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Food and diseases: how to take food properly to get the maximum benefits while protecting our bodies from diseases

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ABSTRACT: The link between food and health has been known for a long time: Hippocrates in 400 B.C. said "Let food be your medicine and medicine be your food". Considering food as a medicine means being aware of the benefits we can obtain and taking care of our health.

Stomach, liver, pancreas, intestine and kidneys are the organs that make up the digestive system and allow the processing and absorption of food with the elimination of undigested food residues.

A correct diet is essential for a healthy lifestyle and to achieve this goal it is necessary to follow diets that recommend both the type of foods to be consumed and the quantities, in relation to the age and activities carried out by each individual. The diet must be varied and contain all foods with different nutritional characteristics in order to provide all the substances necessary for the health of the body: macronutrients such as proteins, carbohydrates, fats; micronutrients such as vitamins, minerals; In addition, other substances are also useful to the body, such as fiber and antioxidants, which optimize its functions by exerting beneficial effects on health.

An inadequate diet, negatively affecting psycho-physical well-being, is one of the main risk factors for the onset of numerous chronic diseases such as obesity, cardiovascular disease, diabetes and cancer. With advancing age, pathologies of the joint system can arise due to a progressive demineralization of the bones due to an insufficient supply of calcium,neurological diseases such as Parkinson's and Alzheimer's due to a lack of functional foods that can counterac the damage caused by the presence of free radicals.

The aim of this work is to highlight the importance of a preventive diet, and in cases of manifest pathology, curative, to improve the patient's state of health, allowing him to live a serene life.

Keywords : Foods; diets; various pathologies and importance of foods

I. INTRODUCTION

In recent years, the concept of food has undergone a radical transformation compared to the past, when it was only a necessity for survival, to the point of attributing to food, in addition to its nutritional and sensory properties, also an important role in maintaining health, psycho-physical well-being and the prevention of various diseases. This change has been made possible by the knowledge of new food technologies such as refrigeration, freezing, pasteurization and sterilization.

Much attention has been paid in the choice of food, with the preference for fresh products over preserved ones, to the absence of microbial or toxic contaminants, both natural and unintentional or intentionally added. The choice of food is influenced by many factors such as the sensory properties of the food such as taste, smell or appearance; social, emotional and cognitive factors that condition our choices; cultural, religious, and economic factors; education, ethnic factors, and product availability, visibility, or pricing all play a role.In addition, the production process, storage, and cooking methods are fundamental conditions to be controlled to ensure the safety of a food. It is necessary to consider not only strict compliance with hygiene rules by personnel working in contact with food, but also control during the production, processing, transport and storage phases, which is essential for food safety.

For all steps of the food chain, the rules indicated in the HACCP (Hazard Analysis and Critical Control Points) system introduced in Italy with Legislative Decree 193/2007, following EC Regulation 852/2004, must be followed, which, promoting the concept of prevention, analyzes the possible hazards that can be verified at each stage of the production process and in subsequent phases such as storage, transport, storage and sale to the consumer.The system places an important emphasis on food quality, in particular, with regard to healthiness and safety; a concept that goes beyond

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simple customer satisfaction, but rather aims to protect public health.

The role of diet quality in reducing the progression of chronic diseases, is becoming increasingly important and indices have been identified to evaluate the effectiveness of a diet in relation to the well-being it brings to the individuals who follow it. Diversity is very important in assessing the quality of a diet. In fact, some are based on the amount of food consumed, others combine the number of foods consumed with their nutritional composition; others, more complex, include a measure of the variety of the diet between food groups, considering the adequacy of nutrients with respect to the patient's conditions of need, the portions to be taken, a certain attention to nutrients/foods to be consumed in moderation; a balance of macronutrients and, in special cases, the use of functional foods.

Greater food variety in the human diet bodes well for providing greater survivability and reduced morbidity among populations. It is evident that more socially active individuals are more likely to achieve food variety. Social activity, physical activity and food variety are the fundamental parameters for a more favorable lifestyle for good health in longevity and aging [1-3].

II. DIETS: COMPOSITION AND EFFECTS ON THE BODY

There are many diets with very different goals, but above all, diets that are effective in
meeting the needs of the individual deserve more attention.

2.1. The **Plank Diet**, defined as a "flash diet", is a high-protein regimen with a fixed schedule to be used for only two weeks, at the end of which a weight loss of 9 kg should be highlighted.

After these 14 days, the weight could be kept constant for about 3 years, following the metabolic changes imposed on the body.

This diet completely excludes carbohydrates, fiber, sugar and oil, increasing the amount of coffee and proteins that significantly exceed the recommended doses for a healthy and correct diet. In addition, there is no reference to the portions and quantities of the foods chosen or to the physical activity to be associated with the diet.

This diet, being very rich in foods of animal origin, could increase cholesterol levels in the blood, resulting in atherosclerosis.

Due to its composition, a tendency to hypoglycemia, ketoacidosis, dehydration could also be observed; nutritional deficiency of mineral salts and vitamins, dietary fibers, conditions that cause cramps, asthenia, weakness, sleep alterations and other symptoms for which the Plank diet is to be considered unsuitable for people predisposed to hypercholesterolemia, diabetics, nephropathic people, hyperuremics [4].

2.2. The **Atkins Diet** is a popular low-carb eating regimen, developed in the 1960s by cardiologist Robert C. Atkins. It is structured on different phases for weight loss and has, as its goal, the correct and balanced consumption of all nutrients.

In 2003, several cases were published describing the benefits of a low-restrictive ketogenic diet, started on an outpatient basis, without fasting and without restriction on calories, liquids and proteins.

This modified Atkins diet limits carbohydrate intake to 10-15 g/day, adds high-fat foods, and has been shown to be very useful as an adjuvant therapy in drug-resistant epilepsy.

In fact, it has been possible to experimentally highlight the efficacy, in the control of epileptic seizures, with a reduction in the frequency of seizures themselves and behavioral problems [5-7].

2.3.Ketogenic Diet is a low-carbohydrate normoprotein diet, which causes the body to release ketone bodies into the blood. It is based on the principle that the reduction of sugars allows the body to burn fat stores quickly in 2-4 days by taking less than 20-50g of carbohydrates per day. Over the years, it has become well known for its proven efficacy in weight loss on increasing insulin sensitivity, reducing dyslipidemia, and also slowing down the onset of epileptic seizures.

It is not yet known how the ketogenic diet can exert these beneficial metabolic effects: recently it has been highlighted the existence of an interaction between diet and gut microbiota that would affect the health of the body.It is not yet known what the impact of this diet is on cardiovascular risk, although improvements in obesity and diabetes type 2 have been shown: the effects are limited in time and associated with adverse phenomena[8-10].

2.4.Weight Watchers Diet is a nutritional education course. If a person does not do physical activity or a very demanding job, again on a physical level, they should not consume more than

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1300 calories per day. Such a low-calorie diet causes a mental load as the thought of food can become obsessive; for this reason, this program includes group meetings to discuss and support each other .

Weight Watchers diet is based on two principles:1) modifying the subject's eating habits and lifestyle; 2) reach a weight that allows you to "feel good" with yourself, and with your body image.

This diet was born in New York in the 1960s by Jean Nidetch and participants are required to enroll in a motivational and educational support group at their own expense. It is a standardized method that makes use of a constant relationship with patients who follow a diet that is the same for everyone based on a system of mathematical evaluation of the calories introduced. Those who follow the diet must achieve a daily score that takes into account not only individual characteristics such as age, height, current weight, target weight, gender, level of physical activity, etc., but also the calorie deficit needed to achieve the desired performance.

The Weight Watchers diet only excludes certain substances, such as spirits, carbonated and sugary drinks, limiting the consumption of others as unhealthy. The use of specific dietary supplements, such as a multivitamin supplement or traditional low-calorie food products, which align with the purposes of the diet, are often recommended. The interaction between nutrition and psychology makes the participants active both by working to find a suitable eating pattern for their condition, but without neglecting certain rules, and by participating in the discussion that is established in the support group [11-13].

2. 5.Zone Diet was invented by the American biochemist Barry Sears and is based on a precise scheme according to which the food on each plate must contain 40% of the calories derived from carbohydrates, 30% from fats and the remaining 30% from proteins. By balancing these three energetic macronutrients, it would be possible to achieve an optimal physical and mental state, with a significant reduction in body fat, present in excess. This could happen as a result of careful hormonal control mediated by diet. In fact, food is the most powerful drug we haveavailable and we must take it as such, in a controlled way and in the right proportions.

Alterations in macronutrients could result in a change in the body's insulin/glucagon ratio with increased production of vasoactive eicosanoids and a greater supply of oxygen to the muscles.

The goal of the Zone diet is to control these two hormones by balancing carbohydrates, proteins and fats, which are responsible for weight gain and many diseases, preventing excessive fluctuations in blood sugar. The Zone diet is based on an assessment of caloric needs, which does not assess the real needs of the body and therefore you lose weight, even when the goal is not weight loss. With this diet, a metabolic state is reached that allows the body to work to its full potential, as a result of weight loss, without hunger pangs, full of energy and efficiency during physical activities [14].

2.6. Dissociated Diet involves the intake of carbohydrates, fats and proteins at times different of the day, separated from each other. Carbohydrates should always be consumed at lunch and protein at dinner, while vegetables should be present at all meals.

It was described by Dr. William Howard Hay and is based on very strict rules that do not allow the association of certain foods in the composition of the same meal or during the same day. The aim is aimed at both well-being and physical appearance only through a correct association of foods.

In the same meal, for example, you can eat a single food in large quantities or several foods belonging to the same category, i.e. compatible with each other; the association between both protein-rich and carbohydrate-rich foods should be avoided, as well as the association between protein sources of different kinds;fruit and dessert should be eaten throughout the day and not at the end of a meal. Great importance is given to the consumption of fruits, vegetables, smoothies and vegetable broths which, due to their low calorie content and correct food associations, promote the detoxification of the body.

It is also important to have the most abundant meal time, which must be eaten from 1 to 4 p.m., being careful not to associate carbohydrates and proteins; dinner should be rich in protein foods, almost completely excluding carbohydrates, with the addition of vegetables and fruit [15,16].

2.7. **Palaeolithic Diet** is inspired by prehistoric ancestors and involves the intake of simple foods, cooked in an elementary way, boiled or grilled. In addition, it recommend the consumption of fruit and vegetables, possibly raw,berries and seeds, reducing carbohydrates,

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cereals, dairy products and refined sugars, being processed foods, which prehistoric man could not have.

The Paleolithic diet has become popular due to its possible health benefits. Several, though not all, studies have suggested that such a diet could improve glucose tolerance, decrease insulin secretion, and increase insulin sensitivity, showing no difference from other types of diets, known as healthy, with regard to the effects on glucose and insulin homeostasis in subjects with impaired glucose metabolism. It has been shown that Paleolithic nutrition is associated with an improvement in lipid profile and a reduction in blood pressure that has a positive impact on weight loss, as well as reducing oxidative stress and inflammatory processes[17,18].

2.8. Chrono dietis a dietary strategy that is based on circadian variations in various biological functions which, in turn, depend on the hormonal changes that occur in the body during the day. In addition to calorie restriction, it is recommended to respect the timing of meals and the way to take them: for example, it is not recommended to eat fruit at the end of a meal, but always away from lunch, and dinner and no later than the early afternoon.

