UNIT-8 Nutrition and the Immune System

Learning Outcomes

By the end of this unit the learner will be able to:

- ✓ Understand how our immune system protects us.
- ✓ Identify common causes of food allergies and intolerances.

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Unit 8

Nutrition and the Immune System

How Does Our Immune System Protect Us?

Our immune system protects us against bacteria, viruses, and other disease-causing organisms. It is an efficient, complex defence system. The immune system is our shield against disease. The immune system is always on the alert. It surveys the internal environment on a “search-and-destroy mission” ensuring that if any potentially harmful organisms invade, they are quickly eliminated. It protects us from pathogens, such as harmful bacteria, yeasts, fungi or parasites, which may be present in the food we eat, and from harmful viruses that we may breathe in.

The immune system is everywhere in our body, but there are certain areas that are a more concentrated part of the immune system than others. These areas are those parts of our body where it is most likely that pathogens will enter. Our skin, which covers the entire body, is the first line of defence. It is sometimes called our “acid mantle”. This is because healthy skin has a low level of acidity to it and this acidity is a barrier against certain pathogens. Stomach acid is an effective barrier against many pathogens due to its high level of acidity. Our small intestine has special areas that detect foreign antigens and stop pathogens from entering through its walls and getting into the inner environment of our body.

The Lymph System

The lymph system is second circulatory system in the body. It clears wastes from the system, especially the waste that results from a fight between immune cells and a non-self-invader. The liver, spleen, bone marrow, and thymus gland also have immune activity. These are all examples of parts of our immune system.

Nutrition and the Immune System

Due to the complexity of the immune system, it is extremely difficult to assess the effects of diet on our immune function. However, research results have identified some dietary factors that affect the human immune response.

Energy intake seems to have an important influence on immune activity. Under nourished people are at greater risk to infections. Weight reduction schemes using diets with less than 1200 kcal per day can also reduce immune function, an excellent reason to avoid unhealthy "crash diets". Excessive energy intake may also compromise the immune system's ability to fight infection.

Obesity is linked to an increased rate of infectious disease. Furthermore, obese people are more likely to develop coronary heart disease, which has been linked to alterations in the immune function. Good nutrition plays a critical role in enhancing the health of our immune system. In terms of diet, keeping our

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immune system healthy is just as much about what foods act as suppressors to our immune system, as it is about what foods enhance our health.

Sugar and the Immune System

One of the most problematic foods for the immune system is sugar. Sugar actively suppresses the immune system. Research suggests that eating only 100 g of sugar at one sitting suppresses the immune system within 30 minutes and this suppression lasts for up to five hours.

Simple Carbohydrates and the Immune System

Excessive alcohol and refined foods are other forms of simple carbohydrates similar to sugar that are not beneficial for our immune system.

Bad Fats and the Immune System

The other category of foods that suppress the immune system is bad fats. The unhealthy fats, such as the hydrogenated and trans-fats, can also adversely affect the immune system. Reducing fat in the diet is important for weight control, but it also seems to influence how well the immune system works. Diets that are high in fat seem to depress the immune response and thus increase the risk of infections. Reducing fat content in the diet can increase immune activity. This might not just affect infections but could also strengthen the type of immune cells, which can fight tumour cells.

However, it is not just the amount of fat that is important but also, its origin. It is important to include oily fish, nuts, soy, or linseed oil in your diet because we need the right balance of fatty acids in our diet. Regular consumption of fermented dairy products, such as yoghurt or kefir, may enhance the immune defences in the gut. Recent research results suggest that yoghurts made with certain bacteria (which are called probiotics) may have a beneficial effect on the immune system. For example, human volunteers who ate yoghurt every day made with specific probiotic bacteria showed a higher resistance to microorganisms that cause food poisoning.

Immune system maintenance requires a steady intake of all the necessary vitamins and minerals. This can be accomplished by eating a well-balanced diet including plenty of fruit and vegetables, and yoghurt products on a regular basis. To date, most studies show that supplements do not stimulate immune response in healthy, well-nourished individuals. However, a recent study among elderly people showed that a multivitamin and mineral supplement can boost their immunity.

