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Review Article

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Nutrition in the Patient with Cancer Clinical Physiological and Therapeutic Aspects

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Introduction

The relationships between nutrition and cancer are as broad as they are conflictive because they encompass the wide spectrum of nuances with which they causally interact. Since times past there has been medical concern about malnutrition in cancer patients, but it is undoubtedly since notable progress has been made about therapeutic options for cancer that nutritional aspects have taken on special importance. This is since when more aggressive therapeutic strategies are applied, there is less tolerance to these treatments and greater morbidity from them, in patients with deterioration of their nutritional status. At present, recent advances in the field of neurobiology have shed light on the participation of neurotransmitters in the mechanisms of anorexia. On the other hand, malnutrition in carriers of neoplasms is closely linked to the negative impact of economic variables, quality of life and survival. De Wys et al., more than 2 decades ago, were among the first to draw attention to this issue, reporting that more than 50% of the 3,000 patients included in the Eastern Cooperative Oncology Group had marked weight loss. Other studies, such as those by Shils et al., show different degrees of nutritional compromise in patients undergoing major surgery for cancer.

The percentages vary according to the type of pathology. Thus, De Wys finds that the highest frequency of weight loss is registered among carriers of gastric and pancreatic cancer (85%), followed by patients with high-grade non-Hodgkin's lymphomas, colon, prostate, and cancer, lung (40-60% of weight losers), and finally, those of non-Hodgkin lymphomas of low grade of malignancy, breast cancer and sarcomas. The stage of the disease is also a determining factor for malnutrition: 90% in terminal patients versus 49% in patients with advanced but non-terminal disease. In general terms, it is estimated that there is a higher prevalence of malnutrition in Oncology in elderly patients, with solid tumors and with more advanced disease. Both because of the eloquence of the figures and because of the broad clinical, psychological, and socioeconomic dimension of this problem, the nutritional alterations of the cancer patient must be adequately and early diagnosed. This is the first step to therapeutically address the complexities of its nature, on which a significant number of investigations are focused in the clinical, nutritional, and pharmacological areas.

Pathophysiology of malnutrition in cancer patients Cachexia-anorexia syndrome.

The presence, in an oncological patient, of a significant weight loss, with evident deterioration of muscle mass, weakness, anemia and hypoalbuminemia, makes clear the existence of a very particular form of malnutrition which has been called cachexia, a word which derives from the Greek, and which etymologically corresponds to "bad condition", denoting a deterioration not only structural but also functional. Oncological cachexia can be considered as the result of a multifactorial complex and includes two different categories of causes:

1. Those derived from a reduced intake of nutrients and calories, associated or not with malabsorption.
2. Those originated in metabolic alterations of the host. In this way, it is possible to distinguish between malnutrition due to cachexia and malnutrition caused by fasting (anorexia). Anorexia is defined as reduced appetite and early satiety, leading to reduced intake. About half of cancer patient's manifest anorexia at the time of diagnosis.

Cancer treatment, especially chemotherapy, often causes nausea and loss of appetite, leading to inevitable weight loss. For its part, cachexia is designated as the effects of the tumor on the host, different from those resulting from the mechanical interference of the tumor with vital organs. That is, although anorexia is associated with cachexia, they should be seen as two different mechanisms, as summarized in Table 1. These basic differences will be treated in detail when the physical and biochemical manifestations of both variants of malnutrition are analyzed. (See Nutritional diagnosis).

Decreased intake (anorexia-fasting)

The reduction in food intake in cancer patients can be caused by alterations directly or indirectly related to the presence of the tumor. As it is easy to understand, the main causes of reduced intake

are associated with neoplasms of the digestive system. However, in many cases, the mechanisms underlying anorexia are chemical meters (cytokines), which are increased in cancer patients. Cytokines [interleukin-1, tumor necrosis factor alpha (TNF-alpha) and interleukin-6] are associated with the development of anorexia through various mechanisms. The case of leptin, a neuropeptide involved with weight control, is interesting. Normally, the increase in fat mass stimulates the release of leptin that acts at the hypothalamic level, reducing intake. This neuropeptide would be increased by stimulation of cytokines, which makes the appetite decrease even in a situation of lower fat mass. But it is important to remember that it is not only cytokines that are responsible for anorexia in cancer patients. When we analyze the picture, we can begin to understand the complex game of neurotransmitters, prostaglandins and hormones that interact with each other at the peripheral and central levels and that lead to the rejection of the subject affected by the food.

Metabolic disturbances

Neoplastic cachexia, understood not as the mere result of a patient who does not eat but as a state of depletion of the metabolically active mass accompanied by metabolic phenomena that become very complex management, has worried researchers for several decades. Thus, various hypotheses have been generated over time. The hypothesis of tumor competition for host nutrients generating metabolic pathways that involve energy expenditure (Cori cycle), installed from animal models, does not seem to represent the main axis of the problem in humans, because the tumor / host volume makes that this supposed competition is energetically negligible. It should be remembered, however, that the preferential use of certain amino acids such as leucine or glutamine by tumor tissues can modify the plasma aminogram and cause disorders in organs with rapid cell turnover, such as the intestinal mucosa. Some authors even consider that certain amino acids traditionally considered essential, can become conditionally essential. It would be the case of glutamine, arginine, ornithine, citrulline and proline. Some authors, such as Cerchietti et al., consider that cytokines would act to generate a true syndrome of immune-metabolic dysfunction, represented by alterations in psycho-neuroimmune-metabolic homeostasis, with a plethora of clinical expressions that include from cachexia to cognitive changes, coagulopathies, and fever of tumor origin.

The main function of these chemical mediators would be to transmit information from cell to cell forming circuits that activate, for example, the immune system in the presence of an infection (pro-inflammatory role of cytokines). This mechanism, normally adjustable when the infection is controlled, can be unleashed in the presence of a tumor, and give rise to a response that is difficult to control, and without benefits for the organism in which these processes develop. In short, it could be considered that organic events constitute a true systemic response, of a low degree but of a continuous nature, This type of response involves both the cytokines produced by the host and those products synthesized by tumor tissues (lipolytic factor, proteolytic factor). Although energy expenditure is not necessarily increased in cancer patients, there are alterations in the metabolism of carbohydrates, proteins, and fats. (Table 2). These metabolic alterations are distinguished from those recorded in fasting patients, which is a situation that could also arise in cancer patients, if, for example, obstructive symptoms of the digestive tract that interfere with the oral intake of nutrients predominate.

Alterations in carbohydrate metabolism

The tumor can become a true second glucose-consuming organ (after the brain). This leads to the need to keep the neoglycogenic pathways permanently active, using the source of amino acids provided by the muscle, lactate, produced in the tumor glycolysis pathway (Cori cycle), and glycerol (provided from the lipolysis process increased). The main protagonist of these processes is TNF-alpha, which promotes neoglycogenesis indirectly or through a glucagon secretagogue stimulus.

Protein metabolism disorders

The most activated metabolic pathway in the process of tumor cachexia is undoubtedly the catabolism of muscle mass, which affects both myofibrillar proteins (contractile proteins) and non-fibrillar proteins (structure proteins). The following participate in this process: Lysosomal system (extracellular proteolysis and cell membrane receptors) System activated by cytosolic Ca ++ active in myofibrillar proteolysis Ubiquitin pathway - ATP (binding of ubiquitin to proteins with signaling for proteolysis; requires ATP): with the active participation of necrosis factor kappa beta (NF-kappa □), TNF-alpha and IFN-gamma. Corticosteroids would "release" NF-kappa □, facilitating its proteolytic action (corticoid muscle catabolic effect). Proteolysis inducing factor (PIF), which also activates the ubiquitin-proteasome pathway, through an intermediate: 15-HETE (15-hydroxyeicosatetraenoic acid). This intermediate would be inhibited by a predominant fatty acid in fish, eicosatetraenoic acid (EPA), which constitutes an interesting line for the therapeutic approach of cachexia (see Nutritional support in oncology). These types of mechanisms operate to a greater or lesser extent in all cancer patients and are more notable in the presence of advanced disease. But in addition, there is a large consumption of glutamine used in tumor cell proliferation, which depletes the host of it, reducing its availability for some tissues that use it as a preferred nutrient, such as the intestinal mucosa and the immune system.

