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Revisión

Burns, metabolism and nutritional requirements

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Abstract

Objectives: **To review the nutritional evaluation in burned patient, considering the literature descriptions of nutritional evaluation and energy requirements of these patients.**

Introduction: **Thermal injury is the traumatic event with the highest metabolic response in critically ill patients. Various mathematical formulas have been developed to estimate nutritional requirements in burned patient. Indirect Calorimetry is the only method considered gold standard for measuring caloric expenditure.**

Methods: **A survey of the literature and data was collected based on official data bases, LILACS, EMBASE and PubMed.**

Results: **The metabolic changes involved in hypermetabolism are designed to supply energy to support immune function, brain activity, wound healing, and preservation of body tissues. Body weight is considered the easiest indicator and perhaps the best to assess the nutritional status. The most common formulas utilized in these patients are the Curreri, Pennisi, Schofield, Ireton-Jones, Harris-Benedict and the ASPEN recommendations. For children is the Mayes and World Health Organization formula. The majority of mathematical formulas overestimate the nutritional needs. The regular use of Indirect Calorimetry supplies adequate nutritional support to the burn patient.**

Discussion: **The traditional nutritional evaluation considers anthropometry, biochemical markers and estimation of nutritional requirements. The weight provides a basis for decisions that are established in the clinical context. Classic parameters can be adapted to intensive care environment.**

Conclusions: **The use of Indirect Calorimetry is crucial to ensure the safety of the nutritional support of burn patients and this should be widely encouraged.**

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Key words: *Burns. Metabolism. Nutritional evaluation.*

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QUEMADURAS, EL METABOLISMO Y LOS REQUERIMIENTOS NUTRICIONALES

Resumen

Objetivos: **Revisar la evaluación nutricional del paciente quemado, considerando las descripciones bibliográficas de la evaluación nutricional y de los requerimientos energéticos de estos pacientes.**

Introducción: **la lesión térmica es el acontecimiento traumático con la mayor respuesta metabólica en los pacientes críticos. Se han desarrollado diversas fórmulas matemáticas para estimar los requerimientos nutricionales del paciente quemado. La calorimetría indirecta es el único método de referencia para medir el gasto calórico.**

Métodos: **se realizó una revisión bibliográfica y una recogida de datos a partir de las bases de datos oficiales LILACS, EMBASE y PubMed.**

Resultados: **Los cambios metabólicos que implican un hipermetabolismo están diseñados para aportar energía para mantener la función inmunitaria, la actividad cerebral y la curación de las heridas así como la conservación de los tejidos corporales. Se considera que el peso corporal es el indicador más sencillo y quizás el óptimo para evaluar el estado nutritivo. Las fórmulas más frecuentemente empleadas en estos pacientes son Curreri, Pennisi, Schofield, Ireton-Jones, Harris-Benedict y las recomendaciones de ASPEN. En los niños son la de Mayes y la de la Organización Mundial de la Salud. La mayoría de las fórmulas matemáticas sobreestiman las necesidades nutricionales. El uso habitual de la calorimetría indirecta proporciona un soporte nutricional adecuado en el paciente quemado.**

Discusión: **La evaluación nutricional tradicional considera la antropometría, los marcadores bioquímicos y la estimación de los requerimientos nutricionales. El peso proporciona la base para las decisiones que se establecen en el contexto clínico. Los parámetros clásicos pueden adaptarse al ambiente de los cuidados intensivos.**

Conclusiones: **el uso de la calorimetría indirecta es crucial para asegurar la seguridad del soporte nutricional de los pacientes quemados por lo que debería potenciarse.**

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Palabras clave: *Quemaduras. Metabolismo. Evaluación nutricional.*

Abbreviations:

TBSA: Total Body Surface Area.
ESPEN: European Society for Clinical Nutrition and Metabolism.
NRS: Nutritional Risk Screening.
ASPEN: American Society for Parenteral and Enteral Nutrition.
IC: Indirect Calorimetry.

