and is crucial for the function of many enzymes. Iron can actually be stored in the body, yet, 1/5th of young women are iron deficient. This is primarily because of the loss of iron in the menstrual blood. Symptoms of deficiency may also include pica (craving unusual foods), light-headedness, constipation, weakness, weak nails and hair loss.

Good sources of iron include shellfish, organ meats such as liver (but be aware that these also contain high levels of cholesterol), red meat, soy products and legumes.

FATS, LIPIDS AND CHOLESTEROL

Cholesterol

Cholesterol is a complex fatty compound produced by all animals. It is important to a number of biological processes, but in excessive amounts can be a problem. Cholesterol in the body is both derived from food and also made by the body. Cholesterol in the blood can be raised by eating too much saturated fat and tends to be elevated in obese people. When blood cholesterol becomes too high, fatty plaques can build up in arteries, reducing the room in which blood has to flow, impeding blood flow. There are five forms of cholesterol in the blood, two of which are more important:

- HDL (High Density Lipoprotein)
This appears to protect against heart disease, clearing cholesterol from arteries as it moves through the blood system.
- LDL (Low Density Lipoprotein)
This appears to cause a build up of deposits on the artery walls, restricting blood flow.

The ratio of LDL to HDL is obviously critical to the significance of cholesterol in the blood.

Fats

There are three types of fats which can occur in foods. They are:

- Saturated fats

This type of fat tends to raise cholesterol in the blood, and should normally be eaten in much smaller quantities than other types of fats. They tend to be full cream dairy products and meats, which are solid at air temperature. A few plant products are also high in saturated fats (e.g. Coconut oil and Palm oil). Trimming meat and keeping dairy intake within recommended limits will help keep your saturated fat intake down. Skimmed dairy products are also an option; however care should be taken as they make up for the reduced fat with increased carbohydrates in many cases.

- Monounsaturated fats

These can contribute to reducing the LDL component of cholesterol. Olive oil has a very high proportion of this type of fat. Peanut and canola oil, and avocados are also good sources.

- Polyunsaturated fats

Polyunsaturated fats can help reduce cholesterol, and reduce the risk of heart disease. Only small quantities are needed, and larger quantities may increase the risk of cancer. These are generally liquids at room temperature, and are found in greater amounts in game (i.e. wild) meats than meat from domestic animals. Fish also contain polyunsaturated fats.

Low Salt or Low Sodium Diets

The chemical name of table salt is sodium chloride. This is why you will often see this salt referred to as sodium, to distinguish it from other salts. You may also see it listed on nutrition labels as NaCl, Na or even NA. Low sodium diets are used when a patient suffers water retention (oedema). It is also recommended in people with high blood pressure (hypertension), heart disease or liver disease and often in those with kidney disease. The degree of salt or sodium restriction will depend upon a doctor's prescription. Points to consider when planning such a diet:

- Salt is often added at the table
- Salt is often added during cooking
- Sodium is often found in processed foods (added during processing)
- Many foods contain sodium naturally (e.g. milk, meat, seafoods).

The maximum recommended salt intake per day is 1 teaspoon.

Low mineral diets – low potassium, sodium, magnesium etc may be prescribed for people with renal conditions. This is because high levels of these minerals puts more pressure on the kidney, which filters out and excretes the excess.

SUGAR

Simple sugars occur naturally in many foods (e.g. sucrose in sugar cane, fructose in fruit, lactose in milk). Refined sugars (e.g. white sugar) provide what is called empty calories - they are high in calories, but have no other beneficial nutrients. Sugar and sugar substitutes are commonly added to foods and drinks as sweeteners. Sugar substitutes are generally much sweeter than sucrose, so smaller quantities are required. However, some leave a bitter after taste and many have a dubious impact on health, with some researchers suggesting links to cancer, Alzheimer's and other serious diseases when sweeteners are taken in quantity.

The following table gives a summary of the main types of sugars and sweeteners. As a general rule the more refined or processed a sweetener is, the less likely it is to harbour any beneficial nutrients and is truly empty calories. Taste is also altered somewhat with processing (compare the taste of refined sugar with dark brown sugar, for example).

TYPE OF SWEETENER	CONTENTS	COMMENTS
Raw Sugar	99.2% sucrose	Almost identical to white sugar
Brown Sugar	95% sucrose, 5% molasses, some water	Slight toffee flavour, about 5-6% less calories than white sugar by weight and the darker it is the more minerals it will have.
White Sugar	99.9% pure sucrose	A very pure, refined product
Honey	2% sucrose 34% glucose, 40% fructose 19% water, some minerals	1 teaspoon contains 60 calories Raw honey is usually heated to destroy yeasts, then blended & filtered before use
Golden Syrup	32% sucrose, 33% glucose & fructose, 20% water	100 grams contains 295 calories
Molasses	36-38% sucrose, 10-13% glucose & fructose, 24-30% water	1 tablespoon contains 45 calories Blackstrap molasses is high in iron.
Maple Syrup	Almost all sucrose	Extracted from the sap of a sugar maple tree (<i>Acer saccharinum</i>)
Fructose	Fruit Sugar	Same calories as white sugar but 10% sweeter.
Lactose	Milk sugar	40% as sweet as white sugar
Sunectar (i.e. Fruit Extracts from Sunrider International)	Yerba dulce, Boxthorn & Chrysanthemum flower	1 to 5 drops substitutes for sugar in coffee or tea. Claimed to be natural.

Saccharin	Artificial sweetener	Three hundred times as sweet as white sugar, not tolerated by the body, excreted by kidneys
Cyclamate	(i.e. Sodium cyclohexylsulphamate)	Thirty times as sweet as white sugar, banned in some countries after trials showed it caused cancers in mice.
Aspartame (Nutra Sweet, Equal)	Aspartic acid plus two amino acids including phenylalanine	200times sweeter than white sugar. Recent research indicates possible health concerns, something to be aware of if you consume large amounts of soft-drink (pop/soda) or artificially sweetened products. People with the genetic disorder PKU should avoid this product.

HEART DISEASE

This is certainly a disease of affluence. It is comparatively rare in developing countries. Deaths from heart disease increased in Great Britain from 80 per million men in 1930, to 8 times that number in 1974. In 2010 the rate is predicted to be almost 850 per million! The cause is not completely understood, but there are many factors which have been identified as increasing the risk. These include: smoking, lack of exercise, obesity, high blood pressure, high blood cholesterol, poor diet and family history of the disease.

Diet strongly affects four factors associated with heart disease:

- Cholesterol
- Blood Pressure
- Obesity
- Diabetes

Improving diet is never a guarantee that heart disease will not occur, but an appropriate diet will lessen the risk of heart disease.

Recommendations include:

- Eat less fat (saturated fat and cholesterol in particular)
- Minimise intake of foods high in triglycerides
- Minimise sugar intake
- Minimise salt intake
- Minimise alcohol intake
- Eat more foods which are high in carbohydrates and fibre
- Eat more fish

Fats

- Small amounts of fat are needed in the diet (but only small amounts!).
- Excessive fat provides an excess of calories which can increase obesity.
- Research shows that calories eaten as fat are more likely to increase weight, than the same number of calories eaten as carbohydrate or protein.
- Excessive saturated fat can raise cholesterol levels in the blood.
- Foods which are high in saturated fats include milk and dairy products, some margarine, and some oils (e.g. palm & coconut oil).
- Chicken fat is mainly under the skin, so by removing the skin will usually remove the fat.
- Lean meats have less saturated fat than other meats.
- Cooking methods such as broiling or baking will remove fat (Frying does not!).
- However if you bake meat and don't have it elevated above the bottom of the pan (on a wire rack or similar) it will simply shallow fry in its own fat.

Triglycerides

Like cholesterol, triglycerides are common types of fats (lipids) that are essential for good health when present in normal amounts. They account for about 95 percent of the body's fatty tissue. Abnormally high triglyceride levels may be an indication of such conditions as cirrhosis of the liver, underactive thyroid (hypothyroidism), poorly controlled diabetes, or *pancreatitis* (inflammation of the pancreas). Researchers have identified triglycerides as an independent risk factor for heart disease.

Higher-than-normal triglyceride levels are often associated with known risk factors for heart disease, such as low levels of HDL ("good") cholesterol, high levels of LDL ("bad") cholesterol and obesity. Triglycerides may also contribute to a type of thickening of artery walls – a physical change believed to be a predictor of atherosclerosis. The human body makes triglycerides from excessive calories irrespective of where the calories come from. So an optimum intake of calories will help lower the triglyceride levels.

Cholesterol

Cholesterol intake can be reduced by reducing various high cholesterol foods such as egg yolks, meat and in particular organ meats. Cholesterol is also present in shellfish. Note: Cholesterol occurs in red meat, not just in the fat surrounding meat.

Sugar

Simple and refined sugars provide calories, but have no other nutritive value as a food. These are frequently eaten together with fats (e.g. in pies, ice cream, biscuits, cakes etc).

Salt

Excessive consumption of sodium (found in salt), has been linked to high blood pressure. Research indicates this negative effect of salt accumulates over years, hence increasing salt intake rarely seems to have an affect (but it does!). Sodium is also found in sodium glutamate, a flavour enhancer, often in processed foods, or added to food in restaurants.

Alcohol

High levels of alcohol have been associated with increased blood pressure. Excessive alcohol will also increase calorie intake, and can lead to obesity. Red wine is on the other hand, known to decrease cholesterol problems. One or two alcoholic drinks each day are generally considered of no harm, and in fact they have some benefit if they are a red wine both in terms of cholesterol and also because of the anti-oxidants present.

Carbohydrates

Carbohydrates are less likely to cause obesity than fats, although excess will still mean more calories. They don't increase cholesterol in blood. Complex carbohydrates are preferable because they are more nutritious per calorie, and also contain vitamins and minerals. They are also high in water soluble fibre (which helps reduce cholesterol). High fibre diet is important in minimising risk of a number of diseases, including bowel cancer.

Complex carbohydrates include grains and grain products, legumes and starchy vegetables (e.g. potatoes, yams, squash etc). Carbohydrate excess is much more likely to cause obesity if you lead a sedentary lifestyle. In this instance, the excess carbs will be converted into fat more readily.

Fibre

Water soluble fibre helps reduce cholesterol. Fibre also helps keep the excretory system functioning effectively.

Fish

Research has shown high intakes of fish will reduce irregular heart beat, mop up excess triglycerides in the blood, slow down atherosclerosis and may even reduce blood pressure in some instances. A study in the Netherlands indicated that eating 1-2 of any type of fish per week will reduce heart disease risk. How does eating fish confer these benefits? Fatty fish contain omega-3 fatty acids which are found in some fish are believed to be responsible. Increased amounts of fish in the diet will lead to a greater production of thromboxane; which is a powerful vasoconstrictor. Effects on platelets mean fewer blood clots, further reducing the risk of blockages in arteries.

Fish oil does contain cholesterol. Fish containing Omega-3 fatty acids are generally the darker fleshed, fast swimming fish. Examples include salmon, tuna, mackerel, herrings and sardines. People who have had, or at risk of stroke, as well as those with cardiac diseases are advised to eat two servings of these 'fatty' fish a week.

OBESITY AND INSULIN RESISTANCE

Obesity has only become recognised as a serious medical problem in recent generations. Everyone has a store of fat under the skin (known as subcutaneous fat), and around vital organs (known as omental fat). It serves as an energy reserve, for heat insulation, and to provide protection for vital organs. In many people, the fat content of the body remains constant, commonly amounting to 10 - 20% of the total body weight in a male adult and higher in a female. When fat content increases to 25% or more in a male, problems arise. Females have a higher normal fat content. (These figures may vary a little according to a number of factors).

Obesity occurs when energy intake exceeds energy expenditure, and is probably the most common nutritional disorder in developed nations, such as Australia, Britain and the U.S.A. today. The complications which may be caused by obesity are many, including high blood pressure, heart conditions, Type II diabetes, Metabolic Syndrome, gall bladder complaints, cancers and poor circulation in the bodies extremities can result in amputations of fingers, toes, hands, feet and even larger sections of the limbs. Obesity means that the joints and bones have to bear much greater weight, making arthritis much more common. Varicose veins can develop in the legs, flat feet, or bad backs are more common, skin damage can occur and they are at greater risk during surgery or child birth. Overweight pregnant women are high risk and must be monitored for complications including gestational diabetes and they are more likely to require a surgical delivery. It is therefore not surprising that obesity reduces life expectancy as well as reducing quality of life.

If you want to determine (approximately) whether you are in the healthy weight range, you can calculate your BMI (body mass index). The formula to use is:

BMI = weight (in kilograms) divided by height (metres) squared

So, if you are 1.75 metres tall and 80 kilograms, your BMI is $80 / (1.75 \times 1.75) = 26$.

BMI Range	Category
Less than 19	Underweight
19-25	<i>Healthy weight</i>
25.1-30	Overweight
30.1 – 34	Obese
Over 34	Morbidly obese

Additionally, some include a category of less than 15 as anorexic or dangerously underweight. There are BMI calculators online.

Abdominal obesity has been linked to insulin resistance. Insulin resistant people produce enough insulin, but cells in their body do not respond to this as normal. This means that glucose is not removed from the circulation. This in turn may lead to fluid retention, and raised blood pressure. Weight loss may help bring insulin back into balance. Extra fat in the hips & thighs is not normally associated with insulin resistance.

Insulin resistance, typically associated with obesity, is a condition where the cells are unable to respond to high blood sugar levels. After eating a meal, digestion and metabolism will release glucose into the blood stream, under the control of glucagon and insulin. Insulin will inform insulin responsive cells that there is glucose available to be drawn out of the blood for use in cells as energy. However, the cells will not respond to this and blood sugar levels remain high, prompting further secretion of insulin into the blood. People suffer chronically elevated blood glucose and insulin levels.

METABOLIC SYNDROME

Also known as Syndrome X, this is a newly defined illness made up of a range of metabolic disorders. It is typically associated with obesity. Sufferers tend to be centrally obese (that is, they carry large amounts of subcutaneous fat around their waist, as opposed to buttocks and thighs) with high blood pressure, poor blood sugar control, high levels of bad cholesterol and low levels of good cholesterol and often have high triglyceride levels in the blood. Sufferers will display some degree of insulin resistance. Excess fat in the body, once large stores already exist beneath the skin, are directed for storage around the internal organs. Obese people with insulin resistance or metabolic syndrome often show fatty plaques on the heart, and develop fatty livers, a condition that can deteriorate into cirrhosis. Some people develop dark patches on their skin and women are at higher risk of developing polycystic ovaries, which in turn affects fertility. Type II diabetes often develops.

Metabolic syndrome is most commonly seen in people who are older and who lead a sedentary lifestyle. Because of the complex range of symptoms the disease is not fully understood, however it appears to have a genetic component. However, given the propensity of families to eat similar diets, it may just be that the apparent heredity of the condition is actually a lifestyle issue. People with metabolic syndrome are diagnosed with blood tests (for lipids, cholesterol, insulin, glucose, and albumin) and treatment may include medication and generally dietary and lifestyle overhaul under the professional care of an endocrinologist and dietician.

CANCER

Cancer refers to cell growth which is abnormal, either growth when there should be none, growth that is too fast, or the growth of cells with mutated DNA (these cells should normally die). The significance of cancerous growths to health will vary according to the type of cancer.

A benign cancer occurs only in a localised area (it does not spread), and is not normally of great concern, because its growth is very slow. They are typically removed and tested as a benign tumour can progress to a more invasive malignancy. Malignant cancers grow rapidly, can spread to other parts of the body, and are generally a far more serious problem. The prognosis with malignant cancers is much worse than with benign and treatment is pursued rapidly and aggressively.

There are a number of different factors in diet which can increase the risk of cancer, including:

- Carcinogens (i.e. cancer promoting substances) found in a wide variety of foods, but in particular foods that are smoked, cured or pickled.
- Pesticide residues in agricultural and horticultural produce.
- Excessive fat in the diet can increase your risk of colon and breast cancers in particular. Excessive amounts of some foods (e.g. some vitamins and minerals).
- Lack of fibre (colon cancer)

Some foods on the other hand tend to combat the development of cancers. These include retinoid, Vitamin C, Vitamin E, Vitamin D and the mineral Selenium. Retinoid are converted to Vitamin A in the body. Too much Vitamin A can be toxic, but retinoid seem to be safe in larger quantities. Retinoid are prevalent in dark green and yellow vegetables, and in yellow fruits (e.g. cantaloupe and apricots). Though their effects are varied, in general vitamins enhance immune system functioning, which may allow the identification and destruction or mutated or deformed cells more readily.

Fibre is also valuable in preventing cancer. A lack of fibre in the diet is one of the primary causes of bowel and rectal cancers. Bowel cancer is the leading cause of cancer related deaths as it affects both genders (Breast cancer is the leading cause of cancer-related death in women, Prostate cancer is the leading cause of cancer-related death in men).

PROTEIN-ENERGY MALNUTRITION (PEM)

Protein-energy malnutrition (PEM) is a potentially fatal body-wasting disorder. It is the leading cause of death in children in developing countries.

PEM is also referred to as protein-calorie malnutrition. It develops in children and adults whose consumption of protein and energy (measured by calories) is insufficient to satisfy the body's nutritional needs. While pure protein deficiency can occur when a person's diet provides enough energy but lacks the protein minimum, in most cases the deficiency will be dual. PEM may also occur in persons who are unable to absorb vital nutrients or convert them to energy essential for healthy tissue formation and organ function.

Although PEM is not prevalent among the general population of the United States, it is often seen in elderly people who live in nursing homes and in children whose parents are poor. PEM occurs in one of every two surgical patients and in 48% of all other hospital patients.

Types of PEM

Primary PEM results from a diet that lacks sufficient sources of protein and/or energy. Secondary PEM is more common in the developed countries where it usually occurs as a complication of AIDS, cancer, chronic kidney failure, inflammatory bowel disease, and other illnesses that impair the body's ability to absorb or use nutrients or to compensate for nutrient losses. PEM can develop gradually in a patient who has a chronic illness or experiences chronic semi-starvation. It may appear suddenly in a patient who has an acute illness.

- **Kwashiorkor**

Kwashiorkor, also called wet protein-energy malnutrition, is a form of PEM characterized primarily by protein deficiency. This condition usually appears at the age of about 12 months when breastfeeding is discontinued, but it can develop at any time during a child's formative years. It causes fluid retention (oedema), dry and peeling skin, and hair discoloration.

- **Marasmus**

Primarily caused by energy deficiency, marasmus is characterized by stunted growth and wasting of muscle and tissue. Marasmus usually develops between the ages of six months and one year in children who have been weaned from breast milk or who suffer from weakening conditions like chronic diarrhoea.

Causes and symptoms

Secondary PEM symptoms range from mild to severe, and can alter the form or function of almost every organ in the body. The type and intensity of symptoms depend on the patient's prior nutritional status and on the nature of the underlying disease and the speed at which it is progressing. Mild, moderate, and severe classifications have not been precisely defined, but patients who lose 10-20% of their body weight without trying are usually said to have moderate PEM. This condition is also characterized by a weakened grip and inability to perform high-energy tasks.

Losing 20% of body weight or more is generally classified as severe PEM. People with this condition can't eat normal-sized meals. They have slow heart rates and low blood pressure and body temperatures. Other symptoms of severe secondary PEM include baggy, wrinkled skin, constipation, dry, thin, brittle hair; lethargy, pressure sores and other skin lesions.

People who have kwashiorkor often have extremely thin arms and legs, but liver enlargement and ascites (abnormal accumulation of fluid) can distend the abdomen and disguise weight loss. Hair may turn red or yellow. Anaemia, diarrhoea, and fluid and electrolyte disorders are common. The body's immune system is often weakened, behavioural development is slow, and mental retardation may occur. Children may grow to normal height but are abnormally thin.

Kwashiorkor-like secondary PEM usually develops in patients who have been severely burned, suffered trauma, or had sepsis or another life-threatening illness. The condition's onset is so sudden that body fat and muscle mass of normal-weight people may not change. Some obese patients even gain weight.

Profound weakness accompanies severe marasmus. Since the body breaks down its own tissue to use as calories, people with this condition lose all their body fat and muscle strength, and acquire a skeletal appearance most noticeable in the hands and in the temporal muscle in front of and above each ear. Children with marasmus are small for their age. Since their immune systems are weakened, they suffer from frequent infections.

