

## **The Problems of Nutritive Support of the Presurgical Period among the Patients with Cancer of Organs of a Gastrointestinal Tract**

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**Abstract:** The role of the nutritive support in the treatment of the patients with oncological diseases can hardly be overvalued. One of the stages of the nutritive support is the presurgical assessment of the nutritional status of the patient. Now a days there is a significant amount of the diagnostic scales of the undernutrition. However, any scale does not satisfy completely the practical experience of the public health service in the prognosis of the development of the postsurgical complications and the necessity of the presurgical nutritive support of the patients with cancer of organs of a gastrointestinal tract. The problem of the nutritive support of the presurgical period as one of the preventive measure of the postsurgical complications is not covered in the Republic of Kazakhstan. Taking into consideration the topicality of the designated problem in our country, the aim of our research is to determine the role of the nutrition in the treatment of oncological patients.

**Key words:** Cancer of a gastrointestinal tract, presurgical assessment, nutritive status, presurgical nutritive support, postsurgical complications

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### **INTRODUCTION**

According to the World Health Organization (WHO), the cancer is one of the main reasons of the death in the world (WHO, 2015). Therefore, 8.2 million cases of the death from cancer are registered in 2012 and 1.8 million people died of cancer of organs of a gastrointestinal tract. In addition, every year, according to data of the International agency for Research on Cancer Globocan in 2012, the incidence rate becomes perceptible. It is typical for Asian countries (Choi and Kim, 2016). In the Republic of Kazakhstan the oncological diseases according to the mortality structure, take the second place after the cardiovascular pathology. According to statistical data of the Ministry of Healthcare and Social Development of the Republic of Kazakhstan, the number of newly diagnosed and registered in the oncological organizations patients grew up in 2003 in all regions of the country. In the structure of morbidity, the oncological pathology of organs of a gastrointestinal tract has one of the leading positions (WHO, 2012). From our point of view, a high level of morbidity is connected not only with the specifics of the region with the way of life and nutrition, habitual intoxications but with appreciable development of the national medicine which gave a chance of earlier diagnostics of the oncological diseases.

The treatment of the cancer of a Gastrointestinal Tract (GT) is one of the most important problem of a

modern oncology. The basic and one of the most effective medical method is the surgical method. The high level of the anesthesiology development and the qualitative postsurgical monitoring allow the middle age patients who have as a rule, severe concomitant disease and the patients with complications of the neoplastic process to have an operation (Davydov, 2011). As a rule, the tactics of such patients' monitoring is specified predominantly by the preventive measures and the treatment of severe purulent-septic complications. It is a fact that the patients with cancer of organs of a gastrointestinal tract initially have the appreciable metabolic disturbances and in a consequence of it, their regenerator reserves are lowered. It is necessary to notice that the tactics of the treatment of the patients with cancer is mainly determined by the correction of metabolic disturbances, the elimination of the disorder of the constancy of the internal environment and the adequate provision with protein-energy needs of an organism.

Clinical nutrition is an important component for the oncological patients' therapy in perioperative period. There is a huge number of the literature devoted to a problem of the nutritive support in postoperative period. The issues of the nutritional status in presurgical period remain little developed in the world in our country they are not considered at all and therefore it is interesting and prospective study for us. The observed works (Inui, 2002; Esper and Harb, 2005; Strasser and Bruera,

2002; Kononenko *et al.*, 2014; Snegovoi *et al.*, 2015; De Vita *et al.*, 2011) in recent years according to presurgical specialized nutrition, say about positive influence on the course of the postsurgical period.

Taking into consideration the positive experience of the presurgical specialized nutrition described in literature, we think that this subject would be urgent in the field of the clinical nutrition and intensive care of the postsurgical period. The analysis of the questions of the presurgical nutritive support is actual within the interest of our state in problems of oncology and the improvement of oncological patients' life quality formulated in a state program of the oncological patients support service development for 2012-2016. The main objective of this program is the increase of the duration and quality of Kazakhstani citizens' life due to lethality's reduction from oncological diseases. The research of the presurgical assessment of the nutritional status and presurgical nutrition in the world and Kazakhstan would allow us to develop and offer the protocols of the presurgical nutritive support of oncological diseases of the upper part of a gastrointestinal tract. We hope, it will promote the improvement of the oncological patients' life quality. The object of the research: the literature sources concerning the assessment of the nutritive status and the conduction of the preoperational nutritive support for patients with cancer of a gastrointestinal tract.

