

## Original

# Comparison of the nutritional diagnosis, obtained through different methods and indicators, in patients with cancer

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### Abstract

**Objective:** The aim of this article is to compare the diagnosis, obtained through different methods and indicators, of nutritional risk in patients with cancer.

**Methods:** It was assessed nutritional risk in of 144 oncology patients was assessed, making use of Subjective Global Assessment (SGA, Detsky 1987), Malnutrition Universal Screening Tool (MUST, 2003), Body Mass Index (BMI) and Serum Albumin. Statistical Analysis: Kappa, chi-square and McNemar tests.

**Results:** It was found a high prevalence of malnutrition (MUST, 78.32%; SGA, 77.08%; serum albumin level < 3.5 g/dL, 45.60%; BMI < 20.0 kg/m<sup>2</sup>, 36.11%) in patients with cancer. In general, there was a higher prevalence in patients with Gastrointestinal Tract Cancer (72.22%), with the stomach cancer being the most common one (29.17%). Tumors of the digestive tract presented with higher nutritional risk according to SGA (p < 0.0001), MUST (p < 0.01), BMI (p < 0,05) and serum albumin level < 3,0 g/dL (p < 0,05); these patients have twenty three times more chances of nutritional risk than patients with cancer in other organs. The patients that have also metastasis presented greater nutritional impairment, according to MUST (p < 0.05) and serum albumin level < 3,0 g/dl (p < 0,01). According to this study, we demonstrate that there is no difference between the Diagnosis of Nutritional Risk, according to MUST and SGA. However, these values are different when confronted with the ones of serum albumin level and BMI.

**Conclusion:** The MUST and the Serum Albumin proved to be sensitive methods for the identification of nutritional risk in patients with metastatic cancer. The SGA and MUST tests are good diagnostic tests which presented convergence of results.

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Key words: Nutritional assessment. Nutritional indicators. Cancer. Malnutrition. MUST. SGA.

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### COMPARACIÓN DEL DIAGNÓSTICO NUTRITIVO, OBTENIDO POR DIFERENTES MÉTODOS E INDICADORES, EN PACIENTES CON CÁNCER

#### Resumen

**Objetivo:** El objetivo de este artículo es comparar el diagnóstico de riesgo nutritivo en pacientes con cáncer, obtenido por diferentes métodos e indicadores.

**Métodos:** Se evaluó el riesgo nutricional en 144 pacientes oncológicos, empleando la Valoración Global Subjetiva ( Subjective Global Assessment, SGA, Detsky 1987), el Instrumento Universal de Despistaje de Malnutrición ( Malnutrition Universal Screening Tool, MUST 2003), el Índice de Masa Corporal (IMC) y la albúmina sérica.

**Análisis estadístico:** Pruebas de Kappa, chi-cuadrado y McNemar.

**Resultados:** Se encontró una alta prevalencia de malnutrición (MUST, 78,32%; SGA, 77,08%, concentración de albúmina sérica < 3,5 g/dl, IMC < 20,0 kg/m<sup>2</sup>, 36,11%) en pacientes con cáncer. En general, la prevalencia era mayor en pacientes con cáncer del tracto gastrointestinal (72,22%), siendo el más frecuente el cáncer gástrico (29,17%). Los tumores digestivos tenían el mayor riesgo nutritivo según el SGA (p < 0,0001), MUST (p < 0,01), IMC (p < 0,05) y concentración de albúmina sérica < 3 g/dl (p < 0,05); estos pacientes tienen 23 veces más probabilidades de riesgo nutritivo que los pacientes con cáncer en otros órganos. Los pacientes que también tiene metástasis tienen mayor trastorno nutritivo, según el MUST (p < 0,05) y la concentración de albúmina sérica < 3 g/dl (p < 0,01). Según este estudio, hemos demostrado que no existen diferencias en el diagnóstico de riesgo nutricional entre el MUST y el SGA. Sin embargo, estos valores difieren cuando se comparan con la concentración de albúmina sérica y con el IMC.