Alterations in lipid metabolism

The loss of adipose tissue of the host of a tumor would respond to 2 mechanisms: Inhibition of lipoprotein lipase (LPL), produced by TNF, increased lipolysis, which responds to the presence of lipid mobilizing factor (LMF), which activates cAMP lipolytic pathway, acting synergistically with lipolytic hormones (norepinephrine, epinephrine, and glucocorticoids).

Certain fatty acids released from adipose tissue, such as linoleic and arachidonic, could promote tumor growth. The first of them is linked to the enzymes COX (responsible for the synthesis of prostaglandins and thromboxane's) and LOX (involved in the synthesis of leukotrienes). In the case of the isoenzyme COX 2, induced by cytokines, its participation in the carcinogenesis process stands out, and the same would happen with some metabolites of LOX. Inhibition of LPL also causes hypertriglyceridemia.

Cancer treatments and nutritional status

The pathophysiological spectrum of malnutrition in Oncology

would be incomplete if the role that cancer treatments play on the nutritional functions of the individual who receives them were not considered.

Surgery

Beyond the metabolic stress (hypermetabolism and protein hypecatabolism) that major surgery implies, its importance on the nutritional status arises from the cases in which it constitutes the therapeutic modality for cancers originating in the digestive system. Radical surgery for head and neck cancers can make it difficult to eat food for long periods and perhaps for the rest of life. Postoperative complications of esophagectomy can include fistulas and aspiration, while total or partial gastrectomy, small bowel resection, total or partial colectomy, total or partial pancreatectomy, or any combination of these procedures for the treatment of tumors of the digestive system, can induce malnutrition due to the decrease in the absorption of nutrients or due to the lack of essential enzymes for normal digestion.

Chemotherapy

It should be remembered that chemotherapy drugs are not only toxic to neoplastic cells but also involve all rapidly changing cell lines, such as those of the digestive system. Mucositis and ulcerations of the oral mucosa, as well as difficulty or inability to swallow (dysphagia) and pain when swallowing (odynophagia) are determinants of the decrease in the intake of solids and liquids. Some agents such as methotrexate and cyclophosphamide can alter the taste buds, causing dysgeusia or hypogeusia. Others, such as procarbazine, can reduce salivary secretion (xerostomia). Although chemotherapy-induced nausea and vomiting can be adequately controlled by the administration of antiemetics such as ondansetron and granisetron, it is common to reduce the intake during the days when chemotherapy plans are administered. The magnitude of these disturbances will depend on the type of drug (greater with dactinomycin, daunorubicin, cisplatin, nitrogen mustard, streptozotocin, nitrosoureas and dacarbazine), its dose, the duration and frequency of the series of treatments and the individual characteristics of each. patient. The need to resort to antibiotics in immunosuppressed patients can accentuate these phenomena of nausea and vomiting. Similarly, fatigue, common in patients undergoing chemotherapy, resents food, because those affected feels tried to eat or weak to prepare their food.

Alterations in the intestinal epithelium led to diarrhea, abdominal pain, and even some degree of protein-losing enteropathy, as occurs with the use of cytosine, arabinosides, and 5-fluorouracil. In addition to the intake limitation imposed by the presence of diarrhea, this manifestation accentuates dehydration and vomiting-induced electrolyte spoliation.

In less frequent cases, chemotherapy can lead to abdominal pain and constipation. The most susceptible patients are the elderly, and the drugs most prone to these types of side effects include the vinca alkaloids, which can potentiate their effects in patients who also receive opioid analgesics.

Radiotherapy

Ionizing radiation therapy can cause fatigue, anorexia, changes in taste, decreased saliva, difficulty chewing, nausea, vomiting, and diarrhea. These manifestations will vary depending on the site of application, the duration of treatment and the radiation dose used. Undoubtedly, patients with head and neck cancer who receive combined radiotherapy and chemotherapy tend to very frequently present significant weight loss (90%) and dehydration This puts the patient at risk of successive hospitalizations for intravenous hydration, and of possible postoperative complications such as fistula formation or poor healing. Also, patients can experience fatigue, anorexia, and emotional stress, which contributes to reducing their food intake. The same happens with the eventual appearance of dysosmia, dysgeusia or hypogeusia, in patients irradiated due to head and neck neoplasms. Although, fortunately, at present they only cause nutritional disorders to 3 to 11% of those who suffer from it, actinic enteritis becomes a long-term complication of radiation, which can cause obstructive and / or malabsorptive conditions.

Immunotherapy

Fatigue and anorexia are collateral effects of immunotherapy, associated with a decrease in the quality of life, which can, at the same time, reduce caloric intake, sometimes forcing treatment to be interrupted. The development of fatigue is more common with the use of interleukin 2, interferon, hematopoietic growth factors, granulocyte and macrophage colony stimulating factor, and tumor necrosis factor. In short, the cause of malnutrition in cancer patients is never unique in nature. Indeed, organic disorders of a chemical-humoral basis are usually associated with psychological disturbances and side effects of oncological therapy, which result in the greater or lesser nutritional deterioration evidenced in this type of patient.

Nutritional risk of cancer treatment

Low risk therapy

Chemotherapy

- Derivatives of Vinca.
- Low dose methotrexate.
- 5-fluorouracil bolus.
- Melphalan.
- Chlorambucil.

Radiotherapy

- Thorax: lung and breast.
- Central Nervous System.
- Bone and muscular.
- Melanomas.

Surgery

- All palliative surgery.
- Benign colic.
- Small intestine (acute).

Moderate risk therapy

Chemotherapy

- High doses of cisplatin.
- (> 80 mg / m2 every 3 weeks).
- 5 - Fluorouracil in continuous melting.

- Irinotecan.
- Docetaxel.
- Ifosfamide.
- Cyclophosphamide.
- Dacarbazine.
- Oral fluoropyrimidines.
- Carboplatin.
- Paclitaxel.
- Mitoxantrone.

Radiotherapy

- Radiation therapy with concomitant chemotherapy for lung neoplasms
- Central nervous system
- Head and neck: - Parotid. Jaws
- Cerebral
- Abdomen and pelvis: - Hepatic - biliary. - Renal. - Ovary. - Fondling. - Bladder. - Prostate.

Surgery

- Benign esophageal.
- Gastric benign.
- Small intestine (chronic).

High risk therapy

Chemotherapy

- Patients undergoing transplantation bone marrow.

Radio – chemotherapy concomitant by cancers of head - neck and esophagus.

Radiotherapy

- Head and neck:
- Mouth.
- Pharynx.
- Larynx.
- Esophagus.
- Abdomen and pelvis:
- Digestive.
- Hematology.
- Marrow transplant.

Surgery

- Head and neck.
- Malignant esophageal.
- Malignant gastric.
- Benign and malignant pancreatic.
- Before the appearance of complications (surgical or not) in risk surgery moderate or ow.

Malnutrition prevalence in cancer patients

In these patients, the nutritional risk and malnutrition can vary from 20 to 80%, depending on the type of cancer, the treatment received and the magnitude of the disease, which conditions their state of health, with the consequent increase in complications and a decrease in quality. Life of the patient. The NUPAC study on assessment of nutritional status in patients with locally advanced or metastatic cancer studied 781 patients during the years 2001-2002. He used the GSR-PG (Subjective Global Assessment Generated by the patient).

The results showed that 52% had severe malnutrition or risk of suffering from it, and what is perhaps more important, that some type of nutritional intervention is required in 83.6% of patients with advanced cancer. More recent studies show that 64% of these patients suffer from malnutrition and this value increases, reaching 81% in patients with palliative treatment. (Nutr. hosp. 2008; 23: 458-468). In our country, a study carried out in 2009 showed that the prevalence of malnutrition was 47.7% of a sample of 132 cancer patients, Diaeta (Buenos Aires) 2010; 28 (130): 31-36. ISSN 0328-1310.

