Sri Lakshmi Narayana Institute of Medical Sciences

Date: 04.06.2021

From

Dr. Thangapannerselvam
Professor and Head,
Department of Biochemistry,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To

The Dean,
Sri Lakshmi Narayana Institute of Medical College
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: **Basic concepts of nutrition and the immune system**

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled **Basic concepts of nutrition and the immune system** for interns May to June 2021. We solicit your kind permission for the same.

Kind Regards

Dr. Thangapannerselvam

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr. Jayakumar

The HOD: Dr. Thangapaneerselvam

The Expert: Dr. Prabhakar Reddy

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal)

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE
KOODAPAKKAM POST
PUDUCHERRY - 605 502

DEPARTMENT OF BIOCHEMISTRY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY - 605 502.

PROFESSOR & HOD
DEPARTMENT OF BIOCHEMISTRY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY 605 502

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

07.05.2021

Sub: Organising Value-added Course: Nutrition and the Immune System. reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Basic concepts of Nutrition and the Immune System".** The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before May to June 2021. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

Encl: Copy of Course content

VALUE ADDED COURSE

1. Name of the programme & Code

Nutrition and the Immune System-BIO-04

2. Duration & Period

30 hrs & May –June 2021

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Assessment –closed

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 time May –June 2021

8. Summary report of each program year-wise

Value Added Course- May –June 2021					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	BIO 04	Nutrition and the Immune System-BIO-01	Dr. Thangapannerselvam Dr. Prabhakar Reddy	CRRI Interns	20 students MAY-JUNE 2021)

9. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

1. Dr. Thangapannerselvam
2. **Dr. Prabhakar Reddy**

COORDINATOR
Dr. Thangapannerselvam

PROFESSOR & HOD
DEPARTMENT OF BIOCHEMISTRY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY 605 502

Course Proposal

Course Title: **Basic concepts of Nutrition and the Immune System**

Course Objective:

Course Outcome:

Course Audience: MBBS and Allied health sciences

Course Coordinator: Dr. Pannerselvam

Course Faculties with Qualification and Designation:

1.Dr. Pannerselvam, Professor & HOD

2.Dr.Prabhakar Reddy, Assistant Professor

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1.	11-5-2021	Introduction to food and nutrition a. Relationship between Food, b. Nutrition and Health c. c. Relationship between Food, d. d. Nutrition and Health e. Digestion, absorption and utilization of nutrients Digestion, absorption and utilization of nutrients f. Nutrient requirements Recommended dietary allowances	4-6p.m	2
2.	12-5-2021	Meal planning a. Guidelines for diet practice aspects of food selection b. Hygine of food and food sanitation	2-3p.m	1
3.	13-5-2021	a. Absorption and digestion of carbohydrate b. Absorption and digestion of protein	4-6p.m	2

		c. Absorption and digestion of lipids d. Absorption and digestion of nucleic acid		
4.	14-5-2021	Therapeutic Nutrition a. Principles of therapeutic nutrition b. Relationship between lung diseases and diet content c. Relationship between fever and diet content d. Relationship between heart failure and diet content e. Relationship between Gastrointestinal and diet content f. Relationship between and diabetes mellitus	4-6p.m	2
5.	15-5-2021	Therapeutic Nutrition a. Principles of therapeutic nutrition b. Relationship between lung diseases and diet content c. Relationship between fever and diet content d. Relationship between heart failure and diet content e. Relationship between Gastrointestinal and diet content f. Relationship between and diabetes mellitus	4-6p.m	2
6.	16-5-2021	Therapeutic Nutrition a. Principles of therapeutic nutrition b. Relationship between lung diseases and diet content c. Relationship between fever and diet content d. Relationship between heart failure and diet content e. Relationship between Gastrointestinal and diet content	4-6p.m	2

		f. Relationship between and diabetes mellitus		
7.	17-5-2021	Pregnancy Nutrients	4-6PM	2
8.	18-5-2021	Nutri-genetics and Nutri-genomics	4-6PM	2
9.	19-5-2021	Nutri-genetics and Nutri-genomics	4-6PM	2
10.	20-5-2021	Role of Nutrients in neuroscience	4-6	2
11.	21-5-2021	Medical Nutrients	4-6P.M	2
12.	22-5-2021	Nutrients disorders	4-6p.m	2
13.	23-5-2021	Nutrients disorders	4-6p.m	2
14.	24-5-2021	Relationship between Micronutrients and immunity	4-5p.m	2
15.	25-5-2021	Meal planning, sanitation and therapeutic nutrients	4-6P.M	2
16.	26-5-2021	Meal planning, sanitation and therapeutic nutrients	4-6p.m	2
		Total		31hrs

REFERENCE BOOKS:

1. Calder PC . Feeding the immune system. Proc. Nutr. Soc. 2013;72:299–309.doi:10.1017/S0029665113001286
2. Assessment of Dietary Intake and Nutrient Gaps, and Development of Food-Based Recommendations, among Pregnant and Lactating Women in Zinder, Niger: An Optifood Linear Programming Analysis

3. Comparison of Vitamin D Levels in Naive, Treated, and Inactive Carriers with Chronic Hepatitis B Virus ShahnazTavakolpour Sali et al., Journal of Clinical and Translational Hepatology, 2016
4. The Cardio Connection: CVH Influences Ocular Diseases, Study Says Cardiology Advisor, 2020

Basic concepts of Nutrition and the Immune System

PARTICIPANT HAND BOOK

Annexure- I

INTRODUCTION:

In recent years, evidence has accumulated on the effects of nutrients on metabolic processes. The role of specific nutrients in modulating immune function has received much attention because of the significant role of the immune system in a variety of disease states. The immune system depends on the complex interactions of its various parts. In response to an "antigen" or foreign substance that penetrates the external protective barriers of the human body, nonspecific (phagocytes, complement) defense mechanisms and antigen-specific factors are activated. The antigen-specific immune system relies on both humoral (antibodies and B cells) and cellular (T cells and lymphokines) defenses. Malnutrition causes a decline in all aspects of host defense. Correction of malnutrition in hospitalized patients and restoration of immunocompetence has become a goal of nutrition support practitioners today. The application of current research findings to patient care requires a basic understanding of immunology.