**Conclusión:** Demostramos que el MUST y la albúmina sérica son métodos sensibles para identificar el riesgo nutritivo en pacientes con cáncer metastásico. El SGA y el MUST son pruebas diagnósticas buenas que tienen resultados concordantes.

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Palabras clave: Valoración nutritiva. Indicadores nutricionales. Cáncer. Malnutrición. MUST. SGA.

## Introduction

Cancer is a major public health problem in developed and developing countries.<sup>1</sup> In Brazil, the estimates for 2006 point that will be identified 472,050 new cases of cancer. The most common types, except for non-melanotic skin cancer, will be the prostate and the lung cancers for males; and the breast and the uterine cervix cancers for females, following the same figures appointed worldwide.<sup>2</sup>

Cancer is frequently related to the person's decline of proper nutritional levels. Proteic-caloric malnutrition affects from 30% to 50% of the patients, leading to worse quality of life, reduction of survival rate and tolerance to treatment; and increasing postoperative morbidity.<sup>3-5</sup>

The attainment of malnutrition's prevalence can be difficult to achieve because it depends on the sensitivity and specificity of the parameters used on the nutritional assessment and because of the lack of consensus on the validity of this parameters.<sup>6</sup>

In general, oncology patients show a more serious nutritional injury and, therefore, chances of complications are higher. The problem is that in many times these patients are not screened or, when they are, it is too late to change the nutritional prognosis.

Several nutritional assessment methods, with different specificities, sensitivities and costs, are in use in this clinical practice. However, there is not an indicator that can be considered the "gold standard". All of them present limitations, being the most significant one, the fact that they are influenced by factors that are independent from the nutritional status.<sup>7,8</sup>

The anthropometry embraces, besides height and weight, the Body Mass Index (BMI), through which it is assessed the relation between these two variables, without assessing, however, the body compartments. The cutaneous folds and the circumferences consist in a convenient anthropometric method to indirectly establish the body fat mass and the free fat mass, respectively.<sup>9,10</sup>

In the absence of a definitive method to diagnose the malnutrition, the MUST (*Malnutrition Universal Screening Tool*) was developed to detect proteic-caloric malnutrition and the risk of malnutrition development, using standards based on evidences.<sup>11</sup> This method shows, among its parameters of nutritional risk identification, the weight loss percentage in the last six months, the BMI (cut-off point 18.5 kg/m<sup>2</sup>) and also assesses the disease's possible acute effect through observing if the patient have been eating or not in the last five days.<sup>12</sup>

Currently, the Subjective Global Assessment (SGA) is one of the most applied protocols and most described as a method of detecting malnutrition, with prognostic value for patients with cancer. This protocol consists in an easy and quick questionnaire which includes the history of past-recent decrease in weight, dietary history and physical examination.<sup>13,14</sup>

Laboratory and biochemical examinations can also be used; however it is necessary to take into consideration the changes that may occur to them due to the present disease, which does not reflect trustworthily the nutritional levels.

The importance of the present study consists in comparing these two methods for the diagnosis of oncology patients with malnutrition, once it can lead to nutritional intervention and, consequently, affect these patients's survival.<sup>15</sup>

## Materials and methods

This prospective and transversal study, whose sample is constituted by adult patients, of both sexes, diagnosed with cancer, hospitalized at Gaffrée e Guinle Hospital/University of Rio de Janeiro's infirmary. It was excluded patients with upper limb oedema, unable to ramble or to stand still, as well as those diagnosed with HIV/AIDS.

In this study, 144 patients were assessed, hospitalized at Gaffrée e Guinle, from September/2004 to august/2006. Their mean age was 56.32 ± 11.67 years, being 59.42% of them male. The sample consisted in patients with bladder, cardial, cecum, colon, esophagus, stomach, breast, mediastinum, ovary, pancreatic, prostate, lung, rectal, adrenal, lymphatic tissue, thorax and uterus malignant neoplasm (fig. 1).

The data were collected preferentially at the moment of hospitalization, or at least three days after it. The SGA, the Anthropometric Assessment and the MUST were done at the infirmary itself, individually, on the patient's bed, by the same well-trained appraiser.