Diagnosis of malnutrition in cancer patients Introduction

To decide whether to intervene therapeutically or not in the face of a physiological alteration and, if so, what the type and magnitude of such intervention should be, it is necessary to establish a prior diagnosis. In the case of nutritional alterations, this diagnosis should be as precise as it is rapid and as accessible as it is economically feasible. (See algorithm for intervention). The study of the nutritional status of an individual or a population encompasses a series of practices (clinical, anthropometric and laboratory) known as nutritional status assessment (VEN). But before considering the various VEN methods it is useful to review some concepts presented in the previous sections. Indeed, according to the state of current medical science, it clearly emerges that malnutrition in cancer patients is not necessarily synonymous with neoplastic cachexia, it is useful for this to present a series of definitions that can clarify the picture. Malnutrition Situation that occurs when the constituent parts of the organism are consumed due to lack of replacement of reserves, due to insufficient, incomplete, or disharmonious intake. Lack of one or more nutritional principles, the administration of which resolves the disease. It is usually applied to vitamin, mineral and trace element deficiencies. Weight loss Reduction of body weight, compared to the previous weight. It does not necessarily imply an anomalous situation. Thinness Body weight deficiency that does not constitute disease Fasting Total or partial abstain from food or drink. It produces biochemical modifications, inversely proportional to the quantity and quality of energy, plastic, and regulatory reserves. There are different phases or stages of adaptation to fasting that, although they fail, in many cases, to prevent the individual from becoming undressed, they tend to preserve the active cell mass.

Neoplastic cachexia

Complex syndrome composed of anorexia, weight loss, consumption of adipose and muscle tissue and alteration of the metabolism of carbohydrates, proteins, and fats. Obeying multidimensional, coordinated changes, cachexia involves redistribution of body proteins. This redistribution basically consists of reducing muscle mass and increasing acute phase protein synthesis. From the metabolic point of view, let us remember that in cachexia catabolic (or degradation) processes are exacerbated, accompanied by variable degrees of insulin resistance, with or without glucose intolerance. All this leads to a growing deterioration of active cell mass, represented mainly by muscle mass. Cachexia can be the direct cause of almost a quarter of cancer deaths. It has been estimated that 20-50% of cancer patients experience cachexia and about 65-80% in

the terminal phase of the disease. In summary, there are clear similarities and differences between fasting and cachexia, situations that appear frequently in cancer patients and that can even coexist, aggravating their nutritional situation.

Assessment of nutritional status

A quick and simple initial assessment allows a priori to detect those patients with nutritional risk, in which the nutritional assessment will be deepened to better adapt the nutritional intervention. Nutritional assessment nutritional diagnosis nutritional treatment. The VEN basically provides 2 types of basic information: Body weight Regarding body weight, it is convenient to remember that even in a healthy individual there are fluctuations, which can correspond from 2% in 1 month to 20 over more than 5 months. years. For this reason, it is necessary to question patients very well to avoid referring their weight loss based on the weight they had 5 or 10 years ago (perhaps the weight that they liked the most). For this reason, it should always be taken as the "usual weight" (a parameter necessary to calculate the weight differences) that the patient had immediately before becoming ill or experiencing the first symptoms.

On the other hand, the influence of non-nutritional variables among those causing changes in body weight should be considered. Among these variables, it is necessary to analyze the depletion of fat and / or protein mass, the use of intravenous hydration, and hypoalbuminemia (clinically translated by edema or and / or ascites). Body composition of an individual in cancer patients, it has been described: Loss of fat-free mass (also called lean mass), represented by the loss of skeletal muscles. This decrease in muscle mass may be due (as mentioned) both to a reduction in intake secondary to anorexia and to a decrease in myofibrillar proteins, which corresponds to one of the responses of cytokines in cachexia.

VEN Methods

There are different alternatives to carry out VEN of sick individuals.

Each of these methods have different applications, depending on the environment in which they are practiced, the availability of human and material groups and the experience of each treatment center or team. It is convenient to highlight some questions regarding some of the techniques or procedures mentioned, namely Body mass index (BMI) is an anthropometric parameter that relates weight and height (BMI = weight in kg / height in m2). The simple measurement of this parameter is of little use in cancer patients. Weight change percentage (PCP). Understood as the loss of weight with respect to the usual weight, being significant percentages of loss greater than 5-10% in weeks or months. Skin folds: measure the body's fat compartment or subcutaneous fat. When measuring with graduated calipers, it is necessary to consider the presence of edema or subcutaneous emphysema, which show falsely high values; there are up to 22.6% interobserver variations, so it is recommended that a single professional act during the follow-up; objectifiable changes are slow. Median Arm Muscle Circumference (MBCM): measures the muscle compartment. Also, the presence of subcutaneous edema or emphysema can give altered values, but the interobserver variations are reduced to 4.6%: The activity of an individual must be considered, since obviously intellectual tasks are associated with smaller muscular circumferences than those of physical type (farmers, carpenters, gardeners, etc.).

The determination of plasma proteins gives us an idea of the state of the visceral protein compartment. The most common: Albumin: it is a very commonly used indicator to measure visceral proteins (not constitutive of muscle); its half-life ranges between 20 and 21 days, which makes it a not very dynamic marker, if it is expected to assess nutritional changes in the short term. The tissue pool reaches 4-5 g / kg of body weight and, in general, it is said that there is severe hypoalbuminemia when plasma concentrations are less than 2.4g/dl. There are multiple non-nutritional causes that can cause hypoalbuminemia These include stress, changes in intravascular fluid, nephrotic syndrome, chronic liver disease, and protein-losing enteropathy.

Transferrin: the half-life of this nutritional marker is 7 days, so it could be more useful than albumin to detect rapid changes in nutritional status. However, it may show decreased values in the presence of bacterial infections, and elevated values due to the use of contraceptives or viral hepatitis. It is necessary to consider that radial immunodiffusion methods are required, which is why it is not accessible to all medical institutions.

Prealbumin: a visceral protein marker whose average is 2 days, for which it can experience acute changes not directly linked to the modification of nutritional status, which are never so fast. Retinol binding protein (RBP), whose half-life is 14 hours; the latter can also be modified in the presence of kidney disease.
Laboratory determinations to evaluate muscle proteins include Creatinine-height index This determination is complex in practice, since it requires 24-hour urine collection, for 3 consecutive days, which many times becomes a cumbersome act, especially in seriously ill patients. It should be noted that the values can be modified depending on the age of the individual studied, which must be especially considered.

3-methylhistidine It is a determination that reflects the state of the myofibrillar protein. It also requires 24-hour urine collection, over 3 days, and requires the existence of an amino acid analyzer, which is why it is not an accessible method for daily practice. Over time, some authors such as Mullen et al., Have designed a series of nutritional indices, with the aim of quantifying or measuring the different variables studied, integrating them into an equation. This is the case of the Nutritional Index (IN), which is based exclusively on biochemical indicators such as IgM, complement fraction 3 (C3), fibrinogen and cholesterol. Another widely used index is the Nutritional Prognosis Index (IPN), which establishes the risk of perioperative morbidity and mortality in percentage, depending on the nutritional status. This index considers albuminemia, the thickness of the triceps fold, and transferrin. In the same way as the previous one, they have fallen into disuse. Anamnesis as part of VEN

They comprise two aspects: the detection of symptoms related to nutritional disorders (vomiting, diarrhea, pain, etc.). In this case, it is convenient to establish the duration and the relationship with the quantity and quality of the intake. the food anamnesis, which serves to determine the quantity and quality of the intake and the technical difficulties in feeding. Although medical experience (especially in clinical or family doctors) many times allows to comply

with this procedure, the participation of the specialist in Nutrition or Nutrition Graduates is convenient, who handle aspects related to volumes, portions with greater precision. and chemical composition of the food consumed. The subjective global assessment generated by the patient or VGS-GP (annex) is a simple VEN tool, easy to apply, based on a previously validated test known as SGA (subjective global assessment) and that was later adapted by other authors to be used in cancer patients. It interrelates data on the evolution of weight, dietary intake and digestive symptoms present in recent weeks, functional capacity, and metabolic requirements. The result classifies the patients into different categories: a. well nourished, b. nutritional risk or moderate malnutrition, c. severe malnutrition, allowing us to predict who would benefit from a nutritional intervention.
VGS-GP model

In summary, the usefulness of VEN in cancer patients lies in: recognizing the structural and functional reserves of the patient, allowing to establish the necessary nutritional support modalitybecome a guide for the implementation of pharmacological measures aimed at improving nutritional disorders facilitate the evaluation of the global response to treatment Nutritional intervention algorithm.
Source: Nutritional support for cancer patients, chapter XX, C. Gómez Candela.

