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**MODERN ARTIFICIAL NUTRITION PRODUCTS AS A PART OF FAST-TRACK  
CONCEPTION USED IN ESOPHAGEAL  
AND GASTRIC CANCER ONCOLOGICAL SURGERY – APPLICATION ANALYSIS**

**ANALIZA ZASTOSOWANIA NOWOCZESNYCH PREPARATÓW  
DIETETYCZNO-PRZEMYSŁOWYCH Z WYKORZYSTANIEM SYSTEMU FAST-TRACK  
W CHIRURGII ONKOLOGICZNEJ NOWOTWORÓW PRZELĘYKU I ŻOŁĄDKA**

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### Summary

**Introduction.** The esophageal and gastric cancer cases according to European statistics and meta-analysis are now still an important clinical and epidemiological problem. Surgical resection is one of the most common methods of first choice treatment in operating cases. Patients with a cancerous tumor within the esophagus or stomach in various stages of clinical staging values of T and N, are usually characterized by a considerable degree of malnutrition, mostly of a protein – calorie type. Malnutrition in this patient group is a factor significantly influencing the quality of life and prognosis in the 5-year's survival classification system. An important element of clinical nutrition in this case, is the introduction of specific elements of the artificial diet system based on modern methods and guidelines, for example under the “Fast – Track” surgery conception.

**Objective:** The analysis was designed to present the latest guidelines, recommendations and specific producer

examples of the use of artificial diet system products in patients with esophagus or stomach cancer, with indications for non-palliative surgical tumor resection, based on Fast-Track system conception.

**Material and methods:** In the study, we analyzed a group of scientific publications, guidelines and recommendations, selected from international gastroenterological, surgical, nutritional and dietary literature as well as material obtained in the selection of published material about the artificial diet system and clinical supplementation international producers.

**Conclusion.** In our analysis and literature review we showed that the use of modern artificial diet products and systems under the Fast-Track conception in oncological surgery of patients operated due the esophagus and stomach cancer is important and has a positive clinical effect.

### Streszczenie

**Wstęp.** Nowotwory żołądka i przełyku według statystyk i meta-analiz ogólnoeuropejskich stanowią obecnie, ciągle istotny problem kliniczny i epidemiologiczny. Resekcja chirurgiczna jest jedną z częstszych metod leczenia z pierwszego wyboru, w przypadkach operacyjnych. Pacjenci

obarczeni guzem nowotworowym w obrębie przełyku lub żołądka w różnym stadium klinicznym i wartościach miana T i N, cechują się z reguły znacznym stopniem niedożywienia, najczęściej o charakterze niedożywienia białkowo-kalorycznego. Niedożywienie u tej grupy pacjentów stanowi

czynnik istotnie wpływający, na jakość życia, rokowanie i 5 letni okres przeżycia. Ważnym elementem żywienia klinicznego jest w tym przypadku wprowadzanie elementów diety przemysłowej także w oparciu o nowoczesne metody i wytyczne, np. w ramach systemu „Fast - Track”.

**Cel.** Przeprowadzona analiza miała na celu przedstawienie najnowszych wytycznych, zaleceń, a także konkretnych przykładów wykorzystania preparatów dietetyczno-przemysłowych, stosowanych w chirurgii onkologicznej nowotworów przełyku i żołądka, w oparciu o system Fast-Track.

**Materiał i metody.** W analizie brano pod uwagę konkretne przykłady opisów metody fast track w korelacji do zastosowanych preparatów z zakresu

dietetycznego żywienia przemysłowego, w ramach międzynarodowych publikacji w czasopismach o tematyce gastroenterologicznej, chirurgicznej, żywieniowej i dietetycznej. Analizowany materiał wzbogacono o materiały informacyjne publikowane przez producentów preparatów z zakresu diety przemysłowej.