Other symptoms include loss of appetite, diarrhoea, skin that is dry and baggy, sparse hair that is dull brown or reddish yellow, mental retardation, behavioural retardation, low body temperature (hypothermia), and slow pulse and breathing rates. The absence of oedema distinguishes marasmus-like secondary PEM, a gradual wasting process that begins with weight loss and progresses to mild, moderate, or severe malnutrition (cachexia). It is usually associated with cancer, chronic obstructive pulmonary disease (COPD), or another chronic disease that is inactive or progressing very slowly. Some individuals have both kwashiorkor and marasmus at the same time. This most often occurs when a person who has a chronic, inactive condition develops symptoms of an acute illness.

Hospitalized patients

Difficulty chewing, swallowing, and digesting food, pain, nausea, and lack of appetite are among the most common reasons that many hospital patients don't consume enough nutrients. Nutrient loss can be accelerated by bleeding, diarrhoea, abnormally high sugar levels, kidney disease, malabsorption disorders, and other factors. Fever, infection, surgery, and benign or malignant tumours increase the amount of nutrients hospitalized patients need. So do trauma, burns, and some medications.

Diagnosis

A thorough physical examination and a health history that probes eating habits and weight changes, focuses on body-fat composition and muscle strength, and assesses gastrointestinal symptoms, underlying illness, and nutritional status is often as accurate as blood tests and urinalyses used to detect and document abnormalities. Some doctors further quantify a patient's nutritional status by:

Comparing height and weight to standardized norms, calculating body mass index (BMI) and measuring skin fold thickness or the circumference of the upper arm.

Treatment

Treatment is designed to provide adequate nutrition, restore normal body composition, and cure the condition that caused the deficiency. Tube feeding or intravenous feeding is used to supply nutrients to patients who can't or won't eat protein-rich foods. In patients with severe PEM, the first stage of treatment consists of correcting fluid and electrolyte imbalances, treating infection with antibiotics that don't affect protein synthesis, and addressing related medical problems. The second phase involves replenishing essential nutrients slowly to prevent taxing the patient's weakened system with more food than it can handle. Physical therapy may be beneficial to patients whose muscles have deteriorated significantly.

Prognosis

Most people can lose up to 10% of their body weight without side effects, but losing more than 40% is almost always fatal. Death usually results from heart failure, an electrolyte imbalance, or low body temperature. Patients with certain symptoms, including semi consciousness, persistent diarrhoea, jaundice, and low blood sodium levels, have a poorer prognosis than other patients. Recovery from marasmus usually takes longer than recovery from kwashiorkor. The long-term effects of childhood malnutrition are uncertain. Some children recover completely, while others may have a variety of lifelong impairments, including an inability to properly absorb nutrients in the intestines and mental retardation. The outcome appears to be related to the length and severity of the malnutrition, as well as to the age of the child when the malnutrition occurred.

Prevention

Breastfeeding a baby for at least six months is considered the best way to prevent early-childhood malnutrition. Preventing malnutrition in developing countries is a complicated and challenging problem.

Providing food directly during famine can help in the short-term, but more long-term solutions are needed, including agricultural development, public health programs (especially programs that monitor growth and development, as well as programs that provide nutritional information and supplements), and improved food distribution systems. Programs that distribute infant formula and discourage breastfeeding should be discontinued, except in areas where many mothers are infected with HIV.

Every patient being admitted to a hospital should be screened for the presence of illnesses and conditions that could lead to PEM. The nutritional status of patients at higher-than-average risk should be more thoroughly assessed and periodically re-evaluated during extended hospital stays or nursing home residence.

HEALTH PROBLEMS AND SOLUTIONS

In general improve nutrition will in turn improve your overall health and wellbeing. To improve and balance your diet and nutrient intake you might consider:

- Reduce red meat consumption, most experts recommend 3 serves a week
- Add fish to your diet, this will provide micronutrients such as iodine and potassium, and if the fish have edible bones you are also getting calcium. The omega-3 fatty acids in fish are some of the best fats to include in your diet
- Use oils in cooking rather than butter/margarine/spreads. Polyunsaturated fat is better than saturated.
- Eat a variety of foods to ensure you are getting ALL the required vitamins and minerals in your diet.
- Leave skins on fruits such as apples and vegetables such as potato, the skin is packed with nutrients
- Increase your fibre intake by switching to wholegrain, un-processed or lightly processed grain products (cereal, bread, flour, pasta etc).
- Green leafy vegetables and coloured vegetables such as capsicum (peppers), carrot and beetroot supply a number of micronutrients
- Make sure you are getting plenty of calcium by incorporating serves of dairy.
- Soy products and legumes are a great source of many nutrients, lack the saturated fats of animal products and are high in protein.
- Stop cooking with or adding salt to meals
- Reduce your fat and calorie intake and keep your weight within healthy limits
- Avoid fad diets that eliminate food groups or have you eating excessive amounts of single food groups. Excess of most nutrients is as harmful as deficiencies and you won't get the full range of micronutrients you need if you don't vary your diet.
- For long term weight loss there is no easy option! Fad diets may give early results, but most people will not be able to maintain the strict restrictions and will crave foods and return to their starting weight or even more. Gradually change your diet, increasing fibre and protein to dampen appetite, avoid high GI foods that give you a sugar rush followed by an energy low, and you will need to incorporate more whole, un-processed foods.
- Go organic. Not only is it an ethical choice, but you will reduce your exposure to harmful pesticides and other chemicals and many people find that the taste is much better.

Special considerations for pregnant and nursing women and children

While fish is an excellent source of essential fats and other nutrients, almost all fish and shellfish will contain trace amounts of mercury. This issue is one of much current debate, however guidelines from the FDA and EPA currently state that women who are, or plan to become pregnant, are breastfeeding, as well as young children should:

- Avoid shark (flake), swordfish, king mackerel and tilefish
- Continue to eat two serves of low mercury fish each week
- If eating fish with moderate to high mercury levels (as a rule larger, older fish) only have one serve a week or a smaller serve

A serve is 6 ounces, or 170 grams. Low mercury options include salmon, anchovy, catfish, cod, crab, spiny lobster, and mackerel other than King, oyster, sardine, squid and canned light tuna. For the most up to date mercury information, check out the FDA website which measures and monitors mercury levels in fish routinely

SET TASK

- Research online or in the library, looking for information on the most common regional dietary deficiencies and related health impacts.
- Prepare a world map (sketch a basic picture) and use colours or patterns to show where in the world particular deficiencies are prevalent.
- For each region (for example, Asia, or north America) prepare a brief set of points giving the cause of the most prevalent deficiencies, feasible options (brief descriptions of a few sentences each) to combat the problem a list of the diseases associated with the deficiencies.

ASSIGNMENT

1. Create a list of up to 5 methods by which a person's nutritional status (nutrient deficiencies or excesses) may be assessed. Try to include a range of allopathic and alternative methods and give a 1-2 sentence explanation of each method.
2. Submit the work you completed in your set task. Add 2-3 sentences commenting on any thing else you learned or gained from this task or anything that surprised you.
3. Consider your own diet. Create a table with the 5 foods you most commonly eat along with the nutrients they are rich in (you may need to do some additional research, online, food labels etc). Then write a paragraph commenting on improvements you could make to your own diet to improve the balance of nutrients you get.
4. Find a friend or family member with a medical condition. Suggest 5 dietary improvements they might make to improve their condition, to reduce their risk of the condition worsening or to improve their basic health. Include for each improvement the reason (1-2 sentences) why you think this is important for this particular person.
5. What services are available in your area for people who want to improve their health or get advice on how to improve their diet to combat illness?

Lesson 2

DENTAL PROBLEMS

Aim

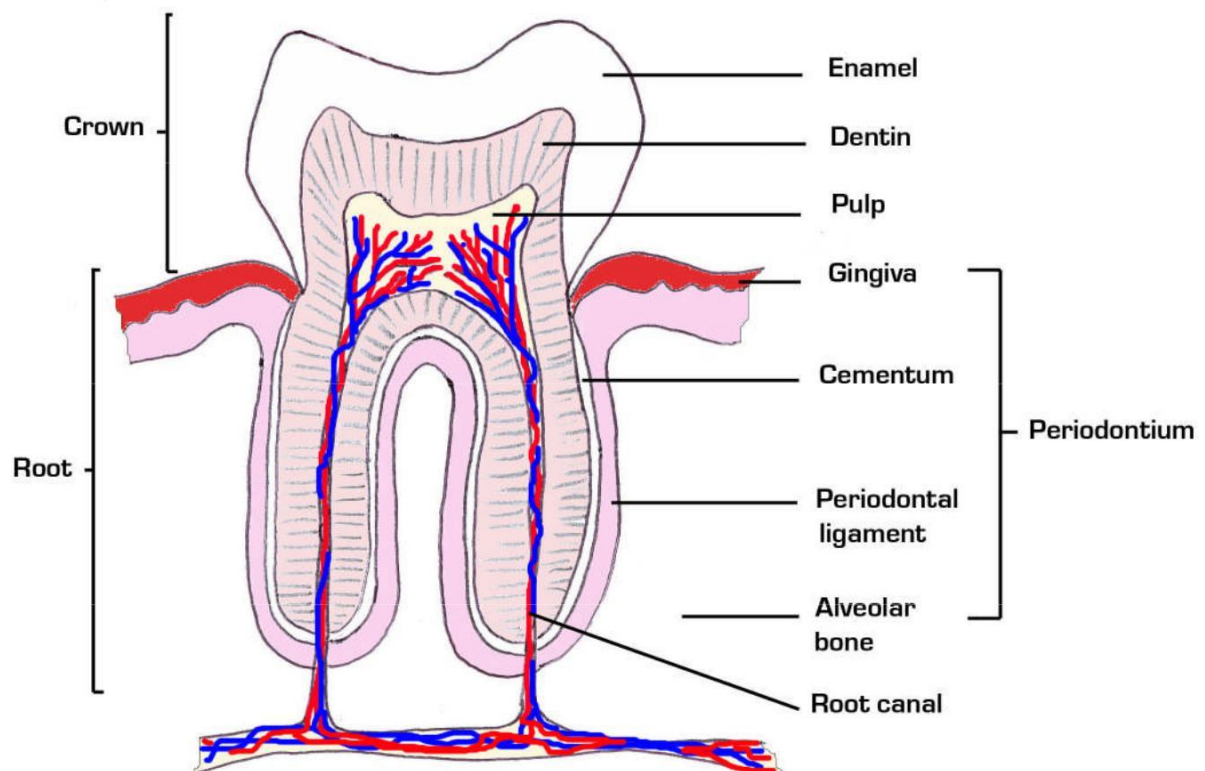
Manage diet to optimise dental health.

TOOTH STRUCTURE

There are three main parts of a tooth.

1. The outer layer (above the gum), is a protective layer of enamel. Below the gum, this is a thinner layer of calcified connective tissue (Cementum) which covers the bulk of the tooth (The dentin is covered by the cementum, under the gum).
2. Under the enamel is the "Dentin", a material like bone, which forms the bulk of the tooth.
3. In the centre of the tooth, surrounded by dentin is a cavity (pulp cavity at the top and narrower root canal lower down). Nerves run through this cavity.

Anatomy of teeth



Teeth are located in sockets called "alveoli", in the mandible and maxilla; these sockets are covered by the gums. Teeth tear and grind food as the jaws are opened and closed (chewed or masticated). This is the first process in digestion; physically breaking food up into smaller pieces so that it can be acted upon more easily by digestive juices. Teeth are in this way very important, and their condition and proper use will have a significant impact upon digestive processes later on.

Two sets of teeth have normally been completed by the age of 21. The first set of teeth is deciduous teeth (the primary dentition, baby teeth or milk teeth). They will begin to appear in a baby at about 6 months of age, and be a complete set of 24 teeth at about 2 years of age.

The second set of teeth (permanent teeth) emerges below the baby teeth normally between the ages of 6 and 12, loosening the baby teeth, and progressively causing them to fall out. Generally 28 of 32 permanent teeth have emerged by around 12 years of age. The final four teeth (i.e. the wisdom teeth) usually emerge between 17 and 25 years of age, but commonly before 21.

Sometimes a tooth remains embedded in the jawbone, and does not properly emerge. Such a tooth is "impacted", and can cause severe pain, requiring surgical removal. This happens sometimes with wisdom teeth. Impacted teeth are a major problem when they are misaligned and impact on adjacent teeth.

Teeth are divided into the following types, distinguished by characteristic shapes and functions:

- Incisors

Flat chisel shaped used for cutting at the front of the mouth

- Canines (eyeteeth)

Beside the incisors, next closest to the front teeth. Pointed; they are used to tear & pierce.

- Premolars (bicuspid)

Toward the back of the mouth they have broad crowns (tops) and two rounded tips (cusps) they are used to grind and crush food.

- Molars (tricuspid)

Found right at the back of the mouth have broad crowns (tops) and three rounded tips (cusps) are used to grind and crush food.

NUTRITION AND DENTAL HEALTH

Good nutrition is essential for good physical health. Nutrition also plays a key role in the development and maintenance of a healthy mouth, especially the teeth and gums. The food we eat affects our teeth. At the same time, the health or lack of health of our teeth and gums affects what we can eat. Good dental health begins early in life and must be practiced throughout life.

Tooth development begins shortly after conception, usually between the sixth and eighth weeks of gestation and continues throughout pregnancy. It seems to take severe nutritional deficiencies in the mother to cause obvious changes in tooth formation in the child. However, slight deficiencies may cause changes in tooth structure that will leave a tooth at greater risk for decay later in life. A good diet during pregnancy is always important. Nutrient excesses as well as nutrient deficiencies may play a role in congenital anomalies of the mouth. Therefore, take supplements during pregnancy only on the advice of a doctor or dietician.

It is interesting to note that archaeologists/anthropologists examining skeletal remains are often able to tell a lot about periods of stress and disease as well as nutritional status by examining the teeth.

While many teenagers endure braces to straighten misaligned teeth, there is no evidence that this is related to diet. It is likely however that severely deformed and misaligned teeth are due to extreme dietary deficiencies in the mother when she was pregnant. People with braces, particularly permanent braces must take extra care of their dental hygiene as food is more able to become trapped in the brace, or between the brace and teeth.

Fluoride intake

Good nutrition is equally important during infancy, childhood and adolescence. During these growth periods, primary (baby or milk teeth) and permanent teeth are being mineralized. This occurs before they erupt into the mouth. Fluoride intake from birth has been shown to reduce dental caries (tooth decay) by as much as 60 percent. During tooth development, fluoride is incorporated into the tooth structure making the tooth strong and decay resistant.

Many community water supplies are fluoridated at the rate of 1 ppm (1 part per million). This rate has proven safe and is effective at reducing (by about 50%) dental caries. The normal daily intake from fluoridated water is about 1 milligram per day. When teeth are forming, an intake of more than 2 parts per million may cause fluorosis, a condition in which tooth enamel becomes toughened, mottled and discoloured. However, teeth remain strong and resistant to decay. There is some question by some health professionals as to the benefit of sodium fluoride in the water supply, given that it is chemically different from fluorine found in foods. Some believe sodium fluoride to be quite dangerous and addition of fluoride to water is still a thorny issue.

If you live in an area where drinking water has little or no fluoride, prescription fluoride drops or tablets may be prescribed by your doctor. An alternative to supplements is the daily use of fluoridated toothpaste and mouthwash. If you don't know the fluoride level of your water, contact your local water department. If you want to increase your dietary intake, as many natural health professionals recommend, in place of fluoridated water/supplements, fluoride can be found in seafood as well as goat's milk, cabbage, parsley and grains such as rice and rye. Liquorice and avocado also contain some fluorine, as well as gelatine.

In the body fluoride is found as calcium fluoride in both the teeth and other bones. Additional fluoride is required in cases where illness results in the excessive turn over of bone, such as osteoporosis. Menopausal women also tend to require additional fluoride.

Calcium intake

Refer to the previous lesson's notes on calcium intake, function and food sources. The uptake and use of calcium is enhanced by vitamin D. Calcium deficiency can compromise the structural integrity of the teeth,

The decay process

Brushing after meals and snacks is one of the best ways to remove sugars and food particles from tooth surfaces. Flossing is important to remove food particles from areas that the toothbrush cannot reach. Toothbrushes are available in many places that include a pad on the reverse of the head to clean the tongue. An indicator of poor dental hygiene or health is bad breath or halitosis. This is often apparent with infections.

The decay process begins when the bacteria that are always present in the mouth break down components of saliva. These components adhere to tooth enamel. This is the start of dental plaque. Dental plaque is a clear, gelatinous material that allows bacteria to remain on the teeth. If dental plaque is not removed frequently (at least once a day) by proper brushing

and flossing, the plaque becomes tightly attached to the tooth and only mechanical cleaning can remove it. This is why frequent visits to a dentist and regular, thorough cleaning by a dental hygienist are very important.

Inside this dental plaque, the bacteria ferment dietary carbohydrates for a food source. This fermentation produces lactic and other acids. These acids demineralise the tooth enamel. As the tooth demineralises, bacteria move into the tooth, decay begins and a cavity is formed. Untreated dental caries are painful and can result in tooth loss. Pain or loss of teeth may cause malnutrition. These conditions often prevent a person from chewing and eating adequate amounts, as well as eating some hard, high-fibre foods.

Bacteria need carbohydrates for food. By cutting back on simple carbohydrates, the rate of dental caries can be reduced. Sucrose (table sugar) is the carbohydrate bacteria prefer. However, other simple carbohydrates, such as fructose, lactose and glucose, are easy to ferment and also support bacteria growth. Simple sugars are found in many foods and have many names. Some of these are table sugar, corn syrup, honey, molasses and dextrose. By reading labels on food products, you can limit foods high in simple sugars and thus reduce the chance of dental caries.

Bacteria can also ferment complex carbohydrates (starches), but the process takes longer. However, many complex carbohydrates are sticky and become lodged between teeth and gums. This allows the bacteria time to ferment the carbohydrate. Meats and foods high in fibre, such as fresh fruits and vegetables, help clean the teeth of food particles and sugars during the chewing process. These foods promote saliva flow, which helps rinse the teeth of food particles. Saliva also neutralizes the acid.

Although fresh fruits and vegetables do contain carbohydrates that can be fermented by bacteria, the fibre content counteracts the effect and helps clean the teeth, therefore protecting against dental caries. When we eat, we provide food for mouth bacteria. Eating three meals a day is important for adequate energy and nutrient intake, but snacking between meals presents special dental health problems.

The snacks most people enjoy tend to be high in simple sugars (examples might be dried fruits such as raisins, sweet rolls, candy bars, pop or caramel corn). Snacking does not need to be completely omitted. In many situations, snacking is important for good physical health. This is especially true for young and growing children who need the calories and nutrients from snacks for proper growth.

Choose snacks that do not harm teeth. Such snacks also tend to be more nutritious. Good snacks include cheese, yogurt, meats, plain nuts (not recommended for children younger than school age), peanut butter, fresh fruits and vegetables, unsweetened breads or cereals, and popcorn. Sticks of raw vegetable (such as carrot or capsicum) are good snacks as they are firm and can help dislodge plaque, as well as stimulating saliva production to flush the mouth.

NURSING BOTTLE SYNDROME

One preventable dental problem that affects young children is "nursing bottle syndrome." It is characterized by rapid decay of the primary upper teeth and some of the lower back molars. The lower front teeth are seldom affected. This condition develops when a child is given a bottle that contains a carbohydrate liquid or a sweet pacifier at bed or nap time. While the child is awake and sucking, saliva flow helps wash sugars away from teeth. As the child falls asleep sucking and saliva flow decreases, the sugars in the liquid pool around the teeth and provide an excellent feeding ground for bacteria.

Painful decay results from this practice. If left untreated, infections and abscesses are possible. Premature loss of upper teeth may lead to the child developing poor tongue-thrust. This could cause poor alignment of permanent teeth and future orthodontic and speech problems.