Nutritional support in oncology

The beginnings of the application of nutritional support techniques date back to the 1970s when a group of surgeons such as Dudrick, Copeland and MacFadyen proposed the use of "parenteral hyperalimentation" in cancer patients. This type of therapeutic behavior coincides with the growing development of pharmacological and technical resources that mark the origin of nutritional support in hospital or secondary malnutrition, in various fields of Medicine. When nutritional support is mentioned, both in general and applied to Oncology, it is immediately associated with the use of exceptional feeding techniques (enteral feeding; parenteral feeding). However, the concept of nutritional support (AN) is broader. It is defined as the implementation of special measures aimed at: treating malnutrition in patients with various pathologies (in this case, oncological) avoiding malnutrition (DN) in patients at nutritional risk. The topic of AN in Oncology raises multiple dilemmas and shows us its different facets, which include factors related to the patient, his illness, the psych socioeconomic environment and the availability of human, technical and material resources.

Faced with this problem, we have resources of a nutritional nature, of a pharmacological nature, and with general clinical support measures.

Nutritional resources

Of course, the need to carry out AN requires a prior assessment of the nutritional status (see Nutritional diagnosis). Once the need to resort to any of these methods has been raised, it is worth noting which one to choose. Objectives AN Identify, through VEN, nutritional risk factors to act early in a timely manner. Implement intensive nutritional therapy to maintain or improve nutritional status and support medical therapy.

Feeding routes: Algorithm for choosing the feeding route Oral feeding

It is important to prioritize oral feeding if it is not contraindicated. The diet should be adapted to the tastes, habits, and symptoms of the patient (see nutritional strategies to treat symptoms).

Nutritional supplements

The pharmaceutical industry offers a series of nutritional alternatives, either in the form of so-called protein caloric supplements, protein or hydrocarbon modules, soluble fiber, medium chain fatty acids, etc.

The variety includes everything from ready-to-eat foods to powdered products, suitable for making numerous nutritional preparations which it reinforces and enriches. The limitations of this type of product lie in costs and the monotony of flavors, which leads to the discontinuation of its use in the short term. It is important to bear in mind that their employment is not "the" answer to the problem of anorexia or cachexia, and this must be adequately transmitted to the patient and particularly to the family, to avoid feelings of frustration, outlays of money and reasons for conflict. relatives. In any case, its availability in special situations (medical transfers, periods of anorexia marked by infectious pictures, etc.) is an auspicious fact. Sanchez et al, demonstrated in their study the significant benefit of perioperative nutritional support in severely malnourished patients undergoing surgery who received oral supplementation. A lower incidence of gastrointestinal and infectious complications and a shorter hospital stay were observed in these patients compared to malnourished patients who did not receive supplementation. Likewise, Arribas H et al, showed in a randomized study a significant increase in calorie and protein intake after the start of nutritional supplementation and without a decrease in energy from the diet consumed. They observed favorable results when the supplement was administered in small volumes throughout the day.

Enteral feeding

Defined as the infusion of nutrients directly into the digestive tract, enteral feeding (EC) is the most physiological alternative, easier to practice and the least expensive to implement methods of feeding by way of exception. In general, it is indicated in patients who cannot meet their caloric-protein requirements orally, if there is adequate functioning of the gastrointestinal tract. Probes will be used in patients who require nutritional support for a period not exceeding 6 weeks and conventional ostomies or transparietal or percutaneous accesses (gastrostomies or jejunostomies) in patients who require nutritional support for a longer period. In patients with pyloric obstruction or gastroparesis, a nasogastric tube can be placed for decompression and a nasojejunal tube for feeding. The use of gastrostomies or jejunostomies has the advantage of avoiding the nasal route (difficulty in their placement in the case of nasojejunals, physical discomfort for the patient, repeated obstructions, accidental removal of the tube, possible bronchial aspiration, and pneumonia, and sometimes, chronic irritation of the pharynx and esophagus). Although the stomach is the preferred site for EC since it acts as a reservoir of nutrients, regulates osmosis, and allows a longer intestinal transit time, its use is sometimes not possible. Indeed, if the stomach has been partially or totally removed, it will be necessary to perform a jejunostomy, a nutritional approach

that reduces episodes of gastroesophageal reflux and broncho aspiration.

Those patients who require EC for a long time (intestinal resection with a significant decrease in the absorptive surface, certain cases of patients with head and neck tumors, non-dilatable actinic esophageal stricture) may benefit from the placement of a gastrostomy button. This device replaces the gastrostomy tube, has an anti-reflux valve that prevents the passage of gastric contents to the outside, allows the implementation of feeding by gravity or with an infusion pump and has a special adapter: while not in use, it remains closed and is practically invisible under clothing improving body image and quality of life. It is preferable that patients with jejunal tube or jejunostomy are fed by an infusion pump, to avoid rapid emptying syndrome. In these cases, special care must be taken in the selection of the food formula since the jejunum demands lower osmotic loads. On the other hand, the antimicrobial defensive mechanism implied by gastric pH does not exist in the case of jejunal infusions, therefore hygienic measures during preparation must be extreme in these cases. In the case of patients who underwent surgery for tumors of the digestive system, situations in which the EN is greatly compromised, the option of jejunostomy is considered, performed in the surgical act itself.

Choosing the enteral formula Once the objectives of the AN, the nutritional needs and the feeding route have been established, it is important to select the nutritional formula. Currently, there are numerous formulas of varied composition, capable of meeting the requirements of those patients with an intact gastrointestinal tract and no pathology (standard ready-to-hang formulas), and others prepared for patients with specific metabolic or clinical conditions (special formulas). Products or formulas of a semi-elemental or polymeric type can also be used, which are sold in the form of powders to be diluted at various concentrations, alone or with the addition of protein modules (calcium caseinates, for example), carbohydrates (glucose, maltodextrin) or fats (medium chain fatty acids). It is possible to prepare artisan formulas resulting from blended foods (milk, sugar, eggs, oil, heavy cream, etc.). This type of alternative requires time, effort, and larger caliber tubes, while increasing the risk of food contamination (diarrhea), but it allows reducing costs or meeting the needs of people with very low resources and without health coverage. Most patients can receive standard formulas, but those with malabsorption, metabolic disorders, or medical problems such as liver failure, kidney failure, diabetes, or respiratory compromise, will benefit from enteral formulas specifically designed for their disease.

Parenteral feeding

The decision regarding the indication of parenteral feeding (PA) in a cancer patient must be made on an individual basis, evaluating both the benefits and the risks and. As emerges from the algorithm, at present this method is used only when there is an absolute or almost absolute impossibility or contraindication to use the digestive tract and the patient will undergo aggressive cancer therapy, in any of its modalities. Those patients with obstruction of the gastrointestinal tract due to tumors or metastases could benefit from PA during aggressive treatment, the side effects of which can be nausea, vomiting, and weight loss. It is important to remember that it is a resource to apply in patients with potentially curable cancer and with a transitory or significant digestive insufficiency, secondary to some treatment implemented, such as actinic enteritis.

A special comment deserves patients who will undergo surgical interventions. In this type of population, the results obtained in various studies that are part of the medical literature are controversial because they are usually patients with different clinical characteristics, who are subjected to equally diverse AN regimen. However, it is generally accepted that those patients who arrive at the surgical stage with a weight loss corresponding to 10% or more of their usual weight, benefit from the use of perioperative nutritional support. Perioperative AN is understood to be one that ranges from 7 to 10 days before the intervention until 10 to 15 days after it. The use of early EA, especially in patients in whom a feeding line is placed during the resection surgery itself, facilitates the implementation of this type of strategy. Otherwise, especially in the case of neoplasms or interventions on the digestive tract, which markedly alter dysgestoabsorption or delay the implementation of sufficient oral feeding, AP is used, which reduces postoperative complications by up to 10 %, in malnourished patients. A recent consensus in which 33 randomized, prospective studies were reviewed, which included 2,500 surgical patients, most of them with digestive tumors, concluded that: The indication of PA 7 to 10 days before the intervention, in severely malnourished patients, reduced postoperative complications by 10%. The use of PC exclusively in the postoperative period did not reduce the number of complications, it could even increase them.