Whole Foods and the Immune System

The immune system responds well to a whole food diet generally because these foods provide an array of nutrients. This will be especially true if we eat organic foods. Foods that are extra supportive to our immune system are those which are high in antioxidants, such as vegetables and fruit.

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Food Allergies and Sensitivities

What is a Food Allergy?

A food allergy is an immune system response. It occurs when the body mistakes an ingredient in food – usually a protein – as harmful, and creates a defence system (antibodies) to fight it. Allergy symptoms develop when the antibodies are battling the 'invading' food. The most common food allergies are peanuts, tree nuts (such as walnuts, pecans, and almonds), fish and shellfish, milk, eggs, soya products, and wheat.

What is Food Intolerance?

Food intolerance is a digestive system response, rather than an immune system response. It occurs when something in a food irritates a person's digestive system, or when a person is unable to properly digest, or breakdown, the food. Intolerance to lactose, which is found in milk and other dairy products, is the most common food intolerance.

Common Symptoms of Food Allergy

Symptoms of a food allergy can range from mild to severe, and the amount of food necessary to trigger a reaction varies from person to person.

Symptoms of food allergy may include:

- Rash or hives
- Nausea
- Stomach pain
- Diarrhoea
- Itchy skin
- Shortness of breath
- Chest pain
- Swelling of the airways to the lungs
- Anaphylaxis

Common Symptoms of Food Intolerance

Symptoms of food intolerance include:

- Nausea
- Stomach pain
- Gas, cramps, or bloating
- Vomiting
- Heartburn
- Diarrhoea
- Headaches
- Irritability or nervousness

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How common are Food Allergies and Intolerances?

Food allergies affect about 2 to 4% of adults and 6 to 8% of children. Food intolerances are much more common than full-blown allergies are. In fact, nearly everyone at one time has had an unpleasant reaction to something they ate. Some people have specific food intolerances. Lactose intolerance is the most common food intolerance.

What Causes Food Allergies and Intolerances?

Food allergies arise from sensitivity to chemical compounds (proteins) in food. They develop after we are exposed to a food protein that our body thinks is harmful. The first time we eat the food containing the protein, our immune system responds by creating specific disease-fighting antibodies (called immunoglobulin E or IgE). When we eat the food again, it triggers the release of IgE antibodies and other chemicals, including histamine, in an effort to expel the protein 'invader' from our body. Histamine is a powerful chemical that can affect the respiratory system, gastrointestinal tract, skin or cardiovascular system.

As a result of this response, allergy symptoms occur. The allergy symptoms appear where in the body the histamine is released. If it is released in the ears, nose and throat we may have an itchy nose and mouth, or trouble breathing or swallowing. If histamine is released in the skin we may develop hives or a rash. If histamine is released in the gastrointestinal tract we will probably develop stomach pains, cramps, or diarrhoea. Many people experience a combination of symptoms as the food is eaten and digested. Food allergies often run in families, suggesting that the condition can be genetically inherited.

There are many factors that may contribute to food intolerance. In some cases, as with lactose intolerance, the person lacks the chemicals, called enzymes, necessary to properly digest certain proteins found in food. Also common are intolerances to some chemical ingredients added to food to provide colour, enhance taste and protect against the growth of bacteria. These ingredients include various dyes and monosodium glutamate (MSG), a flavour enhancer. Substances called sulphites are also a source of intolerance for some people. They may occur naturally as in red wines or may be added to prevent the growth of mould. Salicylates are a group of plant chemicals found naturally in many fruits, vegetables, nuts, coffee, juices, beer and wine. Aspirin also is a compound of the salicylate family. Foods containing salicylates may trigger symptoms in people who are sensitive to aspirin. Of course any food consumed in excessive quantities can cause digestive symptoms.

What is the Difference between a Food Allergy and Intolerance?