Assessing the bidirectional relationship between diet and the immune system can be undertaken utilizing multiple approaches. In human intervention studies, investigators have assessed the impact of bioenergetic status [1], isolated nutrients [2–6], and dietary patterns, such as the Mediterranean Diet [7,8], in both controlled feeding and free-living intervention studies on numerous indices of immune function (e.g., circulating cytokines, high-sensitivity C-reactive Protein, antibodies, tissue-specific Nutrients 2020, 12, 818; doi:10.3390/nu12030818 www.mdpi.com/journal/nutrients Nutrients 2020, 12, 818 2 of 15 transcriptomes). To complement such intervention approaches, a growing body of literature, utilizing observational study designs, has assessed dietary intakes via self-reported measures and circulating biomarkers, and

assessed their associations with similar immune function outputs, as well as disease endpoints (e.g., allergy incidence, chronic disease risk). Such investigations have occurred in a variety of populations, including pregnant women and young infants, adults, individuals with chronic disease, metabolic syndrome, allergic, inflammatory and/or autoimmune diseases. Typically, these clinical observations follow and are complemented by investigations in laboratory animals and cultured cells to provide mechanistic insights, although important differences in immune system development and function and lack of in vivo interactions limit the direct translation of findings in animal studies to humans. It is critical to note that, at present, few large, randomized controlled trials exist with clinical endpoints (e.g., event reduction; disease remission) that demonstrate an impact of diet on immune-mediated disease risk. In some instances, such as the case of early dairy protein exposure and risk of beta-cell autoimmunity, bioplausible hypotheses have not been confirmed in large clinical trials. The difficulties facing nutritional immunology and the caveats of relying on surrogate endpoints are made further evident by the long history of testing the inflammation-atherosclerosis hypothesis; researchers have spent decades employing numerous anti-inflammatory agents prior to demonstrating an effect of interleukin (IL)-1 beta inhibition on cardiovascular event risk reduction. While enthusiasm for nutrition and immune-mediated disease risk abounds, careful consideration of the nature and quality of the data are paramount

AIM OF THE COURSE:

To evaluate the enhancement of Nutrition and the Immune System in human body system

OBJECTIVE

1. Basic knowledge of nutrition and immune interactions can be utilized to formulate nutritional recommendations and interventions that may reduce illness and improve chances of survival.

- To identify the Immune responses are sensitive and functional indices of nutritional status and can aid in assessing prognosis in medical and surgical patients.

METHODOLOGY

1. 20 MBBS students willing to take part in the study were included.
2. The study group students were briefed about the role of specific nutrients in modulating immune function has received much attention because of the significant role of the immune system in a variety of disease states.
3. Taken class about Nutrients and Immunity and awareness created about nutrients among students
4. Feedback was given by students for improvement based on performance.