Introduction

Thermal injury is the traumatic event with the highest metabolic response in critically ill patients.[1,2] This response is proportional to the size of the burn and damage continue years after the incident.[3] Pathophysiological changes induce an acute inflammatory response, peripheral resistance to insulin and immunodeficiency.[4,5]

The effect of continuous and prolonged secretion of cytokines on metabolism can lead to an unstable and hypercatabolic condition, causing multiple organ failure.[6]

Objective determination of nutritional needs should be accurately evaluated to ensure adequate nutrition for this condition. Knowledge of the patient's profile is essential to prevent under-nutrition or over-nutrition and to minimize the complications of nutritional support.[7]

Various mathematical formulas have been developed to estimate nutritional requirements in burned patient.[8] The objective of this study is to review the nutritional evaluation in burned patient, considering the literature descriptions of nutritional evaluation and energy requirements of these patients.

Methods and materials

A survey of the literature and data was collected utilizing the key words *burns, metabolism, nutritional evaluation* and *intensive care unit* based on official data bases from LILACS, EMBASE and PubMed.

Metabolic response to burns injury

The patient essentially exhibits two phases: the first is referred to the *ebb* stage, in which the patient shows a deficit in plasma volume and insulin levels, initial signs of shock, hypothermia, lowered oxygen consumption and a decrease in overall metabolic rate. After this, the body undergoes hormonal modifications and, the *ebb* phase evolves to the *flow* phase. This stage is characterized by an increased concentration of catabolic hormones regulating the metabolic response. An increase in heart rate, body temperature, calorie consumption, proteolysis and neoglycogenesis is observed.[9] These reactions result of metabolic events aimed at wound healing.[10]

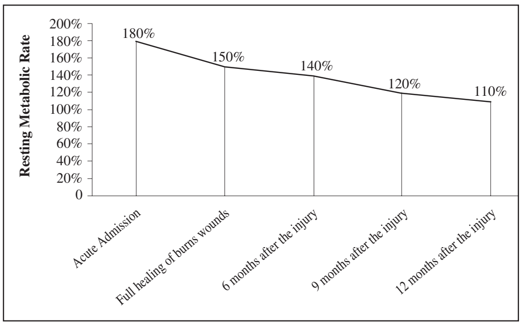

Fig. 1.—Resting metabolic rate of patients with more than 40% TBSA in thermal neutral temperature (33°C). Source: Herndon DN,Tompkins RG. Support of the metabolic response to burn injury. The Lancet. 2004;363:1895-902. Adapted.

Hypermetabolism begins at about the fifth post-burn day and persists for close to twenty-four months, causing loss of lean body mass, reduced bone density and muscle weakness, among other events.[11,12]

The intensive use of energy substrates predisposes the patient to malnutrition, which can cause a deficiency in the immune system, infections, an important nitrogen loss, delayed wound healing, prolonged hospital stay and mortality.[13,14]

The catabolic state is maintained by the inflammatory events activated by the damaged tissues. The cytokines released from these tissues transform the modified basal metabolism and keep it altered for long periods after acute trauma.[15]

Metabolic response in patients with more than 40% TBSA represents values above 100% of the resting metabolic rate.[10] (fig. 1).

Nutrition

Currently the concept that nutritional support plays an indisputable role in treating critically ill patient is well-accepted by scientific and health professional societies.[16] The metabolic changes involved in hypermetabolism are designed to supply energy to support immune function, brain activity, wound healing and preservation of body tissues.[17]

Tissue repair, accentuated and persistent muscle catabolism, and wound losses promote an increased protein needs after thermal injury. A clear recommendation is more problematic, although numerous investigators have discussed the increased protein needs of the thermally injured patient.[18]

The molecular mechanism of the hypermetabolic response to burn injury is not completely understood. Studies indicate that approximately 60% of the increased metabolic response to burn injury is attributable to an increased protein synthesis, gluconeogenesis, urea production and substrate cycling.[19]