Food allergies can be triggered by even a small amount of the food and occur every time the food is consumed. People with food allergies are generally advised to avoid the offending foods completely. On the other hand food intolerances often are dose related.

People with food intolerance may not have symptoms unless they eat a large portion of the food or eat the food frequently. For example, a person with lactose intolerance may be able to drink milk in coffee or a single glass of milk, but becomes sick if they drink several glasses of milk. Food allergies and

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intolerances are different than food poisoning, which generally results from spoiled or tainted food and affects more than one person eating the food.

How Allergies Develop

At birth, the immune system switches to be either allergy prone (TH2) or non-allergy prone (TH1), depending on genetics and environment. TH stands for T helper type white blood cells. TH1 immunity is good for fighting bacteria and viruses, and protecting against allergies. TH2 immunity is good at fighting parasite infections, but makes us more vulnerable to develop allergies. If there is a family history of allergies, a child is much more likely to switch on TH2 immunity. This promotes the manufacture of excessive amounts of allergy-related immunoglobulin E (IgE) in the bloodstream.

This IgE latches on to harmless allergens and triggers allergic reactions. If an inhaled pollen microparticle gets attached to IgE in the nasal membranes, for example, this combined IgE/pollen complex causes mast cells to release naturally occurring defence chemicals called histamine. This leads to profuse nasal itching, tickling, sneezing, and a watery mucus discharge.

Who's Affected?

Atopy, in parents or siblings, is a strong indicator of allergy risk. Allergies are more likely to occur in atopic families where there is early childhood exposure to certain allergens. Men are more likely to become allergic, and an allergic mother who smokes puts a child at even greater risk.

Statistically:

- Children from non-allergic families have a 12% risk of developing an allergy.
- If one parent has allergies, this risk increases to 20%.
- If both parents have allergies, the risk is more than 40%.
- If both parents have the same allergy (such as asthma, hay fever, or eczema) the child has a 70% risk of having the same allergy.

Other factors that may promote allergies include:

- Birth by caesarian section
- Frequent courses of antibiotics
- Coming from a smaller family, with just one or two children
- Passive cigarette smoke inhalation
- Being overweight - obese children are more prone to asthma

A baby's environment during the first year is important. Early low-dose exposure to dust mites, pollen, pets and certain foods increases the likelihood of becoming allergic.
On top of that, our relatively affluent lifestyles - centrally heated homes, regular use of antibiotics, and processed or exotic foods in our diet - seem to encourage allergies.

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How can it be avoided?

A number of factors reduce our risk of developing allergies:

- Being born into a family with no history of allergies.
- Early exposure to good probiotic bacteria in the infant diet.
- Being breastfed exclusively for the first four months of life, with a mother who avoids egg, nuts, and cow's milk while breastfeeding.
- Plenty of vitamins C and E, and omega-3 polyunsaturated oils.
- Having two or more older brothers and sisters.
- Living on a livestock farm and getting grubby playing in the farmyard.

Although breastfeeding hasn't been convincingly shown to reduce allergies or asthma, it transfers protective IgA antibodies to the baby and delays the potential onset of cow's milk allergy by deferring the introduction of cow's milk formula.

Allergic March

The term 'allergic march' is used to describe the progression from one manifestation of allergy to the next over a period of time. For example, many children under age three have eczema and food allergy. As this improves, they develop asthma. Then, as their asthma begins to settle down, they start to be troubled by allergic rhinitis (hay fever) in their teenage years.

True Food Allergy

In children, common allergy-provoking foods include cow's milk protein, egg white from hens, wheat, soya bean, codfish, and peanuts. In adults, nuts including Brazil, almond, hazelnut, peanut and walnut are common allergens. Seafood such as fish, mussels, crab, prawn, shrimp, and squid may also cause allergic reactions.
Localised oral allergies may occur in young adults in association with silver birch tree pollen allergy. They get an itchy mouth and throat on eating certain fresh fruit (apple, cherry, peach, and nectarine), raw vegetables (carrot, celery, and potato) and nuts.

What are the Symptoms?

