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MONOGRAPH

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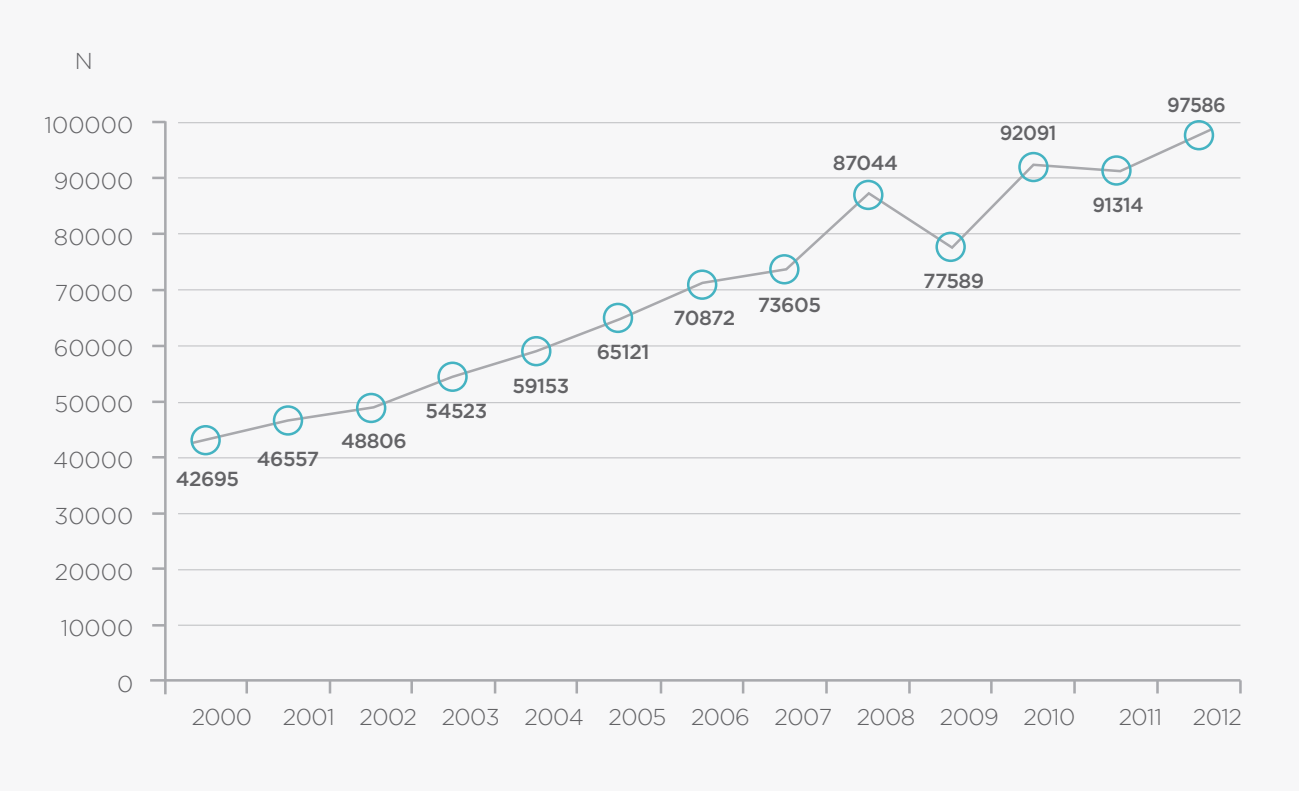
Chronic renal disease (CRD) has more attention each time due to its high worldwide prevalence. In 1990, CRD was in position 27 in the ranking for death causes within the world population getting to position 18 in 2010, being ahead of even some kinds of cancer as leukemia and breast cancer18,26. The World Health Organization (WHO) estimates that more than 80% of the patients being treated in the world are from rich countries, with big population of elderly with access to health. This is due to the raise of other diseases such as arterial hypertension and diabetes, known as the main base diseases for the development of CRD. The absence or discrete signs and symptoms on the first stages of renal disease also contribute for the late diagnosis[4.18.]

A great study carried out in the United States, for instance, with over 13 thousand individuals, with age over twenty years old, identified 13% of this population with renal disease between stages 1 and 4.Brazil presented around 98.000 patients in dialysis treatment in 2012, according to the census published by the Brazilian Society of Nephrology. With this alarming, because the number of patients simply doubled in 10 years. In addition to this factor, arterial hypertension and diabetes were the main base pathologies for the development of this renal disease and 64% of these patients in dialysis present an age between 19 and 64 years (GRAPHIC 01)[18.29].