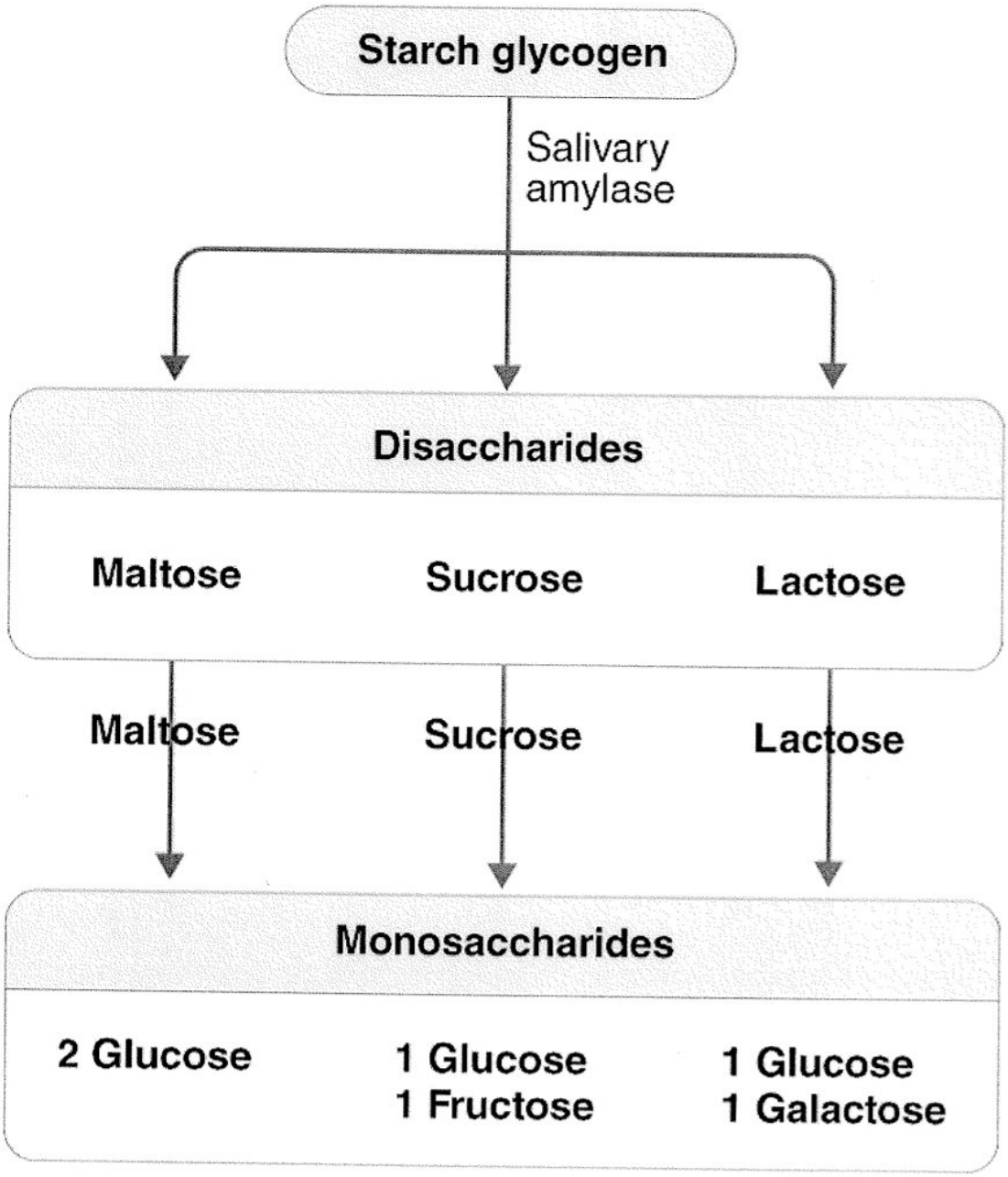
The foods we eat contain nutrients. Nutrients are substances required by the body to perform its basic functions. Nutrients must be obtained from our diet, since the human body does not synthesize or produce them. Nutrients have one or more of three basic functions: they provide energy, contribute to body structure, and/or regulate chemical processes in the body. These basic functions allow us to detect and respond to environmental surroundings, move, excrete wastes, respire (breathe), grow, and reproduce. There are six classes of nutrients required for the body to function and maintain overall health. These are carbohydrates, lipids, proteins, water, vitamins, and minerals. Foods also contain non-nutrients that may be harmful (such as natural toxins common in plant foods and additives like some dyes and preservatives) or beneficial (such as antioxidants).

Carbohydrates (a.k.a. "carbs") are the main fuel source for the body and are basically many sugar molecules strung together. "Simple carbohydrates" are actually just one isolated simple sugar molecule such as glucose, sucrose or galactose. "Complex carbohydrates" are many sugar molecules linked together. Not all carbohydrates are considered equal as you will see in the dedicated Carbohydrate section. A high carbohydrate diet from only good sources such as fruits, vegetables and whole grains NOT from processed refined foods is the recommendation.

Fat is not always bad, but its intake should be quite low to protect your heart from heart disease. While fat from animal sources will carry with it large amounts of the deadly fat cholesterol and harmful saturated fat, when you get fat from plant sources it will cholesterol free and mostly unsaturated. Certain fats such as omega-3 and omega-6 fatty acids are essential nutrients, but only small amounts are needed in the diet. Knowing where to get the right type fat and amount of fat in your diet can make all the difference in being heart healthy or having a heart attack.

Protein is a chain of "amino acids" put together in a complex way to perform one specific molecular task. All amino acids originate from plant sources initially. Humans are not able to make new amino acids, but can convert one to another. When you eat protein, you digest the protein down into its basic amino acids. Like carbohydrates and fats, not all protein was created equal from a health perspective. Hint: Plant protein is the healthiest.

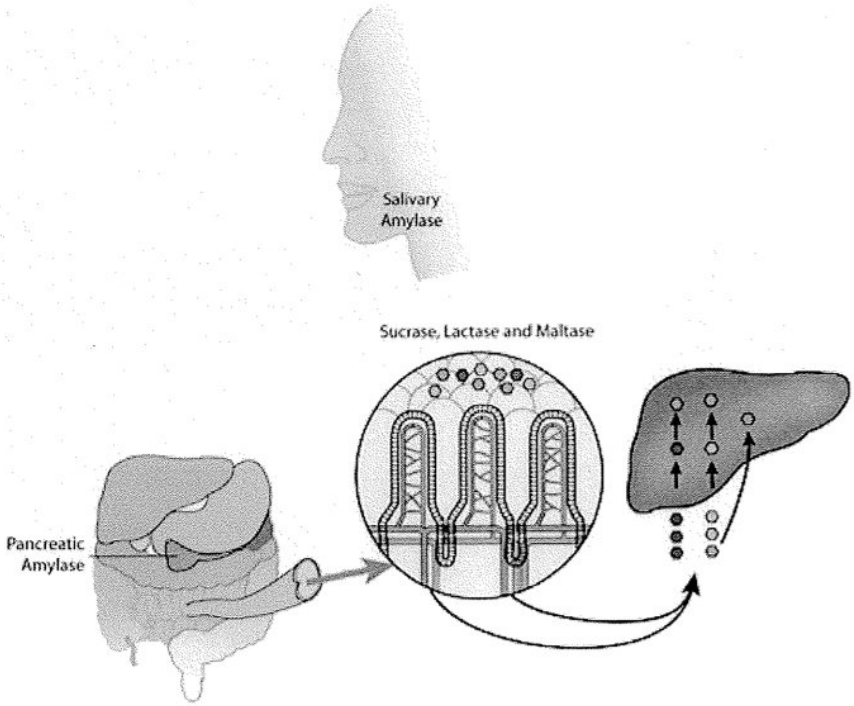
Digestion and Absorption of Carbohydrates



Carbohydrates are one of the essential nutrients in the human diet. There are two types of carbohydrates that can be digested by the human digestive system– sugar and starch.