It is also recommended to take carbohydrates, in limited quantities, in the early part of the day, in the morning and early afternoon, when not only the liposynthetic action of insulin is counteracted by corticosteroid hormones, in particular cortisol, but the activities carried out during the day allow you to metabolize much of the energy introduced with food in the first part of the day. In the evening hours it will be recommended to increase protein consumption because the hormonal variation during the night favors the use of fats for energy purposes and the increase in muscle mass.

The concept of chrononutrition was developed in 1986 by Dr. Alain Delabos who noted that delayed meal times and irregular dieting, not in line with the biological clock, are associated with an increase in adiposity, type 2 diabetes mellitus and cardiometabolic risk factors. Hormonal control is of great importance for the relationship between nutrition and weight loss: some hormones promote the accumulation of body fat and the loss of muscle mass and others promote the disposal of body fat and the acquisition of muscle mass. Stimulating the secretion of one of the two types with the diet means not only achieving the desired goal, but also evaluating individual hormone levels and being able to intervene in case of hyper or underproduction [19-22].

Recently, the chronodiet has evolved into a food system comprising repetitive cycles of fasting and eating, known as "intermittent fasting" which has become a very popular methodof losing weight and preventing pathological conditions such as cancer, obesity, diabetes, cardiovascular disease and neurodegenerative diseases.

Intermittent fasting establishes a period of time of fixed duration during which you do not consume food, drink and exercise. You can freely choose from various time slots the most convenient one for your food intake.

Some examples are: 7:00 a.m. to 3:00 p.m.; from 9:00 a.m. to 5:00 p.m.; from 12:00 to 20:00; from 14:00 to 22:00. The most popular choice is to eat between 12:00 and 20:00, thus dedicating 8 hours to lunch and dinner and caloric drinks, while in the remaining 16 hours only water and non-caloric drinks are allowed, excluding any type of food. It is important to emphasize that in order to achieve weight loss it is necessary that the calories consumed in the 8 hours must be lower than one's needs.

Recent studies show metabolic improvements resulting from intermittent fasting in the decrease of blood glucose, heart and brain function, weight loss. Side effects including muscle loss, ketosis and electrolyte imbalance are also highlighted, therefore great caution is recommended in following this diet for pregnant or breastfeeding women, adolescents, the elderly, people with serious illnesses or organ pathologies [23,24].

2.9.Dash Diet is an alternative and healthy version of the Mediterranean Diet and is promoted worldwide by the scientific community. It has been designed to fight hypertension, LDL cholesterol and obesity and is based on the reduction of sodium and foods that contain it, allowing only 2 g per day. Foods that contain minerals such as potassium, calcium and magnesium also play an important role.

Adoption of the DASH diet has shown a significant reduction in blood pressure in adults with and without hypertension. The 1997 study, Dietary Approaches to Stop Hypertension, showed that a diet that recommended the intake of low-fat fruits, vegetables, and dairy products, which also included whole grains and a low amount of saturated fat and cholesterol, normalized blood pressure in people with established high blood pressure[25-27].

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2.10.Mediterranean Diet is the most important of all diets, it was elected Intangible Cultural Heritageof Humanity in the year 2010. It is typical of the peoples bordering the Mediterranean Sea,first and foremost Italy, and it is not a restrictive regime, on the contrary it recommends the comsum-ption of a very varied diet, while respecting some proportions: 55% of calories from carbohy- drates,15-20% from proteins and 25/30% from fats. In addition, it is essential to use extra virgin olive oil, which consists of a monounsaturated fatty acid, instead of other oils consisting of saturated fatty acids or even butter.

Numerous studies support the benefits of the Mediterranean dietary pattern to increase life expectancy, improve the quality of life, reduce the risk of serious chronic diseases [28-30].

Traditional Mediterranean diet is a complete eating pattern, characterized by a high consumption of plant-based foods: vegetables, fruits, nuts, legumes and unprocessed grains; low consumption of meat and meat products; moderate-to-high consumption of fish and low consumption of dairy products with the exception of yogurt and long-life cheeses, low consumption of eggs and sweets. The consumption of wine is allowed in moderation, during meals, while alcohol and spirits must be avoided.

Mediterranean diet has taken on considerable importance for its role in the prevention of cardiovascular disease [31,32].

Subsequent studies have qualified this dietary pattern as potentially effective against other pathologies such as specific types of cancer, diabetes mellitus, obesity, cognitive decline and mental health, respiratory diseases, osteoarthritis and quality of life or healthy aging.

It has also been noted by many studies, which have been carried out not only in the Mediterranean area, but also in other geographical regions, such as the United States or non-Mediterranean European countries, that the more severely this diet is observed, there is a decrease in the risk of fatal and non-fatal clinical events of cardiovascular disease, stroke and heart failure; reduced mortality, reduced disability in initially healthy subjects [33,34].

The Mediterranean diet represents an important point of reference in preventive medicine, due to the harmonious combination of many elements with antioxidant and anti-inflammatory properties, which overlap with each individual nutrient or food. The consumption of fruit and vegetables is an essential and characterizing element in this type of diet due to the presence of physiologically active compounds, functional foods [35-37].

These are foods used to develop and improve health and for which specific health effects have been approved and demonstrated. By functional food, in fact, we mean a food that, by virtue of the presence of physiologically active components such as flavonoids, phytosterols, isothiocyanates, carotenoids, ω-3, ω-6 fatty acids, has shown the beneficial effect on one or more biological functions of the body as well as having an adequate nutritional activity. In olive oil, for example, the main component, hydroxytyrosol, has been shown to induce apoptosis and cell cycle arrest in cancer cells; it may prevent cardiovascular disease by preventing oxidation of low-density lipoproteins[38-40].

2.11.Vegetarian Diet, once followed mainly by Eastern peoples, is becoming increasingly popular in the West, as it has been noted that a diet based mainly on the consumption of plant foods can help reduce the risk of developing chronic diseases, including cancer. Various reasons are at the basis for adhering to this dietary model: ethical-moral reasons based on the considerations that the killing of animals for one's own food purpose is cruel and immoral.

Food is not important for the use of a vegetarian diet, but the beneficial effects of diet in the prevention of chronic diseases affect health and quality of life. Religious reasons and the worrying environmental situation are also valid reasons to accept an abstention/limitation of meat consumption in favor of vegetable products [41,42].

Vegetarian diet includes two eating patterns that are distinguished by the content of the foods they contain. The **lacto-ovo-vegetarian diet** excludes not only meat and its derivatives but also all types of fish, molluscs and crustaceans; on the other hand, the consumption of milk and its derivatives such as dairy products and cheeses is allowed; eggs, legumes and all foods of plant origin. The **lacto-vegetarian diet** involves avoiding the consumption of eggs, in addition to meat, fish and their derivatives. It is a more restrictive diet and the exclusion of eggs means giving up some fundamental nutrients, such as high quality proteins and vitamin B12, to be absolutely compensated with the help of protein-rich foods of plant origin and supplements [43,44].

Vegetarian diets can promote health by presenting a reduced risk against some chronic diseases including ischemic heart disease, type 2

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diabetes, hypertension, obesity and also prevent some forms of cancer. Reducing the consumption of foods rich in saturated fatty acids by opting for vegetables, fruits, whole grains, legumes, soy, nuts and seeds, foods rich in fiber and phytocompounds, are the purpose of vegetarian diets that thus promote both the reduction of blood levels of total cholesterol and low-density cholesterol (LDL) and a better control of the glycemic load after a meal. It is important for the success of the diet to follow a healthier lifestyle, without smoking, without drinking alcohol, and to exercise daily. [45-47].

2.12.Vegan Diet excludes all products of animal origin from the diet by consuming only plant foods, including algae. This diet is more restrictive than vegetarian diets and, if it is not well strctured, can lead to nutritional deficiencies. Therefore, its composition should not be left to chance, but it is necessary to rely on a doctor or nutritionist to compose a personalized diet, introducing all the nutrients that the body needs, especially in the most delicate stages of life such as childhood, pregnancy and the elderly. Great attention must be paid to protein levels; vitamins, especially vitamin B12; minerals such as calcium, iron, zinc; ω-3 fatty acids, and if a deficiency is noted, resort to supplements [48,49]

According to some researchers, this diet could be useful in the prevention of neurodegera-tive disorders, such as Alzheimer's disease, by including in its composition low levels of saturated fatty acids and cholesterol and high amounts of phytonutrients such as vitamins, antioxidants and dietary fiber, which can help prevent cognitive decline. Among the plant products, in fact, there is a bright yellow flavonoid, very important for our diet, quercetin. It is the active ingredient of many medicinal plants, showing anti-infective, antibacterial and antiviral properties; a powerful antioxidant, protecting the body from the consequences of oxidative stress; It slows down the aging process, reduces the risk of cancer.

Recent studies have shown a neuroprotective effect on the brain and nervous system, by acting as an inhibitor of B-type monoamine oxidases, and therefore could be used against neurodegenerative diseases such as Parkinson's disease and Alzheimer's disease, as an alternative to drugs currently in use, that have undesirable side effects [50,51].

III. IMPORTANCE OF THE RIGHT CHOICE OF FOOD IN THE PREVENTION AND EVOLUTION OF DISEASES

3.1. Diet and Cardiovascular Disease

Cardiovascular diseases represent the most important health problem in the Wester world affecting the quality and life expectancy of patients [52].

The most frequent pathologies are those of atherosclerotic origin, in particular ischemic hear heart diseases, including acute myocardial infarction, angina pectoris, cardiomyopathies, heart ailure, arrhythmias and cerebrovascular diseases, including ischemic and hemorrhagic stroke.

Atherosclerosis develops slowly over the course of life and is asymptomatic; it affects blood vessels and the inner layers of artery walls that become thick and irregular due to the deposit of lipids and cholesterol. It is a generalized disease that can involve the arteries in different areas of the body: the sudden obstruction of a vessel causes myocardial infarction, if it is localized at the cardiac level, stroke if it is localized at the cerebral level,or intermittent claudication, if the arteries of the lower limbs are affected.

Many factors contribute to cardiovascular disease: age, sex, b lood pressure, cigarette smoking , diabetes, cholesterolemia. Currently, the risk factors have been identified and the reversibility of the risk has been demonstrated, therefore cardiovascular disease is now preventable through lifestyle changes, eliminating smoking, controlling blood pressure, taking medications, but above all with adequate nutrition.

A diet that is too abundant or rich in fats, especially of animal origin, produces an excess of cholesterol in the blood and accelerates the formation of atherosclerotic plaques that clog the arteries, while a diet with limited consumption of animal fats such as meat, butter, cheese, whole milk, low in sodium and rich in fibre, contributes to lowering cholesterol levels and blood pressure.

Plant-based diets are a useful tool for preventing heart disease, due to the presence of dietary fiber, complex carbohydrates, vitamins, minerals, polyunsaturated fatty acids and phytochemicals [53,54].

Eating too much and eating badly can also cause overweight, hypercholesterolemia, high blood pressure, diabetes, and therefore increase the risk of cardiovascular disease.

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It is recommended to keep the body active at all times, with daily walks or light gymnastics, as inactivity contributes to reducing the efficiency of the heart muscle.

Without regula physical activity, excess calories accumulate, favoring overweight, thedevelopment of diabetes, increased blood pressure and cholesterolemia, while regular exercise strengthens the heart and improves blood circulation.

Weight must also be controlled, although it does not have a direct action on the development of cardiovascular diseases, but excess weight promotes the risk of factors such as hypertension, high cholesterolemia and diabetes. It is closely linked to the type of diet and physical activity carried out: the right weight, in fact, derives from the balance of calories introduced with diet and spent with physical activity[55].