With this big raise of CRD, there is also the economic burden on the countries. For the treatment of the individuals in stage 4, the USA used around 6% of its budget in 2010, Japan used 4% and South Korea 3% of its budget. For the treatment of patients in the first stages 27% of the budget were disbursed, in other words, around 60 billion of dollars, while Australia spent 647 million dollars[18].

GRAPHIC 01.

PATIENTS IN DIALYSIS TREATMENT IN BRAZIL[30]



Source: Brazilian Society of Nephrology, 2012

Patients in dialysis frequently present a nutritional deficit, accumulation of metabolism between the dialysis sessions, nutritional losses important for the dialysis process, inflammation, apart from the constant absorption of glucose noted in peritoneal dialysis. Malnutrition is high, independent of the dialysis method, and is associated to the worsening of the functional capability, worsening of the prognosis and quality of life, raise of morbity and mortality[31,32]. In virtue of that many nutritional risks, the maintenance and recovery of the nutritional state patients in dialysis becomes a great challenge.

THE SOLUTION: **HDMAX**

Oral Nutritional Supplement

It is unlikely that the renal patient is capable of reaching his nutritional needs raised and maintain or restore the bodily reserves only through feeding. The intervention through the use of oral nutritional supplements presents satisfactory results, being able to reduce the mortality rates and increase quality of life of the dialysis patients. Many investigations showed the effectiveness of oral supplementation. A meta-analysis of 18 studies verified that the enteral nutritional support increased the total ingestion of proteins in 0,23 g/dl34. Other interesting study concluded that the intervention with oral nutritional supplements, chosen by the patients, has significantly decreased the risk of hospitalization33. In other study there was a significant raise of the serum levels of albumin and pre-albumin, and improvement of the results of global subjective evaluation after six months of use of approximately 240 ml three times a week6.Sharma et al also showed significant raise in the levels of albumin of patients in haemodialysis after short term intervention, using nutritional supplements29. The increase of levels of serum albumin was associated with the reduction of morbidity and mortality[17.37]. Figure 1

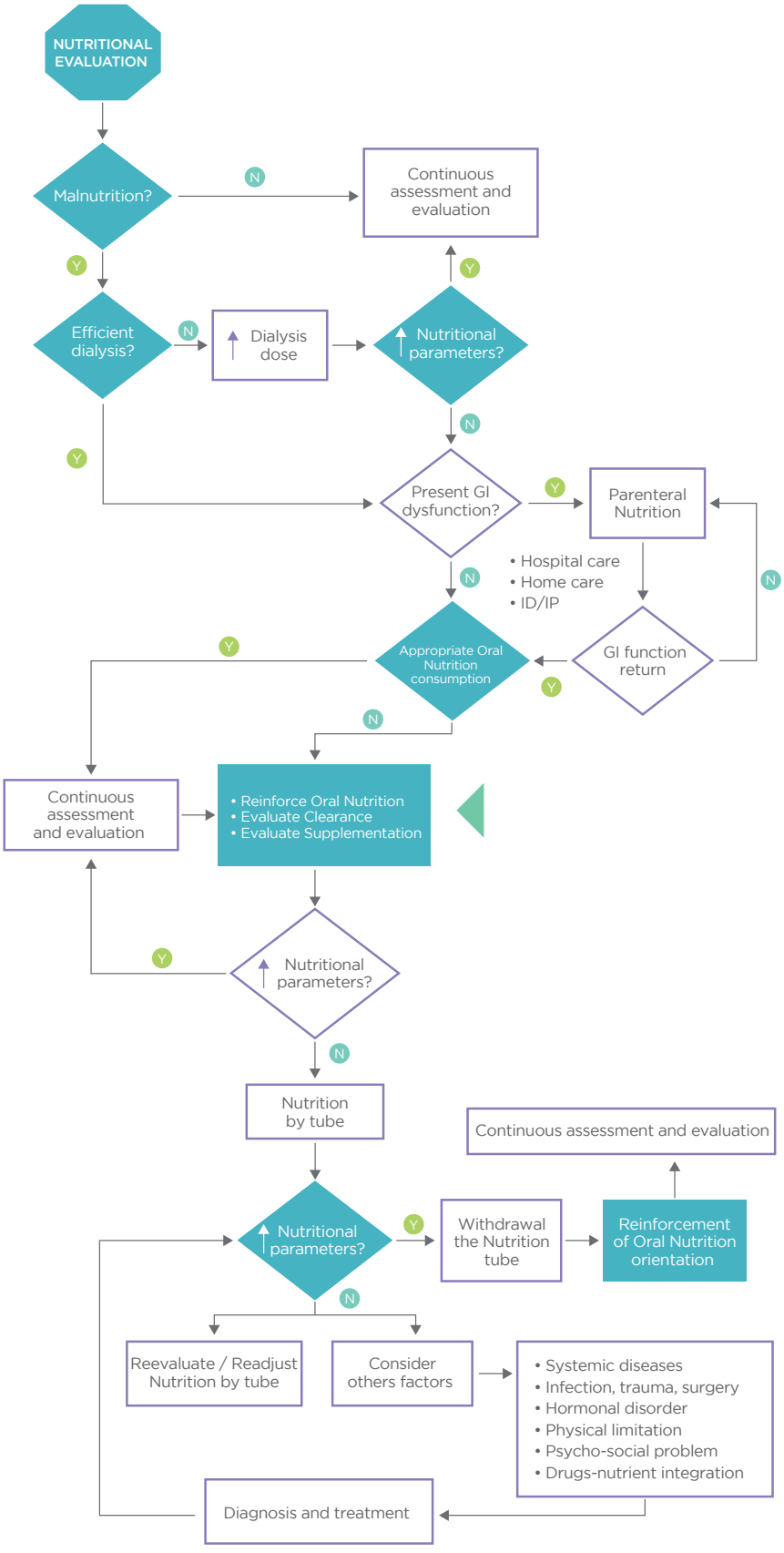
The current recommendations indicate the use of oral and specialized nutritional supplement[7,31,32,35].

