

Concept of Biochemistry of Food

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Abstract

Nutritional biochemistry examines the health benefits gained from eating healthy food. It specifically focusses on nutrient chemical components and how they function metabolically, physiologically, and biochemically. The biochemical study gives information about food metabolism and hormones and enzymes participating in this process and describes the process of food intake and how energy is obtained and the way the energy is spent. It is study of nutrition as a science. Nutritional biochemical therapy refers to specific nutritional procedures including assessment and interventions in the treatment of an illness, injury, or disease condition. Studying the biochemistry of food and its metabolism gives us knowledge about effectors of metabolism in positive direction as it is the source of energy, which is the foundation of life. Its negative effect as metabolite can give rise to diabetes mellitus, cardiovascular disease, and cancer.

Keywords: Metabolism, nutrition, TP

INTRODUCTION

Nutrition has a general effect on health conditions including physical and mental well-being, and this field of study has extended in the recent period and a lot of researches had taken place in nutrition and food.^[1] Most studies concluded that a strong association exists between diet, gut health, and various diseases (both physical and mental).^[2]

Nutrition is science which gives a concept of food and how it manipulates in body. Nutrition includes all the substances that are required for growth and maintenance of life. These include vitamins, proteins, fats, carbohydrates, and minerals.^[3,4] The advice now directed is toward change of concept of nutrition both quantitatively and qualitatively, and there should be different food items to grow and be healthy.^[5]

BALANCED NUTRITION

A balanced diet is a diet that should cover required quantities of calories, proteins, minerals, vitamins, and alternative nutrients.^[6] A balanced diet gives your body the nutrients it needs to function correctly. To get the required nutrition, most of daily calories should come from the following:

fresh fruits;
fresh vegetables;

whole grains;
legumes;
nuts;
lean proteins.

The number of calories in a food refers to the amount of energy stored in that food. These calories should be spent to perform all biological functions and source of these energies is ATP which comes from the metabolism of food.^[7]

FOOD AND DISEASE

Nutrition considered as a source of biological substances (nutrients) is required for all biological cell functions of the human body. Choices of profile of foods are important. It follows that the food and nutrient delivery will have an impact on human biology, and these can be both beneficial and deleterious. Prolonged imbalances in food intake, for example, excess energy, saturated fat, sodium, and added sugar, are associated with higher prevalence of chronic disease such as diabetes mellitus, hypertension, and most fetal effect on DNA of cells. This gives rise to mutation

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and cancer, so what we starting by eating items of food can be ending instead of being source of energy lead to be an epicenter of diseases.^[8,9]

The fast source of ATP comes from carbohydrates. Some may have the following question: when we need energy and try to do extra work, should I take glucose because it is the fastest way to obtain ATP? This is somewhat true. But for metabolism of glucose, we need secretion of insulin. With time and increasing consumption of glucose, we may reach a situation of exhaustion and defect of work of insulin gives rise to developing type 2 diabetes mellitus or what is called insulin resistance.^[10]

From the study of food biochemistry, we knew that extra source of energy can be used instead of glucose and even can supply the energy required for brain. These sources are ketones which can be obtained from lipolysis of lipid and break down of protein. This can be used as an energy source to limit glucose uptake and this work does not need insulin and helps in reducing weight, and this biochemical concept of ketones body gives rise to a type of dieting called keto diet. The principle of this diet regime depends on limitation role of sugar, and lipids and proteins are known to be source of energy for ketone.^[11]

WHY STUDY THE BIOCHEMISTRY OF NUTRITION

Nutritional biochemistry gives information about interactive relationship between food and health from one side and the effect of disturbance on metabolism of food and developing of disease, on the other side.

Biochemistry of food metabolism can identify sources and benefits of nutrient element in food such as vitamins and minerals. The pathway identifies genetic disease associated with defect in metabolism as phenyl ketonuria and other inborn error diseases of metabolism. They also give knowledge to prevent diseases such as diabetes mellitus, obesity, and other associated risk factors.^[12] Biochemistry of food metabolism also gives rise to publishing the knowledge of dieting and changing style of eating and choosing balanced and healthy food to overcome diseases.^[13]

NUTRITION AND DIET

Do nutrition and diet have the same meaning? Although they are closely related, there are some differences. Diet denotes the overall quantity of food consumed, whereas nutrition refers to ways by which food is used for cell growth building and repairing the damaged cells. There is a close relationship between diet nutrition and health as any deficiency in one of the elements of nutrition has an overall effect.^[14]

The imbalance between nutrition and diet leads to negative effect on general health condition. Deficiency in nutrition and energy supply causes malnutrition disorder and has an effect on persons' health, immunity, and wellbeing. On the other side, excess in diet, especially high saturated

fat and carbohydrates, leads to accumulation of fat and obesity, which has a psychological effect besides effect on health. Knowledge of biochemistry of diet is important to supply with information of balanced diet, according to the recommended dietary allowances.^[15]

BIOCHEMICAL AND NUTRITIONAL CHANGES DURING FOOD PROCESSING

Most food, as a general rule, needs to be processed before eating; nowadays, most food processing takes place outdoor mainly at food factories in which food manipulation, cooking, adding flavoring and preserved elements take place, which have positive and negative effects. The processing of meat, vegetables, and milk produces biochemical changes that may affect the product properties in a negative manner. Smoking process contributes in the form of "heterocyclic aromatic amines" in specific heating/grilling situation and the formation of toxic product.