The wide variety of foods of animal and plant origin forms the basis of a healthy and balanced diet. It is necessary to include in the basic daily diet a greater consumption of fresh fruit, vegetables and vegetables of all kinds, being fat-free and rich in vitamins, minerals and fiber; also increase the consumption of legumes such as beans, peas, chickpeas, broad beans, lentils, because they represent a valuable source of protein, are fat-free and therefore can replace meat[56].

Increase the consumption of fish due to their protective effect due to the type of fats they contain, ω-3, which hinder the development of atherosclerosis. Prefer vegetable oils, especial extra-virgin olive oil and corn and sunflower seed oils.

Olive oil is more suitable for cooking and frying, as it alters less than seed oil at high temperatures; however, it is preferable to use raw oils, adding them to foods at the end of cooking [57]. It is advisable to limit the consumption of animal-derived fats such as butter, bacon, lard and cream due to their high amounts of saturated fats, which are the main cause of increased blood cholesterol. Prefer lean meats such as chicken and turkey, veal, rabbit, limiting the consumption of red meats and fatty meats, such as pork, goose, duck.

Cooking is also important and broiling,griddle cooking , steaming, avoiding roasts and all dishes that require sauces rich in fat; prefer stews and boiled meats, avoiding frying.

It is important to consume starchy foods such as bread, pasta, potatoes, polenta, trying to use whole grain products rich in fiber, because they have a high energy value but do not contain fat; their consumption should only be avoided in cases of overweight, obesity and diabetes.

Limit the consumption of salt, as it causes an increase in pressure, both added to food during cooking and before consumption, replacing it as much as possible with spices and aromatic herbs; pay attention to the salt contained in ready-to-eat foods, canned foods,foods preserved in salt, in oil or in brine. Limit the use of carbonated and sugary drinks, preferring unsweetenedjuices and freshly squeezed juices[58].

Wine and alcoholic beverages should be taken in moderate quantities, but not abolished:

many studies have shown that the cardiovascular protective effects of wine are to be attributed to the antioxidant, vasorelaxant and antithrombotic properties of its polyphenolic components, in particular resveratrol, being able to reduce the risk of heart attack and stroke. Excess alcohol,however, should be avoided because it increases blood pressure and damages the heart andliver[59,60].

3.2.Diet and diabetes mellitus 1

Diabetes mellitus is a disorder of glucose metabolism, which accumulates in excess in the blood, depriving cells of their energy needs, and results from the autoimmune destruction of insulin-producing beta cells in the pancreas. Genetic and environmental factors, still not well defined, are the cause of the onset of the disease, which if not diagnosed in time and subjected to therapy can lead to serious consequences, in a short time, such as ketosis, followed by precoma and diabetic coma. This occurs because the cells, not having glucose available, resort to other sources of energy such as fats and proteins, with the accumulation of toxic substances in large quantities [.61,62].

Type 1 diabetes, known as "juvenile diabetes", is on the rise in young children and it is necessary to keep blood glucose levels under strict control several times a day, administer insulin, monitor diet and physical activity, tasks that are assigned to health professionals, who have a great responsibility to perform these checks during the developmental period of young patients whose behavior is often unpredictable and difficult to control. check. No less important is the presence of the parents, especially the mother, who, in addition to protecting and reassuring the child, must understand and adapt quickly to the variations of the disease and the physiological needs of the child [63,64].

Young patients show increased insulin sensitivity, susceptibility to hypoglycemia, and

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neuropsychological effects, but due to poor linguistic expression and lack of knowledge, they are not able to recognize and report the first symptoms of hypoglycemia, on the other hand parents would not be able to distinguish between behavioral manifestations indicating low or high glycemic level and aggressive behaviors, normal development: all this interferes with the proper management of the disease causing considerable stress [65].

Recent studies are interested in the neurocognitive consequences of early-onset type 1 diabetes on hyperglycemia. The researchers found that young diabetic children with significant hyperglycemia had a decrease in gray matter volume compared to healthy control participants in key brain regions associated with cognitive abilities; the association between hyperglycemia and cognitive function was most evident in early and long-term diabetes, further highlighting the vulnerability of the brain during childhood development [66-69].

The diet of the type 1 diabetic child is similar to that of a non-diabetic one, since they have the same nutritional needs and will have as their objectives a harmonious growth, an ideal weight and regular physical activity. It is also necessary to constantly control blood sugar, by counting the carbohydrates taken during the meal, so that it maintains normal values, with the administration of appropriate doses of insulin prescribed by the pediatrician [70].

A nutritional model of a healthy diet for children and adolescents with type 1 diabetes, treated with intensive insulin therapy is represented by the Mediterranean diet, which, due to the varied composition of a large number of natural products, has antioxidant,chemopreventive and anti-inflammatory effects, reduces the level of triglycerides and cholesterol, as well as postprandial blood sugar. Children with T1D, like all children, should consume more fruits, vegetables, whole grains, and low-fat milk, limiting their intake of nutrient-deficient foods, saturated fats, sugars, and simple carbohydrates [71,72].

The preparation of meals should be based on the use of good quality products, with standard fats and without the addition of preservatives. Minimally processed products have a low or medium glycemic index, which for both diabetics and healthy people will help reduce insulin requirement in 24 hours, decrease appetite, and achieve or maintain a normal body mass.

Snacks pose a significant problem for children as they are sweet and highly processed. Fruits and dairy products are not appreciated by children and are usually preferred as an addition to processed foods, such as natural yogurt with the addition of an apple[73,74].

The dietitian's responsibilities should be to explain the importance of following a nutrition plan, while also making use of the participation of parents to solve complicated cases. The presence of parents at meals is important, because, by eating the same foods, they will encourage children, to imitate adults, to follow their example. Young children, in fact, due to food preferences, food refusal, emotional lability and behavioral resistance, reluctantly adapt to the rigors of a diet. Especially in the main meals, they have to get used to eating everything, so it is necessary to vary the diet as much as possible to allow the intake of all the nutrients [75]

3.3. Diet and diabetes mellitus 2

Type 2 diabetes is a very common disease all over the world and the risk increases with age, generally manifesting itself after the age of 40, with the presence of obesity and lack of physical activity. It occurs as a result of reduced insulin sensitivity by the liver, muscle and adipose tissue, or reduced insulin secretion by the pancreas.

Type 2 diabetes generally remains silent for many years as hyperglycemia develops gradually; typical symptoms are: fatigue, increased thirst, increased diuresis, weight loss, malaise. The major complications derived from diabetes can cause significant neurological damage, neuropathy, renal, nephropathy, ocular, retinopathy, and cardio-cerebrovascular, stroke, arterial disease of the lower limbs, coronary artery disease [76].

The prevalence of this disease is largely linked to the increase in obesity and a sedentary lifestyle, so proper nutrition and constant physical activity are of great importance in the treatment of diabetes.

The patient should avoid smoking and keep blood pressure and blood fat values, LDL cholesterol and triglycerides under control: a diet rich in saturated fatty acids increases the risk of developing diabetes, while substitution with unsaturated fatty acids, containing ω-3, reduces it.

The diabetic must prefer unsweetened and fiber-rich foods such as beans, lentils, whole grains, vegetables and fruits; low-fat foods such as skimmed milk, vegetable oils, low-fat yoghurts; must avoid processed foods; avoid fried foods by replacing them with steamed, baked, or grilled foods [77,78]

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IV. DIET AND GASTROINTESTINAL PATHOLOGIES

Diseases of the digestive system are widespread and affect both the upper tract, i.e.the esophagus and stomach, and the lower tract, i.e. intestine and colorectal including diseases of the liver, biliary tract and pancreas. Some diseases cause acute symptoms, which can lead to severe manifestations such as digestive bleeding and require emergency interventions; others, on the other hand, have a slow course and tend to become chronic, becoming permanent and often having a negative impact on patients' quality of life.

Gastroenterological diseases have quite varied symptoms: heartburn, nausea, stomach pain, bloating, dyspepsia, constipation or diarrhea and can be inflammatory or functional in nature.

4.1 Inflammatory gastrointestinal disorders

4.1.1 Gastroesophageal reflux is a disease that involves the involuntary reflux of fluid from the gastroesophagealtract and begins with heartburn, acid regurgitation up to swallowingdisorders with complications that tend to become chronic diseases. It is characterized by an increased backflow of acid secretion from the stomach into the esophagus, causing considerable damage to the sensitive mucous membrane of the latter.

Individuals who suffer from this condition also complain of a range of extraesophageal symptoms, including asthma, cough, hoarseness, and arm pain.

Reflux disease tends to worsen if it is not treated with active therapy, which must continue for a long time, such as to reduce the production of gastric juice.

Fatty foods and the consumption of large meals are one of the causes of contact betweenthe esophagus and gastric juice, because it is related to a delay in emptyin the stomach as well as relaxation of the lower esophageal sphincter. Other substances to avoid are stimulant drinks such as chocolate, coffee, tea; tomato and citrus fruits, because being acidic they can increase the production of gastric acid.

Experimental studies showed that regular exercise had a protective effect against reflux, and the resulting weight loss was effective in reducing reflux symptoms and increased acidity [79,82].

4.1.2 Gastritis is a general term for an inflammatory state, in particular,to the detriment of the Gastric mucosa that lines the walls of thestomach. It is often due to the presence of Helicoba-cter pylori, or to the use of certain medications or excess alcohol, leading to the formation of ulcers and bleeding.The most common symptoms are pain, burning and cramping in the stomach, nausea, vomiting and a feeling of satiety. Inflammation can arise suddenly with severe gastric pain, but of limited duration, in the case of acute gastritis; develop gradually, more subtly and persistently in the case of chronic gastritis.

Helicobacter pylori infection affects the normal gastric mucosa causing non-atrophic gastritis that can be cured by eliminating Helicobacter pylori with antibiotics; in the absence of appropriate treatment, it can extend into chronic infection and progress to atrophic gastritis and carcinogenesis.

A diet for gastritis can help relieve symptoms caused by gastric inflammation and consists of avoiding acidic, spicy, fatty, fried, sugary, processed, and caffeinated foods that can irritate the stomach. Whole grains are recommended such as bread, brownrice and pasta because they are bland and contain fiber important for the health of the digestive system, or even oats, barley and quinoa are other options nutrienti.in case of cramps, bloating, gas, white rice or potatoes are indicated which are more easily digestible[83,84].

Among the drinks, the following are preferable: water, herbal teas, vegetable milk and light apple or cranberry juice; Peppermint, ginger and turmeric tea are also particularly useful for relieving the symptoms of gastritis, promoting digestive function [85].

4.1.3 Gastroenteritis is an infection that involves both the stomach and intestines and iscausedby viruses, rotavirus and norovirus, or by bacteria such as salmonella,campylobacter and clostridium difficile or parasites. Typical symptoms are nausea, vomiting and diarrhea, which can also lead to severe dehydration; the therapy consists of drinking plenty of water and eating a light diet, avoiding fruits and vegetables. Easily digestible foods such as bread, pasta, potatoes, rice, bananas, fish, white meat, apples are preferred.

Norovirus is the mos t frequent caus e of gastrointestinal disease in many developed countries, and transmission often occurs by direct contact between people. This infection has also been associated with both the consumption of contaminated food such as raw seafood, berries, cold foods, sprouts, contaminated water and salads, and the contamination of the food product by food handlers [86].