- USE OF ORAL NUTRITIONAL SUPPLEMENT: ESPEN (DEGREE OF EVIDENCE A)

- USE OF SPECIALIZED FORMULA: ASPEN AND SBNPE

HDMAX IS ORAL NUTRITIONAL SUPPLEMENT SPECIALIZED FOR RENAL PATIENT IN DIALYSIS.

FIGURE 01. NUTRITIONAL HANDLING OF PATIENT IN CHRONIC DIALYSIS[28]



Abbreviations: Y: yes; N: no; ID: Intra-dialysis; IP: Intra-peritoneal; GI: Gastrointestinal; O.V.: Oral via.

Source: Martins C: Nutrition in the patient with renal disease, in: Barros, E, Manfro, RC, Thomé, FS, et al.: Nephrology - routines, diagnosis and treatment. 3rd edition Porto Alegre: Artmed; 2006. P. 494.

Lost of nutrients by the **Protein**

Proteínas

During the dialysis process, a significant loss of amino acids, peptides and proteins occurs. Studies indicate loss of approximately eleven grams of amino acids and peptides for dialysis session and up to ten grams of protein. This loss of nutrients contributes in drastic way for malnutrition[19,34].Scientific investigations reveal a high percentage of malnutrition in patients in dialysis, independent of the nutritional evaluation method, around 50% varying from mild malnutrition to severe[10,15,16,19,26](CHART 01).Malnutrition is multi factorial, however the major cause is certainly deficient food ingestion.

Other important study involving around 350 patients in haemodialysis detected many factors between the patients that survive and those who don't survive to the treatment of renal replacement. A nutritional factor of huge relevance was deficient protein ingestion in the group of non survivors, as 0.92 grams by kilo by day and for the survivors the protein ingestion was of 1.01 grams by kilo by day. Precious difference in moment of ingestion generated malnutrition and mortality[3]. The malnutrition is a risk factor for the survival and quality of life of the patients.