BIHER SLIMS

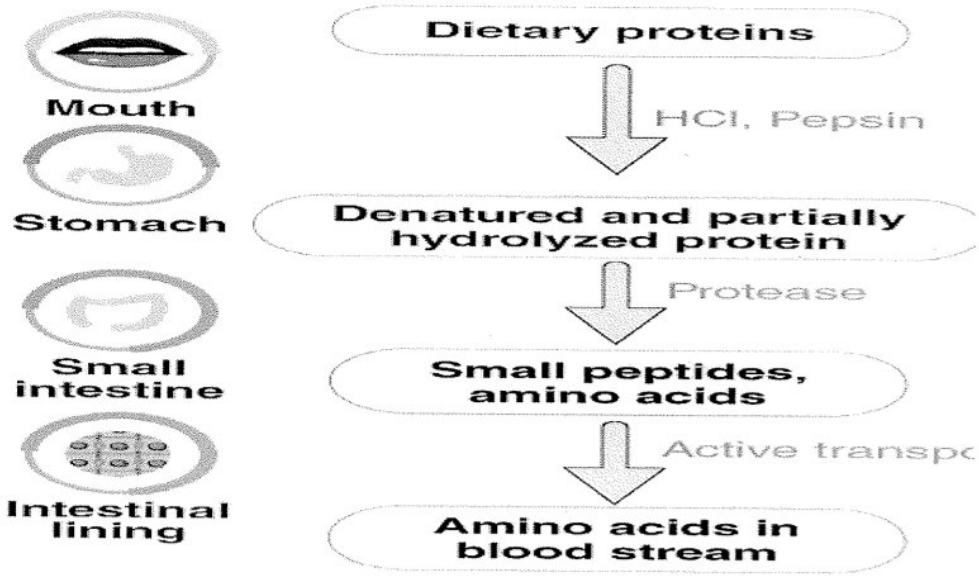
Sugar is broken down in the gastrointestinal tract by the small intestine and three enzymes present in the mouth, namely, Lactase, Sucrase, and Maltase.



In the same way, starch is broken down with the help of the Amylase enzymes which are present in the mouth and the stomach. After digestion, carbohydrates are absorbed in the small intestine with the help of minute finger-shaped projections known as Villi.

The chemical digestion of carbohydrates begins in the mouth. The below flowchart explains in detail about the series of steps involved in breaking down the carbohydrates into their monomers.

Digestion and Absorption of Proteins



Proteins play a vital role in the growth and replenishment of body cells and tissues.

The digestion of proteins takes place in the stomach with the help of protease and pepsin enzymes, which breaks down the proteins into amino acids. The process is facilitated by the hydrochloric acid present in the stomach.

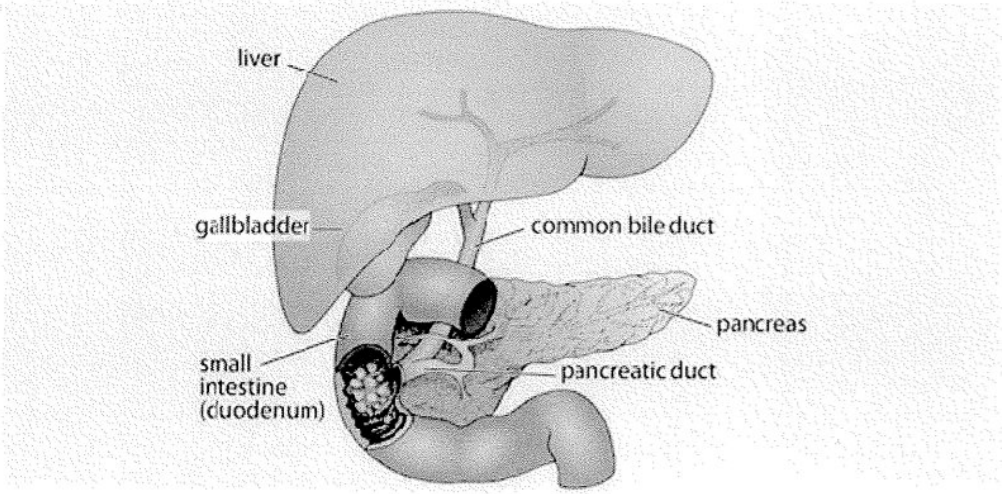
Amino acids are tiny elements which get absorbed into the blood system through the wall of the small intestine.

Digestion and Absorption of Lipids

Lipids are organic compounds comprising fatty acids, which are insoluble in water. Fats are the most common examples of lipids. The insoluble property of lipids makes the digestion and absorption of fats a complicated process.

Since they are hydrophobic, fats stick together as a large glob of insoluble mass after reaching the stomach. It is broken down with the help of bile juice, which

contains bile salts. These broken molecules are then acted upon by pancreatic lipase, the major fat-absorbing enzymes in the body.



Micronutrients

Micronutrients play a central part in metabolism and in the maintenance of tissue function. An adequate intake therefore is necessary, but provision of excess supplements to people who do not need them may be harmful. Single micronutrient deficiency states are comparatively easily recognised and treated. Subclinical deficiency, often of multiple micronutrients, is more difficult to recognise, and laboratory assessment is often complicated by the acute phase response. Clinical benefit is most likely in those people who are severely depleted and at risk of complications, and is unlikely if this is not the case. There is little evidence for supplements leading to a reduction in the incidence of infections in the elderly population, in coronary artery disease, or in malignant disease. The best evidence for benefit is in critical illness, and in children in developing countries consuming a deficient diet. More clinical trials are required with good clinical outcomes to optimise intake in prevention and treatment of disease.