Nutritional therapy aims: to offer favorable conditions for the establishment of the therapeutic plan, to offer energy, fluids and nutrients in adequate quantities to maintain vital functions and homeostasis, recover the activity immune system, reduce the risks of over-feeding, ensure offers of protein and energy necessary to minimize the protein catabolism and nitrogen loss.[20]

Metabolic transformations involving nutrients

Exogenous protein, while capable of enhancing protein synthesis, cannot totally abate muscle protein breakdown despite high nitrogen intakes.[21] Protein breakdown may increase two to four times the usual levels, particularly in burn. Liver gluconeogenesis rises from 2.0 to 2.5 mg/kg body weight/min to 4.4 to 5.1 mg/kg body weight/min in the stressed patient.[17,22] Proteins play the most important role throughout the entire wound-healing process.[23]

Numerous studies have established that hypercatabolic and hypermetabolic states are associated with profound glutamine deprivation. A study conducted by Peng et al. (2005) found that when supplemented at a rate of 0.5 g/kg/day burned patients were capable of reversing the changes made during the burn.[24]

Hyperglycemia from metabolic perspective results from an increase in hepatic gluconeogenesis and a resistance to the action of insulin to clear glucose into muscle.[25]

Futile recycling of free fatty acids and triglycerides results of the enhanced lipolysis combined with fat oxidation. [23]

Nutritional evaluation

Assessment is used to identify patients who would benefit from nutritional support and suggests a design for that therapy.[26] In general, the same methods are used for other patients to conduct an assessment of nutritional status of critically ill patients, such as anthropometric and biochemical markers. However, nutritional assessment is limited in the burned patient.[27]

Most nutritional assessment tools available in a clinical setting are confounded by the physiological elements of the inflammatory response. Despite their limitations, many of markers of nutritional status when used collectively can help in daily monitoring of nutritional support.[21]

Table I
Nutritional Risk Screening (NRS)

Initial screening

	Yes	*No*
Is BMI < 20.5?		
Has the patient lost weight within the last 3 months?		
Has the patient had a reduced dietary intake in the last week?		
Is the patient severely ill? (e.g. in intensive therapy)		

Yes: If the answer is 'Yes' to any question, the screening in table II is performed.
No: If the answer is 'No' to all questions, the patient is re-screened at weekly intervals. If the patient e.g. is scheduled for a major operation, a preventive nutritional care plan is considered to avoid the associated risk status.

Final screening

	Impaired nutritional status		*Severity of disease (E increase in requirements)*
Absent Score 0	Normal nutritional status	Absent Score 0	Normal nutritional requirements
Mild Score 1	Wt loss >5% in 3 mths or Food intake below 50–75% of normal requirement in preceding week	Mild Score 1	Hip fracture* Chronic patients, in particular with acute complications: cirrhosis*, COPD*. Chronic hemodialysis, diabetes, oncology
Moderate Score 2	Wt loss > 5% in 2 mths or BMI 18.5-20.5 + impaired general condition or Food intake 25-60% of normal requirement in preceding week	Moderate Score 2	Major abdominal surgery* Stroke* Severe pneumonia, hematologic Malignancy
Severe Score 3	Wt loss >5% in 1 mth (>15% in 3 mths) or BMI >18.5 + impaired general condition or Food intake 0-25% of normal requirement in preceding week in preceding week.	Severe Score 3	Head injury* Bone marrow transplantation* Intensive care patients (APACHE410)
Score		Score	**Total score:**

Score ≥ 3: the patient is nutritionally at-risk and a nutritional care plan is initiated.
Score < 3: weekly rescreening of the patient. If the patient e.g. is scheduled for a major operation, a preventive nutritional care plan is considered to avoid the associated risk status.
*indicates that a trial directly supports the categorization of patients with that diagnosis.