Typically, an immediate food allergic reaction will involve the immune system. Within minutes, traces of the offending food in the diet can trigger generalised rashes, itching, diarrhoea, vomiting, swelling of the lips and soft tissues, breathing difficulties and even shock. Peanut **anaphylaxis** is a good example where traces of the food are absorbed in the mouth or intestine. This leads to the rapid release of histamine from cells and allergic tissue swelling.

Delayed reactions to food may also occur, which can aggravate eczema in infants. **Coeliac's disease** is a delayed immune reaction to the gluten part of wheat.

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This damages the intestinal lining, resulting in abdominal bloating, discomfort, diarrhoea or constipation. It also decreases absorption of essential foods from the intestine resulting in anaemia, lethargy and nutritional deficiencies. These changes may be subtle and can easily be missed. Food intolerance reactions are of slower onset than allergic reactions, don't involve the immune system and aren't usually life threatening. They're often called 'pseudo-allergic reactions'. Lactose intolerance, for example, is the inability to digest the cow's milk sugar lactose, caused by deficiency of the sugar-digesting enzyme lactase in the intestine. This is common in people of southern European or African descent, and results in smelly diarrhoea, pain and bloating after drinking cow's milk or taking in dairy products. Lactose intolerance doesn't cause rashes, weight gain or lethargy. Natural histamine may be too rapidly absorbed from food in the diet and effectively lead to a histamine 'rush' with headaches, palpitations and flushing that mimics an allergy.

Then there are adverse reactions to chemical preservatives and additives in food, such as sulphites, sodium benzoate, salicylate, monosodium glutamate (MSG), caffeine, and tartrazine. These reactions are usually dose-related, with small amounts of the food being tolerated but larger amounts leading to reactions such as urticaria, flushing, abdominal pain, vomiting, and diarrhoea.

Food Toxicity and Aversion

Natural poisons occur in some foods, such as, mushrooms and potatoes. Bacteria in putrefying meat and fish can cause toxic food poisoning. These reactions occur in all people who consume the toxic foodstuff and don't involve any digestive intolerance or an immune reaction. Some people have a food aversion and convince themselves, with no sound basis, that they're 'food allergic' and will vomit if given the particular food. If the food's concealed or hidden, they consume it with no ill effects. Their reaction is psychological and it can be difficult to convince them that they're not allergic to a particular food.

Diagnosing Food Allergy and Intolerance

Food allergies can be diagnosed by means of skin-prick tests to various foods or by a RAST (Radio allegro sorbent Test) on a blood sample. Skin testing with fresh food extracts is more accurate. If no food can be identified, but an allergic reaction is strongly suspected, an elimination diet lasting two to four weeks should be instituted. This involves eating only a limited number of foods that are unlikely to cause allergies, such as lamb, rice, pears and sweet potato. Once the allergic symptoms settle, foods are slowly reintroduced one at a time to identify the offending substance. Food intolerances to pseudo- allergens are difficult to diagnose as there are no reliable blood or skin tests available.

Preventing Food Allergies

For high-risk families (those with severely allergic parents or siblings), it's recommended pregnant women avoid cigarette smoking and prepare to breastfeed exclusively. Exclusive breastfeeding seems to reduce the incidence of allergies, especially allergic infantile eczema. Although in the past doctors have advocated that breastfeeding mothers avoid allergenic foods such as cow‘s milk, hen's egg and nuts, as

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traces may appear in breast milk, recent studies indicate it makes little or no difference to allergies what the mother consumes in her diet while pregnant or breastfeeding.

Expert allergists and consultant dieticians have pointed out that avoiding all potentially allergy provoking foods after weaning is more likely to cause malnutrition, and less likely to have any long-term benefit for preventing allergies.

There's good evidence that exclusive breastfeeding for the first four to six months has some allergy protection effects, but avoiding potentially allergy-provoking foods, such as cow's milk, hen's eggs, wheat, soy, fish, and nuts in the infant's diet beyond this period offers no benefit to the allergy-prone child.

