

**COURSE CODE: PGD004**

**COURSE NAME: POST GRADUATE DIPLOMA IN HUMAN NUTRITION**

**ASSIGNEMENT 3**

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**Question One**

**Discuss the relationship between nutritional status and immunity**

**Before we discuss the relationship between nutritional status and immunity, we must first understand what exactly they are. According to** a **Dictionary of Food and Nutrition**, **Nutritional status** is defined as the condition of the body in those respects influenced by the diet; the levels of nutrients in the body and the ability of those levels to maintain normal metabolic integrity. However according to **Collins English Thesaurus**, immunity is defined as the ability of an organism to [resist](https://www.collinsdictionary.com/dictionary/english/resist) disease, either through the activities of [specialized](https://www.collinsdictionary.com/dictionary/english/specialize) blood cells or [antibodies](https://www.collinsdictionary.com/dictionary/english/antibody) produced by them in [response](https://www.collinsdictionary.com/dictionary/english/response) to natural [exposure](https://www.collinsdictionary.com/dictionary/english/exposure) or inoculation ([active](https://www.collinsdictionary.com/dictionary/english/active) immunity) or by the [injection](https://www.collinsdictionary.com/dictionary/english/injection) of [antiserum](https://www.collinsdictionary.com/dictionary/english/antiserum) or the transfer of antibodies from a [mother](https://www.collinsdictionary.com/dictionary/english/mother) to her [baby](https://www.collinsdictionary.com/dictionary/english/baby) via the [placenta](https://www.collinsdictionary.com/dictionary/english/placenta) or [breast](https://www.collinsdictionary.com/dictionary/english/breast) [milk](https://www.collinsdictionary.com/dictionary/english/milk) ([passive](https://www.collinsdictionary.com/dictionary/english/passive) immunity)

The simplest and most direct relationship between food and immunity is that of protein. Without sufficient protein, the immune response is compromised and the potential for infection and inflammation increases. The immune system relies on protein-based protectors such as antibodies, lymphocytes (such as T-cells), leukocytes and a host of helper cells and compounds. But carbohydrates and lipids also have their places.

The relationship between diet and immunity is highly complex, as is the relationship between obesity and immunity. The recognition of adipose tissue as an active immune organ could increase our understanding of the relationship between nutrition and the immune system. The promise of emerging ingredients and the research involving them spells promise for formulators creating foods that target immune function

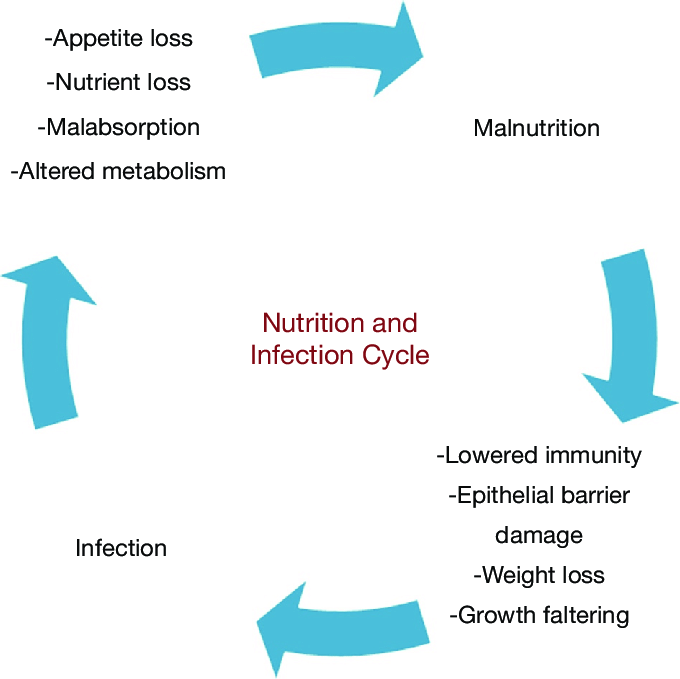
It is generally accepted that nutrition is an important determinant of [**immune response**](http://www.scialert.net/asci/result.php?searchin=Keywords&cat=&ascicat=ALL&Submit=Search&keyword=immune+response)**s** **(Chandra, 1997).** Results from epidemiological and clinical studies suggest that nutritional deficiencies alter immuno-competence and increase the risk of infection. It is agreed that poor sanitation and personal hygiene, overcrowding, contaminated food, water and inadequate knowledge of nutrition contribute to susceptibility to infection. Previous research findings have confirmed that impaired immunity is a critical adjunct factor in malnutrition-associated infection. This concept does not only apply to people in [**developing countries**](http://www.scialert.net/asci/result.php?searchin=Keywords&cat=&ascicat=ALL&Submit=Search&keyword=developing+countries) but to people (all age groups) in all countries **(Chandra, 1991, 1996, 1997; Bell *et al*., 1997; Bogden *et al*., 2000).**