Postoperative AN was important in patients who could not feed themselves orally for long periods of time after surgery, due to the nature of the surgery or the appearance of complications. Another area of interest where AN by way of exception could have a leading role is that of the pediatric population with cancer. In children, as in the case of adults who must undergo bone marrow transplantation, the administration of AP has proven to be a very useful clinical support modality, with really encouraging results. With the use of immunotherapy, it is necessary to maintain an adequate intake of fluids, to maintain adequate renal function that allows the excretion of wastes from tumor lysis that induce chemotherapy and biotherapy, remembering that the accumulation of these cellular debris can increase the feeling of fatigue. Therefore, these patients can benefit from enteral nutrition and hydration.

When evaluating the results

It is important to be clear about the mechanism that operates or predominates in the malnourished cancer patient. In other words, if fasting mechanisms predominate, as is the case usually in patients with digestive tract obstructions, or those with cachexia-anorexia syndrome. In the latter case, AN by way of exception could achieve, at best, the prevention of a greater nutritional deterioration, but the repletion of the protein mass through a greater contribution of nutrients and calories is not feasible, due to the mechanisms described. previously. In cases in which hypophagia is the main component in the malnutrition picture, the tumor is not extremely aggressive and a good response to cancer therapy is assumed, long-term EC can allow moderate filling of the deposits and a replacement, at least partial, of muscle mass. It is important to discuss in advance with the patient and her family the time and reasons for suspending enteral or parenteral nutritional treatment;

Situations such as functional improvement of the gastrointestinal tract that allows a return to oral feeding without enteral or parenteral supplementation should be discussed. On the other hand, the verification of progressive disease without treatment options, increasing electrolyte abnormalities, with also progressive dysfunction of the liver or kidneys, or the great deterioration of the quality of life, are situations that should rethink the advisability of continuing with AN.

Indeed, it is very important to state from the beginning, both with the family and with the patient and even with the family doctor himself, that neither nutritional resources nor anabolic or orexigenic drugs confer benefits in reference to the survival of the patient in the presence of metastatic disease, except for locally advanced head and neck tumors with slow-growing metastases. Another important aspect to clarify is that an excess of calories and nutrients is hardly useful in patients in whom fasting plays only a secondary role in their conditions. The management of these situations and the various alternatives will be discussed in detail later (see Guidelines for nutritional support in terminal patients).

Determination of nutritional needs

Although each individual patient may present differences, from a practical point of view, AN (whether orally, enterally or parenterally) should provide between 30 and 35 Kcal / kg of current weight / day, in patients in those who want to avoid malnutrition, or between 40 and 45 kcal / kg of current weight / day, in cases of patients with moderate or severe malnutrition. Proteins, meanwhile, should range between 1 and 2 g / kg of current weight / day. The intake of calories or protein in excess (to reverse marked cachexia) can be as risky (refeeding syndrome) as it is inefficient. Carbohydrates will be handled between 50 and 60% of the VCT. If there is hyperglycemia, the consumption of polysaccharides should be predominant. Fats Up to 30% or less of the VCT will be contributed. Dietary lipids have been particularly associated with cancers of the breast, colon-rectum, and prostate, and among them, mammary tumorigenesis has been, to date, the most extensively studied. The beneficial effect of fish oil, rich in polyunsaturated fatty acids of the n-3 series, as well as olive oil, rich in monounsaturated fatty acids, mainly oleic acid, has been widely studied.

A negative effect has been described by the fatty acids of the n-6 series and saturated fats, several studies have correlated the excessive consumption of fats, with the risk of colon and breast cancer, with metastases. In other words, it is not the quantity, but the quality of the fat that is important in the development of this disease. The importance of an intake of fatty acids in adequate proportions must be emphasized, and for there to be protection against the development of cancer, an intake of polyunsaturated fatty acids n-3 and n-6 in a ratio of 1: 1 or 1 is needed. : 2 Vitamins and minerals. RDAs must be covered. Vitamin E has antioxidant capacity, which reduces the oxidative stress increased in cachexia, which is the cause of cell death. Due to its antioxidant capacity, it reduces the peroxidation of polyunsaturated fatty acids, so it must be provided when they are administered. It also has an immunomodulatory action through the inhibition of prostaglandin PGE-2 and the stimulation of the production of non-pro-inflammatory prostaglandins. Specific nutrients: arginine, glutamine, nucleotides (see pharmacological resources) Liquids. 2 to 3 liters / day should be indicated. Nutritional monitoring. A periodic monitoring of the nutritional status should be carried out and the diet therapy reevaluated according to the evolution of the disease and the response of the therapy. The regimen should be individual, it is important to promote oral intake in cancer patients.

Pharmacological resources

From the point of view of pharmacological resources, there are different possible alternatives, which point to different objectives related to the action of cytokines, which, together with AN measure, are focused on the treatment of cancer cachexia.

Agents with actions on cytokines

Regarding the drugs and agents involved in the inhibition of cytokine production, it can be said that from a practical point of view the utility of glucocorticoids stands out, which have been one of the first agents studied for their appetite-stimulating effects, predominantly to through inducing important mood changes (states of euphoria). However, it should be noted that its effectiveness is limited to no more than 2 or 3 weeks, since from that period on, the collateral effects of the use of this type of drug begin to prevail. Let us also remember that the observed weight gain is not linked to the improvement of muscle mass, but that on the contrary its prolonged use contributes to deteriorate it (increased protein catabolism). Therefore, this alternative should be considered only for the short term, as it is proposed in terminal patients, for whom the improvement of the mood outweighs the negative aspect of exacerbation of the loss of muscle mass. The usual recommended doses for this situation are 15 mg of methylprednisolone or 3-5 mg of dexamethasone, orally.

Cannabinoids (dronabinol) have been used primarily in the control of nausea in patients with AIDS, but their use in cancer cachexia has also been advocated. The limited controlled studies with dronabinol (where doses of 2.5 mg 3 times a day were used) do not allow to establish recommendations for its use in the treatment of cancer cachexia. On the other hand, legal issues lead to problems in the widespread marketing of the drug in various countries around the world. Pentoxifylline is a derivative of methylxanthine widely used for the treatment of peripheral vascular conditions that has also been proposed as a possible therapeutic resource in cachexia due to its actions as a TNF-alpha blocker. Double-blind, placebo-controlled studies have not found its efficacy in cancer patients and weight loss. Omega-3 oils [eicospentaenoic acids (EPA) and docosahexaenoic acids (DHA)], which are an important part of fish fats, have been shown to reduce inflammatory mediators in cancer patients. Its use was studied in 18 patients with unresectable pancreatic cancer and an average weight loss of 2.9 kg / month, verifying that after 3 months of supplementation with fish oil, weight increases of 0.3 kg / month were achieved. Other studies, also in patients with pancreatic cancer, showed similar results and it is interesting to observe a recovery of lean mass, without significant changes in fat mass.

To these effects should be added the inhibition of tumor growth, possibly through antagonistic actions against angiogenic growth factors. The exact supplementation dose is unknown (although the contribution of 6g / day has been proposed) and at present it is considered that although it is probably a useful tool for to treat

cachexia, comparative clinical studies are needed. From the role of omega-3 fatty acids in reducing available arachidonic acid (see Pathophysiology of malnutrition in cancer patients), the importance of works such as that of researchers from the Transfer Research Unit of the Angel H. Roffo Institute arises (Bs. As. Argentina), which used n-3 fatty acids from fish, associated or not with selective COX 2 inhibitors (celecoxib), with promising results. The use of this type of selective non-steroidal anti-inflammatory drugs could add to the effects of progestogens, improving the symptoms of weight loss, nausea, and anorexia. As agents that inhibit the action of cytokines on target organs, mention can be made of specific monoclonal antibodies to cytokines and specific antagonists of cytokine receptors, which constitute an interesting future challenge. They are not available for clinical use; the bibliographic references are very limited, and it is estimated that their use would imply very high costs. Melatonin, a hormone that controls circadian cycles, whose potential alteration stimulates the release of TNF, could be useful to counteract the action of the latter in the genesis of cachexia. Some studies seem to show promising results, but it is still considered an experimental agent when it comes to treating cachexia. Thalidomide has been used in the malnutrition of the AIDS patient because it has been shown to selectively inhibit the production of TNF-alpha. At doses of 100 to 300 mg / day, it has shown superior results in cases of AIDS-related cachexia, and although the metabolic dysfunction of cancer cachexia and wasting syndrome seem to be similar, a greater number of studies are needed to confirm its effectiveness in the first case.