Two original protocols were applied: SGA, created by Detsky and partners (1987), and the MUST, created by the British Association for Parenteral and Enteral Nutrition's Counseling Group (2004). At the end of SGA protocol, it was added a field to register the anthropometric levels surveyed during the medical consultation and the Body Mass Index calculation.

Besides the application of these protocols, it was also analyzed the following complementary data: tumor localization, presence of metastasis, treatment to be adopted (surgery, chemotherapy, radiotherapy) and serum albumin.

The body weight was measured by digital scale Plenna®, and the stature by Filizola, with the accuracy of 0.01 cm. Through these results, the Body Mass Index (BMI) was figured. The serum albumin was measured in the same day of protocols' application and its analysis was done at Gaffrée e Guinle's laboratory.

It is important to call attention to the fact that the anthropometric data (weight, height, BMI) and the serum levels were transformed into binary variables, using the cut-off points described in literature (< 3.5 g/dl; < 3.0 g/dl e < 2.5 g/dl) and compared through chi-square and McNemar tests, with the significance level of 5% (p < 0.05) for convergent validation. The Kappa

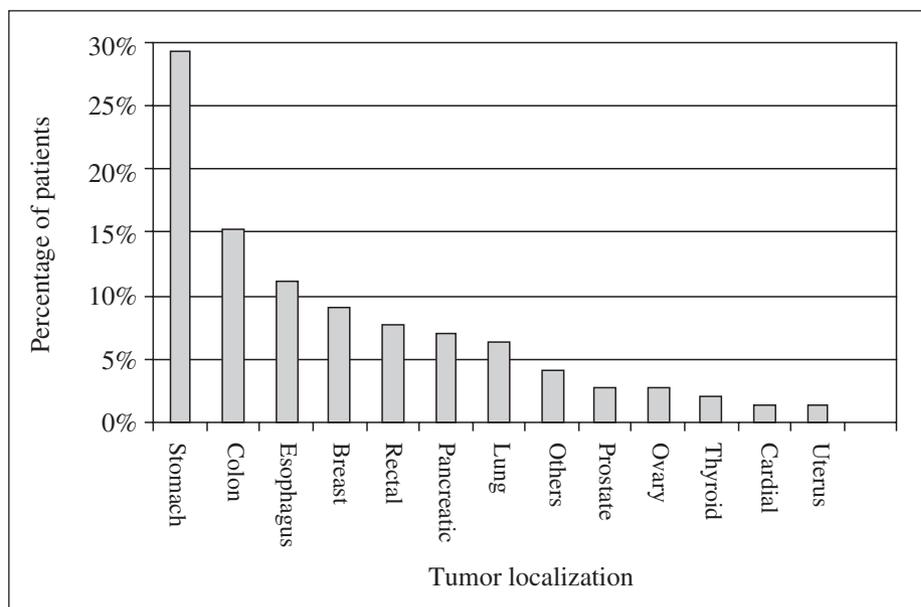


Fig. 1.—Types of cancer's prevalence among the group studied. \*"Others" represents the types of cancer that showed only one isolated case (cecum, lymphatic tissue, mediastinum, adrenal and thorax).

was used to compare the correspondence between the results achieved by SGA and MUST. *Microsoft Office Excel*® 2000 and *Stata*® 7.0 were the programs used to analyze the data.

This work is part of a research project approved by Gaffrée e Guinle Hospital/University of Rio de Janeiro Ethical Committee, titled "Nutritional therapy: the importance of monitoring", according to 196/96 resolution.

## Results

The malnutrition prevalence in the group of people studied was high, being detected nutritional risk in 78.32%, according to MUST, and 77.08%, according to SGA. From all tools used for the nutritional assessment, the MUST achieved convergent results to the ASG's (table I). The serum albumin and the BMI did not converge in terms of results as the ASG and the MUST did.

**Table I**  
Convergent validation tests on the result achieved by the MUST and SGA protocols in patients with cancer at Gaffrée e Guinle Hospital

	Nutritional Risk (SGA)	No Nutritional Risk (SGA)	Total
Nutritional Risk (MUST)	106	6*	112
No Nutritional Risk (MUST)	4*	27	31
Total	110	32	143

p = 0,5271 NS. McNemar.