### CACHEXIA-ANOREXIA SYNDROME

It is known that one of the main links of a pathogenesis of the nutritive insufficiency is the cachexia-anorexia syndrome (Malkov *et al.*, 2008; Inui, 2002; Esper and Harb, 2005; Strasser and Bruera, 2002). This syndrome displays the loss of the body weight due to the decrease of the nutrition arrival in organism and metabolic disturbances. These aspects lead to metabolic disorders with prevalence of protein-energy exchange (Kononenko *et al.*, 2014). According to numerous investigations, the epidemiology of cachexia-anorexia syndrome among patients with common forms of cancer is 60-80% (European society of parenteral and enteral nutrition-ESPEN; 2009). Since 2000, the syndrome of cachexia-anorexia is considered as an independent indicator showing the survival rate of oncological patients (Snegovoi *et al.*, 2015; De Vita *et al.*, 2011; Dewys *et al.*, 1980). It is noticeable that the syndrome is widespread mainly among patients with oncological diseases of organs of a gastrointestinal tract (Fig. 1).

As it was mentioned above, the pathogenesis of cachexia-anorexia syndrome is multifactorial and besides the lesion of the muscular and fatty tissues, the

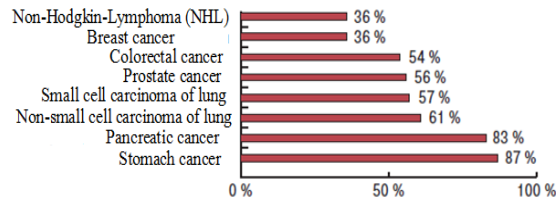


Fig. 1: Prevalence of cachexia-anorexia syndrome among oncological patients (Sonis, 2012)

disturbance of a neurogenic regulation between hypothalamus and stomach (loss of appetite, constant feeling of the saturation) is observed. The emergence of these moments is the result of the interaction between a tumor and target cells (skeletal musculature, fatty tissue, immune system) with the subsequent development of an inflammation and elution of the known mediators like Interleukin 1, 6 (IL-1, IL-6), the Factor of a Necrosis of the Tumor (TNF- $\alpha$ ) (Snegovoi *et al.*, 2015). The pathogenic mechanisms enforce the early diagnostics of cachexia-anorexia syndrome as the preventive measure of the development of the postsurgical complications among patients.

### RATING SCALES OF THE NUTRITIVE STATUS

According to the studied literature, the assessment of the nutritive status plays an important role for the prevention of probable postsurgical complications (Huhmann and Cunningham, 2005; Leather, 2003). The parameters of such assessment usually include the anthropometric data (the index of the body weight, the actual deficiency of the body weight), the data of the anamnesis the loss of the weight within the last month. Therefore, the literature describes 44 scales according to the nutritive status (Jones, 2002). We want to take into consideration the high-usage scales only. ESPEN recommends the use of such scales as Malnutrition Universal Screening Tool (MUST), Mini Nutritional Assessment (MNA), Nutrition Risk Score (NRS)-2002 (MAG, 2000).

The tool for screening and identification of the postsurgical complications MUST (MAG, 2000) is a simple universal scale, usable in clinic and out of the clinic. The validity of the MUST scale was confirmed by the results of the research described in ESPEN Guidelines (Kondrup *et al.*, 2003a). The NRS-2002 scale (Kondrup *et al.*, 2003b) is for the identification of the patients with a nutritive insufficiency in the conditions of clinic (Kondrup *et al.*, 2003a) and proved itself as a qualitative predictor of the postsurgical complications

(Leithold *et al.*, 2016). Wang *et al.* (2015)'s research showed that the NRS-2002 scale was successful and applied in the concept of "fast track surgery" among patients with a carcinoma of the stomach diagnosis. The scientists point out that the scale helped not only to find patients with a nutritive insufficiency but also to start early postsurgical rehabilitation.