Several trace elements and vitamins have essential roles in metabolic pathways and immune cell functions. The deficiencies of these micronutrients have been noted and are known to complicate malnutrition and other systemic diseases. Likewise, human malnutrition is usually a composite syndrome of multiple nutrient deficiencies **(Bendich and Chandra, 1990; Baum and Shor-Posner, 1998; Dannhauser *et al*., 1999; Bogden *et al*., 2000)**. Five general concepts have been advanced: (1) Alterations in [**immune response**](http://www.scialert.net/asci/result.php?searchin=Keywords&cat=&ascicat=ALL&Submit=Search&keyword=immune+response)s occur early in the course of reduction in micronutrient intake. (2) The extent of immunological impairment depends on the type of nutrient involved, its interactions with other essential nutrients, the severity of the deficiency, the presence of concomitant infection and the age of the person concerned. (3) Immunological abnormalities predict outcome, particularly the risk of infection and mortality. (4) For many micronutrients, excessive intake is associated with impaired [**immune response**](http://www.scialert.net/asci/result.php?searchin=Keywords&cat=&ascicat=ALL&Submit=Search&keyword=immune+response)s. (5) Tests of immuno-competence are useful in titration of physiological needs and in assessment of safe lower and upper limits of micronutrient intake **(Chandra, 1997; Dannhauser *et al*., 1999**). An established effect of nutrition on immunity has led to several practical applications and its usefulness is still relevant today.

**Question Two**

**Using illustrations, show describe the malnutrition-infection cycle**

The complex interaction between infection and malnutrition creates a hostile environment that perpetuates a vicious circle that leads to the two entities benefiting from each other. Some of the phenomenon involved during different parts of the cycle include decreases in the activity of macrophages, diminishment of the inflammatory response, and a reduction in the capacity to create specific antibodies. However, there are two effects that can occur in the presence of both malnutrition and infection. The first one is the synergistic effect, and it happens when an infection worsens the malnutrition or when the malnutrition contributes to decreasing the immune response to infection. The second effect is an antagonist mechanism, which occurs less frequently than the synergistic effect. The antagonistic mechanism happens when malnutrition decreases the multiplication of the agent **(**[**Alfonso J. Rodriguez-Morales**](https://www.researchgate.net/profile/Alfonso_Rodriguez-Morales)**,** **2016).** Malnutrition can make a person more susceptible to infection, and infection contributes to malnutrition, which causes a vicious cycle. An inadequate dietary intake leads to weight loss, lowered immunity, mucosal damage, invasion by pathogens, and impaired growth and development in children. A sick person's nutrition is further aggravated by diarrhea, malabsorption, loss of appetite, diversion of nutrients for the immune response, and urinary nitrogen loss, all of which lead to nutrient losses and further damage to defense mechanisms. These, in turn, cause reduced dietary intake. In addition, fever increases both energy and micronutrient requirements. Malaria and influenza, for example, have mortality rates proportionate to the degree of malnutrition.