- Cofactors in metabolism—trace elements are frequently involved in modulating enzyme activity or are an integral part of enzyme prosthetic groups—for example, zinc is a cofactor for over 100 enzymes, whereas selenium is required in the form of selenocysteine within the enzyme glutathione peroxidase.
- Coenzymes in metabolism—many vitamins or metabolites of vitamins are required to play an active part within complex biochemical reactions, for example, riboflavin and niacin in the electron transport chain, or folic acid as part of methyl group transfer. These reactions are critical to intermediary metabolism and ensure utilisation of the major nutrients to provide energy, proteins and nucleic acids.
- Genetic control—zinc "fingers" are transcription control factors that bind to DNA and regulate transcription of receptors for steroid hormones and other factors.
- Antioxidants—much of the popular interest in the micronutrients stems from the recognition that many of the micronutrients have antioxidant properties. Oxidative metabolism inevitably leads to generation of reactive oxygen species (ROS) or "free radicals", which have the potential to cause further oxidative reactions, especially to those parts of the cell in a relatively reduced state, such as cell membranes or nucleic acids.[1] The potential to cause damage is limited by mechanisms that include direct quenching of oxidant activity by tocopherols (vitamin E) or carotenoids (vitamin A), or enzyme systems to dispose of the products of oxidation—superoxide dismutase (either zinc/copper or manganese dependent) and glutathione peroxidase (selenium dependent).

Depending on the size of the molecule, carbohydrates may be simple or complex.

- **Simple carbohydrates:** Various forms of sugar, such as glucose and sucrose (table sugar), are simple carbohydrates. They are small molecules, so they can be broken down and absorbed by the body quickly and are the quickest source of energy. They quickly increase the level of blood glucose (blood sugar). Fruits, dairy products, honey, and maple syrup contain large amounts of simple carbohydrates, which provide the sweet taste in most candies and cakes.
- **Complex carbohydrates:** These carbohydrates are composed of long strings of simple carbohydrates. Because complex carbohydrates are larger molecules than simple carbohydrates, they must be broken down into simple carbohydrates before they can be absorbed. Thus, they tend to provide energy to the body more slowly than simple carbohydrates but still more quickly than protein or fat. Because they are digested more slowly than simple carbohydrates, they are less likely to be converted to fat. They also increase blood sugar levels more slowly and to lower levels than simple carbohydrates but for a longer time. Complex carbohydrates include starches and fibers, which occur in wheat products (such as breads and pastas), other grains (such as rye and corn), beans, and root vegetables (such as potatoes and sweet potatoes).

Carbohydrates may be

- Refined
- Unrefined

Refined means that the food is highly processed. The fiber and bran, as well as many of the vitamins and minerals they contain, have been stripped away. Thus, the body processes these carbohydrates quickly, and they provide little

nutrition although they contain about the same number of calories. Refined products are often enriched, meaning vitamins and minerals have been added back to increase their nutritional value. A diet high in simple or refined carbohydrates tends to increase the risk of obesity and diabetes.
If people consume more carbohydrates than they need at the time, the body stores some of these carbohydrates within cells (as glycogen) and converts the rest to fat. Glycogen is a complex carbohydrate that the body can easily and rapidly convert to energy. Glycogen is stored in the liver and the muscles. Muscles use glycogen for energy during periods of intense exercise. The amount of carbohydrates stored as glycogen can provide almost a day's worth of calories. A few other body tissues store carbohydrates as complex carbohydrates that cannot be used to provide energy.

Most authorities recommend that about 50 to 55% of total daily calories should consist of carbohydrates. Fewer than 10% of total daily calories should come from added sugars. Added sugars are syrups and other caloric sweeteners used in other food products. Added sugars are listed as an ingredient in food labels. They include brown sugar, corn sweetener, corn syrup, dextrose, fructose, glucose, high-fructose corn syrup, honey, invert sugar, lactose, malt syrup, maltose, molasses, raw sugar, sucrose, trehalose, and turbinado sugar. Naturally occurring sugars, such as those in fruit or milk, are not added sugars.

Glycemic index

The glycemic index of a carbohydrate represents how quickly its consumption increases blood sugar levels. Values range from 1 (the slowest) to 100 (the fastest, the index of pure glucose). However, how quickly the level actually increases also depends on what other foods are ingested at the same time and other factors.

The glycemic index tends to be lower for complex carbohydrates than for simple carbohydrates, but there are exceptions. For example, fructose (the sugar in fruits) has little effect on blood sugar.

The following also influence a food's glycemic index:

- **Processing:** Processed, refined, or finely ground foods tend to have a higher glycemic index.
- **Type of starch:** Different types of starch are absorbed differently. For example, potato starch is digested and absorbed into the bloodstream relatively quickly. Barley is digested and absorbed much more slowly.
- **Fiber content:** The more fiber a food has, the harder it is to digest. As a result, sugar is absorbed more slowly into the bloodstream.
- **Ripeness of fruit:** The riper the fruit, the more sugar it contains, and the higher its glycemic index.
- **Fat or acid content:** The more fat or acid a food contains, the more slowly it is digested and the more slowly its sugars are absorbed into the bloodstream.
- **Preparation:** How a food is prepared can influence how quickly it is absorbed into the bloodstream. Generally, cooking or grinding a food increases its glycemic index because these processes make food easier to digest and absorb.
- **Other factors:** The way the body processes food varies from person to person, affecting how quickly carbohydrates are converted to sugar and absorbed. How well a food is chewed and how quickly it is swallowed also have an effect.