Current recommendations are to not allowing a child to fall asleep with a bottle or on the breast, however bottles are considered more of a problem because they will continue to leak more so than the breast if the baby has stopped suckling. Putting an older baby to bed with a bottle of water is another option. Also, pacifiers, if they are used, should be limited to occasions when they are needed (naps for example) and not be allowed to be chewed and sucked on constantly. This is because it can affect the eruption of teeth, particularly the front teeth, leaving them misaligned. This is also the case with thumb sucking.

PREVENTING DENTAL PROBLEMS

Dental disease is almost entirely preventable; or at least able to be managed and minimised and diet management is key. Decay does most damage before the age of 25. Disease of the tissues supporting the teeth (e.g. gums) is the main cause of teeth being lost in middle aged adults. Regular dental checkups and professional cleaning is also vital and can help prevent lesser problems such as staining and can remove plaques you are unable to at home. Dental techniques have improved significantly in recent years and a dentist visit no longer needs to be a fearful, painful experience. Introducing children to dental check ups young while help reduce the chances of them developing a fear of dentists and also encourages them to take care of their teeth. Children's teeth should be brushed at home as soon as they erupt. As the child gets older you can teach them how to brush their teeth correctly, but it may be necessary to assist them for several years.

The role of diet

Bacteria in the mouth thrive on simple sugars. Limiting your intake is a good start in promoting good dental health. Brushing the teeth after sugary meals will also help remove remaining sugar dissolved in the saliva. Eating firm, crunchy foods can mechanically remove food particles and plaque from the teeth during chewing while soft sticky foods or fibrous foods can get stuck between teeth. These can cause plaque development and infection if not removed promptly. In many cases, brushing will not suffice and dental floss will be required. Maintaining hydration with water, rather than sugary soft drinks will help flush the mouth and an all round balanced diet will ensure the teeth are strong and the immune system functioning optimally in order to combat potential problems such as infection or damage (ulcer, cuts, abrasions).

REASONS TO PREVENT TOOTH DECAY

- Toothache is painful (and cavities don't tend to cause pain until decay is at an advanced level).
- Appearance and self confidence can be affected by decayed teeth.
- Tooth decay and gum infections can cause infections in the eyes, ears and throat, and can be dangerous to people suffering from other illnesses including heart conditions and diabetes.
- Dental surgery can be expensive and invasive. In some countries, dental waiting lists are very long and many people live in pain for many years, with their condition progressively worsening.

CAUSES OF TOOTH DECAY

- Carlogenic bacteria in the mouth act on food residues.
- These bacteria only become a danger when they cluster together to form colonies in one location on a tooth.
- The resulting acids will react with vulnerable teeth they come in contact with, causing decay.
- Though the visible part of a tooth is covered with a thin protective, hard layer of enamel, acids are able to gradually dissolve this enamel.
- Grinding the teeth. Some people subconsciously grind their teeth when sleeping. It is commonly thought to be a stress reaction although this is not clear. Grinding abrades the surfaces of teeth, flattening them and eroding the enamel protection. Loss of enamel makes the teeth very sensitive and having teeth capped to artificially replace the enamel is expensive.

Because sugars convert to acids faster than other foods, the intake of sugar should be restricted in order to reduce tooth decay. Starches and other carbohydrates will also convert to acids, but more slowly. Acids may also come from other food sources directly. Some cold drinks, sweets and fruits contain acids. Even fruit juices contain acid which can cause decay.

Unremoved plaque on the gums can accumulate and calcify to form tartar (i.e. also called "calculus"). This situation can result in the seals between the gums and teeth being broken, making the gums susceptible to infection. In early stages, gums can become sore and even bleed. This condition leads to inflammation called "gingivitis". The condition can be reversed if tartar is removed. If neglected it can develop into more serious tooth decay and result eventually in tooth loss.

During pregnancy, a frame is formed to support each tooth as it grows in the developing baby's mouth. This frame is extremely important, because it determines future characteristics of the baby's teeth, as the baby grows into a child and adult. During pregnancy, calcium and phosphorus are deposited as this frame (to support the teeth) grows. Around 20 months after birth, all of the teeth are hard and most have erupted. Vitamin D needs to be present for minerals to be properly absorbed by the body. A deficiency in these minerals, in conjunction with Vitamin A, C or D deficiency can result in deformities in teeth (e.g. late eruption, brittleness, softness -susceptibility to decay).

You can see from this that good nutrition is essential in both a pregnant mother and a baby, in order to reduce the likelihood of tooth decay later in that babies life. Once it has matured, a tooth cannot grow or repair itself (as other body tissues do). For this reason, it is essential to pay particular attention to providing proper nutrition while teeth are forming.

DENTAL HYGIENE

In recent decades, the use of fluoride in water, and in toothpaste, has resulted in a significant reduction in tooth decay in children. Apart from this, there are many other procedures which can contribute significantly to the reduction of tooth decay, including:

- Proper brushing of teeth
- Proper use of dental floss
- Regular inspections of teeth by a dentist (and appropriate action taken before decay becomes advanced).
- Eating fibrous food such as uncooked carrots or apples. These help dislodge food particles from teeth.

- Eating foods which protect against decay (e.g. milk, cheese, nuts, wholemeal bread contains chemicals which neutralise acid from plaque, helping prevent decay).
- Avoid foods which promote decay (e.g. sugars).

(Improper use of floss, toothpicks and toothbrushes may damage gums, or teeth, and expose tissues to infection).

HOMEMADE TOOTHPASTES AND MOUTHWASHES

Like all processed and mass manufactured items, toothpaste has a variety of ingredients that some people would prefer to avoid. If you want to make your own toothpaste a base of baking soda can be mixed with salt (the best being organic fine sea salt, but table salt is also fine). For flavour and freshness spearmint or peppermint might be added or even wintergreen. Generally as an extract, rather than leaves. A paste is made by adding a small amount of water to the mix, or make up a powder and only add water to small amounts of powder immediately before use. The benefits of additives you might include are listed below:

- **Baking soda**

Also known as bicarb soda or sodium bicarbonate. Has anti-microbial properties, is alkaline and can therefore help neutralise acids in the mouth and also helps whiten the teeth.

- **Clays**

Many different types, choose one that is safe, white and has lots of minerals. Some people attribute benefits to coloured clays, generally green for extra cleansing, pink and red to soothe painful gums and yellow to strengthen gums. You can mix different types and add to a powder, reducing the amount of bicarbonate comparatively.

- **Salt**

Sodium chloride. Also has some anti-microbial effect, as well as being a good abrasive to physically remove plaque. If you have swollen gums, salt or a salt water mouth rinse will draw fluid out of the gums by osmosis as well as inhibit infection. Never swallow a salt water gargle – it should be too much salt for one person's daily intake!

- **Glycerin**

Glycerin is actually used in scientific laboratories as it stops motile cells being able to move around which makes microscopic inspection easier. It has the same effect on microorganisms in the mouth; however it is mainly added for texture for pastes.

- **Hydrogen peroxide**

Attacks plaque and whitens the teeth. It has a stronger whitening effect than bicarbonate soda.

- **Essential oils**

Peppermint and spearmint are used to invigorate, stimulate and energise. Wintergreen is mainly used for joint and muscular pain and sometimes respiratory conditions; it has analgesic and anti-inflammatory properties. Take care with wintergreen it can cause some severe symptoms if applied to the skin, and a fatal dose for a child is 10mL (probably less for a smaller child). Only use a few drops for a large batch of paste or powder, or stick with the mints. Do not swallow pastes or powders with essential oils.

Try getting young children to help making their own paste. Add a few drops of food colouring and experiment with flavourings. Some options include cinnamon, cranberry juice (use in place of water), oregano or other savoury herbs, lemon or even chocolate mint. Involving children will likely make them much more excited about caring for their teeth. Some people recommend the addition of powders of vitamins, such as vitamin c in tooth powders and pastes also.

For mouth washes there are also several ingredients you can use individually or in combination at home:

- **Alcohols**

Brandy or vodka (spirits, not beer or wine). Have antiseptic properties. Some people believe alcohol may be harmful to teeth, others use alcohol based rinses without problems.

- **Hydrogen peroxide**

Has some antimicrobial properties.

- **Salt water**

Antibacterial and can help ease swelling and inflammation

- **Vinegar**

Antibacterial and able to dissolve plaques.

- **Cranberry juice**

Often prescribed for people with urinary tract infections, cranberry juice is antibacterial and unlike most other mouth washes, can be swallowed which is good if you are dealing with the elderly or young children (who will probably also be won over by its bright colour!)

- **Clove oil**

Reported to provide a mild anaesthetic, making it a good inclusion for people with sore throats or ulcers. Wintergreen is also an anaesthetic, but as mentioned previously, it must be used in very small amounts, diluted and never swallowed, making it unsuitable for children's mouth washes.

Essential oils you might add to a mouth rinse include myrrh (anti-inflammatory and antiseptic believed to be good for the glands) or cinnamon (tastes nice and some studies show it suppresses appetite).

SET TASK

1. Investigate the affect of each of the following types of foods on teeth:

- Sugars
- Starches
- Fats
- Proteins
- Vitamins
- Minerals

Some of these may have little or no effect, while others may have a significant affect. Spend half an hour or so and take notes.

You may choose to use any of the following methods to research this information:

- Interview a professional person who you know
(e.g. a dentist, doctor, nurse or other health professional)
- Research information at a library which you have access to.
- Contact a government or other authority with responsibility for dental health, or a dentist, and obtain brochures/literature which is of relevance.

2. Investigate the best way to clean teeth.

You may choose to use any of the following methods to research this information:

- Interview a professional person who you know
(e.g. a dentist, doctor, chemist, nurse or other health professional)
- Research information at a library which you have access to.
- Contact a government or other authority with responsibility for dental health, or a dentist, and obtain brochures/literature which is of relevance.
- Obtain brochures from a chemist or a company which sells floss/toothpaste.

Spend about half an hour and record your findings as well as the methods you used. Try to use different sources of information and learn about the different things you can do, the order you would do them in etc.

ASSIGNMENT

1. Explain the effect of the following on the teeth and gums in 2-3 sentences each:
 - High sugar diet
 - Raw vegetable snacks
 - Steak
 - Chewing gum between meals
2. Describe the steps that occur from healthy mouth to gingivitis. You may have to do some additional research on this. For each step, write 2-3 sentences explaining the event.
3. Prepare two lists of guidelines to keep/maintain or improve dental health
4. Discuss the effect of drinks on children's teeth. (Soft drink (pop/soda), cordial, juice, milk, water). Write 1-2 paragraphs and suggest what you think is/are the best drink/s for children to consume during the day and why.

FIBRE & DISEASES OF THE BOWEL

Aim

Understand the role of dietary fibre in the diet and how it relates to bowel diseases.

FIBRE

Dietary fibre is the part of foods which is NOT digested by normal processes before it reaches the large intestine. That is, while simple sugars, lipids and proteins are digested (broken down in to simpler molecules) in the stomach and first portion of the small intestine, fibre remains largely unchanged.

Fibre is a complex carbohydrate. The building blocks of all carbohydrates are different types of sugars and they can be classified according to how many sugar molecules are combined in the carbohydrate:

- **Simple sugars** - consist of 1-2 sugar molecules; for example glucose, fructose, sucrose, maltose and lactose.
- **Oligosaccharides** - consist of 3-10 glucose molecules joined together.
- **Starch polysaccharides** - have more than 10 glucose molecules joined together.
- **Non-starch polysaccharides** - have more than 10 sugar molecules; for example xylose, arabinose and mannose.

How does fibre work?

Fibre works like a sponge in the body; it absorbs water and swells up so that your body can more easily dispose of the waste contents of food. So it is very important to drink plenty of fluids for the fibre to work properly. Try to drink at least 8 cups of fluid a day. Because it is bulky and not rapidly broken down and converted into energy it will leave you feeling full and not feeling hungry soon after like sugary snacks do. This can help you manage your appetite and diet if you are trying to reduce your weight.

Fibre rich foods

You can find fibre in most breakfast cereals, particularly those that are unprocessed or have only light processing. Rice puffs have less fibre than wheatbix for example. Wholegrain and wholegrain products such as breads and pastas are also high in fibre, as opposed to white bread and pasta/rice that are low in fibre and high in carbohydrates. Legumes are also high in fibre and the skins of fruits and vegetables contain most of the fibre of these foods.

Fibre in food

Dietary fibre is found in cereals and grains, fruits and vegetables. Fibre is made up of the indigestible parts or compounds of plants, which pass relatively unchanged through our stomach and intestines. The main role of fibre is to keep the digestive system healthy. Other terms for dietary fibre include 'bulk' and 'roughage', which can be misleading since some forms of fibre are water soluble and aren't bulky or rough at all. It is believed that vegetarians have a lower risk of bowel cancer because they tend to eat more plant and grain products

Fibre keeps the digestive system healthy

Dietary fibre is needed to keep the digestive system healthy. It also contributes to other processes, such as stabilising glucose and cholesterol levels. In countries with traditionally high fibre diets, diseases such as bowel cancer, diabetes and coronary heart disease are much less common than in the West.

Most Australians don't consume enough fibre. On average, most Australians consume 18-25g of fibre daily. The Australian Heart Foundation recommends that adults should consume approximately 30g daily. Australian experts suggest that children should eat 10g of fibre a day plus an additional gram for every year of age. For instance, a 10 year old child should eat 15-20g of fibre per day.

Two types of fibre

There are broadly two categories of fibre and we need to eat both in our daily diets:

- **Soluble fibre** - includes pectins, gums and mucilage, which are found mainly in plant cells. One of its major roles is to lower blood cholesterol levels. Good sources of soluble fibre include fruits, vegetables, oat bran, barley, seed husks, flaxseed, psyllium, dried beans, lentils, peas, soymilk and soy products. Soluble fibre can also help with constipation.
- **Insoluble fibre** - includes cellulose, hemicelluloses and lignin, which make up the structural parts of plant cell walls. A major role of insoluble fibre is to add bulk to faeces and to prevent constipation and associated problems such as haemorrhoids. Good sources include wheat bran, corn bran, rice bran, the skins of fruits and vegetables, nuts, seeds, dried beans and wholegrain foods.

Both types of fibre are beneficial to the body and most plant foods contain a mixture of both types

Resistant starch

Resistant starch, while not traditionally thought of as fibre, acts in a similar way. Resistant starch is the part of starchy food (approximately 10 per cent) that resists normal digestion. It is found in many unprocessed cereals and grains, firm bananas, potatoes and lentils, and is added to bread and breakfast cereals as Hi-Maize. It can also be formed by cooking and manufacturing processes such as snap freezing.

Resistant starch is also important in bowel health. Bacteria in the bowel ferment and change the resistant starch into short-chain fatty acids, which are important to bowel health and may protect against cancer. These fatty acids are also absorbed into the bloodstream and may play a role in lowering blood cholesterol levels.

WHY AND HOW TO IMPROVE YOUR FIBRE INTAKE

Fibre keeps the digestive tract healthy

The principle advantage of a diet high in fibre is the health of the digestive system. The digestive system is lined with muscles that massage food along the tract (a process called peristalsis) from the moment a mouthful is swallowed until the eventual waste is passed out of the bowel. Since fibre is relatively indigestible, it adds bulk to the faeces.

Soluble fibre soaks up water like a sponge, which helps to plump out the faeces and allows it to pass through the gut more easily. It acts to slow down the rate of digestion. This slowing down effect is usually overridden by insoluble fibre, which doesn't absorb water and speeds

up the time that food passes through the gut. Very basically, fibre tends to 'keep you regular'.

You must drink lots of fluid

A high fibre diet may not prevent or cure constipation unless you drink enough water every day. Some high fibre breakfast cereals may have around 10g of fibre per serve and if this cereal is not accompanied by enough fluid it may cause constipation.

Fibre and ageing

Fibre is even more important for older people. The digestive system slows down with age, so a high fibre diet becomes even more important.

Lowering blood cholesterol

Recently, there has been a great deal of interest in oat bran, since some studies showed that regular intake of foods high in soluble fibre - such as oat bran, baked beans and soybeans - reduced blood cholesterol levels. When blood cholesterol levels are high, fatty streaks and plaques are deposited along the walls of arteries. This can make them dangerously narrow and lead to an increased risk of coronary heart disease.

It is thought that soluble fibre lowers blood cholesterol by binding bile acids (which are made from cholesterol to digest dietary fats) and then excreting them. Cereal fibre seems to be more protective against coronary heart disease than the fibre from fruit and vegetables.

A method of weight control

In many cases, people who are overweight or obese have been shown to lose significant amounts of excess body fat simply by increasing the amount of dietary fibre, especially soluble fibre, in their daily diet. Fibrous foods are often bulky and, therefore, filling. They also tend to be low in fat. Soluble fibre forms a gel that slows down the emptying of the stomach and the transit time of food through the digestive system. This extends the time a person feels satisfied or 'full'. It also delays the absorption of sugars from the intestines. This helps to maintain lower blood sugar levels and prevent a rapid rise in blood insulin levels, which has been linked with obesity and an increased risk of diabetes. The extra chewing time often required of high fibre foods also helps contribute to feeling satisfied. As a result, a person on a high fibre diet is likely to eat less food and so consume fewer kilojoules (calories)

Good for people with diabetes

For people with diabetes, eating a diet high in fibre slows glucose absorption from the small intestine into the blood. This reduces the possibility of a surge of insulin, the hormone produced by the pancreas to stabilise blood glucose levels

Conditions linked to low fibre diets

Eating a diet low in fibre can contribute to many disorders, including:

- **Constipation** - Hard and dry faecal matter that is difficult to pass. Can damage the intestinal lining and walls and if it occurs chronically, can increase the risk of bowel cancer and haemorrhoids.
- **Haemorrhoids** - Varicose veins of the anus. Occurs when the veins of the rectum are put under chronic pressure and strain, due to constipation and straining to pass faecal matter. Can be very painful and if left untreated surgical intervention will be required.

- **Diverticulitis** - Small hernias of the digestive tract caused by long term constipation. Small abnormal sacs (diverticulum) form within the intestine, trapping small particles of undigested food. This can lead to inflammation and in severe cases ulceration.
- **Irritable bowel syndrome** - An illness of chronic, recurrent abdominal pain and cramping with associated flatulence and bloating of the abdomen. It is difficult to diagnose with testing generally because it does not appear to be due to an anatomical abnormality (you can see diverticulum or tumours). Often it is diagnosed when a person complains of the symptoms above, along with bouts of constipation and diarrhoea.
- **Overweight and obesity** - Carrying too much body fat. Different types of fat storage have different health implications. For example, carrying fat around the stomach is more dangerous than around the thighs. Low fibre diets may contribute to obesity in a couple of ways. Firstly, fibre gives you a feeling of being full and a high fibre diet is for this reason likely to be lower in calories than one comprised of high fat, high GI (simple sugar foods that cause a sudden, dramatic increase in blood sugar levels which results in the body over-reacting and sending levels plummeting. The low blood sugar levels then stimulate appetite) foods. Also, high fibre intake appears to inhibit the absorption of fat in the intestines.
- **Coronary heart disease** - A narrowing of the arteries due to fatty deposits. This process is hampered by high fibre diets as fibre tends to lower blood cholesterol levels.
- **Diabetes** - A condition characterised by too much glucose in the blood. Regardless of the type of diabetes glucose is not properly removed from the blood.
- **Colon cancer** - Cancer of the large intestine.

Diet, cancer and heart disease

Studies that show a reduced risk of some cancers and coronary heart disease have received much attention. How these apparent health benefits arise is not fully understood. It is possible that these observed health benefits occur indirectly, through the protective effects of 'phytochemicals' (such as antioxidants) that are closely associated with the fibre components of fruits, vegetables and cereal foods. It has also been suggested that dietary fibre dilutes harmful substances and possible carcinogens present in the diet, thus reducing the gut's exposure to such compounds. In the case of bowel diseases, regular, healthy fibre intake will reduce the stress on the bowel as it won't be coping with bouts of constipation and irregular bowel motions etc.

WAYS TO INCREASE YOUR FIBRE INTAKE

Simple suggestions for increasing your daily fibre intake include:

- Eat breakfast cereals that contain barley, wheat or oats.
- Switch to wholemeal or multigrain breads and brown rice.
Add an extra vegetable to every evening meal.
- Snack on fruit, dried fruit, nuts or wholemeal crackers.