Table II
Description of peculiarities of burned patient that must be constantly monitored with the anthropometric assessment

Parameters	*Restrictions*	*Clinical Relevance*	*Method*	*Frequency*
Weight	It is affected by the presence of edema in burned patient and is a difficult variable to be monitored because of the patient's inability to walk by their clinical condition or bedridden for medical advice.	Provides monitoring of nutritional status of the patient while showing a simplified and general condition of the body compartments. This measure serves as a foundation of nutritional status and facilitates the monitoring during hospitalization.	Measuring with the aid of balance.	Biweekly during the acute phase and once a week during the convalescence.
Height	In some cases the patient may not want to cooperate or be unable to assist with measuring.	Assists in the investigation of nutritional status by BMI nutritional needs.	The measurement can be performed with the patient in a supine position with the aid of a fixed scale or tape measure properly.	On admission.
BMI (Body Mass Index)	May overestimate the nutritional status of patients with edema.	It is a noninvasive and practical tool for assessing nutritional status. The use of BMI is considered a good method of evaluation. Rates below 20 kg / m² are indicative of malnutrition and are associated with significant increase in mortality in different types of patient.	Mathematical formula: Weight/height². * Always consider the presence or absence of edema.	Weekly.
Evaluation of subcutaneous tissue	Impossible in patients with use of occlusive dressings and edema.	Constitutes a practical and noninvasive evaluation. Help in the verification of a deficiency status of long or short duration.	Symptomatic evaluation.	Weekly.
Evaluation of the Temporal Muscle	It may be impossible in patients with facial burns due to use of occlusive dressings or edema.	Constitutes a practical and noninvasive evaluation. Demonstrates the reduced intake of solid food and therefore calories and macronutrients. It is considered a physical sign of malnutrition.	Symptomatic evaluation.	Monthly.
Nutritional Risk	No specific restrictions.	Important tool for improving the nutritional therapy.	Questionnaire and verification of nutritional status.	During all the hospital stay.
%TBSA	Depends on the evaluation of plastic surgery.	Whereas energy expenditure is proportional to the length of the burn, the monitoring of wound healing must be done by the nutritionist to avoid overnutrition when the IC is not available. Practically speaking, the knowledge of %TBSA assists in monitoring and allows the application of predictive equations.	TBSA Diagram, adaptation scheme Lund-Browder.	Weekly.
Fasting	No specific restrictions.	Observation can be used as a tool to assess dietary intake and the clinical course of patients when analyzed together.	Verification of patient records and with the team.	Daily.
Estimation of energy requirements	Predictive equations tend to estimate the energy expenditure above or below the real, predisposing the patient to over-nutrition or undernutrition.	Assists in the determination of nutritional therapy when the IC is not available.	Mathematical formulas described in the literature.	Weekly.
Measurement of nutritional needs with IC	The high equipment cost prevents the wide use of it in clinical practice.	It is considered the only valid method for determining the nutritional requirements by measuring the oxygen consumption and carbon dioxide excretion.	Specific exam.	Weekly
Assessment of nutritional intake	Depends on the patient's memory when it is made orally.	It is important for the detection of nitrogen and calorie balance. Assists in detecting eating disorders in which an excessive food restriction is adopted.	Interview with the patient completing the 24-hour recall or food record diary.	Daily.

Adaptation of:

1. American Burn Association. Advanced Burn Life Support Course Provider's Manual. Chicago, Illinois: American Burn Association; 2000.
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Nutritional risk is defined as "the chances of a better or worse outcome from disease or surgery according to actual or potential nutritional and metabolic status" by the European Society for Clinical Nutrition and Metabolism (ESPEN), Nutritional Risk Screening (NRS) 2002.[28,29] (table I).