Infant dietary advice has been a controversial area of allergy and, despite previous recommendations to avoid cow's milk and eggs in the first year and peanuts or nuts for up to three years, the current evidence indicates this practice will have no beneficial effect in preventing allergy. A healthy, nutritious diet is more important for a growing child, and avoiding certain basic foods offers no benefit to the allergy-prone child unless they have a diagnosed food allergy. Once a food allergy has been confirmed, the most effective preventive treatment is complete avoidance of that food. If the food can't be avoided, oral sodium cromoglicate may be taken continuously, but it is expensive and only moderately effective in preventing adverse food reactions. Sodium cromoglicate is very safe and can be bought without prescription.

Simple Elimination and Restriction Diets

If food allergies are suspected, through the aid of the patient's detailed food diary and symptoms, it's recommended that the patient should eliminate all sources of that foodstuff for two weeks to confirm diagnoses. If the assumption is correct, elimination of that food should lead to full symptom relief, and reintroduction of that food should bring the symptoms back. If that doesn't occur, the person has implicated the wrong food and needs to consider other possible culprits. If cow's milk is eliminated from the diet, calcium needs to be supplemented in growing children. Glucose (as in sugar) doesn't provoke allergies and shouldn't therefore be eliminated from the diet.

Sometimes, children and adults may have typical food allergy symptoms attributed to meals, but despite keeping a thorough food diary remain unable to identify any culprit foods. A short, two-week 'hypo-allergenic' or restriction diet is then recommended. This contains only foods that are unlikely to cause allergies. If this diet is continued beyond two weeks, calcium, vitamins and essential oils need to be supplemented. Such diets will lead to malnutrition in infants and small children and should only be done under medical supervision.

A typical restriction diet includes:

- Meat - chicken, turkey, and lamb.
- Rice - cooked rice, rice cereal, rice cakes, and fortified rice milk.
- Cooked vegetables - sweet potato, carrot, squash, parsnip, beetroot, and asparagus.

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- Cooked fruits - cooked or stewed apricots, apples, pears, and peaches.
- Fresh juices - dilute fresh grape and apple juice or bottled water.

How is Food Intolerance Diagnosed?

Most food intolerances are found through trial and error to determine which food or foods cause symptoms. One may be asked to keep a food diary to record what he eats and when he gets symptoms, and then to look for common factors.

Another way to identify problem foods is by going on an elimination diet. This involves completely eliminating any suspected foods from the diet until the person is symptom-free. They can then begin to reintroduce the foods, one at a time. This can help pinpoint which foods cause symptoms.

How is Food Intolerance Treated?

Treatment is based on avoiding or reducing the intake of problem foods and treating symptoms when they arise.

Problem Foods

A toxin is something that is a poison for everyone. A food antigen is not a toxin for everyone, but for a person who has the allergy or sensitivity to it, it is toxic. There are some foods that cause problems more often than others.

These foods are:

- Gluten (the protein in certain grains such as wheat)
- Dairy
- Corn
- Peanuts
- Eggs
- Shellfish
- Chocolate
- Soya

Milk Protein

Cow's milk sensitivity occurs in between 0.5% and 7% of all babies. Syptoms may develop when an infant is transferred from breast to cow's milk. Alternatively, they may appear after 6 to 18 months of life. Treatment involves the replacement of cow's milk by a milk sustitute. Soya milk (e.g. Ostersoy) is commonly used also although some babies also develop intolerance to soya protein.

Hydrolyed protein formulas (e.g. pregestimil) tend to be less allergenic and may be used as an alternative. If the allergy is severe, avoidance of beef products may also be necessary because the range

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of proteins present is similar to that in cow's milk. In addition to dairy foods, milk products may be found in soups, gravy, low fat spread, cakes, deserts, biscuits, rusks, infant foods, sauces, chocolates, and sweets. Milk is not always an obvious ingredient so food labels should always be checked.

Additives

Food additives can occasionally cause adverse reaction which may be due to allergy.