The glycemic index is thought to be important because carbohydrates that increase blood sugar levels quickly (those with a high glycemic index) also quickly increase insulin levels. The increase in insulin may result in low blood

sugar levels (hypoglycemia) and hunger, which tends to lead to consuming excess calories and gaining weight.

Carbohydrates with a low glycemic index do not increase insulin levels so much. As a result, people feel satiated longer after eating. Consuming carbohydrates with a low glycemic index also tends to result in more healthful cholesterol levels and reduces the risk of obesity and diabetes mellitus and, in people with diabetes, the risk of complications due to diabetes.

In spite of the association between foods with a low glycemic index and improved health, using the index to choose foods does not automatically lead to a healthy diet. For example, the glycemic index of potato chips and some candy bars—not healthful choices—is lower than that of some healthful foods, such as brown rice. Some foods with a high glycemic index contain valuable vitamins and minerals. Thus, this index should be used only as a general guide to food choices.

Glycemic load

The glycemic index indicates only how quickly carbohydrates in a food are absorbed into the bloodstream. It does not include how much carbohydrate a food contains, which is also important. Glycemic load includes the glycemic index and the amount of carbohydrate in a food. A food, such as carrots, bananas, watermelon, or whole-wheat bread, may have a high glycemic index but contain relatively little carbohydrate and thus have a low glycemic load. Such foods have little effect on the blood sugar level.

Glycemic load also includes how changes in blood sugar are affected by the combination of foods eaten together. The glycemic index does not.

Proteins

Proteins consist of units called amino acids, strung together in complex formations. Because proteins are complex molecules, the body takes longer to break them down. As a result, they are a much slower and longer-lasting source of energy than carbohydrates.

There are 20 amino acids. The body synthesizes some of them from components within the body, but it cannot synthesize 9 of the amino acids—called essential amino acids. They must be consumed in the diet. Everyone needs 8 of these amino acids: isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine. Infants also need a 9th one, histidine.

The percentage of protein the body can use to synthesize essential amino acids varies from protein to protein. The body can use 100% of the protein in egg and a high percentage of the proteins in milk and meats. The body can use a little less than half of the protein in most vegetables and cereals.

The body needs protein to maintain and replace tissues and to function and grow. Protein is not usually used for energy. However, if the body is not getting enough calories from other nutrients or from the fat stored in the body, protein is used for energy. If more protein is consumed than is needed, the body breaks the protein down and stores its components as fat.

The body contains large amounts of protein. Protein, the main building block in the body, is the primary component of most cells. For example, muscle, connective tissues, and skin are all built of protein.

Adults need to eat about 60 grams of protein per day (0.8 grams per kilogram of weight or 10 to 15% of total calories). Adults who are trying to build

muscle need slightly more. Children also need more because they are growing. People who are limiting calories to lose weight typically need a higher amount of protein to prevent loss of muscle while they are losing weight.

Fats

Fats are complex molecules composed of fatty acids and glycerol. The body needs fats for growth and energy. It also uses them to synthesize hormones and other substances needed for the body's activities (such as prostaglandins).

Fats are the slowest source of energy but the most energy-efficient form of food. Each gram of fat supplies the body with about 9 calories, more than twice that supplied by proteins or carbohydrates. Because fats are such an efficient form of energy, the body stores any excess energy as fat. The body deposits excess fat in the abdomen (omental fat) and under the skin (subcutaneous fat) to use when it needs more energy. The body may also deposit excess fat in blood vessels and within organs, where it can block blood flow and damage organs, often causing serious disorders.

Fatty acids

When the body needs fatty acids, it can make (synthesize) certain ones. Others, called essential fatty acids, cannot be synthesized and must be consumed in the diet. The essential fatty acids make up about 7% of the fat consumed in a normal diet and about 3% of total calories (about 8 grams). They include linoleic acid and linolenic acid, which are present in certain vegetable oils. Eicosapentaenoic acid and docosahexaenoic acid, which are fatty acids essential for brain development, can be synthesized from linolenic acid. However, they also are present in certain marine fish oils, which are a more efficient source.

Linoleic acid and arachidonic acid are omega-6 fatty acids. Linolenic acid, eicosapentaenoic acid, and docosahexaenoic acid are omega-3 fatty acids. A diet rich in omega-3 fatty acids may reduce the risk of atherosclerosis (including coronary artery disease). Lake trout and certain deep-sea fish contain large amounts of omega-3 fatty acids. In the United States, people tend to consume enough omega-6 fatty acids, which occur in the oils used in many processed foods, but not enough omega-3 fatty acids. (Women who are pregnant or breastfeeding should choose fish that are low in mercury. See Mercury in Seafood for more information.)

There are different kinds of fat:

- Monounsaturated
- Polyunsaturated
- Saturated

Saturated fats are more likely to increase cholesterol levels and increase the risk of atherosclerosis. Foods derived from animals commonly contain saturated fats, which tend to be solid at room temperature. Fats derived from plants commonly contain monounsaturated or polyunsaturated fatty acids, which tend to be liquid at room temperature. Palm and coconut oil are exceptions. They contain more saturated fats than other plant oils.

Trans fats (trans fatty acids) are a different category of fat. They are man-made, formed by adding hydrogen atoms (hydrogenation) to monounsaturated or polyunsaturated fatty acids. Fats may be partially or fully hydrogenated (or saturated with hydrogen atoms). In the United States, the main dietary source of trans fats is partially hydrogenated vegetable oils, present in many commercially prepared foods. Consuming trans fats may adversely affect cholesterol levels in the body and may contribute to the risk of atherosclerosis.