**Source: Adopted from:** [**Alfonso J. Rodriguez-Morales**](https://www.researchgate.net/profile/Alfonso_Rodriguez-Morales)**, Sep 29, 2017**

**Question Three**

**Suggest some suitable meals for burn patients - children and adults.**

According to World Health Organization (WHO), a burn is an injury to the skin or other organic tissue primarily caused by heat or due to radiation, radioactivity, electricity, friction or contact with chemicals. Skin injuries due to ultraviolet radiation, radioactivity, electricity or chemicals, as well as respiratory damage resulting from smoke inhalation, are also considered to be burns.

It can also be defined as a thermal injury caused by biological, chemical, electrical and physical agents with local and systemic repercussions, these are the most severe form of trauma that has afflicted humanity since time immemorial and that over the years and the scientific revolution has improved the results in its treatment **(Garcia-Espinoza JA, Aguilar-Aragon VB, Ortiz-Villalobos EH, Garcia-Manzano RA, Antonio BA, 2017)**

A severe burn is not only painful and traumatizing, but it’s extremely stressful to the body. According to a 2012 report published in the **“Surgical Clinics of North America,”** the increased metabolic response associated with a severe burn surpasses that of any other disease state. A burn patient needs a high-calorie, high-protein diet to promote wound healing, minimize the risk of complications and maintain a normal nutritional level.

Burns patients typically have the hyper metabolism and negative catabolism. Nutritional support is an important step in the management of burns patients from the early phase of resuscitation to the final phase of rehabilitation. The pathophysiology of burn injury with its major endocrine, inflammatory, metabolic and immune alterations is similar to any other critical care situation. The route of administration and aggressiveness of the delivery of the nutrients depends on the severity of the patient’s illness and the response of the particular patient. The plan of nutritional support to the patient during the whole period of stay in the hospital varies depending on the clinical condition of the patient. The treatment protocols are evidence based depending on the clinical and laboratory studies. Nutritional support is defined as the provision of nutrients and any necessary adjunctive therapeutic agents to improve or maintain the nutritional status of the patient for normal wound healing. Nutritional support is administered into the stomach or small intestine (enteral) and/or by intravenous infusion (parenteral). Most of the burn victims with lesser percentage of burns can be followed in the outpatient department.

The nutrition management plays a paramount role in order for body weight to be maintained, replace lost fluids and promote wound healing. Therefore, a high protein, high calorie diet is highly recommended for burn patients

**Question Four**

**Discuss the nutritional management of fevers**

Fever is an elevation of body temperature above normal which results from an imbalance between the heats produced and eliminated from the body. Fever may occur in response to an infection, inflammation or a number of other causes brought about by exogenous agents like bacteria or fungi or endogenous factors like antigen-antibody reaction, malignancy or graft rejection. The normal human body temperature is 37 degree centigrade (98.6-degree Fahrenheit). It is lowest in the morning and rises in the evening.

According to **Leggett (2011),** fever is the temporary increase in the temperature of the body in the response to a disease or illness. A child has a fever when the temperature is at or above one of these levels.

* 4°F (38°C) measured in the bottom (rectally)
* 5°F (37.5°C) measured in the mouth (orally)
* 99°F (37.2°C) measured under the arm (axillary)

There are a number of diet guidelines that should be followed when affected by fever. Following a proper diet not only help you treat the condition but also strengthen the body. Therefore there are certain things that you need to keep in mind when it comes to your diet. The Dietary recommendation may mean and include the following:

* **Fluids:** The diet should be more of fluid and at frequent intervals during the first two to three days of fever. The fluid intake must be liberal to compensate for the losses from the sweat and to permit adequate volume of urine for excreting the wastes. Milk, glucose water, soups, fruit juices and water can be included to meet this demand.
* **Calories and Fats:** The calorie requirement may be increased as much as 50% if the temperature is high. It may be difficult to meet the calorie needs during the peak of the fever but a high calorie diet with frequent feeding should be given as soon as fever is controlled. The carbohydrate should consist of glucose, sucrose, and starch. Glucose, which is less sweet and readily absorbed into the blood stream, is preferred. For starch, cereal and cereal grains cooked into gruel and pudding to be given to the patients. Fats in the form of butter, ghee, vegetable oil, and fried food should be avoided during fever.
* **Proteins:** Protein intake is also increased to 50% in excess of the daily requirement due to the increased loss of tissue proteins during fever. The protein should be of high nutritive value and easily digestive such as milk, egg, and moong dhal. High protein beverages are preferred to the regular meals.
* **Vitamins and minerals:** Fever increases the requirement for vitamin A, ascorbic acid, calcium, phosphorous, sodium and B complex vitamins.Foods rich in Vitamin E and Vitamin C should be consumed.Nuts and seeds are great vitamin E sources. It is important to regularly have some nuts and seeds like almonds and hazel nuts. Peanuts and pistachio nuts are also good vitamin E sources. Having peanuts and pistachio nuts regularly increases the vitamin E content of the body. Vitamin E can also be readily obtained from oils made from seeds. Use sunflower oil in your food and you can provide a good amount of vitamin E to the body. Green leafy vegetables are great vitamin E food sources.

Another common source of vitamin E is the tomato. Having raw tomatoes along with your food will certainly help you gain vitamin E in your body. Liberal intake of milk, fruits, fruit juices and two or three eggs will take care of the above requirement.

As soon as the temperature comes down readily digestible bland food should be given to the patient for better digestion and rapid absorption depending on the patient's need of the food can be soft or normal consistency. Initially the interval of feeding should be 2 hours. Later on improvement it can be made into 4 hours interval or 4 meals a day.

Children are more susceptible to the ill effects of fever than adults. Feverish children should be nursed in a cool room, wear light clothing and has plenty of fresh air. The principles of the dietetic treatment of adults are even more important for paediatric age group since they are particularly susceptible to dehydration and protein malnutrition

**Question Five**

**Discuss the dietary management of the following liver diseases**

1. **Hepatitis**

According to **World Health Organization**, Hepatitis is an inflammation of the liver. The condition can be self-limiting or can progress to fibrosis (scarring), cirrhosis or liver cancer. Hepatitis viruses are the most common cause of hepatitis in the world but other infections, toxic substances (e.g. alcohol, certain drugs), and autoimmune diseases can also cause hepatitis.

A patient suffering from acute infectious hepatitis will experience severe loss of appetite or anorexia, nausea, vomiting, abdominal pain, taste changes, fever and jaundice. All these symptoms complicate food intake and make it difficult to ensure that the patient is well nourished at a time when it is essential to provide the patient with a highly nutritious diet to prevent liver damage. **Mahan, L. K., & Escott-Stump, S. (2000)**. Liver organs digest various types of food sources and nutrients such as carbohydrates, fats, proteins etc. Food sources that enter the body will then be absorbed by the intestinal wall and then taken to the liver to be processed. For people with hepatitis, diligently consume foods that are high in protein and vitamin values ​​so that they can speed up the recovery process from hepatitis itself.

The dietary pattern that must be adhered to by people with hepatitis is by giving food that is sufficient to value the essential nutrients and nutrients to meet your body's needs from various energy sources.

While most people with hepatitis C do not require a special diet, there are certain foods people can eat to maintain good liver health. A healthful and balanced diet should include plenty of fruit and vegetables. These food groups are full of necessary [vitamins](https://www.medicalnewstoday.com/articles/195878.php) and minerals that enable the liver to function properly. Fresh fruit and vegetables are ideal, but they can also be frozen or canned. People should aim to consume at least 5 portions of fruit and vegetables a day. Leafy green vegetables can lessen fatty acid composition in the liver, so they are [particularly beneficial](http://www.hepctrust.org.uk/information/living-hepatitis-c/diet) to people with hepatitis C. Good examples include [kale](https://www.medicalnewstoday.com/articles/270435.php), spinach, and cabbage. Leafy green vegetables are sources of iron, which may be harmful to those with hepatitis C when consumed in excess. While it is unlikely a person would eat enough leafy greens to cause an iron overload, people with liver damage may wish to monitor their intake. A doctor or dietitian can help a person determine the right amount for them **(Seymour. T, 2018)**

* **Eat enough calories**.