A daily intake of more than 30g can be easily achieved if you eat wholegrain cereal products, more fruit, vegetables and legumes and, instead of low fibre cakes and biscuits, have nuts or seeds as a snack or use in meals. You don't need to eat a lot more kilojoules to increase your fibre intake; you can easily double your fibre intake without increasing your kilojoule intake by being more selective - compare the tables below.

Fibre intake of less than 20g per day

	Fibre (g)	Kilojoules (kJ)
1 cup puffed rice cereal	0.4	444
4 slices white bread	3.0	1166
1 tablespoon peanut butter	2.7	610
1 piece of fruit (apple)	1.7	268
1/2 cup canned fruit, undrained	1.4	468
1/2 cup frozen mixed vegetables	4.3	102
Mashed potato 120g	1.7	336
1 cup white cooked rice	1.0	999
2 plain dry biscuit	0.4	150
1 slice plain cake 60g	0.6	643
1 cup commercial fruit juice	0.8	391
TOTAL	17.9g	5,557kJ

Fibre intake of more than 30g per day

	Fibre (g)	Kilojoules (kJ)
2 whole-wheat cereal biscuits (for example Wheatbix or Vita brits)	3.2	398
4 slices wholegrain bread	5.7	1085
1 tablespoon peanut butter	2.7	610
2 pieces of fruit (apple & pear)	4.9	515
1 cup frozen mixed vegetables	8.6	203
1 small boiled potato with skin, 100g	2.8	338
1 cup white cooked spaghetti	2.5	696
2 wholemeal dry biscuit	1.5	209
25 almonds	3.0	852
1 cup whole fruit juice	0.5	362
TOTAL	35.4g	5,118kJ

Be warned! If you need to increase your fibre intake do so in increments. Suddenly and dramatically increasing your fibre intake can have explosive effects! A sudden switch from a low fibre diet to a high fibre diet can create some abdominal pain and increased flatulence. Also, very high fibre diets (more than 40g daily) are linked with decreased absorption of some important minerals, such as iron, zinc and calcium. This occurs when fibre binds these minerals and forms insoluble salts, which are then excreted. This could increase the risk of developing deficiencies of these minerals in susceptible individuals.

Adults should aim for a diet that contains 30-35g of fibre per day and should introduce fibre into the diet gradually to avoid any negative outcomes. It is better to add fibre to the diet from food sources rather than from fibre supplements as these can aggravate constipation, especially if you don't increase the amount of water you drink daily. Also, by altering your dietary intake of fibre you should also be improving your vitamin and mineral intake as you eat more fruit and vegetables and whole grain foods rather than processed foods.

THINGS TO REMEMBER

- Dietary fibre is found in the indigestible parts of cereals, fruits and vegetables.
- Animal products do not contain fibre.
- A diet high in fibre keeps the digestive system healthy.
- Most people in Western countries don't eat enough fibre
- In western countries bowel cancer typically affects more people than any other cancer and it also results in more deaths per year than any other cancer.

To check your bowel health you can have a colonoscopy under anaesthetic (a lighted, flexible scope is inserted via the anus and extend through the bowel looking for polyps and early signs of tumours. In many cases small lesions can be removed during the colonoscopy). In some countries, including Australia people over 55 are mailed out faecal testing kits. A sample of faeces is sealed in a small container and returned by mail to a laboratory for testing. This sort of monitoring should be considered as important as a mammogram or prostate check!

Obviously these tests do not sound pleasant; however, they can, and for many people, have, saved lives. Bowel cancer detected early has a good prognosis, but if you leave it too late, the prognosis worsens dramatically. If a tumour grows large enough surgical removal may also result in such damage to the bowel that the region above the tumour will be redirected to a surgically created hole in the abdomen. Patients then wear, for either a short time while the bowel heals, or for some, the rest of their lives, a colonoscopy bag to collect faeces. This is obviously a lot more unpleasant than a colonoscopy or the collection of a faecal sample.

SET TASK

Investigate the fibre content in the diet of four different people. These people might be friends, relatives, neighbours, workmates, or anyone else you have access to. They should all be from a similar age group and socio-economic background. Ideally, however, their diets will vary from one to another.

Determine the "normal" diet of each of these people, through an interview. Also determine any fibre related problems they might experience, such as constipation, and the frequency of such problems. Make notes.

Submit with your assignment a copy of the interview questions you asked each person, a table showing their standard daily diet and an assessment of their fibre intake. Include a list of any illnesses/diseases the person suffers from that could possibly be related, at least in part, to diet. Do NOT include the person's name, but give their general demographics (gender, age bracket etc).

ASSIGNMENT 3

1. Explain the role of fibre in the digestive system in no more than 1 paragraph. Then, compare the fibre intake of your interviewees and any health implications in a further half page maximum.
2. Explain possible implications of inadequate fibre in the diet, for the following three different demographic groups:
 - Teenagers, 13-15 years of age
 - Adult office workers, 40-50 years of age
 - Pregnant women.Write a list of up to 5 dot points for each.
3. List five of the most commonly eaten foods in your diet, including sources of fats, proteins, carbohydrates, vitamins and minerals. Determine and compare the relative value of the fibre content of these different foods. Suggest an alternative food that would provide you more fibre if your current foods are low fibre.
4. Explain why your diet should be high in fibre, a complex carbohydrate, but low other simple carbohydrates like sucrose. Write a paragraph.

DIFFERENT WAYS OF EATING

Aim

Determine the effect which different physical methods of food intake, can have upon health, including the time and order of eating, and chewing.

Formulate a nutritionally balanced vegetarian diet.

HOW WE EAT IS IMPORTANT

The affect of food upon the body is not only influenced by what is eaten, but also by how it is eaten. For example:

- If food is chewed more in the mouth, it will be more broken up before it moves through the digestive tract.
- If food remains longer in the mouth, more saliva may be produced, and digestion through the effect of saliva may be more advanced.
- If food is cut up, minced or blended before ingestion, there may be a greater and faster penetration of digestive juices into the food.
- The order in which foods enter the digestive tract may impact upon digestion.
- The frequency of eating may impact on digestion (e.g. lots of small meals, or fewer large meals).

Eating only one type of food at a time is thought to allow better digestion. This is the principle behind "food combining". (e.g. If carbohydrate is eaten without fats & proteins, the digestive tract will produce gastric juice with enzymes to digest only carbohydrate -without the enzymes to digest fat and protein. With more "pure" digestive juices, digestion may be more effective).

Compatibility of Ingredients

While it is important to vary your diet, casually mixing in lots of different ingredients is not the best approach. Some foods are better not to be eaten together with certain other foods due to the different digestive processes in the stomach. An example of this is meat and milk or meat and starches. Fruits are often best eaten alone, as a separate course, particularly melon fruits. Starches and meats are slow to digest, so when combined together they make digestion even slower. For people with good and quick digestion, this will help them to keep hunger away, but for people with slow digestion, this combination makes things much worse, and in some cases it can provoke chronic health and immune system problems.

Some foods mutually improve each other when eaten together. This is true for plant proteins, where the balance of amino acids is more important than the actual quantity of protein consumed. While meat supplies all of the eight essential amino acids in adequate amounts, plants usually only have some of the essential amino acids. However different plants have different amino acids. By combining grains (e.g. corn, wheat) with pulses or legumes (e.g. beans, lentils) the nutrition of both foods is enhanced.

VEGETARIAN, VEGAN AND OTHER ALTERNATE DIETS

There are a variety of reasons why a person will choose to convert to a vegetarian or vegan diet. In many cases it is an ethical issue; the belief that animals should not be killed for food. For others, it is the belief that vegetarian diets are simply healthier. For other people, the taste of meat is unpleasant, and in some countries meat products are simply too expensive for many people.

There are a number of different categories of vegetarian diet:

	Meat	Poultry	Fish	Eggs	Dairy	Comments
Lacto-Ovo Vegetarian	No	No	No	Yes	Yes	Many foods are processed on machinery that also processes shellfish/dairy/egg etc many vegetarians and all vegans would avoid these foods.
Lacto Vegetarian	No	No	No	No	Yes	Some wines are fined with egg and a Lacto-vegetarian or vegan would not consume these.
Vegan	No	No	No	No	No	Won't eat foods with any animal products in them (renin, casein etc) or products that are processed using animal products Many don't eat honey and won't use/wear products produced with animal products (leather, wool etc)
Macrobiotic	No	No	Some	No	No	Don't eat certain vegetables (potato, capsicum, aubergine) refined sugars and some fruits found in the tropics. Based on the Chinese Yin/Yang principal.
Fruitarian	No	No	No	No	No	Only eat foods that are classified as fruits (so all fruits and some vegetables that are botanically fruits, such as avocado and tomato)
Raw/Living Food	No	No	Some	Some	Some	Emphasis is on eating as much food in its raw state as possible.

Another category – partial or semi-vegetarian refers to people who (variably) eat dairy and eggs as well as fish and in some cases poultry, but never red meat.

HEALTH CONSIDERATIONS WITH NON-ANIMAL DIETS

A fruitarian diet is not recommended as it simply cannot supply all the nutrients the human body requires. It is in fact quite a dangerous diet to follow in the long term (it can however be prescribed for very brief period of detoxification). Vegetarian diets are generally considered to be very healthy, although some vitamins and minerals may be more difficult to obtain, including calcium and iron, as well as Vitamin B12. However, with care, vegetarians can have an extremely balanced diet and if this is the case the risk of many diseases can be reduced, including heart and bowel diseases. Cholesterol levels tend to be lower, there is some evidence for reduced risk of some cancers and obesity levels tend to be reduced in vegetarians.

Vegan diets are generally less well received by mainstream medical professionals, primarily because of the lack of dairy. Vegans should take care to eat lots of green leafy vegetables and should consider a calcium supplement. Iron deficiency can also be a concern, and iron rich foods should be included in the diet, along with a supplement. Extreme care must be taken with Vitamin B12 and generally the only option for vegans is a supplement. While some will disagree, B12 is required for blood cell synthesis and to develop the insulating coating on central nervous system neurons, so it is better safe than sorry!

Iron is usually obtained mainly from animal foods; however vitamin C will increase the absorption of iron from plants. A vegetarian who eats lots of vitamin C rich foods and includes iron containing plant foods, will usually gain adequate iron. Women may need supplements during pregnancy or menopause. Plant foods rich in iron include blackstrap molasses, lima beans, sunflower seeds, soya beans, apricots, raw broccoli, spinach, almonds and peas.

Macrobiotic and vegan diets can be quite low in protein. To combat this, nuts and legumes should be eaten in quantity, as well as grains and soy products. Care should be taken for symptoms of deficiency. These diets can also be proportionally high in carbohydrates, and again, fibrous foods should be eaten in quantity to combat this. Finally, many vegan and macrobiotic diets can result in trace element deficiencies. Zinc and vitamin D and B2 (riboflavin) intake is often low.

Look for vegan foods that are fortified with these, as well as with iron and calcium and consider supplements. You will get no Vitamin D without eating animal products – so ensure you get some sunlight as this will stimulate your body to produce its own! Vitamin D is crucial for uptake and use of calcium. For vitamin B2, which is normally obtained from animal foods, vegan options include dark green vegetables, yeast extract (e.g. vegemite), almonds, mushrooms and some fortified breakfast cereals (read labelling). Cheese and milk are a good source for lacto vegetarians.

Raw/living food diets are somewhat controversial, depending on the strictness. While the underlying principal is sound; in that cooking and processing reduces nutrient value, digestibility is reduced without cooking and processing. Most people on this sort of diet will not eat 100% raw food, and if dairy and fish is a part of the diet it can actually be quite a sound option. As with all dietary principals, moderation and balance is the key.

SOURCING NON-ANIMAL FOODS

There are increasing numbers of certified vegan, vegetarian and organic foods available, in response to the increasing number of people favouring these dietary choices. These items are generally very clearly labelled, and many are organic (but be sure to check). In many cases companies have been established to produce only vegan or vegetarian food and, being aware of possible nutrient deficiencies many are fortified.

For other food products, however, there are ingredients are not always readily identifiable as animal-derived. Some options are kosher foods and organic foods. However both may cause problems with products such as gelatin, which may be present in some kosher non-meat or organic foods even though it is produced from animal (in these foods typically fish) hides and bones. Check carefully for products with “no animal products” to see what the source of gelatin is, if it is an ingredient. Gelatin is found in an array of foods, and options include vegetarian gelatins such as agar agar and tapioca and for those who eat fish, fish gelatin is also available.

Care should also be taken to read ingredients as in many places terms the general public are not familiar with, that are common allergens (shellfish and dairy/egg) will be highlighted in bold or more familiar terms will be inserted next to them. Check out vegetarian and vegan websites to get an idea of brands/products and jargon that you might want to be more aware of if you do not wish to consume animal products.

When in doubt, ring or email the manufacturer, they have a duty to disclose! Stick with brands that you know are free of products you do not wish to consume, but be wary as ingredients in products often change and what was once ok, may not be in the future.

ALTERNATIVE DIETS FOR YOUNG CHILDREN

If you are raising young children vegetarian, it is generally not a concern, so long as you are balanced and ensure all nutrients are obtained, even if it is with a supplement. However, many dieticians do not feel comfortable with vegan diets for children. However, if this is your choice, you must consult an open-minded nutritionist/dietician and be very aware of where you are getting all essential nutrients from, in what quantities and a calcium supplement in particular, should be considered. Failure to thrive will occur more readily in vegetarian/vegan diet children, however, this should not be a problem if parents are responsible and educated.

Fruitarian diets should be considered dangerous for children and macrobiotic/raw food diets are also not advisable, although aspects of these diets could form part of the child's diet. Given the alarming rates of childhood obesity, including raw vegetables as snacks, more nuts and grains in the diet as well as legumes and fruit in children's diets, is a good idea! In fact, given the care that many vegans and vegetarians go to investigating the ingredients and their sources and the manufacturing processes of the foods they eat is admirable and intelligent. From an ethical standpoint, many people question the ‘imposition’ of alternative diets on young children. However, even those who are not vegetarian, there is some imposition of the parental diet on young children. Parents who have a diet high in saturated, fat and salt tend to also supply that diet to their children, resulting serious health implications.

DIET IN PREGNANCY

Eating for two during pregnancy is far more complicated than just doubling the quantity of food eaten. Most of the nutrients required by the foetus are delivered to the foetus through the mother's blood. Any deficiencies in the mother's blood can create difficulties for the foetus. (NB: Some nutrients can also be manufactured by the placenta).

- Needs for many nutrients increase during pregnancy
- Needs for energy (i.e. calories) increase by about 300 to 500 calories per day.

Low birth weights are often caused by insufficient nutrition during pregnancy. This may be due to poor diet, or for some women, severe morning sickness. Physiological characteristics of a baby and developing child can be affected by the nutrition of their mother during pregnancy. Some key points for nutrition during pregnancy:

Protein

Protein requirements can increase up to 60 gm per day during pregnancy

Iron

Iron requirement is 30 mg per day high during pregnancy; and is usually supplied through vitamin supplements.

Calcium

If dietary calcium is insufficient, calcium is released into the blood from the mother's bones. The baby may not suffer, but the mother will. Four servings of milk daily are recommended for pregnant women. Teenage mothers require more because their own bones are still developing.

Folic Acid

Is essential for cell division & foetal nervous system development. 400 to 800 ug per day during pregnancy usually supplied as a vitamin supplement

Fluids

More fluids are needed because blood volume and metabolic rates are higher during pregnancy. Fluid intake should be greater in warmer climates. Drinking pure water is preferable, to help remove waste products from both the mother and foetus.

Fibre

Fibre is important to prevent constipation; and constipation is more likely to occur during pregnancy due to the affect of progesterone relaxing smooth muscles, and pressure on the large intestine by the growing foetus.

Extra iron during pregnancy can also contribute to constipation.

SET TASK

Investigate the different terms used in ingredients lists for foods for animal and egg products. Create a list of terms in a table, identifying the source of the ingredient. Also note processing practises that may expose foods to traces of animal products. Spend about an hour on this task, and be aware you will not be compiling a comprehensive list of all terms, just do as much as you can in this time frame.

Select 3 processed foods that do not obviously contain animal products. Contact the manufacturer and ask if the foods are in fact suitable for vegetarians and vegans. Record your findings, and note how easily you were able to obtain the information.

ASSIGNMENT

1. Comment on how the following affect nutrition and digestion. Write up to one paragraph on each.
 - The order in which different types of food are eaten
 - The time of day when different types of food are eaten
 - The degree to which different types of foods are chewed
 - The speed of swallowing
 - The amount of time between eating different food types
2. Design a balanced daily diet plan for a person with slow metabolism. Write up to one paragraph explaining your diet.
3. Design three different (to each other) nutritionally sound diets for a young child being raised lacto-vegetarian. Present your diet in a table, listing the different foods and the quantity the child would eat each day.
4. Research briefly and then create a list of up to 10 reasons why eating organic foods is a good diet option.
5. Submit your set task findings and write a paragraph on the ethics of animal product labelling on food products.

FOOD TOXICITY/SENSITIVITY

Aim

Manage food sensitivity problems.

ALLERGIES AND SENSITIVITIES

People vary in their ability to digest different foods and expel different waste products.

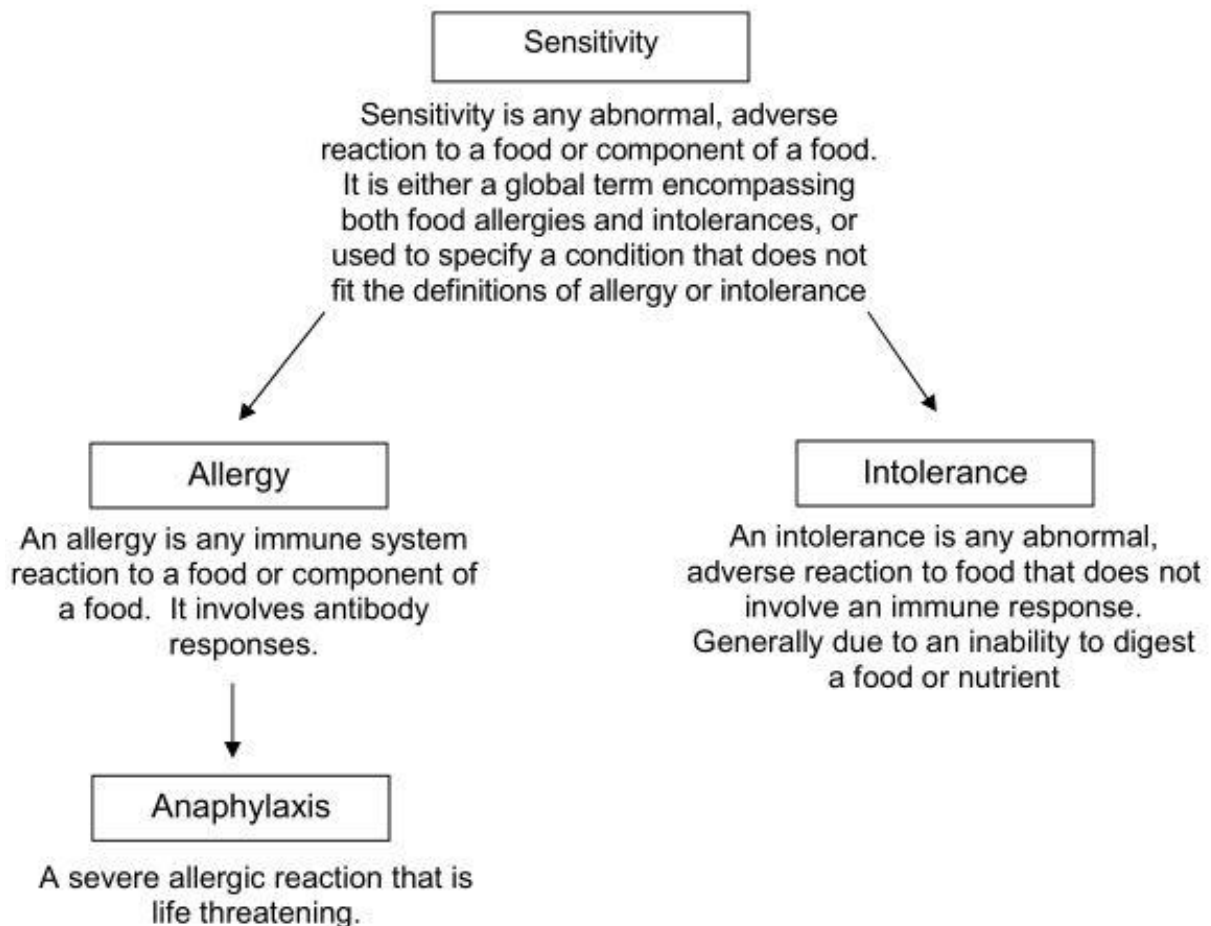
What might be a valuable food to one person might be a toxin to another. (e.g. a healthy athlete may benefit from eating glucose, while a diabetic might suffer severely by eating the same food).