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4.1.4.Coeliac disease is a chronic disease that causes the body to react to the intake of gluten from many cereals. It causes inflammation in the small intestine of which it damages the fundamental structures, the intestinal villi, causing a flattening and consequently an inability to absorb nutrients, compromising the patient's health, leading to diarrhea, abdominal bloating and bloating. Malabsorption of vitamins and trace elements can cause damage to several organs including nervous system, skeletal system, reproductive system, blood system.

The disease is associated with a risk of complications, such as osteoporosis and intestinal lymphoma [87].

Celiac patients have various neurological pathologies as a result of gluten sensitivity,such as ataxia, which compromises the control of voluntary muscles or peripheral neuropathy, which manifests itself with weakness of the extremities, a feeling of numbness up to pain in the hands and feet, caused by a high prevalence of transglutaminase antibodies 6[88].

There is no specific cure for celiac disease, the only effective treatment is the strict elimination of gluten from the diet. Bread, pasta, cakes and bread derivatives made with cereals and flours made from oats, wheat, spelt, barley, wheat, Kamut, or malt are prohibited. Yeast and seitan, ready meals that may contain traces of gluten, milk and yogurt based on cereals and malt, sauces, soluble nuts, sausages and candies that have gluten as a thickener should also be avoided. Drinks include beer and beverages that may hide traces of gluten and flavored teas [89,90].

4.1.5Irritable Bowel syndrome is a very common condition characterized by abdominal disconfort or pain associated with disorders of bowel function.The pain improves after bowel movements and is related to migraines, anxiety, depression, fibromyalgia, chronic fatigue, cystitis, sexual problems.

The pathophysiology of irritable bowel is unclear and the cause remains unknown, although many theories have been proposed.

Irritable bowel syndrome, formerly known as functional gastro-intestinal disorders, can be considered a disorder of the gut-brain interaction, as no organic cause could be detected by laboratory tests. Gastro-intestinal symptoms can be caused by emotional, dietary, hormonal factors, or taking medications. The personality of the patient and his ability to cope with pain and disability can influence not only the physiology of the intestine but also the way of interpreting pathological symptoms and thus influencing therapeutic treatment [91,92].

Although psychosocial factors may be involved, the cause of the syndrome is rather recognized as a combination of physiological and psychosocial factors. The reasons are not clear, but several psychological problems, such as severe depression, anxiety and personality disorders are present in this syndrome and occur under certain circumstances: intake of certain foods, hormonal alterations, stress, diseases of the gastrointestinal tract. According to the most reliable hypotheses, there is an abnormal communication between the brain, nerve fibers that innervate the intestine and intestinal muscles [93,94].

The gut microbiota is made up of the set of microorganisms present in the digestive tract and its well-being is characterized by biodiversity. In fact, there are both bacteria beneficial to humans such as Bifidobacteria and Lactobacilli, and harmful bacteria such as Enterococcus faecalis and Clostridium difficile.

If there is a balance between the two species, a state of eubiosis is established, and the organism enjoys good health; if this balance is altered, a state of disorder is established, dysbiosis, which, causing the permeability of the intestinal barrier, is unable to block harmful bacteria that spread in the circulatory system, causing not only diseases of the digestive system, but also diabetes and obesity, dermatitis, cardiovascular, neurological, psychological and oncological diseases [95].

Just as it is not possible to standardize the therapeutic system for all patients, as the alteration alteration of the bowel, in particular the alternation of constipation-diarrhea, can be diametrically opposed to the predictions, it is equally difficult to recommend a diet valid for all patients.

Most patient s believe that their symptoms worsen not only from foods containing carbohydrates and fats, but also from those that release histamine and those rich in biogenic amines, with a consequent lower quality of life [96].

Improvements in pain symptoms can be obtained, for example, by eliminating all irritating or stimulant products such as alcohol, coffee, chili pepper, pepper; use probiotic supplements combined with prebiotics to keep the gut microbiota healthy to provide adequate nutrient absorption and energy production; moderate the

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intake of easily fermentable carbohydrates such as oligosaccharides, disaccharides, monosaccharides and polyols [97].

Recently, it has been seen that getting a good night's sleep is the most important factor in the influential in reducing the risk of irritable bowel syndrome. In fact, sleep disorders are linked not only to pain but lead to a worsening of mood and consequently to a worse quality of life[98,99].

Gut health is a fundamental element for general well-being and to reduce the risk of developing irritable bowel syndrome it is necessary to maintain an active lifestyle, ensure sufficient sleep, and eat a balanced diet.

4.1.6 Chron's disease is a chronic inflammatory bowel disease that can affect the lower part of the small or large intestine or the entire digestive tract. Intestinal ulcers are present alternating with stretches of healthy intestine not only on the superficial wall of the intestine, but, in severe cases, can also reach the deeper layers. The most common symptom are chronic, sometimes hemorrhagic diarrhea, crampy abdominal pain, fever, loss of appetite, and weight loss.

The exact etiology of this condition is poorly understood: it is thought that the most likely cause is a combination of environmental factors and genetic predisposition. It has been noted that people who have a brother or sister affected by the disease are more likely to develop it than the general population.

Genetic data indicate the presence of dysfunctions of the innate immune system in patients with Crohn's disease and therefore one of the causes of the disease is an innate immune deficiency: the immune system attacks the gastrointestinal tract causing inflammation.

The greatest prevalence of Crohn's disease is found in highly industrialized areas, especially when here is a higher intake of animal proteins, milk proteins and ω6 fatty acids in the diet while there are no symptoms of the disease following the consumption of vegetable and fish proteins.

Nutrition is a fundamental parameter in the management of inflammatory diseases, in particular, on the regulation of the ratio between nutrients that may have pro- inflammatory or anti-inflammatory characteristics. The use of dietary supplements such as curcumin, ω3 fatty acids, vitamin D is also conditioned by anti-inflammatory effects and positive effects on the gut microbiome [100,101].

Lifestyle modifications can reduce the symptoms of the disease: adjust the diet with the introduction of fiber-rich substances; take proper hydration, quit smoking; eating small, frequent meals, instead of large meals; exercise regularly [102].

Among the elderly, weight loss may occur related to decreased food intake as patients experience fewer abdominal symptoms when they do not eat: the nutritional deficit can be harmful leading to steatorrhea, anemia, or protidemia, edema, bone demineralization, dehydration.

Patients with Crohn's disease often undergo complementary therapies: diets, use of probiotics, fish oil, phytotherapeutic and nutritional supplements, although the benefit of these treatments has not been ascertained [103].

The use of food supplements is recommended for patients who have undergone a resection of parts of the intestine: especially the free curcumin extracted from Curcumalonga has been shown to be effective, due to its anti-inflammatory power, in reducing symptoms [104].

4.1.7.Ulcerative colitis is a chronic inflammatory disease that affects the large intestine and then extends to the entire colon. It is characterized by abdominal pain and diarrhea often mixed with blood, extra-intestinal manifestations and an increased risk of colorectal cancer: it differs from Crohn's disease because it affects only the most superficial layers of the intestinal lumen, without extending to the lower ones.

Neither the nature nor a definitive cure is known with certainty, but with pharmacological therapies the tendency is above all to reduce inflammation and complication of the disease [105,106].

Pharmacological treatments are often associated with significant adverse effects, which are not appreciated by patients, many of whom do not experience any benefit from such treatments. Several studies have shown interesting pharmacological effects associated with curcumin, a polyphenol found in the rhizomes of Curcuma longa that has been shown to be effective in preventing or improving ulcerative colitis and inflammation and, therefore, can be considered as a well-accepted adjuvant and complementary treatment without causing sid effects [107].

Recently, new studies in the field of phytotherapy have documented the antiinflammatory properties of extracts of Viola tricolor, a plant of the Violaceae family. In addition to tannins, saponins, alkaloids, flavonoids, it

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contains circular plant peptides, "called cyclotides" with 3 disulfide bonds arranged in a knotted shape. This structure makes them stable to enzymatic degradation, heat and acids, making it possible to apply them in the gastrointestinal tract by oral administration. The different extracts of the plant enriched with cyclotides, obtained both in hot water and in solvents, have shown good anti-inflammatory properties, proposing, after appropriate investigations, as possible drugs for the treatment of inflammatory diseases [108].

In addition to pharmacological and surgical treatment, dietary regulation is a very important element of therapy, as certain components of foods can act on the composition and function of the gut microbiome.

The Mediterranean diet is one of the dietary models that has provided good results and is based on the intake of large amounts of fruits and vegetables being rich in vitamins and minerals; whole grains rich in antioxidants and dietary fiber; dried fruits, fish and olive oil rich in monounsaturated and polyunsaturated fatty acids.

Legumes are an excellent source of vegetable proteins, vitamins, minerals and complementing their amino acid composition associated with cereals, they are a valid alternative to the consumption of red meat. Due to their easy digestibility, red lentils are to be preferred among legumes, rich in complex carbohydrates, high in protein and low in fat, they also contain good amounts of minerals: iron, zinc and calcium [109].

Moderate amounts of fermented dairy products, eggs, herbs, and spices are included in this diet not only for their aromatic properties, but also for their antioxidant potential.

Another important component of such a diet is dietary fiber, especially the water-soluble fraction, because it is not irritating to the colon, stimulating the growth of microorganisms that provide butyric and propionic acid in the intestine.

These substances exert a protective action on the intestinal mucosa as they are anti-inflammatory [110].

V. RESPIRATORY SYSTEM DISEASES

The respiratory system can be affected by diseases that compromise the proper functioning of the organs, on which breathing depends, which are no longer able to supply the body with the amount of oxygen necessary for energy production. The nose, throat and trachea are the channels that allow the passage of air, while the organs mainly involved in the process are bronchi and lungs.

Characteristic symptoms of respiratory disease are: cough, dyspnoea, chest pain, nocturnalsnoring, wheezing.

It is possible to prevent the onset of pathologies by focusing on modifiable risk factors: topping smoking; do not expose yourself to second-hand smoke; avoid source of air pollution; do physical activity, avoiding a sedentary lifestyle; if you are overweigh or obese, lose weight through a healthy diet

5.1.Asthma is a condition in which the airways reversibly narrow, in response to certain stimuli, such as coughing, wheezing and shortness of breath, caused by specific factors triggered by inhaled allergens, such as pollen, particles derived from dust mites, cockroach secretions, particles from feathers and animal dander.

In allergic asthma, these allergens bind to immunoglobulins E, IgE, on the surface of mast cells, to stimulate the release of substances with an asmogenic action.

The causes of asthma are unknown, however, the disease is believed to be the result of complex genetic interactions, environmental conditions, and nutrition, manifesting itself in both children and adults.

Different foods and food groups have been shown to influence the development and course of asthma. Certain foods such as shellfish and peanuts can trigger severe attacks in sensitive individuals. Fruit and vegetable consumption may reduce the risk of developing asthma in children and adults, especially apples and oranges have shown a reduced likelihood of asthma and a reduced incidence of wheezing [111].

Diets low in vitamins C and E, omega-3 fatty acids, and vitamin D have also been linked to asthma; Another predisposing factor is obesity. There is no reliable data on the effectiveness of dietary supplements containing these substances in preventing the development of asthma; however, it has been shown that weight loss can reduce the risk and severity of asthma [112,113].

Several studies have shown that the consumption of fruits and vegetables had an effect on the reduction of proinflammatory cytokines, increasing anti-inflammatory markers [114].

5.2 .Chronic obstructive pulmonary disease (COPD) is a chronic progressive inflammation of the airways that restricts the passage of air due to obstruction of the bronchial tubes, but can also involve the lungs. In the long term, there is a real remodeling of the bronchial tubes, which causes a

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significant reduction in respiratory capacity. The situation is worsened by an increased susceptibility to respiratory infections of viral, bacterial or fungal origin.