According to the study by Hart et al. (2000) the five most significant variables in determining the magnitude of the catabolic response to severe burn were admission weight, percentage of TBSA burned, metabolic rate expressed as the percentage of the predicted energy expenditure, time from burn to the primary excision of the wound and burn sepsis.[30]

Anthropometric variables

Body compartments and evolution of hydration status in burn patients invalidate anthropometric variables for nutritional evaluation.[31] Body weight is considered the easiest indicator and perhaps the best to assess the nutritional status.[32] Moreover, presence of edema are common.[27]

The anatomical point for the anthropometry measurements may be inaccessible and surgical procedures require days of bed rest. Semiologic analysis is important to detect the signs of depletion and some situations must be constantly monitored (table II).

Energy requirements

The size of the burn will proportionally influence the hypermetabolic response, inflammation, catabolism, changes in body composition, hormone production and organic dysfunction.[3,33]

The increase in energetic expenditure significantly contributes to the development of malnutrition and predicts that all adult patients with over 20% of TBSA must receive specific and individualized nutritional support.[34]

The majority of mathematical formulas overestimate the nutritional needs of burn patient.[11] It is difficult for a single formula to define individual nutritional needs with satisfactory precision, since all the factors involved in affecting metabolism are very complex. Predetermined equations to estimate energy expenditure are not recommended.[35,36]

Between 1970 and 1980 the most frequently used formula for estimating the nutritional needs of burn patients was developed by William Curreri.[37,38] In 1976, Pennisi created a more comprehensive formula, designed for adults and children, estimating both the energetic needs in calories and protein needs in grams.[39] Other formulas developed for critically ill and burn patients include Toronto,[40] Schofield,[41] Ireton-Jones,[42] Harris-Benedict,[43,44] and the American Society for Parenteral and Enteral Nutrition (ASPEN) recommendations.[45] The most widely formulas used in children are those of Harris and Benedict, Mayes and the World Health Organization[46] (table III).

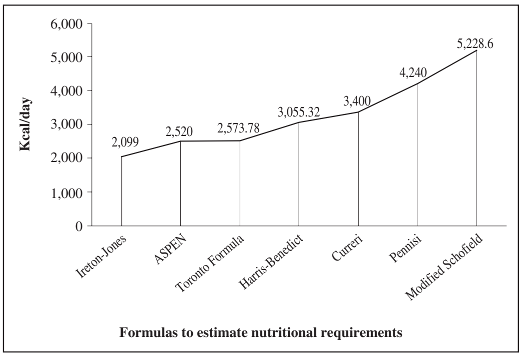

Fig. 2.—Distribution of nutritional requirements estimated by mathematical formulas for one adult burned patient. Electronic archive study, 2010.

A study by a group of researchers analyzed the accuracy of these formulas in children comparing caloric expenditure determined by IC. All the formulas overestimate the patient's caloric expenditure, predisposing him to over-nutrition.[47]

In order to compare the energy requirements suggested by the formulas most commonly used in adults, it was hypothesized a case of burn, and all formulas were employed. Hypothetically, was taken as reference for the use of formulas to a patient following conditions: 30 years old, weighing 72 kg, height 170cm, 40% of TBSA, bedridden, with eight days of burning, body temperature of 37ºC, breathing spontaneously and with average intake of 2.000 calories per day (fig. 2).

Over-nutrition predisposes the patient to hyperglycemia, overload of the respiratory system, steatosis and hyperosmolarity. When dealing with under-nutrition, the patient could suffer from malnutrition and subsequent reduction of immunocompetence, prolonged dependency on mechanical ventilation and delay in the healing processes, increased risk of infection, morbidity and mortality.[46]

In 1783, a study on the physiology of breathing – *Mémoire sur la Chaleur*, published by Lavoisier and Laplace for a periodical on the study of heat, generated the initial concepts of energy metabolism. The study explained the relationship between the inspired oxygen and the heat lost by the body.[48]

With respect to the study of energy metabolism, Indirect Calorimetry (IC) is the only research method considered gold standard for measuring caloric expenditure.[49] Identifying the patient's metabolic rate is essential to prevent deficits in energetic equilibrium. The regular use of IC supplies adequate nutritional support to the burn patient and is useful in the early detection of under-nutrition and over-nutrition.[50,51]