If we are to properly manage a person's food sensitivities, we need to:

Become aware of what a person is sensitive to, and how critical their sensitivity is.

Become aware of what is found in different foods

UNDERSTAND THE TERMINOLOGY



ALLERGIES

An allergy is the reaction of one person's body to substances which are normally harmless to other people. These substances are called "allergens". Susceptibility to allergies tends to be hereditary but there is a lot still unknown about allergies in general. With extremists at either end of the scale (Medical doctors refuting there is a problem and alternative therapists insisting almost all ailments are related to food additives and almost everyone is allergic to something) it is important to take a middle ground and inform yourself. Seek out medical doctors and alternative therapists who can give you sound, scientific guidance and diagnosis and who are up to date with current research.

Common Allergy Symptoms may include:

- Hay fever: congested or runny nose; irritation of throat, ears & nose, watery or itchy eyes, sneezing.
- Skin rashes: itching, lumps, redness, swellings etc.
- Digestive upsets: diarrhoea, bloating, vomiting
- Respiratory upsets: difficulty breathing

Some allergies tend to be suffered at a certain time of year (e.g. in spring when pollen is more profuse). Some suggest that anxiety can trigger food sensitivities and related conditions. Allergic cross-reactivity occurs when a person is not just allergic to one thing, nuts for example, but to many, or all members of a nutrient type, or plant family, so with nut allergies, other legumes.

COMMON ALLERGENS	LIKELY SYMPTOMS
Pollen, Mould, Dust mites, Animal dander (Flakes of skin or fur from pets)	Hay fever (sneezing, itchy nose etc)
Chemicals in some detergents, cosmetics, rubber, leather, pesticides, medicines, plants etc	Skin complaints, rashes, eczema
Foods and some food additives (including wheat, dairy products, shellfish, nuts & eggs).	Breathing difficulty, irritated mouth or throat, digestive upsets, rashes, runny nose.

Natural Toxins in Foods

Some toxins or allergens may be the result of man interfering with foods (e.g. pollutants, preservatives, colourings & pesticides). Other toxins which occur naturally in foods may be classified into three main groups:

- **Mycotoxins**

These are produced by moulds. Their growth depends on environmental conditions. They are usually more likely to develop under moist warm conditions.

- **Aflatoxins**

These are a type of mycotoxin which is visible and obvious to the naked eye. They are carcinogenic to both man and animals; but contaminated food is obvious and normally discarded.

- **Ergot Alkaloids**

These are another type of mycotoxin. They grow on grains and are poisonous if ingested in large amounts.

- **Plant Toxins**

These are chemicals naturally occurring in plants, which may be either toxic to the body; or which may have an undesirable affect upon nutrients being eaten.

- **Phycotoxins**

These chemicals are produced by algae under certain environmental condition. They may be taken into the body through seafood (which has fed on the contaminated algae). The affects of these toxins can be severe, causing death in extreme situations; though such cases are relatively rare.

FOOD ALLERGY AND INTOLERANCE

Allergy is on the increase

Allergies in general are on the increase worldwide and food allergies have also become more common, particularly peanut allergy in preschool children. About 60 per cent of allergies appear during the first year of life. Cow's milk allergy is one of the most common in early childhood. Most children grow out of it before they start school.

There are varying theories on why this upsurge in food allergies and intolerances is occurring. Some say we expose children to food too young (advice on avoiding peanuts in pregnancy follows this line of thought) while others say that by restricting contact with foods early is the cause. In general, the increasing numbers of food allergies and intolerances is a Western phenomenon. Eating habits appear to have some influence, with people from places where a food is a staple, such as rice in Asia, are more likely to have rice sensitivity than someone in America, where nuts are in an array of foods and where peanut allergies are quite high.

Lifestyle issues are thought to be a part of food sensitivity. Reflecting on the fact that sensitivities are not increasing in developing countries in the same way they are in industrialised countries, poor diet, sedentary lifestyle and general poor health and wellbeing (stress, anxiety etc) is increasingly seen as a contributor to insensitivities. It may well be that obesity, poor nutrient balance and vitamin deficiencies are playing a role in some food sensitivities. Some research also suggests that many people self-diagnose sensitivities and the apparent rate of sensitivities is actually far higher than the true rate. It is imperative to get professional diagnosis for sensitivities as they can be severe and some are life-threatening. Even when symptoms are mild repeated exposures can cause unseen internal damage to the gastro-intestinal tract, resulting in chronic illnesses such as irritable bowel syndrome.

Food sensitivities (allergies and intolerances) can be inherited

Along with all the other factors, sensitivities appear to have some genetic basis. If you have a parent or sibling with a diagnosed sensitivity, your risk of having a sensitivity is markedly increased. As with many genetic diseases, the specific gene/s responsible for most food allergies and intolerances are not known. An example of inherited food intolerance would be lactose intolerance (a minority of cases, not all) where a mutation in the gene that encodes the enzyme lactase is passed on from parent to child.

Allergy is an immune response

Allergies are an overreaction of the body's immune system to a specific part of a food, usually a protein. These proteins may be from foods, pollens, house dust, animal hair or moulds. They are called allergens. The word 'allergy' means that the immune system has responded to a harmless substance as if it were toxic. Although the skin tests (scratch tests) have been used for a long time, and are still commonly used, they are not 100% reliable. A food elimination diet, with a RAST test (radioallergosorbent test) is a good start. RAST test is a blood test where possible allergens are mixed with a blood sample and the production (or lack of it) of antibodies is quantified. Another option is a double blind trial. This is where two samples of food are prepared (in capsules so they look the same) and one is the potential allergen, the other is a placebo. Neither the doctor nor the patient knows which is which (a third party does). If a person reacts to the capsule containing the allergen then it is positive confirmation of the particular allergy. This test must be done with medical supervision.

Food intolerance is a chemical reaction

Food intolerance is a 'chemical' reaction that some people have after eating or drinking some foods; it is not an immune response. Food intolerance has been associated with chronic fatigue syndrome and irritable bowel syndrome (IBS). Food intolerance is much more common than food allergy.

The causes of intolerances can vary. It can be that they are sensitive to a component of a food that most people are not bothered by. This is the case with gluten intolerance, also known as Celiac Disease or technically, Gluten-sensitive enteropathy where people are sensitive to gliadin in gluten. In lactose intolerance, there is an enzyme deficiency. Without enough of the enzyme lactase, that catalyses the break down of lactose into simpler sugars a person will suffer stomach cramps, diarrhoea and other gastrointestinal upsets.

Symptoms can be similar

It can be difficult to tell the difference between the symptoms of food allergy and food intolerance. Usually symptoms caused by food allergy develop very soon after consuming the food but, while symptoms caused by food intolerance can be immediate, they may also take 12-24 hours to develop. Food intolerance reactions are usually related to the amount of the food consumed. They may not occur until a certain amount (threshold level) of the food is eaten, but this amount varies for each person. The symptoms of food allergy and intolerance can also be caused by other conditions, so it's important to see your doctor for a medical diagnosis.

Symptoms of food intolerance

Symptoms of food intolerance can include:

- Nervousness, tremor
- Sweating
- Heart Palpitations
- Rapid breathing
- Headache, migraine
- Diarrhoea
- Burning sensations on the skin
- Tightness across the face and chest
- Breathing problems - asthma-like symptoms
- Allergy-like reactions.

Symptoms of food allergy

The symptoms of food allergy can be life threatening. Common symptoms include:

- Itching, burning and swelling around the mouth
- Runny nose
- Skin rash (eczema)
- Hives (urticaria - skin becomes red and raised)
- Diarrhoea, abdominal cramps
- Breathing difficulties, including wheezing and asthma
- Vomiting, nausea.

Affected body parts

Various sites on the body can be affected by an allergic reaction to food, including:

- **Eyes** - itching, watering
- **Nose** - stuffiness, sneezing Mouth - itching, swelling
- **Throat** - swelling
- **Digestive system** - stomach pains, vomiting, diarrhoea
- **Skin** - rashes, such as hives (urticaria) or atopic dermatitis
- **Lungs** - asthma, more common in children than adults
- **Central nervous system** - headache, irritability, fatigue, convulsions.

Anaphylactic shock is life threatening

Anaphylaxis, or anaphylactic shock, is a severe allergic reaction that needs urgent medical attention. Peanuts, other nuts, insect stings and some medicines are the most common allergens that cause anaphylaxis.

Within minutes of exposure to the allergen, the person can have potentially life-threatening symptoms, which include:

- Difficult or noisy breathing
- Cyanosis (blue discolouration of the lips, fingers tips and skin due to oxygen starvation)
- Swelling of the tongue
- Swelling or tightness in the throat Difficulty talking or a hoarse voice
- Wheeze or persistent cough
- Rapid heartbeat
- Weak (thready) heartbeat
- Vomiting
- Diarrhoea
- Stomach cramping
- Flushed skin, hives, itching
- Loss of consciousness or collapse
- Becoming pale and floppy (in young children)

Several factors can influence the severity of anaphylaxis, in some cases the combination of a food and exercise, the consumption of alcohol with the food, the amount of food eaten, and how food is prepared and consumed. Some antibiotics can cause anaphylaxis in sensitive people. The most common anaphylaxis reaction caused by contact is latex allergy. Where a person suffers symptoms of anaphylactic shock without an allergy being involved is suffering anaphylactic shock.

To prevent severe injury or death, a person with anaphylaxis requires an injection of adrenalin (also known as epinephrine). Injections of adrenaline, which can be given by the person themselves or their family or carer, are available on prescription and are known as Epi-pens. The effect of adrenalin is vasoconstriction – making the blood vessels shrink in diameter. With less room in which to flow, blood pressure is then increased. It also causes bronchodilation, widening the tubes carrying air to and from the lungs. This allows a person to breathe more easily. Adrenalin can also stimulate the heart to beat more rapidly than normal so you should see a doctor after administering it.

Food allergy - common causes

Nuts, eggs, milk or soy cause about 90 per cent of food allergies. Milk allergy is different to lactose intolerance and is a response to milk proteins, rather than the milk sugar lactose. Peanut allergy is one of the most common allergies in older children. These foods commonly cause allergies:

- Eggs
- Peanuts Milk
- Molluscs such as oysters, mussels, clam, squid and octopus
- Crustaceans such as lobster, prawn, crab, shrimp
- Other nuts Sesame Gluten
- Soy
- Food additives like benzoates, salicylates, MSG and sulphite derivatives.
- Fruit, berries, tomato, cucumber, white potato or mustard

Food intolerance - common causes

The foods that tend to cause intolerance reactions in sensitive people include:

- Dairy products, including milk, cheese and yoghurt
- Chocolate
- Eggs, particularly egg white (the part containing most protein)
- Flavour enhancers such as MSG (monosodium glutamate)
- Food additives
- Strawberries, citrus fruits and tomatoes
- Wine, particularly red wine
- Histamine and other amines in some foods
- Salicylates and glutamates
- Gluten

DIAGNOSING AND DEALING WITH FOOD SENSITIVITIES

Quick appearance of symptoms within a few minutes of eating a particular food, makes pinpointing the allergen an easier task. However, if the cause is unknown, diagnostic tests may be needed such as:

- Keeping a food and symptoms diary to check for patterns
- Removing all suspect foods for two weeks, then reintroducing them one at a time to test for reactions (except in cases of anaphylaxis). This must only be done under medical supervision.
- Skin prick/scratch tests using food extracts.
- Blood (RAST) tests.

It is worth noting that some people do not need to eat a food, or even touch to develop a reaction. Air-borne anaphylactics can die from simply breathing in the air where the allergen is being stored!

Avoiding the food

The easiest way to treat a food allergy or intolerance is to eliminate it from the diet. Sometimes, the body can tolerate the food if it is avoided for a time, then reintroduced in small doses, particularly in food intolerances. Before you eliminate foods from your diet, seek advice from a doctor and dietician. For some intolerances, you can have small amounts of a type of food with no problems. This is important as eliminating an entire food group from your diet makes obtaining all essential nutrients a lot more difficult.

Preventing food allergy in children

Allergy prevention in children is an active area of research. Findings to date indicate that:

- **Prenatal** - there is no conclusive evidence that avoiding allergens in pregnancy will help prevent allergies in your child.
- **Postnatal** - exclusive breastfeeding during the first four to six months appears to give some protection against the development of allergies in early childhood. Exposure to cigarette smoke and starting solids early can increase the risk of developing allergies in early childhood.
- **Breastfeeding** - if a baby is known to be allergic to a particular food, a breastfeeding mother should avoid eating that food.
- **Soy formula** - studies have shown that using soy milk formula does not prevent the development of allergies in children. It is an alternative if a baby is lactose intolerant
- **Partially hydrolysed formula** - these are cow's milk based and have been processed to break down most of the proteins that cause symptoms in infants who are allergic to cow's milk. They reduce the risk of developing eczema and cow's milk allergy in infancy and early childhood.

Tips to avoid foods that may cause allergies and intolerances

To avoid allergic foods learn the terms used to describe these foods on food labels, for example:

- **Milk protein** - milk, milk solids, cheese, yoghurt, caseinates, whey, lactose, ghee, lactoglobulin, cream, butter, lactalbumin, curd, custard
Lactose - milk, lactose
- **Egg** - eggs, egg albumen, egg yolk, egg lecithin, egg substitute, albumin, ovomucin or ovomucoid, ovoglobulin, vitellins

- **Gluten** - wheat, barley, rye, triticale, wheat bran or wheat germ, malt, oats, cornflour, oatbran, malt extract, couscous, semolina, modified food starch
- **Soy** - soybeans, hydrolysed vegetable protein, soy protein isolate, soy lecithin, tofu, tofuti, tempeh, miso, teriyaki sauce. Soy is in a lot of Japanese foods and ingredients as well as in many other Asian foods.
- **Salicylates** - strawberries, tomatoes, most fruits.
- **Crustacea** – shellfish. Prawn and shrimp, lobster, yabbies, oysters, mussels and Pipis, snails, Octopus and squid.

For some people allergies can be so severe that foods that have been processed on machinery that also processes the allergen, even though it is not a constituent of the final product, can cause a reaction. This is why in many places, you will find a note on the bottom of food labels stating that trace amounts of shellfish or nuts, or milk products may exist in foods that don't list these as ingredients.

If you want foods that are very strict on this sort of cross-contamination, look into kosher as discussed in the previous lesson as well as halaal foods where food preparation, processing and manufacture is more stringently monitored and typically, information is more readily obtainable. No certified halaal food should have alcohol or alcoholic extracts in them for example. A pre-made frozen dinner that is certified kosher and contains meat should never have any dairy product in it.

Vegan food options (not vegetarian) are also excellent for those with any sort of dairy sensitivity or intolerance, although many will contain soy products instead, which is no good if you have a soy allergy! Look for vegan restaurants or Krishna restaurants for dairy free options. If you suffer nut allergy, these options will generally not assist you as nuts, nut oils and other related foods such as legumes form a major component of many Asian cuisines, as well as vegetarian/vegan diets.

Local health food stores are often a good source for people with any sort of food intolerance/sensitivity and for good quality supplements if you need to add nutrients to your limited diet.

FOOD LAWS AND LABELS

Since December 2002, the *Australia New Zealand Food Standards Code* requires food labels to declare certain foods and certain substances in foods, including:

- Cereals which contain gluten and gluten products
- Crustacea and their products
- Eggs and egg products Fish and fish products
- Milk and milk products
- Nuts and sesame seeds and their products
- Peanuts and soybeans and their products
- Added sulphites in concentrations of 10mg/kg or more
- Royal jelly presented as food or present in food, bee pollen and propolis.

These foods must be declared if they are:

- Used as an ingredient
- Part of a compound ingredient
- A food additive or part of a food additive
- A processing aid or part of a processing aid.
- If the machinery used to process the food is also used to process anything with these ingredients in it.

Often you will find ingredients listed in bold font, and unfamiliar terms, such as casein may also have (milk) written next to it.

Things to remember

- A food allergy occurs when the immune system reacts to a harmless food as if it were toxic.
- Food intolerance occurs when the body has a chemical reaction to eating a particular food or drink.
- The symptoms of a food allergy or intolerance are often similar, but food intolerances do not cause severe reactions such as anaphylaxis.

Learn to read food labels so you can avoid foods that cause allergies and intolerances.

SPECIAL CONSIDERATIONS

Some medical conditions can make allergies more severe, or can be worsened by ingredients in food.

- Some asthmatics are extremely sensitive to sulphites. Although they are banned for use on raw foods, you will still find them in dried fruits and juice, powdered soups and stocks, sauces and relishes as well as dehydrate vegetables (such as those food in 2 minute noodle snacks and powdered soups) and cakes/biscuits etc. You may also find them in some medicines and wines. In most places it is a legal requirement that they be listed in the ingredients.
- MSG can cause palpitations, headaches and chest pains as well as other symptoms and should be avoided by those with heart problems or susceptibility to migraine.
- Aspartame should not be taken by phenylketoneurics.
- A yellow food colouring (tartazine) can cause allergic reactions in some people and should be listed on ingredient panels for this reason.
- Caffeine should be avoided by people who have heart conditions as it can vasodilatation and elevated blood pressure. As it is a diuretic it should also be avoided if you are dehydrated or have kidney problems.
- The vasodilatation properties can actually relieve symptoms of migraine if you act quickly as soon as symptoms start.
- Yeast extract, often used in place of MSG can cause symptoms similar to those seen with MSG.
- Children with hyperactivity disorders should avoid artificial food colourings. Dietary changes are very often enough to combat ADHD and similar disorders and are being used more and more frequently in place of steroidal drug treatments.

ASSIGNMENT

1. Complete the following table:

Classification of Condition	Type of Response	Result of exposure
		Possibly death
	Chemical	
		Antibody production, excessive histamine release
Sensitivity	Undefined	

2. Describe hay fever, what causes it, the body's response and treatment options. Research and record the medical name for this condition. Is hay fever an intolerance, allergy or toxicity? Why? Write a paragraph.
3. Explain in up to 100 words how a toxin can be an allergen.
4. Create a set of 5-10 dot points listing why natural products are not guaranteed to be healthy, fit for consumption or non-allergenic.
5. Write 2-3 sentences each on common food sensitivity and toxicities, including: Gluten
Sugar
Salt
Yeast
Monosodium glutamate (MSG).
6. Develop a checklist of body reactions which may occur, in response to food sensitivity or toxicity, as a tool for diagnosing possible causes.
7. List an order of first aid treatments for a person an allergic reaction after eating something.
8. Living with allergies is difficult. Create a table of up to 5 considerations for each of the following people must make in their day to day life. Include a description and possible solutions/alternatives. The aim is to gain insight into the issues that confront people with food allergies.
- Lactose Intolerant Nut allergy
 - Shellfish allergy
 - Breastfeeding woman with another child aged five where both children have severe anaphylactic allergies, the baby to corn and soy, the older child to shellfish and egg.

FOOD TOXICITY: POISONING

Aim

Implement procedures to know and avoid food poisoning.

The most serious types of food poisoning are due to bacteria. The more bacteria present, the more likely you are to become ill. Bacteria multiply fast and to do so need moisture, food and warmth. The presence or absence of oxygen, salt, sugar and the acidity of the surroundings are also important factors. Some bacteria love salt, some are killed by it, sugar is generally loved by all microorganisms and many bacteria can grow in the absence of oxygen.