The main symptoms of COPD are coughing up phlegm, shortness of breath, wheezing, and shortness of breath sometimes associated with wheezing, which can progress to pulmonary emphysema, promote infections such as pneumonia, and develop respiratory failure. The prolonged inflammatory state is also the cause of emphysema, an irreversible damage to the pulmonary alveoli.

COPD can also occur in the presence of a genetic disorder, such as "alpha 1 antitrypsin deficiency," a protein produced by the liver that protects the lungs.

The prevention of COPD is achieved by quitting smoking: tobacco, cigarette, cigar or pipe smoke, irritates the mucous membranes and promotes the establishment of inflammatory processes [115].

Exposure to environmental pollution and toxic substances should also be reduced: cadmium dust, dust produced by grain processing, silica dust, fumes from metal welding, coal dust and isothiocyanates.

The life of patients with COPD can be much more compromised if there are also "breathing difficulties" at rest, both during the day and at night, a disorder identified as "dyspnea at rest", which prevents the normal performance of daily and work activities, also affecting night rest [116,117].

Patients, in fact, experience recurrent fatigue; swelling in the ankles; loss of appetite and weight loss; tendency to acute respiratory infections, requiring hospitalization.

Sleep apnea syndrome is present more in males than in females over 50 years of age, who have excess weight, the presence of respiratory symptoms, tobacco, alcohol and hypnotic drug users. [118].

Sleep apnea is a very common condition, characterized by breathing that stops in a cyclical manner during sleep. These temporary respiratory interruptions deprive the brain and the entire body of oxygen, leading to awakening.

Interruption of sleep causes excessive daytime sleepiness, which is responsible for the increase in the rate of accidents both at home and at work and prevents you from leading a peaceful life. Another effect of apnea is desaturation, decrease in the amount of oxygen in the blood, which leads to heart rhythm abnormalities, coronary or cerebrovascular accidents, pulmonary vasoconstriction, systemic hypertension [119].

Sleep apnea can also give rise to mood swings, irritability, and even depression. It can also cause serious conditions such as diabetes, heart disease, liver problems and weight gain from metal welding, coal dust and isothiocyanates.

Sleep apnea can also give rise to mood swings, irritability, and even depression. It can also cause serious conditions such as diabetes, heart disease, liver problems and weight gain [120].

A healthy lifestyle is a valuable support for relieving symptoms and slowing down the progression of alterations in the lungs. It is important to stop smoking; practice regular physical activity, eat a healthy and balanced diet to maintain normal body weight. Add food such as fruit, vegetables, fish, yogurt, milk to your diet, avoiding fatty foods, fried foods, reducing the consumption of red meat, especially if processed [121,122].

The ideal diet should provide all the nutrients the body needs to function at its best and defend itself against infections.

5.3.Cystic fibrosis is the most common genetic disease affecting the respiratory and digestive systems. The cause is a mutated gene, CFTR (Cystic Fibrosis Transmembrane Regulator)gene, whose function is to regulate hydroelectrolyte exchanges [123].

Alteration of the protein leads to an abnormality in the transport of salts and determines, mainly, the production of "dehydrated" secretions which, producing a very thick mucus,causesthe closure of the bronchi and repeated respiratory infections. It also obstructs the pancreasand prevents pancreatic enzymes from reaching the intestine with the consequence that food cannot be digested and assimilated.

It is a subtle pathology, which acts without alterations in the physical appearancethroughoutthe course of life and without damaging intellectual abilities.Persistence of infection and lung inflammation, which causes progressive deterioration of lung tissue, is the major cause of morbidity.

Symptoms are: persistent cough, wheezing and shortness of breath, frequent bronchial and pulmonary infections, chronic diarrhea and in some cases intestinal obstruction at birth and in adulthood; poor growth in weight and height; salty sweat [124].

Nutritional support is very important, which should begin immediately after diagnosis

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with the aim of achieving an optimal state suitable both in the growth and development phase of the child and indispensable support for the well-being of the elderly. The diet has to address the problem of malnutrition in cystic fibrosis, which is the result of a chronic negative energy balance as a result of malabsorption. It must be high in calories and rich in fatty substances, with an increased protein intake to prevent muscle loss; It is generally associated with pancreatic enzyme replacement therapy and oral supplementation of fat-soluble vitamins A, D, E. If oral caloric intake is not sufficient to achieve anthropometric nutritional goals, additional enteral or parenteral feeding is necessary to improve nutritional status [125-127].

Enteral or parenteral nutrition consists of the administration of nutritional formulations enriched with specific nutrients, such as, for e xample, a triplet consisting of L- arginine, nucletides and omega-3 fatty acids, with a positive effect on clinical and immunological outcomes, which are dispensed enterally via nasogastric tube and parenteral intravenously.

Many studies show that even minimal amounts of nutrients administered enterally reduce atrophy of the intestinal villi and mucosa, increase the intestinal immune barrier, exert a preventive function on malnutrition and important deficits of the immune system [128].

5.4. Lung cancer is a disease that causes an uncontrolled growth of malignant cells, from the alveoli to the lung tissues, impairing the function of the lungs to transfer breathed oxygen to the bloodstream and at the same time to purify it of carbon dioxide produced by the body.

The main types of lung neoplasms are: non-small cell tumors such as adenocarcinoma and squamous cell carcinoma and small cell tumors such as microcytoma, typical of heavy smokers [129].

An effective primary prevention of lung cancer is based on the elimination of smoking, both active and passive, as it is the cause of the vast majority (85-90%) of lung cancers.

Other risk factors are: exposure to substances such as radon, asbestos, arsenic, nickel, tar and chromium for work purposes; air pollution.

In the early stages, lung cancer is asymptomatic and this is the main cause of late advance and metastatic diagnosis of this disease. Some early symptoms, common to other pathologies, should be a warning sign for the patient: difficulty breathing, a persistent cough, chest tightness, weight loss, blood in the sputum or following a cough [130].

The choice of treatment depends on the type of cancer and the stage at which it is found:surgery, chemotherapy, radiotherapy, targeted therapy, combination therapy.

The presence of a tumor in any area of the body can cause a feeling of general malaise, fatigue, loss of appetite and weight loss [131].

Proper nutrition is essential during therapy and it is necessary to take the correct amount of calories to maintain a healthy weight; can happen, due to the side effects of therapy, that foods have a different taste than usual, causing nausea and vomiting.

Recent studies for the chemoprevention of different types of cancer have been aimed a ω-3 polyunsaturated fatty acids, considered immunonutrients for their ability to promote the decrease of the state of hyper-inflammation and promote the action of the immune system [132].

Lung cancer patients suffer from complications, such as anorexia-cachexia syndrome, pain, and depression. The advanced stage of the tumor also implies a higher risk of developing malnutrition, these fatty acids, in addition to the anti-inflammatory effects, have shown promising antihypertensive, antitumor, antioxidant, antidepressant, antiaging, anti-arthritis and antidiabetic effects.

Since the type of treatment, surgical, chemothetapic, radiotherapy influences the risk of nutritional problems, both personalized approaches and knowledge of specific nutritionalproblems could have a positive impact on the course of the disease [133].

In practice, it has been noted that personalized dietary counseling, increased protein intake and supplementation with ω-3 fatty acids are effective only for some patients and therefore its use is very limited.

VI. TUMOR AND CANCER

According to the Italian Association for Cancer Research, by tumor we mean "an abnormal cell proliferation and can be limited to the site of origin, or it can give rise to metastases; for cancer, on the other hand, it indicates only a tumor capable of producing metastases"

Three types o f tumors can be distinguished: benign tumor, which does not have a cancerous form, grows slowly and does not spread to other parts of the body; malignant tumor, when cancer cells reproduce quickly they

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spread to adjacent organs and tissues in the form of metastases; precancerous tumor, when cancer cells reproduce quickly and spread to organs and tissues in the form of metastases.

The types of cancer are: carcinoma that arises from the cells of the epithelium lining the organs; sarcoma that originates from the bones and fat from the muscles in the pelvis, chest, and legs; lymphoma is a cancer of the lymphatic system; myeloma is a cancer that develops from plasma cells, which are useful for fighting infections; leukemia, blood and bone marrow cancer; brain and spinal cord cancer attacking the central nervous system.

6.1. Oral cancer is one of the most common malignancies. The incidence increases with age and is mainly found in the Alpine areas and in the North East, due to the greater consumption of alcohol and tobacco which, if combined, mutually enhance their harmful effects on the oral mucosa.

Other causes are poor oral hygiene; dental microtrauma such as broken, chipped and prosthetic teeth; precancerous lesions such as persistent white or red spots; Lichen planus.

Often these lesions occur in the vicinity of a decayed tooth or at the support points of dentures. The most affected sites are the tongue, the floor of the mouth, the mucous membrane of the cheek, the tonsil region [134].

Prevention consists of the elimination of alcohol and tobacco, treatment of oral lesions, care of oral hygiene, annual control of teeth, diet rich in vegetables and fresh seasonal fruit.

To reduce the risk of oral cancer, the diet must be optimized, reducing calorie intake, monounsaturated fats, and red or processed meat. The consumption of fruits, vegetables and grains, which are the main source of vitamins and fiber, should be increased in the daily diet; daily intake of micronutrients such as vitamin C, E, antioxidants, zinc, beta-carotene, and folic acid are effective in preventing oral cancer]135,136].

6.2. Cervical cancer

Cervical cancer is most common in the age group between 35 and 50 years. The main cause responsible is infection with the human papilloma virus that is transmitted during sexual activity. Risk factors are: early and persistent infection with human papilloma virus; early sexual activity; unprotected sex; high number of pregnancies.

Prevention is very important: protected sexual intercourse; intimate hygiene and sexual hygiene are essential to avoid the disease. To young people in particular are also Human papillomavirus vaccine recommended to protect against lesions pre-cancerous and cancers of the female genitals and male genitalia.

Although the tumor is asymptomatic in the early stages, some signs may occur such as blood loss after sexual intercourse, blood loss between cycles or during menopause, vaginaldischarge.

The treatment is chosen on the basis of the location and extent of the lesions in the individual patient and consists of a topical pharmacological approach, with specific cream preparations, which act both by physically destroying the lesion and by activating the local immune system; surgical approach, for the physical removal of growths [137,139].

6.3. Colorectal cancer

Colorectal cancer is a very common disease in countries with high economic development and it is thought that the risk is associated above all with a diet rich in fats, with a high caloric value, but lacking in vitamins and minerals.

Risk factors are mainly dietary, overweight and obesity; smoking could also have an influence, while a diet rich in vegetables and constan t physical activity have a protective action [140].

Family and hereditary factors concern the genetic origin of colorectal cancers resulting from polyposis and chronic inflammatory bowel diseases.

Important signs to keep under control are changes in bowel habits: in particular constipation and alternation between constipation and diarrhea; blood loss in the stool, colic abdominal pain[141].

Prevention consists of following a healthy diet, low in fat, with little salt and preservatives containing nitrates; take selenium, folic acid, vitaminB12, vitaminD, chlorophyll and antioxi-dant such as carotenoids, perform an endoscopy, to the removal of adenomatous polyps and avoiding the onset of cancer; after the age of 50, perform a faecal occult blood test every two years and, if positive, a colonoscopy [142].

New treatments for both primary and metastatic colorectal cancer, including surgery laparoscopic for the primary disease, more aggressive resection for liver and metastases of lung,radiation therapy for rectal cancer, and chemotherapy, have had limited impact on cure rates and long-term survival[143].