Kappa = 0,799 95% confidence interval: From 0.678 to 0.919.

SGA: Subjective Global Assessment. MUST: Malnutrition Universal Screening Tool.

The diagnosis achieved with BMI cut-off point of 18.5 kg/m<sup>2</sup> and with serum albumin levels of 3,0 g/dL (kappa = 0.279; IC: 0.025 a 0.533), were convergent. When the BMI had its cut-off point increased to 20.0 kg/m<sup>2</sup> and the serum albumin levels to 3,0 g/dl (kappa = 0.177; IC: 0.019 a 0.373) and 3.5 g/dl (kappa = 0.133; IC: 0.046 a 0.313), the results were also convergent.

Among the patients assessed, 14.69% were not submitted to any antitumoral therapy during the hospitalization period. From this group, 61.9% had metastasis detected and 76.2% had unable to surgical resection gastrointestinal tract tumors. Whereas in those to whom were adopted some kind of procedure, the most employed method was Surgery (69.93%).

From the total of patients, 20.28% presented metastasis. And, when associating the presence of metastasis with the Serum Albumin levels, was noticed that this group has around 12, 5 and 5 more chances of presenting nutritional injury, with Albumin cut-off point of < 3.0 and < 3.5, respectively. Nevertheless, when comparing the presence of metastasis to the SGA and BMI, the results were insignificant.

The majority of the population studied (70%) presented gastrointestinal symptoms which lead to serious nutritional consequences, specially when the patients are not submitted to an appropriate nutritional supervision. The most common symptoms mentioned by the patients were anorexia (38%), vomits (36%) and nauseas (34%).

The patients with tumors in gastrointestinal tract regions, including the pancreas, have greater chances of presenting nutritional injury, according to the nutritional assessment's different methods and indicators. These chances are increased according to BMI < 20.0 kg/m<sup>2</sup> (4,45 times), to MUST (14.18 times) and SGA (23 times) (tables II, III and IV).

It is also important to call attention to the fact that when the presence of tumors in gastrointestinal tract

**Table II**  
Nutritional risk in patients with digestive tract tumors, according to BMI (< 20,0 kg/m<sup>2</sup>)

	Nutritional Risk (BMI < 20,0 kg/m <sup>2</sup> )	No Nutritional Risk (BMI ≤ 20,0 kg/m <sup>2</sup> )	Total
Digestive tract tumors	43	61	104
Other cancers	9	31	40
Total	52	92	144

p < 0.05 OR = 4.45.  
BMI: Body Mass Index. OR: Odds Ratio.

regions is combined with the serum albumin levels, there are more chances of nutritional risk to the cut-off point of 3.0 g/dl.

## Discussion

As there is no referential method for malnutrition's diagnosis, different strategies are used to validate new nutritional assessment techniques. One of them, called convergent validation, verifies if the result achieved through the new method leads to the same answer of the traditional method that is being used as a comparison standard.<sup>14-17</sup>

In our database the MUST converged with SGA in terms of results, being this second one used in this study as the traditional method for this comparison, which proved to be a good tool for the malnutrition diagnosis.<sup>15</sup>

Although the MUST has the BMI as one of its assessment criteria, it only obtains maximum score with cut-off point under 18.5 kg/m<sup>2</sup>. One of the main points of criticism on the BMI is that it is essential that a big modification concerning the weight had occurred so that it would be possible to achieve the BMI reduction till malnutrition's cut-off point (18.5 kg/m<sup>2</sup>).

Exactly because of that, some authors explain that cut-off point alteration to 20.0 kg/m<sup>2</sup> could be useful in the sense that more low weight patients could be caught, increasing IMC's sensitivity.<sup>18</sup> However, even

**Table III**  
Nutritional risk in patients with digestive tract tumors, according to MUST

	Nutritional Risk (MUST)	No Nutritional Risk (MUST)	Total
Digestive tract tumors	89	14	103
Other cancers	23	17	40
Total	112	31	143

p < 0.01 OR = 14.18.  
MUST: Malnutrition Universal Screening Tool. OR: Odds Ratio.