Fat in the diet

Authorities generally recommend that

- Fat should be limited to less than about 28% of daily total calories (or fewer than 90 grams per day).
- Saturated fats should be limited to less than 8%.

Eliminating trans fats in the diets is recommended. When possible, monounsaturated fats and polyunsaturated fats, particularly omega-3 fats, should be substituted for saturated fats and trans fats.

Risk Factors

Category I

- Cigarette smoking
- LDL cholesterol
- High fat/ cholesterol diet
- Hypertension
- Left ventricular hypertrophy
- Thrombogenic factor

Category II

Risk factors for which interventions are **likely** to lower CVD risk

- Diabetes mellitus
- Physical inactivity
- HDL cholesterol
- Triglycerides, small dense LDL
- Obesity
- Postmenopausal status

Category III

Risk factors associated with increased CVD risk may reduce if the following are modified

- Physiological factors
- Lipoprotein A
- Homoecysteine
- Oxidative stress
- No alcohol consumption

Category IV

Risk factors associated with increased CVD risk which **cannot** be modified

- Age
- Male gender
- Family history of early onset of CVD

A paradigm shift in nutritional sciences is underway. Nutrigenetics/nutrigenomics, the study of relationship between gene expression and nutrition, proposes that disease can be prevented and reversed by drastically altering the nutritional environment.[2] Basic premises include: (a) people are genetically predisposed to develop some type of chronic illness; (b) expression of these genes is largely influenced by environment; (c) food is a large part of this environment that affects gene expression; and (d) whole food, plant-based, nutritionally-dense diets positively influence genetic expression and the incidence of disease. Nutrigenetics has given rise to "Nutritional Medicine" or "Nutritional Therapy", a system of healing based on the belief that food, in its whole and natural form, provides the substance needed to obtain and maintain a vibrant state of health.

Nutritional Therapy uses food to prevent and reverse diseases that plague most western societies: diabetes, obesity, heart disease, arthritis, and depression. In

order for food to be therapeutic, it must be nutrient-dense, measured in part by the **nutrients and anti-nutrients**, contained in consumed foods.

Nutrients are plant and animal sources providing macronutrients (protein, carbohydrates, fat), micronutrients (vitamins, minerals, phytochemicals, antioxidants, probiotics), and fiber. They are whole and unprocessed vegetables, fruits, beans, legumes, whole grains, and raw nuts/seeds. Free range, grass-fed organic meat, dairy, eggs, and wild fish also qualify.

Anti-Nutrients are food products that have no biological necessity. Though edible, these are not considered "food": high fructose corn sweetener, sugars, artificial sweeteners, highly processed and hydrogenated fats, refined flour products, preservatives, and additives. Further, some critical nutrients become anti-nutrients when consumed in excess. For example, while our biological salt need is as low as 250 mg/day, the US recommended allowance (RDA) of salt is under 2400 mg and Americans often consume more than 3500 mg/day. Thus, salt intake within the RDA limits is considered an anti-nutrient.

Nutritional Therapy is also concerned with the way that foods are prepared and delivered for consumption. In order for foods to be **therapeutically beneficial**, the appropriate micro- and macronutrients must be delivered in a nutritionally dense format without contaminants. While plants are the main source of micronutrients, nutrient content can be altered with improper handling. Fruits and vegetables picked before their peak ripeness contain fewer phytochemicals. These phytochemicals protect plants them from all kinds of invaders, and when consumed, transfer these same protective advantages to the human body. Cooking and processing can further destroy vital properties of phytochemicals and antioxidants.

The presence of harmful chemicals in foods, such as pesticides, herbicides, and nitrogen-based fertilizers contribute to altered genetic environments. Organic produce is preferable, particularly for certain fruits and vegetables..

The Aggregate Nutrient Density Index (ANDI) provides a means to judge and calculate the level of micronutrients per calorie and thus therapeutic value of food. Green leafy vegetables, colorful vegetables, fresh fruit, and berries have the most micronutrients per calorie and are the most nutritionally dense foods to choose from. Refined sweets and oils have almost no nutrition density and are not considered food in a nutrition therapy program.

The Basics of Nutritional Therapy

Nurse practitioners are leaders in treatment of the whole person, valuing approaches that are holistic, safe, and effective. Nutritional therapy is fundamental for patients seeking relief from obesity and chronic illness and for patients pursuing health promotion and wellness. Basic recommendations include:

1. Avoid anti-nutrients, including processed foods. They contribute to obesity, and a wide range of diseases.
2. Eat ONLY whole foods: unprocessed, raw vegetables and fruits, beans, legumes, raw nuts, raw seeds, whole grains, free-range, grass-fed organic animal products, and small wild fish.
3. Eat a variety of whole foods, without as much attention to calories, carbohydrates, and fats.
4. Judge the therapeutic value of the whole food diet by eating a majority of calories from foods that are the most nutritionally dense (micronutrients per calorie), and adjust the macronutrients according to individual caloric needs. For instance, if a person is trying to reverse a disease process, the

focus of the diet should be mostly raw fruits and vegetables, eliminating animal products completely. A diet to maintain health can be more flexible and include some grains and animal products.

Reference:

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4. Drewnowski A. Concept of a nutritious food: toward a nutrient density score. *American Journal of Clinical Nutrition.* 2005;82:721–732.