The other complications of food processing are product of complexes that comes from the process of "oxidation reactions of lipids and proteins," which can affect flavor and consistency.^[16]

The positive direction for favor processes that enhancement the food with nutritional valued components such as in meat products for facilitate digestion through an extensive proteolysis. The formation of bioactive peptides with different bioactivities such as "antioxidant, antihypertensive, immunomodulating, antimicrobial, prebiotic, and hypocholesterolemic" properties can be enriched in a selection of "fermented and aged meat products." The preservation processes can apply for protection of specific nutrients such as vitamins.^[16]

PROBLEMS ASSOCIATED WITH FOOD CANNING

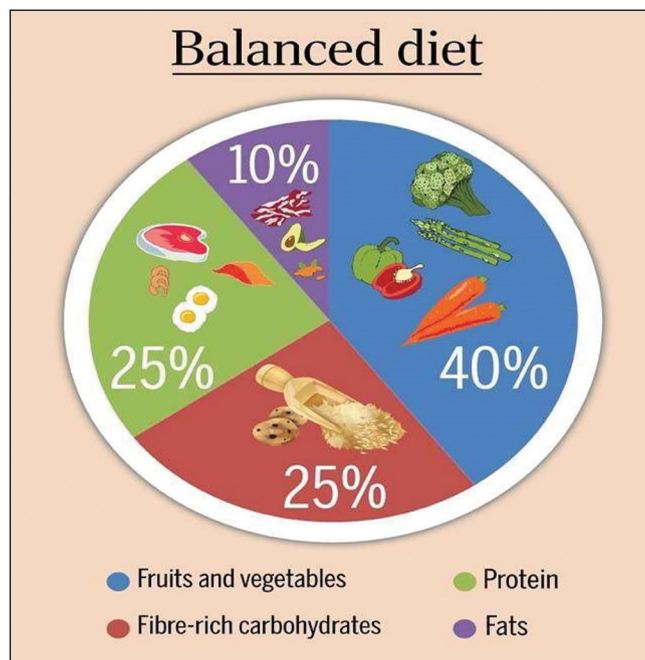
Canning is a process of preserved food. Food in its fresh state can spoil because of different factors such as high water content, which allows pathogens to grow, active enzymes that continue to ripen the food, or a reaction with oxygen. The canning process counteracts these factors. It removes oxygen, destroys enzymes, and prevents growth of undesirable bacteria, yeasts, and molds.

Canning alters food chemically by changing the moisture, pH, or salinity levels to protect against microbes, bacteria, molds, and yeasts. Chemical property of food determines the type of canning process for each type of food, according to pH of food such as high acid food. Each type needs to be prepared differently to prevent the growth of harmful bacteria.^[17] There are efforts for publishing health education about food manipulation that approach to food safety must be adopted which affects the entire food chain from farm to fork.^[18]

So canning has advantages and disadvantages in [Table 1].

Table 1: Advantages and disadvantages of caning food

Advantage of caning food	Disadvantage of caning food
Canning alters food chemically by changing the moisture, pH, or salinity levels to protect against microbes, bacteria, molds, and yeasts. It also limits food enzyme activity	Sodium percentage in canned food is high Sugar content usually high, especially fruit canning with heavy syrup
Combining these chemical processes with the physical barriers of glass jars, seals, and lids effectively prevent decay	Some category of food as fruits and vegetables become less nutritious when they are canned
Can keep canned foods on shelves from 1 to 2 years or longer	

**Figure 1: Balanced diet**

There are a number of benefits that come with eating canned fruits and vegetables and they are easy to use! This is not to say we should eliminate fresh produce from our diet, but rather introduce a balance among all types of produce including fresh, frozen, and canned.

BALANCED HEALTHY FOOD

A balanced diet [Figure 1] is a diet that contains different categories of foods in definite measures and proportions, so that the requirement for calories, proteins, minerals, and vitamins is the calculated average requirement according to the international institute. The institute defines the average recommended daily allowance for each item of nutrient in order to be healthy and reduce the chance of diseases. The daily consumption of red meat, saturated fat, butter and margarine, chips, French fries, or other processed potato products should be limited.^[19,20]

CONCLUSION

Food is considered a main source of energy for life and nutrition is required for basic health. Balanced food and

nutrition are important to improve health and to lower risks of non-communicable diseases such as diabetes and cardiovascular disease. Therefore, biochemistry opens the door to know the benefit of food and nutrition and the relation between food and health.

The study of chemical nature of food gives rise to appropriate method of processing and caning to overcome negative events associated with these processes and obtain the optimal advantage.

Ethical approval

Not applicable.

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Conflicts of interest

There are no conflicts of interest.

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