Anorexia is a [symptom](https://www.verywellhealth.com/an-overview-of-hepatitis-symptoms-1760105) associated with advanced cirrhosis that can make it difficult for someone to get enough calories. Usually, this only lasts a short period of time, brief enough for your body to get by on its reserves. However, if it lasts for several days or weeks, you probably aren't getting the nutrition you need. One solution is to discuss with your physician whether you're getting enough food or enough of the rightfoods.

* **Eat the right amount of protein**.

Meats, milk, nuts, and cheese are all good sources of protein. Protein is an important nutrient and it's absolutely necessary for good health. People with chronic hepatitis should be able to enjoy moderate amounts of protein without worry. However, too much protein is bad for people with advanced cirrhosis and can lead to brain disease as the excess protein accumulates in the blood. Again, the liver is responsible for keeping protein at safe levels, but when the liver is damaged as is the case with decompensated cirrhosis, it can't do as much as it did before. While it's important to eat enough protein, too much can be harmful. Talk with your doctor to determine the best amount of protein for you.

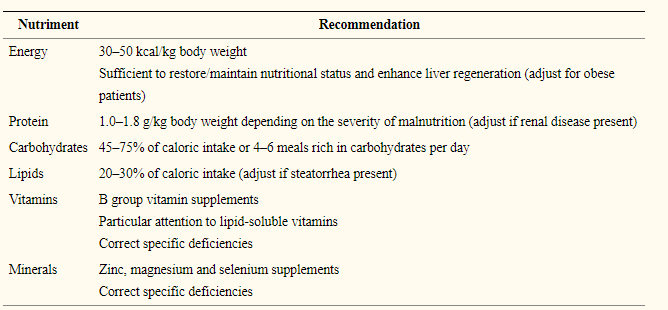
* **Eat enough vitamins and minerals**.

Some people with chronic hepatitis, especially those with alcoholic [hepatitis](https://www.verywellhealth.com/hepatitis-4014707) or advanced cirrhosis, may not be getting enough of the fat-soluble vitamins and necessary minerals they need through their diet. Your doctor or nutritionist may measure your levels of vitamins A, D and E to check your clotting time. One solution to this deficiency is using doctor-prescribed supplements. Otherwise, you'll need to make certain you get these vitamins and minerals the old-fashioned way: through a balanced diet.

1. **Liver Cirrhosis**

Cirrhosis is defined as the histological development of regenerative nodules surrounded by fibrous bands in response to chronic liver injury that leads to portal hypertension and end stage liver disease. Recent advances in the understanding of the natural history and pathophysiology of cirrhosis, and in treatment of its complications, resulting in improved management, quality of life and life expectancy of cirrhotic patients. At present, liver transplantation remains the only curative option for a selected group of patients, but pharmacological therapies that can halt progression to decompensated cirrhosis or even reverse cirrhosis are currently being developed **(Schuppan. D, & Afdhal. N. H. *et al* 2008).**

Nutritional recommendations for cirrhotic patients in general focus on suppression of hepatotoxic agents and the provision of optimal macronutrient supply in terms of energy, protein, carbohydrates and lipids together with micronutrients such as vitamins and minerals. **(Amodio P,** **Bémeur C, Butterworth R.F et.al** **2013**), (**Bémeur, C., & Butterworth, R. F, 2015, PP.131–140).** Energy, macro- and micronutrient supplies should be based on the results of individual nutritional assessments and adjusted for weight maintenance and/or repletion. General recommendations are summarized in the table below