**Table IV**  
Nutritional risk in patients with digestive tract tumors, according to SGA

	Nutritional Risk (SGA)	No Nutritional Risk (SGA)	Total
Digestive tract tumors	91	13	104
Other cancers	20	20	40
Total	111	33	144

p < 0.0001 OR = 23.  
SGA: Subjective Global Assessment. OR: Odds Ratio.

when these patients were classified according this suggested cut-off point, the results did not converge with the MUST and SGA's.

Laboratory exams can also be used in malnutrition's assessment. It is a simple reasoning: because of their great sensitivity, these exams could identify the alterations that still could not be pointed by the anthropometric variables,<sup>19</sup> partially solving the problem mentioned above, exemplified with the BMI.

The serum albumin level is deeply used on the nutritional risk identification; however, it is criticized because of the low sensitivity it offers, once its half-life is usually of 18 days.<sup>10,20</sup>

When the SGA, MUST and BMI levels were compared to the serum albumin (< 2.5 g/dL), we saw that these methods/indicators did not converge in terms of results. As the albumin cut-off point was increased to 3, 0 and 3.5 g/dL, we observed that the first cut-off point (3.0) converged with BMI (< 18.5 kg/m<sup>2</sup> and < 20.0 kg/m<sup>2</sup>), while the second (3.5) only converged with BMI < 20.0 kg/m<sup>2</sup>. We can infer that this convergence, in bordering nutritional status situations, represented by the serum albumin levels of 3.5 g/dl, can restrict the use of BMI as a nutritional diagnosis parameter.

It is also important to call attention to the fact that Serum Albumin levels can be qualified, in this study, as a parameter, and not as a method for nutritional diagnosis, as has been already pointed by literature.<sup>21</sup>

The chances of nutritional risk in patients with metastasis are bigger, according to MUST and Serum Albumin. This fact has already been proved by other authors, without making use, however, of this new tool (MUST). It is interesting to notice that the relation between the SGA and the metastasis was not significant, which makes us think about this method's subjectivity in contrast to MUST's more objective data.<sup>11</sup>

As cancer's development is related to the worsening of nutritional status,<sup>22-24</sup> and as metastasis presence happens in cancers in more advanced states,<sup>25</sup> it is expected that a greater nutritional risk is associated to the presence of metastasis.

In the same way, the patients with gastrointestinal tract tumors have at least 23 times more chances of presenting nutritional risk when compared to those with cancer in other sites.<sup>26</sup> The cancer itself causes bigger injuries to the

nutritional status than other diseases, because the way the patient gets malnourished is different. The response to cancer is not an adaptation-to-fasting response, but an inflammatory one, in which the inflammatory mediators release leads to the secretion of catabolic hormones conducting the patient to a constant catabolic state.<sup>27</sup>

In this study, were founded 41.67% of patients with obstructive upper digestive tract tumors, in which was diagnosed nutritional risk in 86.67% through SGA and 88.33% through MUST. The present catabolism is, then, increased because, besides the inflammatory response, there is also a metabolic response to the fasting.<sup>28</sup> It explains the greater prevalence of malnutrition in these types of cancer.

Literature shows the great malnutrition's prevalence in cancer of 30 to 80%.<sup>29</sup> In Brazil, the multicenter study IBRANUTRI identified an incidence of 66.4% of malnutrition in oncology patients, being 41.1% moderate and 21.3% serious.<sup>6,15,30,31</sup>

In the present study, the malnourished oncology patients' percentage remained in the values achieved by the past studies, according to MUST (78.32%) and SGA (77%), which shows that these methods can be considered good tools for nutritional diagnosis. However, the use of BMI and Serum Albumin were not so efficient to achieve this diagnosis.

## Conclusion

The results achieved through SGA and MUST converge when detecting nutritional risk in this group of patients. They also proved to be good diagnostic tests.

The Serum Albumin and MUST showed themselves sensible on the nutritional risk's detection in patients with metastatic cancer.

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