TABLE 01. PREVALENCE OF MALNUTRITION IN RENAL PATIENT IN DIALYSIS TREATMENT [10,15,16,19,36]

Haemodialysis

Vegine 2010	n15	SGA	73.3% Mild/moderated malnutrition 6.7% Severe malnutrition
Kadiri 2011	n37	IMC, Albumina, DEXA	29% Malnutrition
Gracia-Iguacel 2013	n122	IMC, CB, BIA	40.5% Malnutrition

Peritoneal Dialysis

Ciancaruso 1995	n263	SGA	42.3% Malnutrition
Gusmão 2010	n61	SGA	36% Malnutrition
Duarte 2012	n30	SGA, PCT, CB, CMB, IMC	56% Moderated malnutrition 6% Severe malnutrition

n: number of attendants of the study. SGA: Global Subjective Evaluation. BMI: Body Mass Index. DEXA: Dual Energy X-Ray Absorptiometry. AC: Arm circumference. EBI: Electrical Bio-Impedance TST: Triceps Skinfold Thickness. AMC: Arm muscle circumference

Due to the protein loss during the dialysis process, summing the insufficient ingestion, the need for proteins in superior to the one in healthy individuals[7,31,32,35]:

- 1.2 to 1.5 grams/Kg/day - ESPEN
- 1.5 grams/Kg/day - ASPEN
- 1.2 grams/Kg/day - SBNPE

HDMAX OFFERS 13.4 GRAMS OF PROTEIN / UNIT

Carbohydrates

Renal patients can present alterations in the metabolism of carbohydrates, between them the peripheral resistance to insulin and the intolerance to glucose, even in non-diabetic. Therefore, the quantity and quality of carbohydrates must be adequate. Due t the fact of being a partially hydrolyzed carbohydrate, maltodextrin is the most interesting source of carbohydrates for the renal patient, because it is easily absorbed through the digestive tract.

HDMAX OFFERS 100% MALTODEXTRIN IN THE SOURCE OF CH. IT IS EXEMPT OF SUCROSE

Fibers

Patients in haemodialysis present a framework of chronic and acute intestinal obstipation frequently caused by the low ingestion of liquids and foods rich in fibers. Neuropathy is a common complication of the renal chronic disease and seems to affect specially the inferior part of the body, also contributing for the development both of intestinal obstipation as diarrhea24,25. Intestinal obstipation can attack 8% up to 57% of the patients in dialysis, being among the main complaints of the patients and seldom leads to grave complications as bleedings or peritonitis[2].

The mixing of soluble and insoluble seems to be the best approach in enteral nutrition and has the objective of regularizing the intestinal function. In addition to the motor function, the mixing of fibers provides functional balance of intestinal microbiota[12,13,21].

The recommendation of dietary fibers for patients in dialysis varies between 20 grams and 30 grams by day[12,13,21].

HDMAX OFFERS 3 GRAMS OF DIETARY FIBERS / UNIT

Lipids

Even with all the advances of the last decades, the chronic renal patients in dialysis present an extremely high mortality rate for cardiovascular disease (CVD). The risk of death by CVD in renal patients is 10 to 30 times higher than in the general population. Patients in dialysis present alteration in the serum lipids, being hypertriglyceridaemia the most observed lipidic abnormality (around 65% of the patients) and hypercholesterolemia in 25% of the patients. Dyslipidaemias are proportional to the advance of the loss of the renal function[14,26,28].

The current recommendations for lipids are[35]:

Lipids: < 35% VET

saturated: <7% | Mono-unsaturated: 10 a 15% | Poli-unsaturated: 10%

HDMAX OFFERS 28% LIPIDS
SATURATED: 7% | MONO-UNSATURATED: 11% | POLI-UNSATURATED: 9%

Minerals

Renal patients need the restriction of some nutrients such as potassium and magnesium. The restriction of potassium is due to the framework of hyperkalemia (excess of serum potassium). Aiming on maintaining the internal homeostasis, the organism try to excrete it by the kidneys and also by the feces. Ensure this adequate homeostasis becomes a frequent problem. Patients with low or no renal function are prone to develop hyperkalemia generating excitability of the cardiac cells and, in more severe cases, fatal arrhythmias leading the patient to death[1,2,8,22].

Some patients with chronic renal failure (CRF), for any reason, are capable of maintaining a safe level of potassium in the blood, which enforces the indication of potassium restriction. the fecal excretion of potassium also becomes restrict, once such patients present a framework of chronic obstipation. Studies point that hyperkalemia is responsible for 5% of death in the population with CRF. Anzuategui (2008) have analyzed 448 patients in dialysis treatment and more than 60% of the patients presented chronic obstipation. Of these 60%, half were still carriers of diabetes, other co morbidity influencing in intestinal obstipation[2,8,22].