Due to its high cost, the use of IC for nutritional evaluation occurs mainly for research and few professionals have access to it. In the past 33 years, about 111 scientific articles reporting on burn injuries and IC have

Table III
Formulas for calculating approximate nutritional needs in burn cases. Electronic archive study, 2010

Author	*Gender*	*Formula*
Harris & Benedict BMR	Male Female	Estimated Energy Requirements: BMR x Activity factor x Injury factor 66 + (13.7 x weight in kg) + (5 x height in cm) - (6.8 x age) 665 + (9.6 x weight in kg) + (1.8 x height in cm) - (4.7 x age) *Activity factor* Confined to bed: 1.2 Minimal ambulation: 1.3 *Injury factor* < 20% TBSA: 1.5 20-40% TBSA: 1.6 > 40% TBSA: 1.7
Curreri	For all patients	Estimated Energy Requirements: (25 kcal x w) + (40 x %TBSA)
Pennisi	*Adults* Calories Protein *Children* Calories Protein	Estimated Energy Requirements: (20 x w) + (70 x %TBSA) (1 g x w) + (3g x %TBSA) (60 kcal x w) + (35 Kcal x %TBSA) (3 g x w) + (1 g x %TBSA)
Toronto Formula	For all patients	Estimated Energy Requirements: [- 4343 + (10.5 x %TBSA) + (0.23 x kcals) + (0.84 x Harris Benedict) + (114 x T (°C)) - (4.5 x days post-burn)] x Activity Factors *Activity factors non-ventilated:* Confined to bed: 1.2 Minimal ambulation: 1.3 Moderate act, 1.4 *Ventilated-Depedent:* 1.2
Modified Schofield	Men	Estimated Energy Requirements: BMR x Injury factor 10-18 yrs = (0.074 x w) + 2.754 18-30 yrs = (0.063 x w) + 2.896 30-60 yrs = (0.048 x w) + 3.653 60 yrs = (0.049 x w) + 2.459
	Women	10-18 yrs = (0.056 x w) + 2.898 18-30 yrs = (0.062 x w) + 2.036 30-60 yrs = (0.034 x w) + 3.538 > 60 yrs = (0.038 x w) + 2.755 *Injury Factors:* < 10% TBSA = 1.2 11-20% TBSA = 1.3 21-30% TBSA = 1.5 31-50% TBSA = 1.8 > 50% TBSA = 2.0
ASPEN	For all patients	25 a 35 kcal/kg/day
Ireton–Jones Formula	For spontaneously breathing patients	Estimated Energy Requirements: 629 – (11 x yrs) + (25 x w) – (609 x O)
	Ventilated-Dependent	1784 – (11 x yrs) + (25 x w) + (244 x S) +(239 x t) + (804 x B)
WHO	For Children Male < 3 years Male 3 to 10 years Female < 3 years Female 3 to 10 years	 (60.9 x weight in kg) – 54 (22.7 x weight in kg) + 495 (61 x weight in kg) – 51 (22.5 x weight in kg) + 499
Mayes	For Children Male & Female < 3 years Male & Female 3 to 10 years	Estimated Energy Requirements: 108 + (68 x weight in kg) + (3.9 x %TBSA) 818 + (37.4 x weight in kg) + (9.3 x %TBSA)

Kcals: calorie intake in past 24 hours;
Harris Benedict: basal requirements in calories using the Harris Benedict formula with no stress factors or activity factors;
T: body temperature in degree Celsius;
Days post burn: the number of days after the burn injury is sustained using the day itself as day zero;
w: weight in kg;
yrs: age in years;
S: Male = 1 / Female = 0
t : trauma present:1 / No trauma present :0
O: presence of obesity > 30% above IBW: 1 / absent: 0
B: burn present = 1 / No burn present = 0

been published. The rate of publications over the last three decades follows an irregular pattern.