Agents that counteract the effects of cytokines

Anabolic agents would have potential utility in restoring severely altered lean (muscle) mass in the cachexia patient. These agents include growth hormone (GH), insulin-like growth factor 1 (IGF-1), testosterone, and their analogues: oxandrolone and nandrolone. The anabolic effects of GH, which exerts controversial results in cancer patients (unlike that observed in AIDS patients) and malnutrition, would be mediated by IGF-1. The proposed dose of CH is 5 mg / day subcutaneously (twice the physiological one), for 12 weeks. Nandrolone, a parenteral anabolic, has not shown significant positive results in lung cancer patients treated with chemotherapy, although it appeared to halt weight loss. Oxandrolone is a derivative of testosterone and the only oral anabolic approved by the FDA to treat patients with weight loss secondary to disease processes. The favorable effects in patients with weight loss could respond to an increase in appetite and the promotion of muscle anabolism, improving the intracellular reuse of amino acids. Some authors, who propose the concept of "anabolic competence" maintain the importance of associating an adequate protein-calorie nutritional intake, the practice of physical exercise and the improvement of the hormonal environment. However, it should be remembered the main side effects of these drugs (virilization, hepatoxicity) that should be weighed against their potential benefits. The recommended dose is between 2.5 and 20 mg / day.

The increase in appetite and weight registered in patients treated with medroxyprogesterone acetate / megestrol acetate in hormone-sensitive tumors of the breast, endometrium, and prostate, led to its potential use in the treatment of cachexia in patients who do not carry this type of neoplasm. They were the most studied agents with respect to their use in cachexia-anorexia, and although the weight gain lies in the accumulation of adipose tissue and some fluid, but not in the muscle compartment, some authors recommend their simultaneous use with anabolic and a program of physical exercises, as they have applied to AIDS patients. It is necessary to remember the potential adverse effects, which include ankle edema, mild hyperglycemia, impotence, dry mucous membranes, thrombophlebitis. The recommended dose of megestrol acetate ranges between 160 and 480 mg / day (although some authors have used up to 1,600 mg / day), and those of medroxyprogesterone acetate, from 500 mg to 1 g / day.

Cyproheptadine, although it causes weight gain in patients who use it as an antiallergic due to its antihistamine properties, has not been useful for the treatment of weight loss in patients with advanced cancer, as evidenced by double-blind, randomized clinical studies and placebo controlled. It should be remembered that although nausea may be partially attenuated, patients treated with cyproheptadine tend to be drowsier and dizzier. Hydrazine sulfate, by inhibiting phosphoenolpyruvate kinase (the main enzyme responsible for NE glycogenesis), would cause an inhibition of this clearly catabolic mechanism and, in such a way, would partially counteract the metabolic manifestations that give rise to cachexia. However, three important studies did not show benefits in its use with patients with colorectal cancer, non-small cell lung cancer, and cancer cachexia in general. There are a series of nutrients that can be classified as drug-nutrients due to their extra nutritional properties, including glutamine, arginine, and nucleotides. In the case of glutamine, a trophic amino acid of the intestinal mucosa, it has been proposed to regularize the plasma aminogram (altered in patients with cachexia) and because in some studies it has been shown that it improves the efficacy of chemoradiotherapy treatment. The results are controversial and its use, outside of exclusively nutritional purposes, is debatable. The theoretical use of the enteral route offers an additional advantage: that of providing glutamine directly to the intestinal mucosa and splanchnic territory. Tolerance and safety studies have shown no adverse side effects using doses of 0.1 to 0.3 g / kg. The truth is that the optimal values for its supplementation in different disease situations have not yet been determined. The contributions of ammonium and glutamate increased proportionally to the dose of glutamine without showing signs of toxicity in any case.

Although, in principle, its use seems contraindicated in patients with hyperammonemia, hepatic encephalopathy and renal failure, due to its ammonium potential. A beneficial action has been observed on the toxicity of chemotherapy treatment in patients with leukemia and with autologous bone marrow transplantation, as well as on the incidence of infection, assessed by positive cultures, and the length of hospitalization in patients with bone marrow transplantation.

Arginine has been promoted because it is considered to stimulate both immune function and the synthesis of CH and IGF-1. Its potential in promoting tumor development is an aspect to be carefully considered. It has an immunomodulatory action by stimulating the proliferation of lymphocytes and macrophages and enhancing both antibacterial and antitumor cytotoxic activity. It is considered that its contribution in cancer cachexia may be beneficial, and there is evidence that together with other nutrients in immunomodulato-

ry diets it reduces surgical complications in cancer patients. Although, in any case, objective data is lacking to clarify the most optimal arginine doses. At present, the general use of preparations containing arginine is not justified. The role of nucleotides in the treatment of cachexia remains unclear, although they are known to improve immune function and nitrogen balance, while reducing intestinal atrophy. Its indication seems justified in all those situations that involve intestinal aggression, since they modulate intestinal repair after an aggression, but more studies will be necessary to clarify its potential role in various pathologies.

Clinical support resources

As mentioned above, there are multiple causes of malnutrition, loss of appetite and reduction of effective intake in cancer patients. Many of them are linked to the existence of physical and psycho-emotional symptoms (see psychological aspects of the cancer patient) that disturb the eating act. Therefore, all those measures that tend to the resolution of gastrointestinal symptoms (nausea, constipation, early satiety, etc.) and respiratory symptoms (dyspnea, cough), to the treatment of pain and to the pharmacological management of disorders of the psychic sphere and emotional, will undoubtedly result in an improvement of the nutritional and nutritional aspects. For this reason, the joint approach of the nutritionist with the clinical oncologist or the family or family doctor who routinely follows the patient is important.

Synthesis and questions

Because malnutrition in cancer patients does not always respond exclusively to the mechanism of reducing caloric-protein intake, the benefits of AN (AE and / or OC) are not guaranteed. Indeed, numerous publications indicate that intensive AN does not improve survival and only minimally reduces the toxicity of chemotherapy or radiotherapy and surgical morbidity. However, it is a very appropriate alternative in certain clinical states such as:

- Perioperative in severely malnourished patients
- Tumors in childhood
- Bone marrow transplants
- Mechanical obstructions of the upper gastrointestinal tract
- Complications of surgery or radiotherapy
- Liver resections

On the contrary, AN is not indicated in:

- Perioperative in mild malnutrition, since it can even add greater morbidity
- End-stage patients
- As the exclusive means of achieving a reduction in chemotherapy toxicity

There are some interesting aspects pending confirmation, such as the possible differences between standard nutrition or the so-called specialized formulas, containing omega 3 fatty acids, arginine, glutamine and / or nucleotides. On the other hand, the hierarchy of the oral route should not be neglected because: it is the physiological route, it has fewer complications, it is easier to prepare and administer, it is the most economical resource, it has very important symbolic and cultural implications. The early application of AN, preferably in the prevention of malnutrition rather than in its treatment, is an important objective in improving the quality of life of the patient. Finally, a challenging question is that of the potential for stimulating tumor growth secondary to the use of AN, as raised as early as 1956 by Terrepka and Waterhouse, who observed an increase in tumor mass in animals subjected to forced ingestion. Other authors such as Torosian saw in this type of response of tumor cells to AN (acceleration of the cell cycle with passage of tumor cells in quiescent stages to the proliferation phase) an opportunity to achieve better results in the application of cyclo-specific chemotherapeutic agents. The potential harmful effect of ANs could theoretically be more likely in patients who do not receive any type of cancer treatment.