In addition to the renal incapability and fecal excretion, other situations may exacerbate the tendency to develop hyperkalemia as an insulin deficiency, metabolic acidosis and the use of -blockers. Other important item is the dialysate that presents concentration of potassium and influences the serum levels of the patient. Recent study published by the Journal of Nephrology in 2010, followed up for 19 months 1267 patients with CRF and observed at the end that 41% died by hyperkalemia[1,5,11,22].

The restriction of magnesium in the renal patient is due to the framework of hypermagnesemia (excess of serum magnesium). The renal chronic patients are destitute of the defense mechanism against hypermagnesemia, which can lead the patient to present symptoms such as mental confusion, respiratory and neuromuscular paralysis, nauseas, arrhythmias and even cardiac block. In healthy patients, magnesium, predominant in the bones and also present in the intracellular compartment (up to 40%) and extracellular (1%), when in normal individuals is absorbed in 40% in the gastrointestinal tract and the other part is excreted in the feces. The PTH (parathormone) hormone, calcitonin and glucagon influence the renal re-absorption of magnesium. When reducing the ingestion of this mineral, the healthy individual presents a mechanism that increases the renal absorption in 70% and reduces excretion in 0,5% of the filtered. Other situation that influences hypermagnesemia is the utilization of medicines of continuous use as phosphorus chelator containing magnesium or magnesium carbonate[5,9,24,38].

The importance of the reduction in the ingestion of potassium and magnesium for renal patients is visible, it should be part of the nutritional therapy, once it aims on maintaining or reaching the good nutritional status of the renal individual, improve or prevent the toxicity of metabolic disturbances and, thus, corroborate with the success of dialysis therapy.

The current recommendations for potassium are[7,35]:

• 2000 mg to 2500 mg / day – ESPEN

• 2000 mg / day - ASPEN

HDMAX OFFERS 74 MG OF POTASSIUM/UNIT

HDMAX OFFERS 18 MG OF MAGNESIUM/UNIT

Vitamins

The water-soluble vitamins deserve special attention, because they frequently present themselves below normality in renal patients due to the loss through own dialysis process and by the insufficient food ingestion. Low levels may contribute to the mortality of renal patients in dialysis, specially low levels of B12, B6 vitamins and folic acid. When these are in levels lower, contribute for the development of vascular disease, because they work as co-factors in the enzymatic reactions of the homocysteine metabolism. Hyperhomocysteinemia is a significant agent for atherosclerosis. Supplementation should be daily, many times allied to pharmacological doses [28,31,32].

Recommendations for water-soluble vitamins - Complex B are[7]:

• Vitamin B6: 10 to 20 mg / day ESPEN

HDMAX OFFERS 0.5 MG OF VITAMIN B6/UNIT

In conclusion, chronic renal patients in dialysis present significant metabolic, hormonal and biochemical alterations, that indicate specialized care and nutritional recommendations. The nutritional therapy, by means of specialized oral supplementation can recover or maintain the adequate nutritional status, apart from minimizing the protein catabolism, maintaining hydra-electric balance and even improving prognosis and quality of life of the patient.

HDMAX. NUTRITIONAL RECOVERY IN DIALYSIS

NUTRICTION FACTS	PER 100 ML
Energy	150Kcal=630KJ
Carbohydrates, of which:	20 g
glucose	0,3 g
lactose	0
maltose	1,4 g
polysaccharide	19 g
Proteins	6,7 g
Total fat, of which:	4,6 g
saturated fats	1,1 g
trans fats	0
monounsaturated fats	1,8 g
polyunsaturated fats	1,6 g
cholesterol	0
Dietary Fiber	1,5 g
Sodium	113 mg
Calcium	59 mg
Iron	0,74 mg
Vitamin A	21 mcgRE
Vitamin D	0,76 mcg
Vitamin B1	0,20 mg
Vitamin B2	0,23 mg
Niacin	2,7 mg
Pantothenic Acid	0,76 mg
Vitamin B6	0,25 mg
Vitamin B12	0,42 mcg
Vitamin C	13 mg
Vitamin E	2,1 mg
Biotin	4,5 mcg
Folic acid	42 mcg
Vitamin K	5,2 mcg
Potassium	37 mg
Chloride	45 mg
Phosphorus	81 mg
Magnesium	9,0 mg
Zinc	1,6 mg
Copper	88 mcg
Iodine	22 mcg
Selenium	7,9 mcg
Molybdenum	6,5 mcg
Chromium	5,1 mcg
Manganese	0,32 mg
Choline	42 mg

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