Various studies on nutritional support in liver disease concluded that aggressive nutritional support is essential to meet elevated protein requirements and reduced muscle catabolism and improve disease outcome **Kearns PJ, Young H, Garcia G, Blaschke T, O'Hanlon G. (1992),** **Hirsch S, Bunout D, de la Maza P, Iturriaga H, Petermann M. (1993**). Priority should be given in the prevention and improvement of protein energy malnutrition in liver cirrhosis. Inappropriate protein, fat or sodium restrictions will cause malnutrition in hyper metabolic patient. As malnutrition is more prevalent in liver cirrhosis

A diet low in sodium can help to treat ascites and edema as it will minimise the amount of salt entering the kidney, leaving less sodium available for re-absorption, therefore, less fluid is retained **Dolz C, Raurich JM, Ibáñez J, Obrador A, Marsé P. (1991).** Those patients who have already poor appetite and inclusion of low salt diet make food unpalatable and may further reduce the food choices which results to Protein calorie malnutrition in cirrhotic patients. Diet should be fresh, perishable produce, which has to be bought, stored and prepared and many patients may not be able to do when they are already malnourished, weak and anorexic.

Cirrhotic patients have significant reductions in antioxidant enzymes and antioxidant nutrients, such as carotenoids, selenium, vitamin E, and zinc. Deficiency of folate is also found in liver cirrhotic patients and an estimated 50% have increased blood homocysteine concentrations which cause liver fibrosis and ultimately cirrhosis. Vitamin K is essential for the management of cirrhosis, because it helps in prevent bleeding of liver tissues. It also helps in conversion of glucose into glycogen, a chemical that is stored in your liver. Glycogen is essential for bile excretion and healthy liver function. Increase your intake of vitamin K by adding broccoli, avocados, spinach, kale, strawberries, cabbage and eggs.

In liver cirrhotic patients there was imbalance in bacterial gut flora which contributes significantly to ammonia production, resulting in varying degrees of encephalopathy. So these patients should intake of supplemental combinations of probiotics which reduces the blood ammonia concentrations **(Nakaya Y, Okita K, Suzuki K, Moriwaki H, Kato A, et al. (2007)**.

1. **Liver Failure**

Liver failure is the inability of the [liver](https://en.wikipedia.org/wiki/Liver) to perform its normal [synthetic](https://en.wikipedia.org/wiki/Protein_synthesis) and [metabolic](https://en.wikipedia.org/wiki/Metabolism) function as part of normal physiology. Two forms are recognized, acute and chronic.[[1]](https://en.wikipedia.org/wiki/Liver_failure#cite_note-1) Recently a third form of liver failure known as acute-on-chronic liver failure (ACLF) is increasingly being recognized.

A patient of acute liver failure is generally not malnourished at presentation, since there is no preceding illness. The aim of treatment is to maintain a nutritional balance in presence of an increased catabolic state due to liver failure and coexistent sepsis. Hypoglycemia is common due to impaired gluconeogenesis, depletion of hepatic glycogen and hyperinsulinemia. Administration of IV glucose 1.5-2 gm/kg/day is recommended. There is great disparity amongst liver units in using nutritional regimens. A recent European survey was conducted on 33 hepatology units attending two to 170 cases of acute liver failure per year. All units used specific nutrition regimens, but these varied considerably and mostly resembled those used in critically ill patients with near-normal liver function. Eight units preferentially used enteral feeding and 25 parenteral. Two-thirds used standard parenteral regimens containing amino acids, although plasma amino acid levels are already greatly elevated due to liver failure and increased protein catabolic rate

Liver failure is as a result of decreased number of functioning liver cells and diminished delivery of nutrients to the liver. The liver therefore loses the ability to convert ammonia, which is toxic to urea. There is also decreased breakdown of specific amino acids namely phenylalanine, tyrosine, tryptophan which are basically metabolized in the liver. The symptoms for liver failure include; edema (accumulation of intracellular body fluids), yellowing of the body and urine (jaundice), dysfunction of the central nervous system and weight loss.