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6.4.Liver cancer

Liver cancer is considered an infrequent tumor, while secondary tumors, metastases, which colonize the liver from other organs, are more frequent.

Viral hepatitis B and C are the main cause of the onset of hepatocellular carcinoma that occurs many years after contact with the organ. The tumor can be diagnosed very early by ultrasound or alpha-fetoprotein assay[144].

Since the number of factors that cause hepatocarcinomas is very limited, they could be avoided, for example, with adequate immunization by vaccination for hepatitis B, which has been found to be very effective, or by pharmacological treatments.

Liver cancer in the early stages does not show any signs of itself; as the disease preads,specific symptoms appear: pain in the upper abdomen, enlargement of the abdomen, loss of weight and appetite, nausea,vomiting, feeling full, tiredness, jaundice, dark discoloration of the urine, fever, edema in the lower limbs.

Treatments include: minor or major liver resection; percutaneous ablative treatments such as thermal ablation, cryosurgery, liver transplantation[145,146].

Liver damage could be limited by drinking modest amounts of alcohol and moderating cigarette consumption.

6.5. Breast cancer

Breast cancer is a disease that is constantly increasing among the female population, the risk of which increases progressively with age. It is caused by the uncontrolled multiplication of mammary gland cells, which turn into malignant cells.

As with other cancers, in addition to environmental factors associated with lifestyle, there are also individual oncogenetic risk factors.

Breast self-examination, together with breast examination, screening examinations, a correct lifestyle, are the main elements of prevention and early diagnosis [147].

The most frequent initial sign is the breast lump, which is hard compared to the normal consistency of the breast and almost always painless.Other signs are: skin with characteristics resembling orange peel, nipple retraction, hardening of the breast, axillary lumps, nipple bleeding [148].

There is a close correlation between the onset of breast cancer and female hormones. In fact, the risk changes in relation to age: the incidence of the disease is high around the age of 50, decreases slightly later, to increase again after menopause.

Other factors concern 1st-degree relatives with breast cancer; obesity after menopause, excessive alcohol consumption, age at menarche, high blood pressure. Ionizing radiation is also a risk factor, if used repeatedly in prepubertal or pubertal age, also diagnostic purposes, especially on the chest wall and spine [149].

Currently, there is still no real primary prevention for breast cancer. It seems that appro-priate physical activity has a protective role; with regard to diet, it is advisable to consume more vegetables and fresh seasonal fruit; vitamin A derivatives appear to exert protective.Treatment consists of conservative surgery, followed by radiotherapy; mastectomy used if necessary [150]

6.6.Melanoma

Cutaneous melanoma occurs mainly in old age, but it is one of the most common cancers among young adults. It is a tumor that results from the tumor transformation of melanocytes, some of the cells that form the skin.

The main risk factor for cutaneous melanoma is excessive and repeated exposure to ultraviolet light; especially at an early age, it poses a danger, because it can damage the DNA of skin cells and trigger tumor transformation, which many years later can lead to the onset of melanoma. Other risk factors are functional impairment of the immune system and certain hereditary diseases, such as xeroderma pigmentosum.

There are four types of cutaneous melanoma: superficial spreading melanoma, lentigo maligna melanoma, acral lentiginous melanoma and nodular melanoma, the most aggressive,which unlike the first 3 types, which initially have a superficial growth, nodular melanoma invades the tissue deep from its early stages.

Main sign of cutaneous melanoma is the change in the appearance of a mole or the size, appearance of a new one. Asymmetry in shape, irregular edges, variable color, increase in evolution of the mole in a short time are the parameters that must be controlled; even a mole that bleeds even slightly, itches, or is surrounded by a lump or reddened area should be considered and checked periodically [151].

Best prevention is to expose oneself to the s un in a moderate way from childhood, avoiding burns. It is necessary to protect the skin by not exposing oneself directly to the sun during the hottest hours; it is advisable to wear clothing

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that protects against ultraviolet rays, hats and sunglasses and to use UVA and UVB protective creams with a high sun protection factor [152].

A thorough examination of the skin using epiluminescence, a special technique of enlarging and illuminating the skin; a biopsy, in which the suspicious lesion is taken and then analyzed under a microscope; imaging tests such as chest X-rays, CT scans, PET scans, and MRIs are helpful in determining the extent of the disease.

There are many treatment options for cutaneous melanoma: the first choice is usually surgery, which often cures the disease at an early stage. In some cases, sentinel lymph nodes, which are the first to receive lymph directly from the tumor, are also surgically removed [153].

In recent years, the development of immunotherapy and molecularly targeted therapy has opened up new perspectives for more personalized care for each patient.

Studies are underway to evaluate the combination of therapies, their sequencing or integration with other available treatments, for example, surgery and radiotherapy.

6.7. Pancreatic cancer

The pancreas is an organ that has the task of producing various hormones, including various enzymes useful for digestion. Pancreatic cancer often spreads rapidly to the lymph nodes and other surrounding organs, particularly the liver, and progresses so rapidly that treatment or surgery often fails [154] .

Pancreatic cancer can come in two types: endocrine pancreatic tumors and exocrine pancreatic cancers. The first type includes all pancreatic neoplasms that develop from a cell of the islets of Langerhans, the insulinoma. The second type includes all pancreatic neoplasms that originate from a pancreatic cell responsible for producing the enzymes necessary for digestion: pancreatic cancer.

Risk factors are mainly genetic factors; non-insulin dependent diabetes; pancreatitis, chronic, alcohol, exposure to solvents for industrial and agricultural use. It is important not to smoke and to eat a diet rich in vegetables and fruits [155,156].

Early-stage pancreatic cancer does not show any particular signs and the diagnosis is often made when the disease is already extensive. Weight loss and appetite, jaundice, localized pain in the upper or middle abdomen, often radiating to the dorsal region, asthenia, nausea or vomiting may occur.

The course of treatment depends on the size of the tumor and its spread to other tissues and organs. In some patients, the disease is identified when it is still localized and it is possible to proceed with complete surgical removal of the tumor, although the surgery is complicated and very risky.

Radiation therapy and chemotherapy may be used in combination or individually after surgery and in cases where surgery is not possible[157].

6.8. Prostate cancer

Prostate cancer is the second most common cancer in many Western countries; the tumor can be silent for many years, sometimes it may not give clinical manifestations for life. The risk increases after the age of 50 as you age. Three-quarters of cases develop after the age of 65: high levels of endogenous androgens increase the risk. If the tumor is diagnosed at its onset, there are several treatment options with a very good chance of recovery [158].

Constant physical activity, weight reduction and a balanced diet, low in fat and rich in vegetables, especially yellow vegetables,tomatoes and peppers with antioxidant properties, substances rich in vitamins A, D, E and selenium, are important for prevention.

Symptoms include urination disorders: difficult and frequent urination, pain when urinating, hematuria, perineal weight in the recto-bladder area, incomplete evacuation, acute urine retention.

Treatment includes robotic surgery, videolaparoscopic surgery, radiotherapy, hormone therapy and chemotherapy in advanced cases [159].

6.9 Kidney cancer

Kidney cancer accounts for about 2% of all cancers, with almost twice as much frequency men as in women. A risk factor is chronic exposure to certain metals such as lead and cadmium; tobacco smoke; special substances. There are also very rare hereditary forms such as von Hippel-Lindau syndrome, hereditary papillary carcinoma and clear cell carcinoma.

Early diagnosis typically comes from ultrasound and CT scans performed for other causes.

In the initial phase, this disease does not present any particular symptoms; in advanced kidney cancer, there is a palpable mass in the abdomen, blood in the urine, and localized pain in the lower back. General effects on the body are:

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weight loss, marked tiredness, fever, anemia, high blood pressure and hypercalcemia [160].

The use of minimally invasive techniques for the treatment of small tumors has increased significantly. Initially, cryotherapy and radiofrequency ablations were only recommended for patients with only one kidney or for those who could not undergo major procedures [161].

Clinical indications for these treatments are increased, but complications occur that include kidney bleeding or abscess formation, or additional effects in the intestine, pleura, and other organs. Better results are obtained with total surgery, partial surgery preserving the nephron or laparoscopic partial nephrectomy.

Metastatic kidney cancer is treated with molecularly targeted therapies and immuno-therapy: by combining an immunotherapy drug with a molecularly targeted biological drug, which recognizes and acts on specific molecules, angiogenesis and tumo growth tend to be inhibited [162].

6.10.Stomach cancer

Stomach cancer or gastric adenocarcinoma originates from uncontrollably growing gastric cells originating from the inner lining of the organ, the mucosa. It is one of the most common worldwide,and is found mainly in East Asia and Eastern Europe, above all in males than females

In recent years, there has been a decrease in cases following improvements in diagnosis and eradication by antibiotics of Helicobacter pylori, the main infectious risk factor also responsible for gastric and duodenal ulcer[163].

Cases have been reduced in part due to the recognition of other dietary and environmental risk factors. A diet rich in starches, fats and smoked or salty foods can promote the onset, as well as excessive alcohol consumption and cigarette smoking, while a Mediterranean-type diet, with plenty of vegetables, fresh seasonal fruit and little grilled or smoked meat, seems to have a protective effect.

A simple antibiotic therapy should be able to eradicate a Helicobacter Pylori infection.

The disease manifests itself with nausea, difficulty digesting , lack of appetite or difficulty eating; more serious symptoms are vomiting with blood or weight loss with anemia.

The chances of cure and the choice of treatments depend on the stage of development of the tumor and the general condition of the patients. For the initial stages of the disease, surgery is the treatment of choice and the surgery involves the removal of all or part of the stomach; surgeries can also be performed by video-laparoscopy [164,165].

In particular cases, some positive signs also come from the use of immunotherapy in addition to chemotherapy.

6.11 Bladder cancer

Bladder cancer, which is constantly increasing in industrialized countries, accounts for about 70% of cancers of the urinary tract and more than 3% of all cancers. It is most common between the ages of 60 and 70, and is much more common in men than in women.

Risk factors include cigarette smoking, chronic exposure to aromatic amines and nitrosamines, frequent in workers in the textile, dyestuff, rubber and leather industries, and the intake of certain drugs; infection with parasites such as Bilharzia and Schistosoma haematobium widespread in Egypt in particular; papillomavirus infections; bladder stones [166].

Currently, there are no scientifically reliable screening programs or early detection methods, so prevention consists of lifestyle changes by avoiding smoking and a healthy and balanced diet.

The symptoms related to bladder cancer are also common to other diseases that affect the urinary tract: presence of blood in the urine and the formation of clots; the burning sensation in the bladder when the abdomen is compressed, difficulty and pain in urinating; ease of contracting infections. Asthe disease progresses, these disorders can become important.

An early diagnosis consists of cytological examination of the urine: at the first urination disorders or in case of hematuria, ultrasound, kidney, bladder and biopsy are necessary [167].

Surgical treatment is the only cure for renal cell carcinoma . Laparoscopic radical nephrectomy is a standard treatment for renal malignancies with oncological efficacy equal to that of open radical nephrectomy. However, it has significant advantages such as reduced post operative morbidity, reduced need for analgesics, and shorter hospital stay and recovery [168].

Partial nephrectomy has become the preferred treatment for smaller tumors, established early in the disease and without metastases. Compared to radical nephrectomy, it is technically more difficult to perform as it depends on the specific characteristics of the tumor, such as size, depth, location, and proximity to the renal vascular system and urinary collecting system [169].