The Korean research (Kim *et al.*, 2013) conducted among patients with a stroke, assessed the relevance of Mini Nutritional Assessment (MNA) scale on the example of the detection of the correlation between a scale and anthropometric, biochemical parameters of such patients. The scientists received very interesting results: the correlation of a scale with albumin level was identified but at the same time, the dependence between scale and the level of a transferrin was not found. However, the transferrin as we know is a short-lived protein (Yoon *et al.*, 2005). The scientists explain these results by small group and possible influence of an iron deficiency anemia. The received results testify the necessity of further research conducting.

Rubenstein *et al.* (2001) developed the simplified scale of Mini Nutritional Assessment-Short Form (MNA-SF) based on MNA. It is necessary to notice that MNA-SF is recommended to use for the assessment of the nutritional status among elderly patients. Kaiser *et al.* (1999) made in their work the comparative analysis of MNA and MNA-SF scales. The results of the analysis showed that the MNA-SF scale equals MNA one in its significance. At the same time, the MNA-SF scale possesses the unique property as the usability. The use of a MNA-SF scale is described by (Gu *et al.*, 2015) which is devoted to a nephrocellular cancer of kidney. The scientists recommended to use MNA-SF as a predictor of criterion of the survival rate among patients of target therapy but the scale proved to be statistically worse in comparison with a scale of Geriatric Nutritional Risk Index (GNRI), used in the work of the above mentioned scientists for the comparative analysis. Bouillanne *et al.* (2005) developers of the GNRI scale positioned it as a new index for the assessment of the nutritive status among elderly patients. At the same time according to recent research, the Nutrition Risk Index (NRI) scale acquired a good reputation. NRI represents a scale which notes the proper and actual weight of the patient and the level of an albumin of plasma. The method of the nutritive status assessment is easy to use and convenient for the majority of clinics.

Therefore, the research by Bo *et al.* (2015) investigated the NRI index among patients with cancer of a liver. The scientists deduced that index <100 showed the reduction of the postsurgical survival rate. While the previous researches by Clugston *et al.* (2006) Kyle *et al.*

(2004) point out that the index <83, 5 predicts the worst prognosis. Another tool Subjective Global Assessment (SGA) according to results of the investigations (Makhija and Baker, 2008) proved itself as the predictor of the postsurgical complications in the general surgery (Baker *et al.*, 1982) but at the same time, Fang (2014) says about the insensibility to postsurgical noninfectious complications in comparison with NRS-2002 scale.

Thus, all recommended scales show quite high degree of sensitivity but the scientists of the analyzed sources as a rule, do not argue the choice of one or another scale for the prevention of the development of the postsurgical complications. The presented scales display mainly the anthropometric data, the data of the anamnesis of nutrition without emphasis on albumin level, except for NRI scale.

**Plasma markers:** In spite of a great number of researches devoted to the importance of albumin level in postsurgical complications, we think it would be necessary to place some emphasis on albumin and other plasma markers of inflammation. The albumin is one of the main preoperative plasma markers. The available researches prove the direct interrelation of the albumin level reduction and the worst prognosis in the postsurgical period consisting in the development of purulent-infectious complications and increasing of the death rate among patients with cancer of a gastrointestinal tract. There is a research, confirming this statement which was conducted by Hennessey *et al.* (2010) where the scientists proved that the hypoalbuminemia is the main factor of a local wound infection development among patients with a carcinoma of the stomach (RR = 5.68, 95% of confidence interval: 3.45-9.35,  $p < 0.001$ ). The S-Reactive Protein (SRP) as well as an albumin is raised in case of inflammation and damage. The high level of SRP in preoperative period has a direct interrelation with unfavorable outcome with different localizations of cancer (Takasu *et al.*, 2013; Roxburgh and McMillan, 2010). We will give the literal excerpts from the work of Takasu *et al.* (2013) "preoperative increase of SRP >10 mg L<sup>-1</sup> reliably reduced the survival rate 8.3 against 18.2 months ( $p < 0.05$ ), than among the patients with SRP level  $\leq 10$  mg L<sup>-1</sup>" (Takasu *et al.*, 2013). The role of the nutritive status of other plasma markers such as a transferrin and the amount of lymphocytes is confirmed by the last century investigations (Roza *et al.*, 1984; Forse *et al.*, 1985). The contemporary investigations in the field of markers do not follow the aims and the tasks of our research that is why we did not place the emphasis on them.