Psychological aspects

Cancer patients have a great affectation of the psychological sphere because of the diagnosis of cancer itself and of the anguish before the different treatments to which they are going to undergo. Some psychosocial factors that can cause a significant alteration in nutrition must be considered: a) Depression, anxiety, the stress of having to deal with cancer treatments and fear are common emotions experienced by people with cancer and can contribute to anorexia. b) Solitary life, the inability to cook or prepare meals due to physical alterations, causes a decrease in intake and therefore a progressive deterioration in nutrition

General guidelines on nutritional support in terminal patients

Algorithm for intervention in palliative patients.
Source: Nutritional support for cancer patients, chapter XX, C. Gómez Candela.

Introduction

The specialists and the most recognized entities representing the area of Nutritional Support throughout the world agree that patients with advanced cancer whose disease does not respond to the pertinent oncological therapy, hardly benefit from the application of techniques of feeding by means of exception, particularly from total parenteral feeding. Daily experience, beyond scientific documentation, confirms this reality, to which are added the eventual complications (infections, metabolic imbalances, etc.), the appearance of costs that are difficult to face in the current situation, and the deterioration of the quality of life of the patient and his family. The concept of futile measures arises, understanding as such acts or interventions that are ineffective or incapable of achieving a desirable objective result despite intensive and heroic efforts. However, in the list of most common symptoms of the patient subject to Palliative Care, anorexia, nausea, vomiting, dysphagia and weakness are present in percentages that range between 10 and 38% of cases. To this must be added the family demand related to the nutritional and nutritional aspects of the patient, which leads to consultation with the nutritionist, often by referral from the surgeon or the family doctor who is overcome by the difficulty in solving this problem.

Objectives of nutritional support in Palliative Care
The general objectives of nutritional intervention in this type of patients include addressing the clinical, psychological, and socioeconomic problems of the patient and their environment will be:

- Participate in symptom control

- Improve psychological aspects
- Reduce socioeconomic problems
- Reduce hospitalizations
- Reduce economic costs
- Collaborate in family integration and respond to their demands

But from the point of view of specialists, nutritional support is considered as a chapter that covers not only the application of enteral and / or parental feeding, but to all those measures that, in conjunction or not with the rest of the pharmacological therapies (see Nutritional support in cancer patients), tend to improve or alleviate the symptoms and the quality of life of the patient. In the particular case of patients with advanced cancer, the usefulness or not of the application of EA and / or PA is widely debated. First, it is convenient to distinguish between those "oncological terminal" patients who may have a survival prognosis of several months and those whose life expectancy is very short (dying patients). In this sense, home EC could be a reasonable measure for those patients: with obstruction of the digestive tract (chronic aphagia), life expectancy greater than 2 months and malnutrition fundamentally conditioned to starvation or fasting and not to tumor progression absence of major symptoms not related to nutrition, or with adequate control of them. existence of vital organs (brain, lung, liver, etc.) free of disease. For this reason, those practical resources will be analyzed for the management of those manifestations related to nutritional or nutritional aspects of the patient at this stage of his life.

Characteristics of nutritional counseling for the patient and the family
The characteristics of the dietary advice to the patient and the family can adopt positive or negative modalities. The bases for achieving tailored nutritional counseling include:

Fully know the patient's clinical problems Establish a fluid connection with the family and the intervening team.

Dietary strategies to face nutritional symptoms in terminal patients

Anorexy

Recommend frequent, small-volume meals with high caloric and protein content. Administer, first, solid foods and then liquids, because the latter have lower caloric density and cause greater satiety. Replace non-caloric liquids (tea, water, broth) with liquid preparations of greater nutritional value (juices, milk, liquid foods based on soy). Try to include foods rich in calories (cheeses, oils, dried fruits, olives, sugar, creams, butter, sauces, chocolate, ice cream) and / or in proteins of good biological value (eggs, fish, meat, seafood, legumes, cereals, cheeses). Add powdered milk to preparations such as mashed potatoes, cream soups, white sauce, semolina or cornstarch desserts, tortillas, etc. Sprinkle with grated cheese or chopped hard-boiled egg soups, salads, etc. Cooked, peeled, seedless, low-fiber foods are better tolerated.

Hypogeusia (decreased sense of taste)

Use herbs and spices to enhance the flavor of food. Get advice from cookbooks about the type of spice or aromatic herb that best flavors each type of food (aromatic herbs, pepper, cloves, curry, cinnamon, vanilla, oregano, basil, thyme, bay leaf, rosemary, strained fruit syrup, concentrated meat and vegetable broths) Avoid cooking with loss of flavor (in a lot of water, with prolonged time, etc.). Serve food at normal or cold temperature. Include cakes or refreshing liquids. Modify and vary other organoleptic aspects of food, such as color and texture.

Dysgeusia (alteration of the sense of taste) Respect tastes, avoid foods with strong flavors and odors If you experience rejection of meat, turn to other sources of protein: soy-based products, chicken, eggs, cheese, pasta peanuts, fruit juice helps to tolerate the protein ration. Suppress cooking odors: prevent the patient from taking charge of preparing meals or being present in the kitchen environment. Avoid raw, bloody meats and odor concentration.

Stomatitis and odynophagia, mucositis.

Avoid food that irritates the mucosa: food or drink at extreme temperature; very spicy or spicy sauces or preparations; juices or highly acidic foods (citrus, vinegar, etc.), alcohol and tobacco. Smooth and homogeneous textures of soft consistency and cooked are better tolerated. Foods and preparations usually better tolerated: liquids at room temperature, applesauce, cooked cereals (products for feeding babies or young children, polenta, rice pudding, rolled oats, etc.), warm cream soups; flan, mousse, puree or souffle. Maintain oral hygiene by washing with saline or sodium bicarbonate several times a day,

Xerostomia

Avoid tobacco and alcohol. Maintain oral hygiene, rinse before eating. Choose foods that are liquid, moist, soft, or stimulating salivation (ice cubes). Use of citrus fruits before meals (stimulation of saliva by acids). Sugar-free candies, gum, puffed cereals (popcorn, puffed wheat or corn). Add dressings, sauces, broths, heavy cream, drinking yogurt, mayonnaise, etc. to humidify or hydrate food. Avoid dry and fibrous foods such as toast, cookies, semolina, etc.

Dysphagia

Preparations with smooth, moist, and homogeneous textures, without lumps, cooked and soft foods are better tolerated. Use processed preparations, blended, porridge, pureed, in "soft" puddings, custards (sweet or salty). As a base for smoothies, use milk (common or lactose-free) or soy-based drinks, thickened liquids with a suitable texture, with modified starches, addition of flours, gelatins, etc. Protein sources of soft or liquid consistency: eggs, chocolate milk, soy flour, white cheese, yogurt. Choose low-fibrous foods for the preparation of mincemeats (chicken, fish, etc.) Divide the meals into small volumes throughout the day, eat slowly and drink plenty of water whenever the intake of liquids is possible, to facilitate the progression of the bolus. Eat in a sitting position during and after eating, with a straight back, choose a quiet environment that generates concentration on food.

Nausea and vomiting

Drink liquids in small sips and outside of meals. Use homogeneous textures. Include easily digestible foods (cooked foods, no crusts, little fiber). Reduce the fat content of the diet (butter, cream,

chocolate, sausages, snack products). Avoid foods with strong aromas and / or extremely sweet taste. Prefer cold foods and avoid hot ones. Use small portions and multiple snacks throughout the day. Try not to match the times of pharmacological prescriptions exactly with those of the meals. Except for some special contraindication, reinforce the sodium intake. Wear loose clothing, eat in moderation, divide the diet into several small meals throughout the day to avoid gastric distention. Avoid lying down after eating.