The dietary management of a liver failure is to minimize the production of ammonia. Because of this, the diet should be low in proteins. Simple carbohydrates are also recommended.

**Question Six**

1. **Explain the differences between Type 1 and Type 2 diabetes mellitus**

Whilst both type 1 and type 2 diabetes are characterized by having higher than [normal blood sugar levels](https://www.diabetes.co.uk/diabetes_care/blood-sugar-level-ranges.html), the cause and development of the conditions are different. It's not always clear what type of diabetes someone has, despite what many people think.

For instance, the typical assumption is that people with type 2 diabetes will be overweight and not [inject insulin](https://www.diabetes.co.uk/Diabetes-and-injections.html), while people with type 1 diabetes will be, if anything, underweight. But these perceptions just aren't always true. Around 20% of people with type 2 diabetes are of a healthy weight when diagnosed, and many of them are [dependent on insulin](https://www.diabetes.co.uk/about-insulin.html).

Similarly, people with type 1 diabetes will in some cases be overweight. Because both types of diabetes can be so varied and unpredictable, it's often difficult to know which type of diabetes someone has. It's not safe to assume that an overweight person with high blood glucose levels has type 2 diabetes, because the cause of their condition might in fact be attributable to type 1.

In some cases, when the type of diabetes is in doubt, your health team may need to carry out specialized tests to work out which type of diabetes you have. This way, they can recommend the most appropriate treatment for your diabetes.

Despite the uncertainty that often surrounds a [diagnosis of diabetes](https://www.diabetes.co.uk/Diabetes-diagnosis.html), there are a few common characteristics of each diabetes type.

Please note that these differences are based on generalizations - exceptions are common. For instance, the perception of type 1 diabetes isn't strictly true: many cases are diagnosed in adulthood.

* **Type 1 diabetes**

This type of diabetes used to be referred to as Insulin Dependent Diabetes Mellitus (IDDM), juvenile diabetes or Autoimmune Diabetes. This is a type of diabetes that is common among children and is as a result of failure of the pancreas to produce insulin

[Type 1 diabetes](https://jdrf.org.uk/information-support/about-type-1-diabetes/) can occur at any age, but is most commonly diagnosed from infancy to the late 30s. With this type of diabetes, a person’s pancreas produces no insulin. It occurs when the body’s own defense system (the immune system) attacks and destroys the insulin-producing cells in the pancreas. What causes the immune system to do this is not yet completely understood, but we are funding [world-class research](https://jdrf.org.uk/our-research/) to find out.

The only treatment for type 1 diabetes is [insulin](https://jdrf.org.uk/information-support/treatments-technologies/insulin/), which is usually injected or infused via a pump.

* **Type 2 diabetes**

This was previously referred to as Non-Insulin Dependent Diabetes Mellitus (NIDDM) or adult onset diabetes. This type results from either failure of the pancreas to produce adequate insulin or failure of body cells to utilize insulin or both.

Type 2 diabetes is by far the most common type of diabetes. For Example, in the UK over 90 per cent of people with diabetes have type 2. Type 2 diabetes usually affects those over 40, or 25 if you’re of South Asian descent. However, it is becoming more common among young people due to lifestyle. The symptoms of type 2 diabetes are not always obvious and, unlike with type 1, they can take a long time to develop.

People with type 2 diabetes either don’t make enough insulin or don’t make insulin that the body can use properly. The cells in the body become resistant to insulin, making a greater amount of insulin necessary to keep blood glucose levels within a normal range. Eventually, the pancreas can wear out from producing extra insulin, and it may start making less and less.

Type 2 can usually be managed through diet, exercise, and self-monitoring blood glucose, at least in the first few years following diagnosis. However, type 2 diabetes is a progressive condition, and most people will need to take tablets and/or inject insulin after living with it for five to 10 years.