Symptoms

The allergic response to a food can occur within a few minutes or be delayed for several hours. Immune reactions include lip swelling, tingling of the mouth and throat, and vomiting. Asthma, conjunctivitis, urticaria, and angio-oedema generally occur within an hour. Diarrhoea and bloating tend to occur later. All of these symptoms are transitory, if the food is not eaten again, they usually subside within 24 hours. Eczema, however, may take several days to develop.

Malabsorption

Malabsorption of nutrients may occur for any number of reasons, including enzyme deficiencies, reduction in absorption surface of the intestine or infection. The two malabsorption disorders are:

- carbohydrate intolerance
- Coeliac's disease.

Carbohydrate Intolerance

Carbohydrate Intolerance is commonly caused by a deficiency of one or more of the enzymes which split disccharides into simple sugars. Disccharides then enter the colon taking water with them, which may lead to osmotic diarrhoea. In the colon they are fermented causing abdominal discomfort and cramp.

Lactose Intolerance

Lactose Intolerance is caused by the deficiency of the enzyme called lactase, a condition which may be present from birth, although it is relatively rare. There are wide individual variations in the amount of lactose required to produce symptoms of intolerance. Many lactose-intolerant people can consume about 15g (the amount contains in half pint of milk) a day but others can only tolerate much smaller amount.

Glucose and Galactose Intolerance

Glucose and galactose intolerance causes the same symptoms and is treated in the same way as lactose intolerance, but there is no enzyme deficiency. Lactose is broken down to produce glucose and galactose, but these sugars are not absorbed.

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Sucrose Intolerance

Sucrose Intolerance is much rarer than lactose intolerance and is caused by a deficiency of the enzyme sucrose.

Coeliac's Disease

Coeliac's disease arises from an intolerance to gluten which produces malabsorption of food. About one person in a thousand is affected. Some patients may also be intolerant to lactose. It starts primarily in infancy between the ages of four and six months but is also increasingly diagnosed in adults. Sensitivity to gluten produces intestinal atrophy. Although an immunological reaction may be involved, it is not a simple allergy. Symptoms include failure to thrive and loss of weight, abdominal distension, sometimes vomiting. Impairment in fat absorption leads to fatty diarrhoea which is pale in colour and foul smelling.

Dietary Management

The diet must be completely gluten free. Vitamin and mineral supplementation may be required initially, because malabsorption of food causes nutrient deficiency; this will be prescribed by the doctor. Gluten is found in wheat, rye, and barley. Once diet has been started, the patient's symptoms rapidly improve.

Allowed Foods		
amaranth	legumes	seeds
arrowroot	millet	sorghum
buckwheat	nuts	soy
cassava	potatoes	tapioca
corn	quinoa	teff
flax	rice	wild rice
Indian rice grass	sago	yucca
Job's tears		

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Foods To Avoid		
wheat including einkorn, emmer, spelt, kamut wheat starch, wheat bran, wheat germ, cracked wheat, hydrolyzed wheat protein		barley rye triticale (a cross between wheat and rye)
Other Wheat Products		
bromated flour durum flour enriched flour farina	graham flour phosphated flour plain flour	self-rising flour semolina white flour
Processed Foods that May Contain Wheat, Barley, or Rye*		
bouillon cubes brown rice syrup candy chips/potato chips cold cuts, hot dogs, salami, sausage communion wafers	French fries gravy imitation fish matzo rice mixes sauces	seasoned tortilla chips self-basting turkey soups soy sauce vegetables in sauce

How can the Immune System be strengthened?

While it is difficult to enhance a normal functioning immune system, there are things that can be done to protect and strengthen the immune system during periods of illness or in the face of chronic disease. The three areas that are most important in protecting and bolstering the immune system are diet and nutrition, exercise, and stress reduction.

Diet, Nutrition, and Immunity

There are two major changes that one can make in the diet to help the immune system. First, enriching the diet with antioxidants and secondly, getting enough nutrients and micronutrients.