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VII. NUTRITION AND CANCER RISK

The results of a growing number of studies have shown the importance of a healthy diet in the prevention of cancer: it has been established that the presence of certain substances in food can be the cause of the disease.

Nitrites and nitrates used for the preservation of cured meats facilitate the appearance of colon and stomach cancer; Aflatoxins are toxic substances that can be released by certain molds in corn, legumes or other poorly preserved grains, they are responsible for liver tumors; Acrylamide is a substance that can be formed in the cooking of foods that contain starch, such as potatoes, biscuits, bread, etc., in the roasting of cereals and coffee, but only at high temperatures;

Animal fats and proteins present in large quantities in the diet promote the appearance of the disease, while foods rich in fiber, vitamins and trace elements, such as whole grains, legumes and vegetables, seem to have a protective effect. It is very important to have the variety of vegetables that are consumed in order to guarantee all the vitamins and minerals we need to protect our health, without the need to resort to supplements.

In cancer prevention, citrus fruits rich in vitamin C, berries containing a considerable amount of antioxidant substances, have a prominent place; green leafy vegetables such as salad, spinach, chard, endive very rich in folate: they play an important role in protecting DNA from genetic mutations.

Among vegetables, carrots and pumpkin are important for their antioxidant content; tomato, due to its lycopene content, a substance that seems to reduce the risk of prostate cancer. Cruciferous vegetables should not be forgotten: cabbage, cauliflower, broccoli, Brussels sprouts, turnip greens, arugula, radishes and watercress, with a protective impact against breast, lung, colorectal, prostate and bladder cancer.

Fruit and vegetable juices, juices, smoothies and smoothies can help compensate for a low intake of plant foods in the diet.

Numerous studies have shown an association between obesity and the incidence and mortality of different forms of cancer. In addition to those of the digestive system and thoseof the female system, the risk for tumors of the thyroid, kidney and prostate, multiple myeloma, acute promyelocytic leukemia and meningioma,also emerged.

The risk of developing stomach or colorectal cancer can derive from the type of cooking to which food is exposed: meat, fish, poultry cooked at very high temperatures on grills and barbecues release substances such as amines and aromatic hydrocarbons that are mutagenic;even during frying, at a high temperature, toxic substances such as acrolein can be produced.

The best type of cooking is undoubtedly steamed because the temperature is low preventing the nutrients, especially the water-soluble vitamins, from being dispersed.

Traditional oven or microwave cooking is also recommended.Alcohol is also an important risk factor for the consequences on the central nervous system and liver.

Very recent studies have shown a relationship between the substances present in our diet and the activity of our genes. They act mainly by activating certain genes and deactivating others, under certain conditions, and the observation of these variations is part of "epigenetics", a branch of genetics that studies how age and exposure to environmental factors, including physical and chemical agents, diet, physical activity, can modify the expression of genes without changing the DNA sequence.

Epigenetic modifications occur as a result of the activity of molecules that, through specific reactions, attach or detach from specific portions of DNA. These changes vary by type of gene, cell and over time: the consequence of epigenetic modifications is whether or not a gene is transcribed into mRNA, and transformed into a protein. Depending on whether or not this protein is produced, it may or may not perform its function.

Epigenetic modifications normally occur during life and can be influenced by many factors, especially diet, which is the most studied and well-known factor among those that can influence epigenetic mechanisms of gene control.

The foods we ingest are broken down within the body and their metabolites can generate important effects from an epigenetic point of view, also influencing the development of tumors in several ways. It is possible, for example, both to activate genes that promote cell growth or increase chromosomal instability, and to block the expression of genes that control growth, repairing damaged DNA, or initiating processes of programmed cell death, i.e. apoptosis [170-172].

Although ongoing research has identified drugs that can modify the epigenetic profile of cancer cells, further investigation is needed to

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understand how to get some of these drugs to the right gene, in the correct tissue, at the right time.

VIII. CENTRAL AND PERIPHERAL NERVOUS SYSTEM DISORDERS

The central nervous system consists of the brain, enclosed in the cranium , and the spinal cord contained in the spine.

The central nervous system processes the information collected by the peripheral nervous system and then distributes it through the same peripheral nervous system to the whole organism. The peripheral nervous system is formed by the set of nerve fibers and ganglia of the somatic nervous system and the autonomic nervous system.

The somatic nervous system transmits signals to the skeletal muscles involving voluntary movements. It presides also over involuntary reactions and includes the sympathetic system, which is concerned with the body's defense reactions in the face of unfavorable environmental situations, while the parasympathetic system is concerned with maintaining and integrating the body's energy in the resting state.

Pathologies of the nervous system are very numerous and the causes are very different because they involve various parts of the body.

8.1. Multiple Sclerosis

Multiple sclerosis is an inflammatory disease caused by an abnormal functioning of the immune system which, instead of being activated by external agents, attacks myelin, the substance that covers and protects nerve fibers and helps to ensure efficient transmission of nerve stimuli in all body districts [173].

The loss of myelin is followed by an alteration in the ability of nerves to conduct electrical impulses to and from the brain. The abnormal activity of the immune system does not affect just one area of the brain, but several areas: optic nerves, cerebellum and spinal cord, causing lesions that heal and form plaques.

The electrical impulses that are responsible for transmitting information are thus impaired and the patient is unable to perform movements, move a limb or see well, loss of sensation,dizziness, difficulty in perceiving heat and cold, fatigue [174].

There are many risk factors including age, sex, genetics, environment, smoking, injuries and infections, such as herpes simplex and rabies. The underlying cause of the disease is not yet known, but epidemiological studies mainly point to two causes: genetic and environmental factors.

Multiple sclerosis is not considered a hereditary disease, but it has been observed that people with a sick relative have a higher risk of getting the disease later in life. Among environmental factors, vitamin D deficiency, which manifests a protective role against immune diseases, seems to be associated with an increased risk of this disease.

In most people with multiple sclerosis, periods of relative well-being alternate with episodes of worsening symptoms, however multiple sclerosis gradually worsens over time.

People with multiple sclerosis can often maintain an active lifestyle, although they can tire easily, but regular physical activity, such as stationary bikes, walking, swimming or stretching, reduces spasticity and helps maintain good cardiovascular, muscular and physiological condition. In case of deficiency, it is important to take vitamin D, both to avoid more seriou symptoms of the disease and the risk of developing osteoporosis [175].

Multiple sclerosis is a chronic disease, from which there is no cure, despite the use of effective treatments that can decrease the frequency and severity of attacks, slowing their progression. For several years, the positive effects of cannabinoids for multiple sclerosis have been studied, both for symptomatic treatments and basic treatments: some active ingredients of cannabis such as delta-9-tetrahydrocannabinol and cannabidiol help reduce inflammation of nervous tissue and loss of myelin [176,177].

Multiple sclerosis is often treated with disease-modifying drugs: these drugs are effective but have some side effects, so more clinical and real-world evaluations are needed to obtain evidence of the long-term efficacy and safety of these drugs.

8.2. Ataxia

Ataxia is a disorder that progressively reduces the ability to perform voluntary movements due to the loss of motor-muscle coordination; It is called hematassia when the shape affects only one lateral half of the body.

The origin is due to damage to the cerebellum, since this is where impulses to the spinal cord and peripheral nerves that reach the muscles start. Various forms can be highlighted: cerebellar ataxia caused by a lesion to the cerebellum produced by inflammation, a deficit in blood supply or a neoplasm; labyrinthine ataxia, in

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which the inner ear is involved, and an optic ataxia, which involves a disturbance in visual coordination [178].

Ataxia can also occur as a result of ingestion or contact with toxic substances such as drugs, alcohol, radiation. In addition to generating involuntary movements in the arms,legs, head, and trunk, ataxia can create difficulties related to swallowing, voice, speech ataxia, and incontinence

The causes of cerebellar ataxia are genetics and gene mutations; some correlation with vitamin E deficiency has also been observed.

The therapy to counteract this pathology has not yet been identified; there are palliative therapies such as physiotherapy that helps to relieve pain and improve the quality of life of the ataxic patient with the aim of restoring motor alterations, monitoring pathological kinetic movements and, above all, increasing the patient's self-sufficiency and self-esteem.

In some cases, ataxia can also lead to memory loss, and neurological damage can lead to heart disease and bronchopulmonary complications.

In recent years, several studies have explored the relationship between the ingestion of gluten-containing foods and the appearance of neurological and psychiatric symptoms such as ataxia. Non-celiac gluten sensitivity is a combination of symptoms, similar to irritable bowel syndrome, including abdominal pain, bloating, abnormalities in bowel habits, and systemic manifestations such as "foggy mind," headaches, fatigue, joint disorders and muscle pain, numbness in the legs or arms, dermatitis, depression, and anemia [179].

Gluten ataxia is an immune-mediated disease triggered by the ingestion of gluten in genetically predisposed individuals. It generally affects individuals over the age of 50 who have symptoms of enteropathy and ataxia of the lower limbs. Early detection and treatment with a gluten-free diet can improve ataxia and prevent the progression of neurological dysfunction.

Readily available and sensitive markers of gluten ataxia include antigliadin antibodies. of the IgA and/or IgG type. Newer and more specific serological markers have been identified, but are not yet available [180].

8.3. Myelitis

Myelitis is a disease of the central nervous system, characterized by inflammation of the white matter or gray matter neurons of the spinal cord. The inflammatory consequence prevents the proper function of the spinal cord, consisting of the distribution of nerve signal between the various brain areas and the rest of the body.

Myelitis is due to several causes: some have a direct action on the spinal cord; others have an indirect action, being able to inflame the spinal cord even though they are not the main target the causative factors of myelitis are pathogenic bacteria, viruses, fungi and parasites; autoimmune diseases and some vaccines. In myelitis caused by an autoimmune disease, inflammation of the spinal cord occurs as a result of the immune system's aggressive attack on neurons in the white or gray matter. Some of the autoimmune diseases capable of producing myelitis are: systemic lupus erythematosus, multiple sclerosis, Sjogren's syndrome [181].

Depending on the area of inflammation, four types of myelitis are recognized: polio or gray matter myelitis, which affects gray matter neurons of the marrow; leukomyelitis, characterized by a lesion of the white matter neurons of the spinal cord; transverse myelitis, attacks the white matter of the medulla extending over the entire width of a relevant tract; meningococcal myelitis, in which inflammation of the meninges of the marrow also occurs [182].

The symptoms of myelitis vary depending on the cause and the area of location of the inflammation on the spinal cord: pain and stiffness in the neck, back and limbs; fever; headaches; nausea; vomit; widespread fatigue; spasms; loss of appetite; muscle atrophy; paralysis of the limbs; instability of posture and difficulty walking [183,184].

For diagnosis, the following are required: medical history, physical examination, neurological examination, CT scan and magnetic resonance imaging of the spine and spinal cord; lumbar puncture and blood tests.

The treatment of myelitis varies according to the underlying cause: administration of anti-inflammatories, painkillers, immunosuppressants, antiviral drugs, antispasmodics, to alleviate the suffering of this disease. Physiotherapy and psychotherapy support are also essential as adjuvants for both physical-motor problems and depression.

The diet must be aimed at the production of myelin, a fatty substance, white in color, similar to a sheath that surrounds the nerve fibers forming an insulating and protective layer.

It is composed of 40% water, while the remaining 60% is divided between lipids (80%) and proteins (20%). Myelin is essential for the

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normal functioning of the nervous system;it optimizes the transmission of nerve signals between neurons, which are transmitted to the whole body simultaneously and quickly.