**Presurgical period:** According to ESPEN (Weimann *et al.*, 2006) recommendations, the indication

for nutritive support in the preoperative period is described for patients with a severe insufficiency of nutrition (the level of validity A). Recently, the scientists became interested in a hypothesis of an additional specialized enteral nutrition for the patients without severe nutritive insufficiency. Kabata *et al.* (2015) carried out a preoperative nutrition of the patients with the confirmed diagnosis of a cancer of the upper parts of a gastrointestinal tract without the signs of the nutritive insufficiency.

The reliable results of the reduction of the postsurgical complications were received. Okamoto *et al.* (2009) carried out the similar work among the patients with a carcinoma of the stomach. The main group of the patients who had an additional immune nutrition for 7 days showed the smaller percent of infectious complications after the operation. Fujitani *et al.* (2012) carried out an experiment with a similar group of patients who had a cancer of organs of a gastrointestinal tract. The scientists, however, did not find the reliable differences between the main and control groups. Besides, the systematized review (Burden *et al.*, 2012) of the Randomized Controlled Trials (RCT) with six RCT concerning enteral and three RCT of a parenteral preoperative nutrition showed that the obtained data are unconvincing and further research is necessary. Perhaps, the reason of the unconvincing results is a duration of the additional nutrition.

Therefore, in the specified researches by Fujitani *et al.* (2012), Barker *et al.* (2013) and Mikagi *et al.* (2011), it lasted 5 days among patients with the signs of a nutritive insufficiency while in the work by Kabata *et al.* (2015), it lasted 14 days among the patients without the signs of the nutritive status disturbance. However, Weimann *et al.* (2006) and Russian national guidelines for parenteral and enteral nutrition recommend to carry out a presurgical specialized nutrition within 10-14 days among patients with the nutrition status disturbance and 5-7 days without signs of the disturbance (Gokcan *et al.* 2014). The information presented in the review cannot solve all problems which the doctor faces in the process of oncological patients' treatment.

Our country does not have the developed and approved standards of the nutritive support of patients including oncological patients. However, it is necessary to understand that oncological patients' treatment is an individual process that is why, it is impossible to have the uniformed treatment for everyone. At the same time, the analysis of the scientific publications devoted to questions of preoperative nutritive support of the patients with cancer of a gastrointestinal tract shows that there is no enough literature concerning issues mentioned above. This fact testifies the continuation of the research devoted to the assessment of the nutritive status of the patient as predictor of the postsurgical complications.

## CONCLUSION

The contemporary nutritive support is one of the components of an intensive care of patients of a surgical profile. However, it is necessary to remember that nutritive support has to be used in a complex with the main treatment. The adequate nutritive therapy allows the reducing of the risks of the postsurgical complications of a pyoinflammatory character, the time of hospitalization in the intensive care units and the lethality of patients with oncological diseases.

On the basement of existing literature sources, we tried to systematize knowledge about the nutritive insufficiency and the necessity of its early correction. The analysis of the literature sources devoted to the assessment of the preoperative nutritive status and the presurgical nutrition of the patients with cancer confirms the topicality of this problem. As we see from publications, the results of the scientific research are connected with the development of the various scales for the assessment of the nutritive status. They do not differ from each other cardinally and represent the measurement of anthropometric data and the anamnesis of the nutrition.

The existence of the variety of the scales allowing to estimate the nutritive status, gives the chance to clinicians to choose the most acceptable scale for a certain category of the patients. At the same time, we did not find the information in scientific investigations devoted to the complex assessment of the nutritive status of the patient according to the anthropometric data, the anamnesis of the nutrition and albumin level. From our point of view, the analysis of the scales of the nutritive status and the level of albumin will allow to apply the methods of presurgical nutritive correction to patients with cancer. The necessity and the duration of nutritive presurgical support is a debatable issue. We suppose to study the possibilities of positive effect in terms of the prevention of early postsurgical complications and the use of nutritive support in the presurgical period.

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