This table should be seen as a rough guide to the differences between type 1 and type 2 diabetes, rather than hard and fast rules.

| **Common differences between type 1 and type 2 diabetes** | |
| --- | --- |
| **Type 1 Diabetes** | **Type 2 Diabetes** |
| Often diagnosed in childhood | Usually diagnosed in over 30 year olds |
| Not associated with excess body weight | Often associated with excess body weight |
| Often associated with higher than normal ketone levels at diagnosis | Often associated with high blood pressure and/or cholesterol levels at diagnosis |
| Treated with insulin injections or insulin pump | Is usually treated initially without medication or with tablets |
| Cannot be controlled without taking insulin | Sometimes possible to come off diabetes medication |

1. **Discuss the dietary recommendations for patients with diabetes mellitus**

Diabetes is a chronic illness that requires a holistic approach in terms of care to prevent both acute and long-term complications. Nutritional management for diabetic patients has been evolving for 100 years as the pathophysiological basis of the complications incurred from diabetes becomes more explicit.

Medical nutrition therapy is extremely important for diabetic patients and prediabetic patients so that adequate glycemic control can be achieved. One-on-one consultations with a registered dietician well-versed in diabetic nutrition are most preferable, as has been shown in studies performed in Pakistan **(Hakeem R, Fawwad A, Siddiqui A, Ahmadani MY, Basit A. et at 2008)** and Hungary, **(Rurik I, Ruzsinko K, Jancso Z, Antal M. et al 2010)** which proved the utility of a dietician in improving dietary adherence

Medical nutrition therapy for diabetics can be divided into (1) dietary interventions and (2) physical activity. Lifestyle and dietary modifications form the cornerstone of therapy in type 2 diabetic patients (insulin resistance). In [type 1 diabetic patients](http://emedicine.medscape.com/article/117739-overview), who have an insulin deficiency, a balance between insulin and nutrition needs to be obtained for optimal glycemic control **(Stephenson EJ, Smiles W, Hawley JA. et al 2014)**

Nutrition and physical activity are important parts of a healthy lifestyle when you have diabetes. Along with other benefits, following a healthy meal plan and being active can help you keep your [blood glucose level](https://www.niddk.nih.gov/Dictionary/B/blood-glucose-level), also called blood sugar, in your target range. To manage your blood glucose, you need to balance what you eat and drink with physical activity and diabetes medicine, if you take any. What you choose to eat, how much you eat, and when you eat are all important in keeping your blood glucose level in the range that your health care team recommends.

You may worry that having diabetes means going without foods you enjoy. The good news is that you can still eat your favorite foods, but you might need to eat smaller portions or enjoy them less often. Your health care team will help create a diabetes meal plan for you that meets your needs and likes.

The key to eating with diabetes is to eat a variety of healthy foods from all food groups, in the amounts your meal plan outlines. The food groups are:

**Vegetables: There are two types of vegetables, Starchy and nonstarchy**

* nonstarchy: includes broccoli, carrots, greens, peppers, and tomatoes
* starchy: includes potatoes, corn, and green peas

**Fruits—**includes oranges, melon, berries, apples, bananas, and grapes

**Grains—**at least half of your grains for the day should be [whole grains](https://www.niddk.nih.gov/Dictionary/W/whole-grains) includes wheat, rice, oats, cornmeal, barley, and quinoa examples: bread, pasta, cereal, and tortillas

**Protein:** like Lean meat, chicken or turkey without the skin, fish, eggs, nuts and peanuts, dried beans and certain peas, such as chickpeas and split peas, meat substitutes, such as tofu

**Dairy—nonfat or low fat** e.g Milk or lactose-free milk if you have [lactose intolerance](https://www.niddk.nih.gov/health-information/digestive-diseases/lactose-intolerance), yogurt & cheese

We should also note that in the dietary management of diabetes the feeding pattern also contributes to the progression of diabetes. It is recommended that small frequent meals (the three traditional meals, breakfast, lunch and supper plus at least three snacks) are consumed in a day. Consumption of heavy meals or/and long episodes of hunger (fasting) are not encouraged.

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