Lack of myelin as a result of inflammation, metabolic or genetic factors, leads to nerve dysfunction and blockage or slowing of nerve conduction between the brain and the rest of the body. Some foods contain the building blocks for myelin production, promoting optimal nerve function and faster healing of damaged nerves.

A component of myelin is choline, belonging to the B complex, which is found in eggs, fatty parts of meat, nuts, sesame seeds, flax seeds, oats. Other components are: lectin, known as phosphatidylcholine, is a fatty substance composed of choline, fatty acids, and other lipid molecules and is contained in egg yolk, soybeans, wheat germ, liver, Brussels sprouts, peanut butter, and chocolate; vitamin B12 is also necessary for myelin synthesis and is found in eggs, shellfish, meat, poultry, fortified foods[185,186].

Minerals such as copper, zinc; zinc and iodine are important to stimulate myelin synthesis; cholesterol, tyrosine, lithium, vitamin C as well as polyphenols that can be taken following a varied and balanced diet.

8.4.Epilepsy

Epilepsy is a neurological disorder characterized by a predisposition to the onset of epileptic seizures. An epileptic seizure is a clinical event caused by an abnormal electrical discharge in the cerebral cortex that can be asymptomatic or cause significant disturbances. This electrical discharge temporarily interrupts normal brain function, leading to the appearance of alterations in the state of consciousness, convulsions or involuntary focal movements, and abnormal sensations.

It is not always possible to identify the underlying cause of epilepsy and in this case the disease is defined as idiopathic; In other cases, however, it is possible to link epilepsy to identifiable factors, such as genetic factors; brain damage due to trauma during childbirth; abnormalities in brain development; brain tumors; Infections; stroke[187].

Some factors can promote the onset of seizures: dehydration; skipped meals; alcohol consumption; hormonal alterations; sleep deprivation; fatigue; stress; use of certain medication.

The diagnosis of epilepsy is based on the evaluation of the signs and symptoms reported by the patients and the results obtained from the electroencephalogram; TAC; magnetic resonance imaging; positron emission tomography.

There is no real cure for epilepsy, however, there are numerous therapeutic approaches that can be taken to control the disease and seizures [188].

For some patients who do not respond to treatment with medication, a diet-based intervention may be indicated: these patients are prescribed a ketogenic diet that should help reduce symptoms associated with the disease [189,190].

8.5. Parkinson's disease

Parkinson's disease, or Parkinson's disease, is a neurodegenerative disorder that affects the central nervous system. It causes the degeneration of dopamine-producing nerve cells in the brain's gray matter, which is responsible for activating circuits that control movement and balance [191].

The disease is identified by the appearance of motor symptoms, such as tremor at rest, slowness and decrease in movement, rigidity, associated with instability of posture and/or gait. In Parkinson's disease, the failure to release dopamine leads to a series of severe dysfunctions of the basal ganglia, thalamus and cerebral cortex and motor disorders including tremor, rigidity, decreased movement and loss of balance depend on these alteration. altera Non-motor symptoms such as constipation are also present; depression; sleep disorders; olfactory deficits; cognitive disorders; alterations in blood pressure regulation[192,193].

The average age of onset of Parkinson's disease is about 60 years and it develops more frequently in men than in women. Forms associated with genetic mutations account for about 10% of cases and most often have an onset at a young age and/or more cases among blood relatives. Currently, more than 20 genes are known whose mutations can cause the disease or increase the risk of developing it.

The correct therapeutic approach from the early stages of the disease is important both in determining the control of symptoms and in the long-term prognosis and is influenced: by the clinical condition of the patient; possible comorbidities; pharmacolo- gical therapies already in progress; the family and work context [194].

The activation of the dopaminergic system is the focus of drug therapy in Parkinson's disease, but for selected patients, in the advanced stages of the disease, it is possible to access advanced

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neurosurgical therapies such as deep brain stimulation []195].

8.6.Alzheimer's disease

Alzheimer's disease is a chronic and progressive neurodegenerative disease that destroys brain cells, causing an irreversible deterioration of cognitive functions to the point ofcompro-mising autonomy and the ability to perform normal daily activities.

The cause of Alzheimer's seems to be due to the formation of a neurotoxic substance, the amyloid beta protein, which slowly accumulates in the brain forming plaques that adhere to neurons leading to progressive neuronal death.

The symptoms of the disease can vary greatly from person to person;the earliest symptoms to look out for is memory loss. Subsequently, other disorders are added, such as:

difficult performing normal daily activities with consequent loss of autonomy; speech disorders; spatial disorientation; depression; sleep disorders; agitation, delusions and hallucina-tions.The person with Alzheimer's also has personality alterations, showing apathyand disinterest in their hobbi or work [196].

Prevention of the disease consists of protecting oneself from heart disease, hypertension, hypercholestelolenia, overweight and diabetes, by following a balanced diet, combined with physical activity and appropriate cognitive stimulation: all strategies in favor of brain and cognitive well-being [197].

Components of the Mediterranean diet that include fruits, vegetables, bread, wheat and other grains, olive oil, fish, and red wine, may reduce the risk and delay the course of Alzheimer's disease. Furthermore, curcumin, a spice obtained from Curcuma longa, for its anti-inflammatory and antioxidant properties, could be useful in Alzheimer's not only to inhibit the formation of new plaques of amyloid beta protein, but to prevent the aggregation of these plaques, binding to them, destabilizing them and preventing aggregation between

them [198].

Some drugs, such as acetyticolinesterase inhibitors, can improve symptoms and the progression of the disease; other medications control depression, sleep disorders, behavioral disorders; the possibility of administering antibodies against amyloid beta has not yielded positive results [199].

Many studies show correlations between certain lifestyles and the incidence of the risk of contracting the disease. In fact, people who engage in intellectual activities, such as reading, board games, crossword puzzles, performing with musical instruments, or who have regular social interaction, show a reduced risk of developing Alzheimer's disease[200].

8.7.Autism

Autism is a complex syndrome with multiple genetic and environmental causes concerning developmental disorders, characterized by behavioral impairments, such as difficulty in establishing normal social relationships; abnormal use of language or even absence of speech; limited and repetitive behaviors; very limited and intense interests; very pronounced or reduced response to physical sensations such as tastes, smells, touch [201,202].

Several studies have shown that in some people diagnosed with autism there are neuronal and cortex abnormalities affecting the frontal and temporal lobes, i.e. the brain sites involved in emotions, social behavior and language, the main abilities impaired in autistic subjects.

Neuronal networks are formed mainly during the fetal development phase, which is why it is hypothesized that the cause of this disorder is due to a combination of genetic factors and congenital alterations.

Some environmental risk factors could affect the onset of autism, such as premature birth;alcohol and drug abuse by the mother during pregnancy; exposure of the foetus to continuous pollution; any infections contracted by the mother during the gestation period; the advanced age of the parents [203].

Autism spectrum disorders typically occur in the first few years of a child's life.

Generally, parents are the first to realize their child's difficulties as early as 18 months.

The diagnosis is clinical, based solely on observation of the child during play: there are no laboratory or imaging tests that can confirm the diagnosis. In addition to autism-related symptoms, it is necessary to investigate the child's cognitive functioning, adaptive behavior and language skills .

In the autistic subject, the sensory alteration of taste is one of the causes for which the child has eating problems, so it is necessary to intervene not only therapeutically, but also by stimulating a greater interest in food [204] .

The autistic child with taste problems not only presents himself malnourished due to a deficient or inadequate diet, but may, for example, eat inedible substances such as detergents or soap,

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compromising his health; it can be selective, feeding for long periods always with the same always with the same foods; In some cases, it can even regurgitate the ingested food and then summarize it [205].

Anything that has a taste, when put in the mouth, is evaluated by the tongue according to these four tastes: sour, salty, bitter and sweet; in addition, it is also extremely sensitive to touch,distinguishing the texture of food, so it is sometimes difficult to separate the gustatory function from the tactile one.

The choice generally manifests itself in a preference for certain particular foods, and is based on the texture, color and shape of the foods; it is usually aimed at dry, dry or semi-liquid foods. Most of these children also have recurrent behaviors at mealtime, such as fleetingly touching the food that is offered to them, with the intention of testing its texture, testing it orally, smelling it and only then eating it. For other children, it is a routine behavior to chew food for a very long time, until it is swallowed by random ingestion rather than as a voluntary act. Finally, many of the preferences for food are induced by the interest in the organoleptic characteristics or in the box or in the packaging of the food itself.

An autistic child may insist on eating the same food at every meal, may request/demand a particular presentation of the food on the plate or prefer only foods with a very reduced consistency such as puree or fruit juices; finally, it can show preference/rejection of a particular food just because of its color [206,207].

A great obstacle in the nutrition of these children is the inability to verbally communicate their needs, such as hunger, the sense of satiety, the preference for certain foods for which it is necessary to carefully observe their reactions when, at times, which must be strictly respected, food is taken. Autistic child also has a tendency to isolate himself, has a reduced interaction with peers, thus making it very difficult to learn common eating behaviors such as the appropriate use of the spoon or the ability to feed himself.Autistic behavior is often accompanied by numerous annoying symptoms of the gastro-intestinal system, such as abdominal pain, nausea, vomiting, constipation or diarrhea, which cause loss of appetite and malabsorption of food. These problems are often associated with an imbalance of the intestinal microflora: clostridia, enterococci, as well as quantitative differences in staphylococci and candida have been found in the feces of autistic people [208,209].

In particular, in their faecal flora, a greater presence of the Clostridium histolyticum group,Clostridium I and II clusters, which are producers of a toxin, responsible for intestinal dysfunction, with their metabolic products, also exerting systemic effects, has been found [210].

Monitoring and stabilization of gut microflora and knowledge about the role of particular strains in the etiology of autistic disorders may increase the likelihood of appropriate therapy.

IX. CONCLUSIONS

Proper nutrition is essential to ensure a good quality of life and a peaceful old age. Eating healthy and in the right proportions is the secret to keeping the body in good health without burdening the functioning of the organs: from the various foods it is possible, in fact, to keep provide the body with all the nutritional principles necessary to carry out various activities, it in good health without resorting to doctors or drugs.

In more recent years, there has been increasing evidence on the priority role of diet and specific foods in the prevention and therapy of many morbid conditions. Therapeutic foods are taken on a daily basis, but only recently has it been possible to know the mechanism of action of their constituents. The evaluation of the health potential and/or prevention of a specific pathology It certainly represents the most delicate and critical phase in the enhance-ment of a food in order to consider it therapeutic.

In the initial phase of research, it is necessary to know perfectly the chemical composition of the food, and to verify the existence of any form of interaction between one or more components of the food itself with a specific function of the human body: this is certainly not easy and not always possible to demonstrate with scientific rigor.

However, properly combined, foods can replace drugs and cure many diseases, because the natural molecules contained in food are just as effective as medicines, but, very importantly, foods are also free of long-term side effects.

In addition, the influence of the food matrix on the gastrointestinal absorption of the active substances and thus their bioavailability must be considered. Many of them, although active in vitro, do not show any beneficial action when administered in vivo, precisely because of poor bioavailability. Experimentation also needs to be deepened: the results of animal trials may not

match those in humans, and the long-term effects are poorly understood.

In more recent years, there has been increasing evidence on the priority role of diet and specific foods in the prevention and treatment of many morbid conditions.

Therapeutic foods are taken daily, but only recently has it been possible to learn about the mechanism of action of their constituents. The evaluation of the health potential and/or prevention of a specific pathology certainly represents the most delicate and critical phase in the enhancement of a food in order to consider it therapeutic.

Competing interest

The author declares that there is no conflict of interest

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