Nutritional support

The American College of Chest Physicians suggests that enteral nutrition should be initiated as soon as possible after resuscitation.[52] Burn patients frequently receive inadequate nutrition, initially because of hemodynamic instability and paralytic ileus. Eventually, nutrition is still inadequate due to required fasting for surgical procedures or diagnostic exams, the difficulty in chewing solid foods because of facial burns and due to anorexia and vomiting.[53]

The introduction of nutritional support cannot suppress hypermetabolic and hypercatabolic responses produced by a burn. Nevertheless, simply providing enteral nutrients in the first 24 hours postburn, reduces the caloric deficit.[54]

A study designed to compare the benefits of enteral nutrition when provided in different amounts was verified that the mortality of patients in the group receiving enteral nutrition in the proportion of 30 kcal/kg/day or more had lower mortality rates.[32,55]

In general rule critically ill adults require around 2 g of protein/kg/day or approximately 15% to 20% of total caloric intake in 24 hours.[56] The nutrients often used for Pharmacological nutrition in burned patients are glutamine, arginine and omega-3. These components, when supplied in quantities 2-7 times higher than those commonly eaten by healthy people, appear to have a beneficial effect on the pathophysiological changes induced by burns.[57]

Discussion

Nutritional support has become a major focus in the care of severely burned patients to overcome clinical events.[55] Malnutrition is an increasing problem in critically ill adults and can have a profound impact on outcomes. Given the ongoing challenges associated with nutrition screening, assessment, and support processes, this situation is perhaps not surprising. There is an unacceptably high prevalence of malnutrition in critically ill adults.[52]

Nutrition support may reduce morbidity and mortality after severe thermal injury, but excessive caloric and protein intakes cannot overcome the catabolic response to critical illness.[18]

Some patients do not exhibit the expected hypermetabolic response from their wounds. There are other individual factors that interfere with this response and advance the patient's progress to hypometabolism. The chief factors responsible for this unusual response are: the use of analgesia and sedatives, the presence of malnutrition, hypothyroidism, shock or hemodynamic instability, cellular bio-energetic failure, hypothermia and advanced hepatitis.[58]

This unusual response of some patient's causes an increase in the risk of developing clinical complications related to over-nutrition, because this picture is "masked" by typical hypermetabolism of burn patients. Accurate determination of resting energy expenditure is necessary in patients receiving nutritional support to ensure that their energy needs are met and to avoid the complications associated with over or underfeeding.[59]

Determining nutritional needs in burns becomes a challenge for nutritionists. The valorization of metabolic aspects of critical ill patient should be promoted with the inclusion of IC equipment. Nutritional evaluation should include a specific investigation, considering the clinical condition and patient's exposure to situations that may interfere with nutritional support.

In clinical practice, the burned patient is constantly exposed to periods of fasting, mostly due execution of examinations or surgical procedures. However, what differs this from other patients in intensive care is the constant need to make bandages. The frequency of these procedures can be daily and also require fasting. Moreover, it is widely described in literature that some inflammatory markers induced anorexia in patients submitted to metabolic stress.[60,61]

Keeping patients "fasted" to avoid aspiration complications when attempting extubation and a variety of other reasons generally delay enteral feeding. Several studies and reviews have shown that only about 75% of prescribed nutrients are actually delivered, with substantial variability.[62]

Even in a simple fasting, as a prolonged fasting, the body of an average adult loses about 60 to 70 g of protein (240 to 280 g of muscle tissue) per day. In severe trauma or sepsis, this loss can reach 150 to 200 g (600 to 1,000 g of muscle tissue) per day.[27]

The constant development of nutritional assessment reveals a promising future for the discipline. The results of these investigations will allow professionals in the field to broaden knowledge and devise new treatment strategies, improving the quality of care. Nutrition occupies a central role in our lives and for this reason it should be approached seriously, especially in pathological states.

Conclusion

There are lists of possible markers for nutritional assessment, but a minimum set of standards should be established. The use of IC is crucial to ensuring the safety of the nutritional support of burn patients and this should be widely encouraged.

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