Antioxidants

Antioxidants are vitamins and minerals, found in foods and available as supplements, which remove harmful oxidants from the bloodstream. Oxidants, which are also known as free radicals, are the toxic

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by-products our bodies make when we turn food into energy. They are also by-products of cigarette smoke, pollution, sunlight exposure, and other environmental factors. Free radicals are capable of damaging DNA and suppressing the body's immune system. Free radicals also play an important role in the development of many human diseases. In fact, there are several journals now dedicated to their study and investigation. Nearly all types of cancers have been related to diets that are poor in antioxidants. Data from some research also suggest that a diet high in antioxidants might also protect against cancer.

Heart disease and atherosclerosis (hardening of the arteries) are also brought about, in part, by free radicals. Certain diseases of the central nervous system — such as dementia and some forms of kidney, gastrointestinal, and skin disease — also involve free radicals. One cannot prevent these diseases simply by taking antioxidants. But one can, however, ensure by doing everything possible to lessen their effects.

Nutrients and Micronutrients

Marginal nutrient deficiencies in the diet can also weaken the immune system. Marginal deficiency is a state of gradual vitamin loss that can lead to a general lack of wellbeing and impairment of certain biochemical reactions. Marginal deficiencies of micronutrients (nutrients required only in a small amount) do not cause obvious symptoms of disease, but they can effect mental abilities, coping abilities, and body‘s ability to resist disease and infection. They might also slow down the recovery from surgery.

Foods

Diet can be further modified by eating less saturated fat and animal protein (particularly red meat), by limiting dairy products (particularly those with fat), by modifying the use of oils and fats, and by eating more fresh fruits, vegetables, and whole grains.

Nutritional Supplements

Vitamin C is also an extraordinarily important antioxidant. While many studies have shown that daily ingestion of vitamin C does little to protect us from the common cold, it can reduce the severity of colds. Furthermore, there are several controlled studies performed in populations of people working under heavy stress that have shown a profound protective effect of vitamin C in terms of common colds and pneumonia.

Other nutrients that might be helpful include selenium in doses of 200 µg per day and vitamin E in doses of 400 IU per day. Many over-the-counter vitamins with similar doses are available. There is no difference between natural vitamins and synthetic vitamins.

Exercise and Immunity

Even more so than nutrition, exercise has the capacity to protect and even enhance the immune response. Experimental studies have shown that a regular exercise programme of brisk walking can

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bolster many defences of the immune system, including the antibody's response and the natural killer (T cell) response.

Fortunately, the intensity and duration of exercise needed to support the immune system is less than that needed to provide the best cardiovascular training. Thus, even relatively low levels of aerobic exercise can protect the immune system. 20 to 30 minutes of brisk walking five days per week is an ideal training programme for maintaining a healthy immune response.

Exercise can also improve the mental wellness. Regular aerobic exercise can help relieve mild to moderate degrees of depression and anxiety. People who exercise also have less loneliness and anger, and are better able to control their own destiny. It is not clear whether exercise boosts the immune system directly or works through a link with the brain and nervous system.

Stress and Immunity

The final component for fine-tuning the immune system is reducing the stress in the life by achieving a higher level of spiritual harmony. Altered mood states, such as, depression, anxiety, and panic, are harmful to the body in many ways. Secondary symptoms, such as fatigue, difficulties with memory and concentration, aches and pains, and problems with sleep are common in people with mood disorders. Mood disorders also harm the immune system.

Putting it All Together

Diseases, such as Chronic Fatigue Syndrome, Fibromyalgia, and many other poorly understood illnesses should no longer be viewed as disorders of either the mind or the body. The mind and body act as one unit and thus we must approach them together. To maintain the strongest immune system possible, one must have a nutritious diet, get regular exercise, and reduce stress in the life.

Further Reading:

- ✓ ***Diet and Immune Function, (2020), By Elizabeth A Miles, Philips Calder, Caroline E Childs (Eds)***
- ✓ ***Nutrition, Immunity, and Infection, (2018), By Philip C. Calder, Anil D. Kulkarni***

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