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Department of Biochemistry

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3	U15MB382	SUMATHI .B	
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7	U15MB395	VIGNESH .V	
8	U15MB397	VIJAY KUMAR .C.M	
9	U15MB398	VINOTHINI .S	
10	U15MB370	SIVA SAKTHI VELAN .A.V	
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Nutrients

SRI LAKSHMI NARAYANA INSTITITE OF MEDICAL SCIECNES

BASIC CONCEPTS OF NUTRITION AND THE IMMUNE SYSTEM

1. **Which one of the following options represents potential complications of enteral nutrition?**

   A. Osteoporosis and refeeding syndrome

   B. Diarrhea and cholestasis

   C. Esophagitis and pancreatitis

   D. Aspiration and refeeding syndrome

   E. Aspiration and Constipation

2. **. Enteral nutrition is preferred over parenteral nutrition for all of the following reasons EXCEPT:**

   A. Lower risk of electrolyte abnormalities

   B. Lower risk of refeeding

   C. Lower risk of liver disease

   D. Improved Glycemic control

   E. Stimulate gut barrier function

3. **Which of the following is an ABSOLUTE contraindication to parenteral nutrition?**

   A. Diarrhea

   B. Liver cirrhosis

   C. Malignancy

   D. Active Infection

   E. Osteoporosis

E. Osteoporosis

4. **Which one of the following options represents historical features of the Subjective Global Assessment?**

A. Weight loss and gastrointestinal symptoms

B Malignancy and nausea

C. Family history of IBD and personal history of weight loss

D. Family history of Celiac Disease

E. Functional impairment and recent hospitalization

5. **Which of the following is NOT a clinical consequence of refeeding syndrome?**

A. Hypophosphatemia

B. Hypomagnesemia

C. Hypervolemia

D. Hyperphosphatemia

E. Hyperglycemia

6. **Which one of the following micronutrients is <u>routinely</u> added to TPN?**

A. Vitamin D

B. Iron

C. vitamin E

D. Vitamin K

E. Manganese

7. **Which one of the following medications can be added to TPN in the appropriate clinical circumstance?**

   A. H2 Receptor Antagonists

   B. Proton pump inhibitors

   C. Fluroquinolones

   D. Narcotics

   E. Cephalosporins

8. **Which one of the following gut hormones is responsible for promoting appetite?**

   A. Leptin

   B. Grehlin

   C. Peptide YY

   D. CCK

   E. Insulin

9. **Which one of the following hormones plays an important role in inhibiting appetite?**

   A. Grehlin

   B. Resistin

   C. TNF α

   D. Peptide YY

E. Neurotensin

10. Which of the following in an example of a *prebiotic*?

A. Yogurt

B. Inulin

C. Creatinine

D. Fish Oil

E. Vitamin C

Nutrition

SRI LAKSHMI NARAYANA INSTITITE OF MEDICAL SCIECNES

BASIC CONCEPTS OF NUTRITION AND THE IMMUNE SYSTEM

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Annexure- V

Course feedback form

Course title: Date :

Course code:

Department: BIOCHEMISTRY

S.no	Design of the course	1	2	3	4	5
1	The objective of the course clear to you	/				
2	The course contents met with your expectations	/				
3	The lecture sequence were well planned		/			
4	The lectures were clear and easy to understand	/				
5	The audiovisual teaching aids were effectively used		/			
6	The instructor's encouraged interaction and was it helpful	/				
7	The contents were illustrated with examples		/			
8	Overall Rating of the course		/			

*** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory**

Suggestions if any:

— Satisfactory —

Signature

Annexure- V

Course feedback form

Course title: Date :

Course code:

Department: BIOCHEMISTRY

S.no	Design of the course	1	2	3	4	5
1	The objective of the course clear to you	✓				
2	The course contents met with your expectations	✓				
3	The lecture sequence were well planned	✓				
4	The lectures were clear and easy to understand		✓			
5	The audiovisual teaching aids were effectively used	✓	✓			
6	The instructor's encouraged interaction and was it helpful		✓			
7	The contents were illustrated with examples		✓			
8	Overall Rating of the course		✓			

*** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory**

Suggestions if any:

- Good -

Signature

Annexure- V

Course feedback form

Course title: Date :

Course code:

Department: BIOCHEMISTRY

S.no	Design of the course	1	2	3	4	5
1	The objective of the course clear to you	✓				
2	The course contents met with your expectations	✓				
3	The lecture sequence were well planned		✓			
4	The lectures were clear and easy to understand		✓			
5	The audiovisual teaching aids were effectively used	✓				
6	The instructor's encouraged interaction and was it helpful		✓			
7	The contents were illustrated with examples		✓			
8	Overall Rating of the course		✓			

*** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory**

Suggestions if any:

Good

Signature

Date: 09.10.2021

From

Dr. Pannerselvam
Professor and Head,
Department of Microbiology,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course:

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: **Road safety measures and awareness on RTA** We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr. Pannerselvam

PROFESSOR & HOD
DEPARTMENT OF BIOCHEMISTRY
Sri Lakshmi Narayana Institute of Medical Sciences
PONDICHERRY 605 502

Encl: Certificates

Photographs

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that MOUNIKA.B has actively participated in the Value Added Course on **BASIC CONCEPTS OF NUTRITION AND THE IMMUNE SYSTEM** April – May 2021 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

E. Prabhakar Reddy

Dr. Prabhakar Reddy

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CERTIFICATE OF MERIT

This is to certify that RADHIKA .C has actively participated in the Value Added Course on **BASIC CONCEPTS OF NUTRITION AND THE IMMUNE SYSTEM** April – May 2021 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Prabhakar Reddy

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COORDINATOR

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