Food poisoning is more likely to affect people with lowered resistance to disease than healthy people who might show mild symptoms or none at all. Elderly or sick people, babies, young children and pregnant women are particularly vulnerable to food poisoning and should always seek treatment if they have symptoms. Extra care should also be taken when preparing food for, and looking after, these vulnerable groups to minimise the risks of their coming into contact with food poisoning bacteria. One reason that these groups are more at risk is because they cannot cope with the effects of the poisoning as well - that is loss of nutrients and dehydration due to diarrhoea and vomiting as well as the potential electrolyte imbalances that occur with severe symptoms.

Food borne illness is an ever present threat, but it can be prevented with proper care and handling of food products. It is estimated that between 24 and 81 million cases of food borne diarrhoea disease occur each year in the United States, costing somewhere in the region of \$5-17 billion dollars in medical care and lost productivity. In Australia, up to one fifth of the population suffers a bout of food poisoning each year. Up to 20% of cases are believed to be due to people mishandling food themselves (rather than manufacturer or food service/provision issues).

Chemicals, heavy metals, parasites, fungi, viruses and bacteria can all cause food borne illness. Bacteria related food poisoning is the most common, but fewer than 20 of the many thousands of different bacteria actually are the culprits. More than 90 percent of the cases of food poisoning each year are caused by *Staphylococcus aureus*, *Salmonella*, *Clostridium perfringens*, *Campylobacter*, *Listeria monocytogenes*, *Vibrio parahaemolyticus*, *Bacillus cereus*, and entero-pathogenic *Escherichia coli*. These bacteria are commonly found on many raw foods. Normally a large number of food-poisoning bacteria must be present to cause illness. Therefore, illness may be prevented by:

- (1) Controlling the initial number of bacteria present
- (2) Preventing the small number from multiplying
- (3) Destroying the bacteria by proper cooking avoiding re-contamination

Poor personal hygiene, improper cleaning of storage and preparation areas and unclean utensils cause contamination of raw and cooked foods. Mishandling of raw and cooked foods allows bacteria to grow. The temperature range in which most bacteria grow is between 40 degrees F (5 degrees C) and 140 degrees F (60 degrees C). Raw and cooked foods should not be kept in this danger zone any longer than absolutely necessary. Undercooking or improper processing of home-canned foods can cause very serious food poisoning.

So, the most important things to remember when it comes to preventing food poisoning are:

- (1) Keep food at the correct temperature
- (2) Reheat food properly
- (3) Avoid cross contamination (hands, utensils, pots, plates etc)

BACTERIAL FOOD POISONING

Since food-poisoning bacteria are often present on many foods, knowing the characteristics of such bacteria is essential to an effective control program.

Staphylococcus aureus

Man's respiratory passages, skin and superficial wounds are common sources of *S. aureus*. When *S. aureus* is allowed to grow in foods, it can produce a toxin that causes illness. Although cooking destroys the bacteria, the toxin produced is heat stable and may not be destroyed. Staphylococcal food poisoning occurs most often in foods that require hand preparation, such as potato salad, ham salad and sandwich spreads. Sometimes these types of foods are left at room temperature for long periods of time, allowing the bacteria to grow and produce toxin. Good personal hygiene while handling foods will help keep *S. aureus* out of foods, and refrigeration of raw and cooked foods will prevent the growth of these bacteria if any are present.

Salmonella spp.

The gastrointestinal tracts of animals and man are common sources of *Salmonella*. High protein foods such as meat, poultry, fish and eggs are most commonly associated with *Salmonella*. However, any food that becomes contaminated and is then held at improper temperatures can cause salmonellosis. *Salmonella* are destroyed at cooking temperatures above 65C (150F).

The major causes of salmonellosis are contamination of cooked foods and insufficient cooking. Contamination of cooked foods occurs from contact with surfaces or utensils that were not properly washed after use with raw products. If *Salmonella* is present on raw or cooked foods, its growth can be controlled by refrigeration below 4C (40 F).

Eggs and chicken, when raw or undercooked are the most common source of salmonella food poisoning. Other sources are other raw meats and dairy products. Where the source is different, it is most likely that it was cross contaminated with one of these foods. Symptoms can present within a few hours, or may take up to three days, and they tend to resemble symptoms of a gastric-flu condition. It can take up to 5 days to fully recover. In a minority of cases it may lead to an arthritic condition, Reiter's Syndrome.

Campylobacter

Unlike salmonella spp, this organism doesn't grow well on foods, however it may be present in foods already and only a few hundred cells is enough to cause illness. It generally takes a couple of days or up to a week for symptoms to appear and they remain for up to 5 days, causing gastrointestinal upset with fever. In a minority of cases it can result in a more chronic condition known as Guillain Barre Syndrome. Foods most likely to harbour *Campylobacter* include any poultry, as well as unpasteurised dairy products and other raw meats.

Clostridium perfringens

C. perfringens is found in soil, dust and the gastrointestinal tracts of animals and man. When food containing a large number of *C. perfringens* is consumed, the bacteria produce a toxin in the intestinal tract that causes illness. It is one of the lesser known causes of food poisoning and yet the symptoms can be quite severe with painful stomach cramping and diarrhoea. In the elderly or frail it can be fatal, but for otherwise normal individuals recovery can be quite swift (about 24hrs).

C. perfringens can exist as a heat-resistant spore, so it may survive cooking and even boiling for many hours. If food is then left at a milder temperature, the bacteria will then be ready to multiply and can grow to large numbers if the cooked food is held between 4C (40F) and 60C (140F). It can multiply extremely rapidly, in less than 20 minutes in the right conditions. Meat and poultry dishes, sauces and gravies are the foods most frequently involved. Hot foods should be served immediately or held above 60C (140 F).

When refrigerating large volumes of gravies, meat dishes, etc., divide them into small portions so they will cool rapidly. The food should be reheated to 75C (165⁰ F) prior to serving. Particular care should be taken with slow cooking stews and casseroles. A large pot of casserole can take many hours, and in commercial quantities, days to cool to 4C if not divided into small portions.

Clostridium botulinum

Botulism accounts for less than one of every 400 cases of food poisoning in the U.S. and is very rare in most other western countries, but two factors make it very important. Firstly, it has caused death in approximately 30 percent of the cases; and secondly, it occurs mostly in home-canned foods. In 1975, for example, 18 or 19 confirmed cases of botulism were caused by home-processed foods, and the other was caused by a commercial product that was mishandled in the home.

Like *Cl. Perfringens*, *Cl. botulinum* can exist as a heat-resistant spore, and can grow and produce a neurotoxin in under processed, home-canned foods. An affected food may show signs of spoilage such as a bulging can or an off-odour. This is not true in all cases, so canned foods should not be tasted before heating. The botulinum toxin is destroyed by boiling the food for 10 minutes.

Symptoms of poisoning include are both gastrointestinal and neurological. They develop within 3 days of ingesting the bacterium, but can occur as rapidly as 12 hours later. In developing countries the soil and dust are common sources of infant poisoning. Take care when bottling vegetables and fruits that are not naturally high in acid, citric acid should be added or for vegetables vinegar. Bottling in oils is not safe unless the foods are acidified first and you should store your bottles at 4C for the first 10 days.

Vibrio parahaemolyticus

V. parahaemolyticus is found on seafoods, and requires the salt environment of sea water for growth. *V. parahaemolyticus* is very sensitive to cold and heat. Proper storage of perishable seafoods below 40 degrees F, and subsequent cooking and holding above 60C (140 F), will destroy all the *V. parahaemolyticus* on seafoods. Food poisoning caused by this bacterium is a result of insufficient cooking and/or contamination of the cooked product by a raw product, followed by improper storage temperature. This is a major problem in Japan where much seafood is consumed raw. *Vibrio vulnificus* is another member of the vibrio genus that is found in the marine environment. *V. vulnificus* is truly an emerging pathogen, but it can be controlled with proper cooking and refrigeration.

Bacillus cereus

B. cereus is found in dust, soil and spices. It can survive normal cooking as a heat-resistant spore, and then produce a large number of cells if the storage temperature is incorrect. Starchy foods such as rice, macaroni and potato dishes are most often involved. The spores may be present on raw foods, and their ability to survive high cooking temperatures requires that cooked foods be served hot or cooled rapidly to prevent the growth of this bacteria.

Symptoms will present within a day of eating the food, sometimes only a few hours later. The condition is mild with gastrointestinal symptoms and is generally resolved in 24hrs. Not only are the spores heat resistant, but so is the toxin. The bacteria can survive in refrigeration and will slowly multiply, so precooked food should not be stored in the fridge for more than 3 days.

Listeria spp.

Before the 1980's most problems associated with disease caused by *Listeria* were related to cattle or sheep. This changed with food related outbreaks in Nova Scotia, Massachusetts, California and Texas. As a result of its widespread distribution in the environment, its ability to survive long periods of time under adverse conditions, and its ability to grow at refrigeration temperatures, *Listeria* is now recognized as an important food-borne pathogen.

Immune compromised humans such as pregnant women or the elderly are highly susceptible to virulent *Listeria*. *Listeria monocytogenes* is the most consistently pathogenic species causing listeriosis. In humans, ingestion of the bacteria may be marked by a flu-like illness or symptoms may be so mild that they go unnoticed. Vomiting and discolouration of urine may also occur and medical advice should be sought. Pregnant women may miscarry and even if they show no symptoms, if there is a likelihood they have been exposed it is imperative to seek medical attention. Symptoms will generally not present until over a week after ingestion, making it difficult to determine the source. In some cases it may be up to 3 months before symptoms appear, in the meantime they are a carrier. Death is rare in healthy adults; however, the mortality rate may approximate 30 percent in the immune compromised, new born or very young.

As mentioned earlier *Listeria monocytogenes* is a special problem since it can survive adverse conditions. It can grow in a pH range of 5.0-9.5 in good growth medium. The organism has survived the pH 5 environment of cottage cheese and ripening cheddar. Heat is by far the easiest and most effective means of killing this bacterium. It is salt tolerant surviving concentrations as high as 30.5 percent for 100 days at 4C (40F), but only 5 days if held at 37C (98.6 F).

The key point is that refrigeration temperatures don't stop growth of *Listeria*. It is capable of doubling in numbers every 1.5 days at 39.5 degrees F. Since high heat, greater than 77°C (170 F), will inactivate the *Listeria* organisms, post-process contamination from environmental sources then becomes a critical control point for many foods. Since *Listeria* will grow slowly at refrigeration temperatures, product rotation becomes even more important.

Yersinia enterocolitica

Even though *Yersinia enterocolitica* is not a frequent cause of human infection in the U.S., it is often involved in illness with very severe symptoms. Yersiniosis, infection caused by this microorganism, occurs most commonly in the form of gastroenteritis. Children are most severely affected. Symptoms of pseudoappendicitis have resulted in many unnecessary appendectomies. Death is rare and recovery is generally complete in 1-2 days. Arthritis has been identified as an infrequent but significant sequellae of this infection.

Y. enterocolitica is commonly present in foods but with the exception of pork, most isolates do not cause disease. Like *Listeria* this organism is also one that can grow at refrigeration temperatures. It is sensitive to heat (5%) and acidity (pH 4.6), and will normally be inactivated by environmental conditions that will kill *Salmonellae*.

Campylobacter jejuni

C. jejuni was first isolated from human diarrhoea stools in 1971. Since then it has continually gained recognition as a disease causing organism in humans. *C. jejuni* enteritis is primarily transferred from animal origin foods to humans in developed countries. However, faecal contamination of food and water as well as contact with sick people or animals is a predominate source of this disease in developing countries.

Although milk has been most frequently identified throughout the world to be a vehicle for *Campylobacter*, one anticipates that future investigations will identify poultry and its products and meats (beef, pork, and lamb) as major reservoirs and vehicles. *C. jejuni* dies off rapidly at ambient temperature and atmosphere, and grows poorly in food.

The principles of animal science will play a significant role in the control of this ubiquitous organism. Hygienic slaughter and processing procedures will preclude cross-contamination while adequate cooling and aeration will cause a decrease in the microbial load. In addition, thorough cooking of meat and poultry products followed by proper storage should assist in maintaining food integrity and less contamination.

Enteropathogenic *Escherichia coli*

Enteropathogenic *E. coli* is a significant cause of diarrhoea in developing countries and localities of poor sanitation. In the U.S. it has been associated with "travellers' diarrhoea." However one of the latest outbreaks was in North America, in a nursing home in Ontario. This was a severe outbreak of *E. coli*0157:H7 associated hemorrhagic colitis.

There are at least four subgroups of enteropathogenic *E. coli*: enterotoxigenic, enteroinvasive, hemorrhagic, and enteropathogenic. Each strain has different characteristics. The major source of the bacteria in the environment is probably the faeces of infected humans, but there may also be animal reservoirs. Faeces and untreated water are the most likely sources for contamination of food.

Control of enteropathogenic *E. coli* and other food-borne pathogens such as *Salmonella* and *Staphylococcus aureus* can be achieved. Precautions should include adequate cooking and avoidance of recontamination of cooked meat by contaminated equipment, water or infected food handlers. Food service establishments should monitor adequacy of cooking, holding times, and temperatures as well as the personal hygiene of food handlers.

PREVENTING BATERIAL FOOD POISONING

The first step in preventing food poisoning is to assume that all foods may cause food-borne illness. Follow these steps to prevent food poisoning:

- Wash hands, food preparation surfaces and utensils thoroughly before and after handling raw foods to prevent recontamination of cooked foods.
- Keep refrigerated foods below 4C (40 F).
- Serve hot foods immediately or keep them heated above 60C (140 F).
- Divide large volumes of food into small portions for rapid cooling in the refrigerator. Hot, bulky foods in the refrigerator can raise the temperature of foods already cooled.
- Remember the danger zone is between 4C (40 F) and 60C (140 F).
- Follow approved home-canning procedures.
- Heat canned foods thoroughly before tasting.
- “When in doubt, throw it out”

Remember the following key points:

1. 37C is the optimal growth temperature for most bacteria
2. Slow cooking gives microorganisms a chance to multiply
3. Some bacteria can survive long periods at very high temperatures

Frozen foods (e.g. meat), may not reach a sufficiently high enough temperature in the centre when they are cooked, even if the outside is cooked at a temperature over 63. To ensure any micro organisms inside meat are killed during cooking; meat should be completely thawed before cooking. This thawing is best done slowly at a low temperature.

Infants, older persons, women who are pregnant and anyone with a compromised immune system are especially susceptible to food-borne illness. These people should never consume raw fish, raw seafood, or raw meat type products. You are the key to preventing food-borne illness. By observing the simple rules of good handling, food poisoning can be prevented in almost all instances.

Bacteria Responsible	Description	Habitat	Types of Foods	Symptoms	Cause	Temperature Sensitivity
Staphylococcus aureus	Produces a heat-stable toxin	Nose and throat of 30 to 50 percent of healthy population; also skin and superficial wounds.	Meat and seafood salads, sandwich spreads and high salt foods.	Nausea, vomiting and diarrhoea within 4 to 6 hours. No fever.	Poor personal hygiene and subsequent temperature abuse.	No growth below 40° F. Bacteria are destroyed by normal cooking but toxin is heat-stable.
Salmonella	Produces an intestinal infection	Intestinal tracts of animals and man	High protein foods - meat; poultry, fish and eggs.	Diarrhoea, nausea, chills, vomiting and fever within 12 to 24 hours.	Contamination of ready-to-eat foods, insufficient cooking and recontamination of cooked foods.	No growth below 40° F. Bacteria are destroyed by normal cooking.
Clostridium perfringens	Produces a spore and prefers low oxygen atmosphere. Live cells must be ingested. Produces a toxin.	Dust, soil and gastrointestinal tracts of animals and man.	Meat and poultry dishes, sauces and gravies.	Cramps and diarrhoea within 12 to 24 hours. No vomiting or fever.	Improper temperature control of hot foods, and recontamination.	No growth below 40° degrees F. Bacteria are killed by normal cooking but a heat-stable spore can survive.
Clostridium botulinum	Produces a spore and requires a low oxygen atmosphere. Produces a heat-sensitive toxin.	Soils, plants, marine sediments and fish.	Home-canned foods.	Blurred vision, respiratory distress and possible DEATH.	Improper methods of home-processing foods.	Type E and Type B can grow at 38° F. Bacteria destroyed by cooking and the toxin is destroyed by boiling for 5 to 10 minutes. Heat-resistant spore can survive.

Vibrio parahaemolyticus	Requires salt for growth.	Fish and shellfish	Raw and cooked seafood.	Diarrhoea, cramps, vomiting, headache and fever within 12 to 24 hours.	Recontamination of cooked foods or eating raw seafood.	No growth below 40° F. Bacteria killed by normal cooking.
Bacillus cereus	Produces a spore and grows in normal oxygen atmosphere.	Soil, dust and spices.	Starchy food.	Mild case of diarrhoea and some nausea within 12 to 24 hours.	Improper holding and storage temperatures after cooking.	No growth below 40° F. Bacteria killed by normal cooking, but heat-resistant spore can survive.
Listeria monocytogenes	Survives adverse conditions for long time periods.	Soil, vegetation and water. Can survive for long periods in soil and plant materials.	Milk, soft cheeses, vegetables fertilized with manure.	Mimics meningitis. Immune compromised individuals most susceptible.	Contaminated raw products.	Grows at refrigeration (38-40° F.) temperatures. May survive minimum pasteurization temperatures (161° F. for 15 seconds.)
Campylobacter jejuni	Oxygen sensitive, does not grow below 86° F.	Animal reservoirs and foods of animal origin.	Meat, poultry, milk, and mushrooms.	Diarrhoea, abdominal cramps and nausea.	Improper pasteurization or cooking. Cross-contamination.	Sensitive to drying or freezing. Survives in milk and water at 39° F for several weeks.
Versinia enterocolitica	Not frequent cause of human infection.	Poultry, beef, swine. Isolated only in human pathogen.	Milk, tofu, and pork.	Diarrhoea, abdominal pain, vomiting. Mimics appendicitis.	Improper cooking. Cross-contamination.	Grows at refrigeration temperatures (35-40° F.) Sensitive to heat (122° F.)
Enteropathogenic E. coli	Can produce toxins that are heat stable and others that are heat-sensitive.	Faeces of infected humans.	Meat and cheeses.	Diarrhoea, abdominal cramps, no fever.	Inadequate cooking. Recontamination of cooked product.	Organisms can be controlled by heating. Can grow at refrigeration temperatures.

TREATMENT

In most cases, vomiting and diarrhoea will clear the body of the offending bacteria or toxin. In more severe cases, in pregnant women, the frail, elderly, very young or immune compromised antibiotics will be prescribed. However, viral food poisoning can occur, and in this instance the same processes will tend to remove the virus from the body and the illness will resolve without treatment in about 24hrs. I

If it does not or if symptoms are severe medical advice should be obtained. Remember however that antibiotics are drugs that are anti (against) biotic (bacteria) and are ineffective against viruses. Anti-emetic (anti-vomiting) drugs in tablet form, or injection may be administered, particularly in the risk groups listed above.

Where a person has lost a lot of fluid, they may be admitted to hospital. An IV line will be inserted to rehydrate and nourish the person and anti-emetic drugs such as maxilon may also be administered. Electrolyte balance will be monitored and electrolytes may be administered via the IV line to stabilise the patient. In many countries, food borne illness is a notifiable illness and your doctor will take samples (faecal most likely) to be sent for testing.

This is not always of immediate benefit to the patient, but the bacterium needs to be positively identified for reporting, particularly in an outbreak. Food samples may also be tested where available. If you are providing food for people and they become ill, you can expect thorough checking of your premises, samples to be taken for testing and in large, severe outbreaks, suspected businesses may be banned from trading until it is confirmed they are safe. Legal ramifications also exist if you are found to be negligent.

CONTAMINATION FROM COOKING

Some cooking methods may cause food contamination. Materials in utensils and cooking pots can find their way into foods. Generally the effect is seen only after chronic exposure. The jury is still out on most of these issues and there are ethical issues with setting up new long term trials in humans. However, research is on going and some key points or areas of interest to be aware of include:

Aluminium

If acidic foods are used with aluminium cookware (eg. saucepans), the increased quantities of aluminium from the cookware will contaminate the food. If such foods are cooked in aluminium over long periods, or left sit in the container after cooking, the problem is increased. There is no conclusive evidence linking aluminium with health risks, but suspicions exist.