Diarrhea and bloating

Consume liquids with low osmolarity (not very sweet) and at warm or hot temperatures. Avoid soda or carbonated drinks, coffee, cocoa, juices, and mate with bombilla. Prefer strained and salted vegetable broths, apple broth with sweetener, light tea, light cooked mate. Avoid sources of lactose (milk or yogurt), replace with low-lactose milk. Option for low-fat dairy, low-fat foods. Incorporate products with soluble fiber (rolled oats, apples, pears). Avoid foods that tend to cause bloating: legumes, broccoli, Brussels sprouts, cabbage, cauliflower). Cereals must be refined or decorticated and well cooked. Try to replace potato and sweet potato with rice or pumpkin, but if they are included, eat them well cooked and freshly made. Prefer cooked fruits and vegetables, without skin and seeds.

Constipation

Drink enough liquid throughout the day, especially on an empty stomach. Indicate fruits and vegetables, both at lunch and dinner. Use dried or dried fruits as a snack, and whole grains or granola as a complement to snacks and breakfasts. Replace the breadcrumbs or the batter used in empanada preparations (e.g., meatballs, etc.) with oat or wheat bran. Incorporate whole grain baked goods (cookies, breads, pancakes, etc.); consider the inclusion of legumes (soups, salads, stews). Use raw oils, hot and cold foods in an alternative way. Exercise to promote intestinal motility and have a regular time to go to the bathroom, adopting a position that favors abdominal effort. Avoid astringent foods: quince, tea, cinnamon, rice, hard cheeses, and pasta, among others.

Heartburn and / or reflux

Limit fatty foods, menthol, peppermint, garlic, onion, chocolate, caffeine, and citrus. Indicate the use of pillows or elevation of the head of the bed at night; recommend a period of waiting before going to sleep do not do it immediately after ingestion.

Dumping syndrome (or rapid emptying of the stomach)
Frequent meals, with small portions. Chew food slowly and stay upright (sitting in a chair, couch, or bed) for no less than 1 hour after eating. Reinforce the protein content of the diet and reduce the intake of carbohydrates, especially simple sugars (sweets, refined sugar, jelly, jams, sodas, or sweetened fruit juices). Consume liquids away from main meals (15 to 30 minutes after solids) at room temperature or warm.

Dietary factors that act on the predisposition of cancer

Excess calories in intake and obesity are associated with certain types of cancer such as breast and endometrial cancer. Excess fat is associated with an increased risk of breast, colon, and prostate cancer. Alcohol seems to play a causal role in the formation of tumors of the mouth, larynx, pharynx and esophagus nitrates and dietary nitrites (related to nitrosamines), used in the processes of salting, curing, and preserving food, intervene in gastric carcinogenesis. Forms of food preparation, where coal combustion and protein roasting take place, can cause food contamination with carcinogenic products, related to esophageal and stomach cancer.

Dietary factors that act in the prevention of cancer

Dietary fiber has a possible protective effect against colon and rectal cancer. Vitamin A and its precursors (carotenoids) are possible inhibitors of carcinogenesis in the skin, mammary glands, esophagus, and respiratory system. Cruciferous vegetables (cabbage, Brussels sprouts, broccoli, and cabbage), green and yellow vegetables and assorted fruits also have a protective effect. Vitamin C could be a possible protector against gastric and esophageal cancer. And on the other hand, it inhibits the formation of nitrosamines. Vitamin E, due to its antioxidant function, can protect against carcinogenesis (source vitamin E = vegetable oils and wheat germ). Intake of calcium and vitamin D is associated with a low risk of colon cancer.

Some food myths

"Bananas are the source of potassium par excellence"

While bananas are a good source of potassium, all fruits and vegetables are. The same occurs with vegetable and fruit broths, which should be strained in cases of diarrhea.

"Fried foods and ice creams are not recommended foods"

Avoiding excess fat in the diet is a very useful advice for the prevention of cardiovascular risk and other chronic conditions, but in cases of cancer patients with anorexia this precept must obviously be reviewed. Unless there are symptoms directly linked to fat intake (permanent nausea, etc.), including portions of foods cooked by frying can provide extra calories, break the monotony of "sick diets" and participate in family meals. Ice creams, except in the presence of diarrhea or symptoms that recommend avoiding cold preparations, are a good source of calories, protein, and due to their consistency, they constitute an appreciable resource in the presence of dysphagia and anorexia.

"Alcohol must be replaced by mineral water or fruit juices"

Small amounts of alcohol in meals, whether in the preparation of them (in cooking fruits or in casseroles) as an aperitif or as a glass of wine, gives a different "flavor" to meals. Obviously, the alcoholic graduation of the beverages used and the possible undesirable interactions with the analgesic medication that the patient receives must be considered.

"Gelatin is a good source of protein"

Gelatin is a useful way to provide liquid, to incorporate preparations of a soft or solid consistency to patients with severe dysphagia. Its nutritional value, however, does not exceed what has already been mentioned and cannot be considered as a valid source of protein.

"Soup is not a useful food"

Although the soup is not exactly part of the group of foods with the highest caloric or protein value, it does have some advantages to

consider. Indeed, beyond the supposed nutritional qualities of the nucleic acids contained in vegetable broths made with the addition of white or red meats, soup is an inexpensive, accessible, and very ductile way of incorporating liquids and electrolytes. Ductility lies in the possibility of adding substances that enrich it and that increase its nutritional value: cereals, milk cream, legume flour, egg, vegetable fiber modified by cooking, cheese, etc. The use of each of these supplements will provide varieties of flavor and nutrients.

Additional aspects

The careful and personalized selection of foods and the planning of dietary strategies appropriate to the existing symptoms in each patient or clinical situation, does not exhaust the available resources in the face of this problem. In this sense, it is convenient to emphasize the importance of:

- Control of pain and fever.
- Management of depressive symptoms.
- Physical or recreational activity prior to the moments of ingestion

Avoid medical actions that generate greater anxiety in the patient and his family (weigh the patient at each consultation) and promote actions that improve the feeling of self-esteem and well-being (clothing appropriate to the new body structure, outings, or meetings with friends, etc.). Use of specific drugs for each of the symptoms outlined: antacids, antiemetics, artificial saliva, rinses or mouthwashes, antifungal, cathartic, psychotropic drugs, appetite stimulants, etc. Maintain a relaxed and pleasant atmosphere and climate at mealtime (avoid raising conflicts and demands, etc.) remembering the role of eating as a social act. Family support and advice, emphasizing the role of food in this stage of the disease, clarifying dark aspects of it, and contextualizing the symptoms and their importance for the patient. Request a consultation with a speech therapist, in case of dysphagia or dysglusia.

In summary, for AN in palliative care, it will be necessary: Not to lose sight of the objective of nutritional support in this situation. Periodically reevaluate the nutritional strategy. Remember that there are no ethical or legal obligations to provide futile treatments. If necessary, request the support of the Ethics Committee. Ensure that there is a representative or interlocutor of the family with whom to agree on the procedures if the patient is not able to do so. Know and understand the differences between healing and caring.

Between the artificial nutritional support measures (enteral or parenteral feeding) and the "eat what you want or what you can", there is a challenging range of possibilities for professional intervention, most of the time multidisciplinary in nature. Recognizing it is undoubtedly a first and important step in the process of assisting patients in Palliative Care referred to one of the most transcendent acts with the greatest implications in the life of man: food.

Conclusions

Regardless of the causes that provoke it, cachexia in cancer patients has been associated, predictably, with a poor prognosis. Indeed, malnutrition, understood as a loss of the structural components and functional capacity of an individual, not only increases the morbidity and mortality of these patients but also causes changes in body image and significantly reduces the quality of life. The weakness and fatigue that force the patient to stay in bed and limit him in his daily activities, the greater frequency of hospitalizations and the complications arising from cancer treatment, also cause higher health costs. If we add to this the poor response and low tolerance to the chemo and radiotherapy treatments indicated in each case, there is no doubt that malnutrition constitutes an extremely adverse situation. For this reason, it is necessary from the diagnosis, to establish the degree of nutritional commitment, current or future of the patient, in order to establish strategies and plan resources that serve to ensure the best results regarding the nutritional recovery of the same. At present, the interdisciplinary approach (nutritional, clinical and pharmacological) focusing on the different facets that the cachexia-anorexia syndrome seems to demonstrate, will undoubtedly be the most productive way to overcome or mitigate this problem.

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