Copper

Problems can be similar to with aluminium. Cooking acidic foods will increase copper contamination, and copper can cause destruction of vitamin C in foods. Excessive copper in the body is of course a toxin.

Cooking source

Materials from fuels may find their way into foods (ash from a wood fire, propellants or accelerants, smoke etc)

Treated Pine

There have been reported cases of poisoning when people have used treated pine off cuts to cook a barbeque. When treated pine is burnt toxic chemicals are released. These may be inhaled, or may find their way into food.

Safest options

The safest types of cookware include earthenware, glass, enamel and stainless steel.

CONTAMINANTS FROM FOOD PROCESSING

Various materials which are used in processing foods can contaminate the foods being processed, though the likelihood of a problem is low. These contaminants may include:

- Cleaning materials
- Lubricants
- Packaging materials
- Chemical residues (e.g. glues, solvents etc)
- Other substances (e.g. hair, insects, rodent excreta)

For people with allergies, care should be taken to learn about the processing of foods as many items used in processing are not listed on the nutrition panel of many products. Cross contamination can occur between different foods prepared on the same equipment. There are questions regarding some of the chemicals used in the processing, preserving and packaging of foods.

EFFECTS OF FOOD PREPARATION ON NUTRITION

Various food treatments and preparation methods will destroy nutrients. Heat from cooking is destructive to a wide variety of nutrients, and for this reason, many foods are more nutritious if eaten fresh, or with minimal cooking. Heat on the other hand, will destroy microorganisms which may contaminate food and cause problems if ingested.

Preparing for cooking

Cutting, peeling or trimming foods in preparation for cooking will remove nutrients. The nutrients removed depend upon the parts of the foods being discarded. Trimming fat from meat may, for example, be an advantageous procedure; while peeling skin from fruit or vegetables will often result in loss of some of the most nutrient rich parts of the food.

Of course for soil born microorganisms, and particularly in areas where soil/dust related illness is common, peeling vegetables and skins may prevent food poisoning. However, if a clean source of water is available, the vegetables can be rinsed and scrubbed clean and the peel left in tact for nutritional purposes. The balance between adequate nutrition and potential food poisoning is precarious in many developing countries.

As mentioned previously food preparation and storage is also a factor in the development of microorganisms in foods. Raw meats and chicken, raw fish and eggs should be prepared last and kept cold until preparation time. If they are prepared first, the juices etc will contaminate the work surface and may transfer to the foods you prepare after. Storing your foods in the fridge, you should have potentially contaminated foods on the lowest shelves, so they cannot drip down onto other foods. They should also be stored in the coldest parts of your fridge (not the door, for example). Fridges should be cleaned out and sanitised routinely as a precaution. Utensils should be thoroughly washed in hot water between uses.

Beneficial and detrimental affects of cooking are summarised below.

BENEFITS OF COOKING	PROBLEMS CAUSED BY COOKING
Converts certain otherwise inaccessible nutrients to a form which can be used by the body.	Destroys some nutrients (particularly vitamin C, and to a lesser extent vitamin B1).
Increases palatability of food, by making it softer	May reduce fibre
Destroys harmful microorganisms	Using baking soda in cooking can increase vitamin C loss
Heating legumes destroys substances which inhibit the uptake of proteins into the body.	Can cause contamination with metals/residues from cooking pots
Destroys some toxins in certain legumes.	Can cause some bacteria to convert to more stable spores.
Heating flour increases niacin available to the body.	
Cooking egg whites & fish makes biotin and vitamin B1 available.	
Grilling lowers fat content of food	Frying can increase fat content

Pressure cooking generally retains more nutrients than other methods. Microwave cooking has similar nutrient losses to conventional cooking methods. To retain nutrients, try steaming – it produces very high temperatures, cooks food quickly, without added fats and nutrients don't leech out as they would if boiled in water. Another idea is to retain the water from boiling to use as a sauce base or similar. Boiling it down will concentrate the leached nutrients in a smaller, more useable volume of water.

FOOD PRODUCTION AND PROCESSING

The use of nitrogen fertilisers when growing plants may accelerate the growth rate, this can then cause a small increase in the protein content. At the same time, vitamin C content usually decreases.

Using organic or inorganic fertiliser makes no difference to the nutrition of the plant food. Organic foods should be produced using natural growth promoting methods so that fertilisers can be avoided. (Companion planting, crop rotation, soil improvement etc)

Milling and refining

Milling cereals can result in loss of various nutrients (including fat, fibre, certain vitamins and minerals). The loss depends upon the milling processes involved. The refining process for crops such as flour and sugar removes much of the fibre from the foods and methods used to bleach foods white (for aesthetic reasons) add chlorine and potassium bromate to food.

Additives, colourings and flavourings

A very contentious area! Typically flavourings are not tightly controlled compared to other additives as current research suggests they are safe. However, many people hold grave concerns over flavourings in food. Previously permitted colourings however, have been linked to cancer. Of those still permitted (in some areas, there are major differences between countries) those that are viewed with the most suspicion/caution include:

E104, E122, E123, E124, E131, E132, E151 as well as Brown FK and HT and Blue FCF.

Many people believe that artificial colourings cause hyperactivity in children, scientifically there is some evidence and further studies are on going. While there are naturally occurring colours such as beta carotene, tumeric and caramel, there are currently very few artificial colours approved for use in most countries (between 7 and 9). Flavourings are generally added to sweeten foods, or to boost the natural flavour synthetically. MSG is a flavouring additive used to enhance the flavours already in the food, however many people react adversely to it and it is very controversial and banned in baby food.

Some other potentially hazardous additives to be aware of (generally you require chronic exposure of quite high doses to cause illness) include:

- The firming agent aluminium potassium sulphate used on glace cherries
- The antioxidants E320 and E320 (also called hydrotoluene)
- Sulphites which are used as a preservative in a massive range of foods and destroys their Vitamin B1 content.
- Sulphites cause reactions in some people.
- Aspartame, (NutraSweet, Equal) the artificial sweetener used in carbonated drinks and other low calorie sweetened foods is believed to be hazardous.
- Saccharin is another controversial sweetener. It is a petroleum derivative that has been shown to cause cancer in rats and is under a moratorium in the United States and products including it must carry a warning label.

Be aware that what is ok in America may be illegal in Australia, or vice versa, in Europe it may be a different case again! Potassium bromate, for example is not used in flour bleaching in Canada or Europe, but is in America. It is worth remembering that additives are monitored and tested, and the majority have excellent safety records, but it is worth noting that some remain contentious.

ROTTING AND DETERIORATION OF FOOD

Micro Organisms

Micro organisms including bacteria, moulds and yeasts may cause putrefaction, decay, fermentation or moulding of food. Small quantities of such micro organisms are common in the environment, and will almost inevitably be found on the surfaces of most foods. Under favourable environmental conditions these organisms can grow and multiply at an alarming rate, feeding off the foodstuffs. If the surface of a food is damaged or broken, micro organisms are more readily able to penetrate the inside of the food, and can develop even faster.

Enzymes

Decomposition of food can also be hastened through the action of enzymes. Various enzymes occur in fresh foods which are part of the nature, controlling natural mechanisms such as the ripening of fruit. These enzymes will continue to affect the biochemistry of the food beyond peak condition, and in doing so, they can contribute to deterioration.

For example, fruit and vegetables which are not quite ripe may be acidic. Enzymes in the plant material will progressively assist changes of acid to sugar, bringing about a ripening. Eventually it will pass a stage where it is in optimum condition, and tissues will begin to deteriorate.

Mechanical Deterioration

Physical or mechanical damage to food can cause deterioration. Damaged parts of food will then be more susceptible to attack by microorganisms (or other problems). Damage may come from bruising, cutting, tearing, puncturing, insects, birds or other pests, etc.

Ripening of Fruit

As a fruit ripens, it undergoes a variety of different changes, and susceptibility to attack by micro organisms will increase as it progresses through these changes. These changes may include:

- Abscission Softening
- Changes in carbohydrate (i.e. increase in sugar content)
- Organic acid changes (decrease)
- Change in colour Seed maturing
- Change in respiration rate
- Change in ethylene production Change in tissue permeability
- Change in protein content
- Production of volatile oils
- Development of wax on skin.

Consideration needs to be given to these different changes when considering storage and preservation of fruits.

Low Temperature Damage

Storing fresh foods (e.g. fruit & vegetables) at low temperatures will slow deterioration by reducing the rate of respiration and metabolism, to a greater or lesser extent. Low temperature doesn't slow all metabolic processes though. Some metabolic processes (ie. cold labile enzyme systems) will stop completely if the temperature becomes too cold. Given that some reactions may still occur, and others stop, an imbalance can develop where certain chemicals accumulate, through some reactions producing them; but they are not disposed of, because the elimination metabolism is stopped.

The net result can be an accumulation of certain chemicals to toxic levels resulting in cells collapsing, and areas of tissue where this occurs, in turn becomes brown. **Chilling injury** can occur in tissues exposed to temperatures below 15°C in some tropical plants. The critical temperature will be lower for other types of tissue. (Note: This is different to freezing injury where ice crystals are formed inside tissues at temperatures below zero).

When plant tissue is damaged by chilling, various metabolic chemicals can be released from inside cells (e.g. amino acids, sugars, salts etc). Floating freely in tissues, unprotected by the cell walls, these chemicals become a food for microorganisms, particularly fungi. For this reason, fruit may often be more susceptible to rot after cold storage than before (particularly the more susceptible tropical fruits).

HYGIENE TO PRACTICE:

- Always wash hands before preparing food
- Never smoke when preparing food
- Never comb hair near food
- Cover wounds, cuts, pimples (e.g. with band aid) when preparing food
- Don't touch pets when preparing food
- Control insects and other pests in food preparation areas
- Wash all benches and utensils with hot water.
- Don't eat or lick food during preparation unless from a new, clean utensil which is not reintroduced to the food after you have licked it.
- Don't use the same knives, benches etc for preparing different foods, without first properly washing them (e.g. avoid cutting vegetables with a knife used on meat a few seconds before).
- Separate storage places for raw and cooked foods.
- Keep handling of cooked food minimal (use spoons or tongs, not hands, after cooking).
- Don't keep food warm; keep it either hot or cold!
- Avoid buffets where food is left out for long periods at incorrect temperature
- Put food away in the fridge after eating, don't leave it on the bench and then put it away later.
- Discard any food that is suspicious -if in doubt, throw it out.

SET TASK

Spend about an hour on the following two tasks:

1. Contact your local council and determine what health regulations relate to establishing a restaurant in your locality. (They may have brochures they can post out or a website with guidelines). Write a list of the general rules and regulations and the procedures involved at start up and later on.
2. Research to find out information about the most common sources of food poisoning in your local area. Take notes, include the source of your information.

ASSIGNMENT

1. List 5 factors which can cause food poisoning.
2. Explain 3 ways in which food contamination may cause poisoning, write one paragraph for each.
3. Why is food storage so important in preventing food poisoning? Discuss in one paragraph.
4. Develop a set of guidelines to minimise food poisoning in your kitchen, based upon your normal eating habits.
6. Explain a course of action that may be taken by a health practitioner, to treat someone affected by food poisoning. Write no more than 250 words.

DETOXIFICATION/BODY CLEANSING

Aim

Understand detoxification; methods, purpose and efficacy.

DETOXIFICATION

Detoxification is a concept applied widely in natural medicine. It is based on the premise that the body accumulates a variety of different toxic compounds (both natural and unnatural) over time, and that these compounds will eventually reach a critical level if they are allowed to increase their concentration in the bodies tissues, unchecked.

Detoxification is the process of reducing the concentration of toxins which have been accumulating in the body, bringing those antagonistic compounds back to a level which the body is able to more easily cope with. The net result should be greater vitality and a stronger constitution, hence less likelihood of disease or any other problem.

Detoxification is claimed to be affected by various different techniques, including:

- Fasting
- Water therapies
- Herbal treatments
- Diet
- Massage
- Stim'ulating Bowel or Urine Movement

During a cleansing period, there should be differences in the normal functioning of the body. There may be some discomfort, and it is normal to experience increased bowel or urine movements. If discomfort persists or increases however, the intensity of the treatment should be reduced or curtailed.

METHODS OF DETOXIFICATION

Several methods of detoxification are currently available. These include fasting, specific diets, colon therapy, vitamin therapy, chelation therapy, and hyperthermia. As a word of caution - all long-term fasts require medical supervision as well as prior assessment as to levels of nutrients, to ensure that deficiency does not occur. Weekend fasts are safe for most people, although it is still wise to seek advice from a professional experienced in detoxification.

The easiest, most inexpensive, and effective, methods of detoxification are fasting and specific dietary regimens. Keep in mind that the goal is to achieve a healthier way of eating, not weight loss, or to rid the body of all bacteria. In fact, "the good bacteria," known as **probiotics**, or commensal bacteria (which is also known as 'flora') is necessary in order to remain in good health.

Several methods of detoxification are currently available. These include fasting, specific diets, colon therapy, vitamin therapy, chelation therapy, and hyperthermia. As a word of caution - all long-term fasts require medical supervision as well as prior assessment as to levels of nutrients, to insure that deficiency does not occur. If you plan to make detoxification part of your dietary regime, do so with professional guidance.

If you are planning on offering it as a service within nutrition or other complementary medicine service, be sure you are familiar with all aspects of the particular methods you plan to advise on.

Some methods of detox include:

Water and juice fast: Most experts recommend beginners to do one or the other in alternation over a few separate weekends. A water only fast starting Friday evening and ending Sunday morning (or just all day Saturday, as an alternative) should be broken with a day of raw foods (fruit/salad only, plus water), not with a heavy meal. Make sure that not less than four and not more than eight pints of water are consumed during the fast.

Weekend mono-diet: This consists of a full weekend of relying on a single food such as grapes, apples, pears (best choice if you have a history of allergy problems), brown rice, millet, or even potatoes (boiled only).

Vitamin C therapy: Exposure to various toxins, like lead or benzene, will deplete your vitamin C stores. Evidence also suggests that vitamin C deficiency hampers the body's own detoxification process.

Chelation therapy: A synthetic amino acid known as EDTA (ethylenediaminetetraacetic acid) is administered intravenously and binds to various toxic metals in the blood. The toxins are then flushed from the body through the kidneys. Used primarily to treat cases of lead poisoning, many doctors have found that EDTA can remove the calcium and plaque present in the walls of arteries in atherosclerosis. This therapy has yet to receive FDA approval as a treatment for heart disease.

FASTING

Many experts advise that not eating for a period will have the effect of detoxifying the digestive system. It is not uncommon for a one day fast to be prescribed once every 1-4 weeks. During the fasting period, water should still be drunk. Nothing should be added to water though. A modified fast may involve taking in a limited type of food or clear broths.

The practise of fasting has been around for thousands of years primarily as an act of religious observance. These most typically take the form of 25hr fasts or, for Muslims the entire month of Ramadan, or Baha'i for the month of Ala where fasting occurs from dawn til dusk (approximately) with no food or fluid taken in those hours. Some Buddhist sects also fast, eating only until midday and then fasting until the following morning. For some Christians, a partial fast of forty days is observed during the period of lent. The 40hr famine is held in many parts of the world, to give young people an insight into the suffering of those who lack regular access to food. In all cases a healthy individual should suffer no ill effects of fasting and in general feel more vital, alert and healthy for the practise.

Medically, fasts may be used for diagnostic purposes (blood sugar observance) or in preparation for surgery or diagnostic procedures. For example, it is necessary to fast and drink a medical electrolyte fluid prior to colonoscopy to ensure the bowel is entirely empty or to fast prior to anaesthesia. Fasting should be under the supervision of a medical professional if you are diabetic, have heart problems, kidney problems or any other major health concerns. There is some scientific evidence to suggest that temporary dietary restriction or dietary modification can improve health, combat chronic diseases and perhaps even increase longevity.

Whether this is more to do with people not taking in excessive nutrients as they do in most western diets, or due to the period of rest given to the gastro-intestinal tract, or a detoxification of the tissues is not yet clear. In general, shorter, more regular fasts are more effective than long term dietary restrictions. Certainly a person should go no more than a day without fluids.

Side-effects and symptoms

When fasting you can expect to suffer some mild symptoms that will resolve when you conclude your fast. These include:

- Dizziness
- Dark coloured, strong smelling urine
- Nausea
- Headache
- “Fuzzy” tongue
- Bad breath
- Skin rash

In people prone to migraine, fasts with no fluid should be avoided. If symptoms become severe, the fast should be finished. Symptoms can be reduced by some pre-fast preparation:

- Reduce or cease intake of caffeine
- Drink plenty of water
- Gradually restrict heavy, more difficult to digest foods prior to the fast
- Eat a healthy, easily digestible meal prior to the fast
- Do not undertake strenuous activity immediately prior to, or during your fast

WATER THERAPIES

A sauna (or sweat bath) is designed to flush the body's toxins and residues of metabolism out through the sweat glands. The ideal humidity of a sauna should be 3-6% and no higher than 15%, and the air heated to approximately 40 plus degrees C. A steam bath (or wet sauna) does not remove toxins so effectively. A sauna will dehydrate the body in this process, so it is important to drink plenty of water to rehydrate. A sauna is not a weight loss treatment. The weight which is lost is due to water lost, and that must be replaced.

Hydrotherapy for detoxification involves the use of hot or cold water, either in a bath or running (shower). Hot water initially raises the blood pressure, before lowering it as the blood vessels dilate (widen). This improves circulation, particularly close to the body surface and oxygen transport is enhanced. This enhanced circulatory function is then believed to aid in flushing toxins. Perspiration may also remove accumulated toxins. Other effects of hot water include increasing the body's temperature and metabolism rate, as well slightly lowering blood acidity. For some people the effects can be disconcerting, as the body may perceive the hot water as a threat, setting off a flight or fight reaction until the body is accustomed to the elevated temperature.

Cold water is invigorating and stimulates the immune system. Brief immersion in very cold water will cause the blood vessels to constrict, and when the person is removed, they will automatically dilate, providing the same type of benefits you get with hot water. Constriction of blood vessels slows blood flow to an area and may provide relief from oedema and also pain as the nervous system slows.

Cold will also reduce inflammation. Washing with warm water will help cleansing of body wastes by cleaning clogged pores and allowing perspiration to occur more freely. Washing the abdomen may improve digestion, and washing the skin with warm water will stimulate the flow of blood closer to the skin surface, helping expel body wastes.

Care should be taken with the temperature of water. Icy cold water should be used only for very brief periods as hypothermia will set in after only a few minutes. For heat treatments, 100F (38C) is a good starting point, but you should never go beyond 110F (43C). When going from hot to cold or vice versa, the body will sense temperatures to be more extreme than they actually are, and you should stick to the milder heat. Exposure to icy cold water should be avoided in people with heart conditions, or the generally frail as it can cause shock or in some cases heart attack in such people. Cool water is a better option in this case.

Herbs can be used in baths or spas, facilitating all of the benefits of washing, plus added benefits associated with specific herbs. Apart from any other benefits, the relaxation affect will allow metabolism to occur with reduced stress. Refer to the list below for herbs and their specific effects. They may be diluted into baths and in warm baths the oils will be released and can penetrate through the skin and the aromatics breathed in.

- Basil – for a stimulating, energizing bath
- Calendula - soothing and healing herb, for dry skin or to soak a healing wound
- Chamomile - relieves pain and provides relief from insect bites
- Dandelion flowers - renew skin and improve mood
- Eucalyptus – relieves congestion, helps you breathe
- Fennel - a lovely, sweet scent reminiscent of licorice, for stimulation
- Grated ginger - enhances blood flow
- Hops - relieve insomnia, leave you sleepy
- Jasmine - enhances mood, refreshes skin
- Lavender - calms nerves and rejuvenates skin
- Lemon balm - relaxing when ingested, energizing in a bath
- Linden flowers - aid in relaxation, stifle a cold before it takes hold
- Meadowsweet - relieves sore muscles and improves your mood
- Mint - stimulates and heals your skin
- Orange blossoms - aid in relaxation, lower blood pressure
- Parsley - heals bruises
- Rose petals - relax muscles and refresh skin
- Rosemary - a piney scent, improve mood, clear nose congestion
- Sage - prevents stiff, sore muscles
- Stinging nettle - promotes circulation, soothe aching joints
- Yarrow - soothe irritated skin, soak healing wounds, has a pleasing scent, but most folks find it a bit "different." Use a light hand when adding yarrow to your bath herb mix.

*A word of caution: A hot bath also lowers your blood pressure, so avoid it if yours is already low; otherwise, it may leave you weak and faint. This may lead to the belief that a hot bath is a remedy for high blood pressure, and this is true—but the effect doesn't last. A cold shower, on the other hand, spikes your blood pressure for a few seconds but lowers it in the long run. If you have heart failure or any kind of heart problem, you should avoid hot baths due to the fluid pressure the water exerts on your chest, which can trigger or escalate heart failure. A warm half bath (where the water rises only to your navel) is a good alternative.

HERBAL TREATMENTS

Cathartics

These are medicines which encourage better bowel movement by acting on the digestive tract. They fall into two distinct groups:

1. **Laxatives** - have a mild effect on the intestines.

e.g. Aloe Vera, liquorice root, cascara sagrada, castor oil, agar agar, rhubarb root, a tea from coriander seed etc.

2. **Purgatives** –more dramatic effect to empty bowels. These are generally only used in adults with a severe problem.

e.g. Egyptian senna.

Large consumption of cathartic herbs as teas can be hazardous, though proper dosage is fine. Long-term use can result in habituation and a laxative habit. Cathartic herbs include aloe, buckthorn berries, rhubarb, senna and Cascara sagrada. Drastic purgatives are best avoided and include colocynth, ipomoea, jalap and podophyllum.

Various herbal detoxification products are marketed through health food shops and other herb suppliers. Dr Alfred Vogel from Switzerland is one of many authorities who have developed such products. Advice is normally given that such herbal cleansing programs must be adhered to strictly, for them to work properly:

- Herb preparations must be taken at the appropriate times of day and in the recommended sequence
- Food which is eaten during the period of cleansing must be in accordance with recommendations

HERBS AND REMEDIES FOR DIGESTIVE COMPLAINTS AND DETOXIFICATION

- **Acidophilus**

Reported to kill pathogenic E.coli strains in the intestine and also assists the body in the production of B group vitamins. Taken after antibiotic treatments, vaginal or rectal suppositories it also helps restore the body's normal flora (microorganisms)

- **Alfalfa**

Packed full of micronutrients, alfalfa is also used to relieve oedema (fluid retention in the tissues) as well as some kidney complaints.

- **Aloe Vera**

Most people are aware of the topical application of Aloe Vera to soothe sunburn and promote healing of cuts and scratches. In cases of severe burn it can also be more effective than vitamin E treatments. However rapid improvement in the burn may also be accompanied by quite severe pain on initial application. It is a worthwhile option for people suffering radiation burns from cancer treatment. Taken internally it is believed to neutralise stomach acid and aid in digestion.

- **Angelica**

Believed to reduce flatulence and aid digestion.

- **Black walnut**

Has a variety of uses, one being to aid the body in ridding itself of parasitic infections.

- Cats Claw

Used to treat a variety of digestive complaints, from colitis, haemorrhoids, irritable bowel syndrome to gastric ulcers.

- Chamomile

More than a night cap, chamomile is used to combat loss of appetite, migraine, diarrhoea, colic and dyspepsia.

- Cinnamon

Reported to both reduce blood sugar peaks after eating as well as reducing high cholesterol and to combat gastro-intestinal complaints.

- Cranberry

Cranberry juice is a widely accepted treatment for urinary tract infections.

- Dandelion

Digestive and liver stimulant and diuretic

- Echinacea

Immune specific – antimicrobial and anti-inflammatory

- Fennel

Relief of colic and flatulence and stimulation of the digestive tract.

- Ginger

Useful for relief of abdominal cramps and for some women, can alleviate symptoms of nausea associated with morning sickness.

- Grapefruit

Component molecules of this fruit are believed to bind toxins in the body and cause them to be excreted in the faeces.

- Kelp (seaweed)

Believed to act on the thyroid, improving metabolism.

- Parsley

Rich in Vitamin C which is believed to benefit the immune system.

- Raspberry Leaf

Often taken as a tea, can tone the uterine muscles and is used to promote labour in women at full term. May also ease digestive complaints and provides a rich source of many important micronutrients. Believed to make contractions more efficient and birth easier. Studies suggest its use during childbirth may speed dilation.

- Thyme

Often used as a mouth rinse to treat mouth and throat infections such as tonsillitis and also has an expectorant function.

- Watermelon

The seeds are reported to assist in the removal of excess body water.

MASSAGE

Massage aids detoxification by stimulating the circulation and the lymphatic system. It can also assist in muscular aches and pains and the removal of excess lymph fluid in this tissue. Massage can also assist a person to feel more calm, and has positive effects on mental health and wellbeing. Following a massage it is common to feel light headed, fuzzy and in some cases a little fatigued as your body is processing and preparing to eliminate mobilised toxins. Some massage techniques that are particularly suited to detoxification programs include:

Lymphatic Drainage Massage

Also known as Manual Lymphatic Drainage, this is a light rhythmic massage that aids in the removal of fluid from the tissues back into the lymphatic system and then directing it toward the lymph nodes. Often used in patients to assist in the treatment of oedema. The massage stimulates the circulation of the lymph fluid within the lymph vessels, promoting metabolism of toxins and their targeting for removal from the body via the urine.

Swedish Massage

Swedish massage is used to increase blood flow, providing more oxygen to cells and tissues while enhancing the removal of toxins and built up waste products such as lactic acid in muscles and uric acid and other metabolic wastes. Swedish massage is incorporated into many modern medical treatment regimes and has its own specific techniques.

Most light massage techniques will have the benefit of stimulating the flow of the lymph system and the removal of built up fluid in the tissues if performed correctly. Addition of herbs such as those listed above to massage oils can give more specific benefits to the massage, as well as the use of aromatic oils from different sources (aromatherapy).

BOWEL MOVEMENTS AND URINATION

Toxins/wastes are eliminated from the body by expelling urine or faeces. Many cleansing treatments are designed (at least partially), to increase the elimination of wastes this way. Drinking extra water, for instance, will increase the flow of urine, and contribute towards cleansing the body of unwanted material. You should aim to consume 1.5-2L of water a day. Excessive water consumption results in electrolyte imbalance, hyponatremia is a serious condition where the sodium in the blood is too low. Take care with harsh purgative treatments, as the increased speed of faeces through the bowel will hamper nutrient absorption.

CAUTIONS

Detoxification programs are becoming increasingly popular. In fact, in many areas you can buy what is essentially a do it yourself kit. However, fasting is not appropriate for some people and if it lasts any longer than a day or two should be at least in the first few instances monitored by a health professional. The majority of people undertaking regulated, professional detox programs report benefit and there is an increasing body of research to support this. However, it is never recommended to omit food groups, or restrict yourself to only one food group for any extended period of time. As with all things, moderation is the key, just as too much fat is bad for you, so is too much water, which can result in the excessive removal of salts from the blood. There is no point in cleansing something that is already clean, ie, cleanses as short term and regular eating should be the majority of the time.

SET TASK

1. Research businesses in your area that offer any sort of detoxification program or package. Create a short questionnaire to find out more about their services. Contact them by email/phone and ask them about their service. Try to find out what the detoxification involves, what benefits it has, the costs and the qualifications of the people offering the service (Professional body memberships etc). The aim is not to interrogate staff, but just to learn more about different options and opinions in your area. If possible, you could look for a mainstream and an alternative health care practice to compare the different perspectives offered.
2. Using the information you gained from task 1, do your own research into the validity of the business's claims, methods and qualifications. Take notes.

ASSIGNMENT

1. Provide your findings and your opinions based on your set tasks. Provide information in lists and then give a 2 paragraph discussion.
2. Explain the following different techniques of accelerating elimination of toxins from the body, in 2-3 sentences each including:
 - Heat (e.g. Sauna)
 - Fasting
 - Diet Modification
 - Antioxidants
 - Exercise
 - Drugs and Herbs
 - Disease & Stress control.
3. Consider yourself, or someone you know. Evaluate diet and lifestyle and determine potential detoxification needs. Create a table listing the diet/lifestyle issue along with a possible detoxification treatment.
4. In approximately 250 words give **your** opinion on detoxification, its role in good health and nutrition. Design a short set of guidelines explaining the best ways for an average person to detox.

CONSULTING/GIVING ADVICE

Aims

Recommend a nutritional program to a client in a proper and responsible manner.

LEGALITIES

There are legal implications involved in giving any sort of advice, and these are particularly serious when advising on a person's health. If you provide incorrect and ill conceived advice, which results in health problems, the client/patient may be justified in claiming compensation. There may be legal restrictions upon advice which can be given. In some Australian states (e.g. Victoria and NSW) it is illegal for certain professionals (e.g. natural therapists) to treat cancer. In Queensland however, holistic cancer treatment is legal. In Australia, as of 2007, anyone can call themselves a nutritionist, but to practise as a dietician there is a range of requirements that must be met. Such legalities may change from time to time, and place to place. To keep abreast of such changes, anyone practicing therapeutic medicine (of any kind), should maintain membership to appropriate professional associations; and maintain subscriptions to appropriate journals or newsletters. While you may be able to work as a nutritionist, no professional body will accept your membership as a nutritionist without evidence of a sound course of study.

INSURANCE

Just as a medical doctor requires appropriate medical indemnity insurance, so does anyone offering nutrition or other health/fitness advice. In some cases, you will be required to show you are making efforts to further your knowledge and keep up to date with current information and research. Before spending money in the set up of a consultancy, ring a few insurance agencies in your area and find out what qualifications you will need, and what other requirements you must meet to obtain suitable insurance coverage. Obtain quotes and be sure to budget for insurance, as to practise without it is foolhardy at best, and in most areas illegal.

PROFESSIONAL BODIES

Professional bodies are often overlooked by the very people they are designed to assist. Your membership fees go toward professional seminars, conferences and meetings, as well as giving you a networking resource and a place to turn with questions and opinions. Membership will give clients confidence that you are a professional with a good qualification. They often also give you an opportunity to provide community services and promote health, nutrition and wellbeing, or another specialist area within these fields to the wider public. Some bodies even offer a professional referral service to help you build your business.

The membership types and requirements vary from body to body, depending on their focus and philosophy. It is always worth researching organisations thoroughly prior to becoming a member. Advertising membership with an organisation that purports to be professional that is frowned upon by other practitioners in your field and fields with whom you may be inter-referring patients may hamper your career progression.

It is not possible to list all relevant professional bodies for people working in nutrition, however, below are a few you might consider investigating:

COUNTRY	WEBSITE	ELIGIBILITY
Australia		
Nutrition Australia	www.nutritionaustralia.org	Any person or company supporting the promotion of health, wellbeing and nutrition in the wider community
Dieticians Association of Australia	www.daa.asn.au	Professional membership requires completion of recognised degree or post-graduate diploma Student memberships available
Australian Traditional Medicine Society	www.atms.com.au	Members must hold an accredited award or equivalent
Australian Counselling Association	www.theaca.net.au	Completion of a recognised counselling course (diploma) Student memberships available
New Zealand		
The New Zealand Nutrition Foundation	www.foodworks.co.nz/nutritionfoundation/	Contact foundation
New Zealand Dietetic Association	www.dieticians.org.nz	Membership for people with scientific nutrition or dietician qualifications or in a prominent related job
New Zealand Natural Medicine Association	www.nznma.com	Graded professional memberships requiring at least a diploma qualification Student and honorary memberships
United Kingdom		
The Nutrition Society	www.thenutrition society.org	Anyone who can demonstrate a genuine interest in the science of human or animal nutrition. Nutritionists register also for professionals.
The British Dietetic Association	www.bda.uk.com	Full membership for people eligible for Dietician registration. Student memberships also available. Associate memberships for dietetic assistants.

British Association of Nutritional Therapy	www.bant.org.uk	Professional memberships for those with recognised qualifications
The Complementary Medicine Association	www.the-cm.org.uk	Range of professional memberships for different levels of qualification Student and friend memberships available
United States		
American Association of Nutritional Consultants	www.aanc.net	Association and professional memberships. Professionals must pass an exam for membership.
American Dietetic Association	www.eatright.org	Professional memberships for those with degree level or higher qualifications
The Natural Health Association	www.thenaturalhealthassociation.com	Memberships for certified natural health professionals

HOLISTIC APPROACH

While nutrition is very significant to maintaining good health, it is only one of several considerations. When providing advice on nutrition, you should always take a holistic approach. That is, consider the entire body and the client's lifestyle, not just the specific complaint they have at that time. Give consideration to other factors such as disease, exercise, age, etc. This will help you ascertain the probable cause/s, the treatment options most likely to be effective and the best long term management plan.

In taking a holistic approach to a person, it is worthwhile also taking a holistic approach to the health care professions. By combining modern medicine with traditional methods you can find the best way to assist a person. Refuting other options out of hand because they do not match your own philosophy is not advisable, as, the relationship between different modalities of health care is often a lot closer than you think (or than many health professionals claim!).

ETHICS

There are a variety of ethical issues in the area of nutrition, just as there are in the wider health care field. One of the most important to be aware of is personal bias. That is, your personal leaning toward, and favouring of one health care philosophy over another. The legalities and ethical considerations specific to your region can often be found encompassed in the member codes and requirements of professional bodies. As a general rule your ethical requirements toward anyone you consult and advice (be it professional, or as a service to friends or family) include:

Maintaining confidentiality

- Providing up to date, unbiased advice based on a thorough medical history
- Not acting outside your qualifications/skill set (don't offer advice you aren't qualified to give, don't give yourself a title you are not qualified to have and don't perform treatments you are qualified to perform)
- Treating clients with dignity, compassion, respect and honesty
- Continuing your professional development
- Obtain informed consent when performing any procedure (iridology, blood pressure readings, obtaining body measurements, touching any part of the persons body)
- Not making false or exaggerated claims about the benefits of the service/advice offered
- To maintain an awareness of new products/diets/lifestyle fads and trends and be able to honestly and factually advise patients on their efficacy, safety and side-effects.

THE CONSULTATION

If you want to provide a professional service for clients, you need to know how to properly conduct a consultation. Clients need to feel welcome and free to divulge often very personal information in confidence. It is important to be punctual, and non-judgemental, showing warmth and interest in the client. You should greet your clients by name and ensure you are able to pay full attention to them, making it clear to the client that you are listening and taking in what they say. Be careful not to cut them off, but also to redirect them if they begin to ramble.

Before you begin consulting with clients, you need to determine your specific process. What you need to know from the client and how you are going to find that information out. You may prefer to let the conversation flow, picking out key issues from the client. Alternatively, you may choose to have a questionnaire to work through with the client. This is particularly useful for first consultations. You need to determine how you are going to assess the patient. Depending on your qualifications and experience you might take blood pressure readings, draw blood, perform an iridology assessment, test reflexes or take anthropometric measurements (height, weight, waist measurements, hip measurements etc).

Once you have all the information you need, how are you going to assess it and come up with an effective, appropriate treatment plan? Things to consider include: how well you think a client will comply with a treatment program, any physical or psychological reasons some treatments may not be appropriate, complications of multiple existing conditions, how compliance will be monitored, clients expectations (are they realistic?) and whether you need to include another medical professional in the clients care.

Through out the process of obtaining information, assessing it and developing a plan of treatment you need to ensure the patient is at all times comfortable and involved in decisions, being free to express their opinions and concerns. Difficulties can arise if patients come to you with something in mind (they believe they suffer one condition, but you believe they don't or have something else wrong with them), patients who expect one treatment but you feel another is more applicable, patients who want you to assist in ways you are not qualified to or refuse to be referred to certain practioners you feel they need to see etc.

Compliance

A common problem with dietary and lifestyle intervention and alteration is compliance. People often want to make changes but for many reasons fail. They then feel to embarrassed/ashamed/frustrated to inform their care provider. There is no real way to verify if patient feedback is correct. Food diaries may omit snacks or foods the client doesn't think you will approve of. Exercise may have been done less frequently or at lower intensity than reported. It is very hard to know, however, depending on the goals of the client you may be able to surmise they aren't complying (weight gain, or no weight loss despite daily calorie intake being reported as low and exercise being done).

How you deal with non-compliance is another tricky issue altogether! You can suggest it to the client, you can ignore it, or you can alter the program, depending on the situation and the particular client. If you have an obese client who is quite depressed, confronting them with non-compliance may result in some distress. However, altering their program subtly may provide less effective results than the original could, but may enhance their compliance. Ignoring the issue would probably result in further depression when weight loss is not being achieved. Compliance can be addressed with group activities, particularly for exercise. These should NOT be competitive, but rather, when part of a group with a social aspect clients are more likely to attend sessions and enjoy them. Working with a personal trainer can be a good idea for non-compliant clients. In terms of nutrition, it is a little more difficult to make things more enjoyable and interesting when a person is used to chocolate and potato chips. Simple reward systems may work for some clients and can be tailored to suit the client. Care is required to not set unrealistic goals or to patronise the client.

Setting a nutritional program

In general dietary programs aren't set in isolation and often include lifestyle changes, exercise etc. For a nutritional program specifically you need to identify areas of nutrient deficiency and excess and then provide the client with the information and tools to correct these imbalances in their dietary intake. If a patient shows signs of specific nutrient deficiency or their reported regular diet highlights deficiencies, it is not enough to say, for example, each more zinc. You need to tell them what foods contain zinc, and give them an idea of how much of each food they should consume.

Particular care should be taken in cases where a person has an existing medical condition and it is wise to obtain information from their specialist/medical specialist regarding the specifics of the condition, its severity and the medications they are taking. Some medications will require the person to take extra nutrients, or to avoid certain foods. Some medical conditions will require specific dietary requirements different to that you would normally advise. Never ever tell a person to stop taking prescribed medication! Even if you don't believe it is a good treatment, it is not generally within the role of a nutritionist or nutritional counsellor or other natural therapist to contradict accepted standard medication protocols. You can always advise the client to learn more and discuss with the prescribing doctor, however, there have been cases of practitioners advising cessation of prescribed medications or with fatal consequences.

In one instance an 8 year old diabetic died after her mother stopped giving her insulin on the advice of another practitioner recognised by an unrecognised professional body and who proclaimed bogus qualifications. The result for the practitioner was a hefty jail term for involuntary manslaughter. While this is an extreme example, if you provide advice that is unsupportable, or outside your qualifications to provide and a person suffers because of it, or could have potentially suffered, you will find yourself not only facing professional ostracism and insurance issues, but criminal charges with jail terms and or large fines.

Finally, ensure clients are well aware that media promotion of magical weight loss tablets, pills and potions are not healthy weight loss options, along with fad diets and rapid weight loss plans that exclude food groups and deprive the body of essential nutrients.

You need to research all new trends, opinions, revolutionary new products and 'scientific confirmations/conclusions/warnings'. As a health professional this is part of your duty of care to your clients and only to your benefit. Part of working as a nutritionist or health care provider is not only to provide sound advice to clients, but also to provide factual advice on the dangers of treatments, medications and diet plans that professionals are aware of but the general public may not be. In this way you are helping to educate the wider community about healthy living, lifestyle and nutrition practises.

SET TASK

Find a person you know who could benefit from some nutrition advice. Conduct a consultation/interview with that person to determine any nutritional problems, and then give them advice. You can either audio or video tape the consultation, or if you prefer take written notes showing how you presented a nutritional program and explained it clearly, to an adequate and professional standard.

ASSIGNMENT

1. Design a set of guidelines members must adhere to for a hypothetical industry body for people giving nutritional advice.
2. Explain in one paragraph, the role of professional bodies in your area (you may need to do some additional research).
3. List the professional nutritional or food service bodies and associations in your area.
5. Explain bias and how it can impact on a practitioner's ethical conduct in 100-200 words.
6. Give two specific hypothetical situations where nutritional advice might be misinterpreted and the ramifications of this. How could the misinterpretation be avoided? Write about 150-250 words for each example.
7. Define compliance in 1-2 sentences. List 5 ways in which compliance issues may be combated.
8. Submit your audio or video tape or your written record of the consultation with a client, presenting a nutritional program, designed for that client.