**Wnioski.** Dzięki analizie materiału, uzyskano dane dotyczące wykorzystywania preparatów z zakresu diet przemysłowych w ramach systemu Fast Track u pacjentów leczonych chirurgicznie z powodu nowotworów przełyku i żołądka. W niniejszej pracy wykazano także iż stosowanie preparatów z zakresu diety przemysłowej w ramach koncepcji Fast Track, ma pozytywny wpływ na efekt kliniczny u pacjentów z omawianej grupy problemowej.

**Key words:** clinical nutrition, artificial nutrition products, fast-track conception, stomach and esophagus cancer, oncological surgery

**Słowa kluczowe:** żywienie kliniczne, dieta przemysłowa, koncepcja fast-track, nowotwory przełyku i żołądka, chirurgia onkologiczna

## INTRODUCTION

The problem of protein and calorie malnutrition in oncological patients with cancer of the esophagus and stomach is very important and constantly growing. Protein-calorie malnutrition is a major complication in cancer patients. In some cases, malnutrition is the first sign of disease. Fast weight loss and anorexia, are the basic symptoms of malnutrition. Increasing cachexia in patients with cancer is an indication for enteral nutrition, especially with use of artificial diet products rich in essential substrates [1]. Over 85 percent of patients with esophageal cancer are with profound symptoms of malnutrition due to obstacles of tumor in the anatomical complementary course of esophagus. Many authors suggest that preoperative malnutrition is one of the main problematic points of septic complications of esophageal cancer, and especially in this group should be applied without exception preoperative total parenteral nutrition. Feeding patients suffering from esophagus cancer is now a major challenge for the proper treatment of long-term nutritional and dietary procedure. Those patients often avoid nutrition because of: pain, mucositis, vomiting, possible insomnia caused of mechanical irritation of tissues located nearby tumor, and because of possible bleeding. Other important conductive negative factors are drug related anorexia and dysphagia. This type of condition often affects the quality of life and the most important factor which is general organism weakening and cachexia, which may complicate significantly the individual case prognosis and the possibility to implement not only surgical procedures, but also the systemic therapy methods. [2, 3].

Gastric cancer is still a significant epidemiological problem. Despite of a good knowledge of this type of cancer, many prevention programs, better social access to the endoscopic examinations or a standard trial of proton pump inhibitors in GP proceedings, the number of new diagnoses in Poland is still high. Bandurski, Zaręba et al. suggest that over 5246 new diagnosed cases are notified annually in the territory of Poland [4]. This type of cancer plays a significant role in malnutrition and cachexia caused impaired digestion and absorption. The clinical symptoms burdened with this type of cancer are mostly: the obstruction of the digestive tract, pains, constipations, the weakness, as well as the weight loss. This effect is often caused by minimal food delivery, associated also with side effects of applied therapy based on opiates, radiotherapy and chemotherapy [5].

Nutrition is important to ensure the restoration of lost body weight, maintain optimal body weight and prevent weight loss, to achieve positive nitrogen balance and provide the body with adequate water-electrolyte and acid-base. One of the most important factors directly and positively influencing those balances is applying all essential principles of clinical nutrition dedicated especially for the purposes of the cancer surgery.

Through this type of action fast introducing the nutritional algorithms, also based on artificial diet products nutrition under Fast Track conception is understood [6].

## NUTRITION

It is important to use food supplements. Nutritional therapy should begin from the moment of arrival to the hospital, following an assessment of nutritional status. Nutrition is important in situations when a patient does not eat for 7 days or when we know that over a period longer than 7-10 days food supply will be less than 60% of the actual energy demand. Indications for enteral nutrition are a BMI below 18.5 and a decrease in albumin level [7]. Patients may be nourished directly by the nasal tube into the stomach or the establishment of nutritional fistula. Many of physicians increasingly use PEG (percutaneous endoscopic gastrostomy) or percutaneous endoscopic jejunostomy (PEJ) in order to relieve the organs in patients who cannot eat. Dietary recommendations should provide 50-70% more calories, 1-2 g amino acids / kg body weight and 30-35% of energy fat. Supplementation is important to eicosapentaenoic acid (EPA), vitamin A, beta carotene, vitamin C, multivitamin, and selenium [8].

## FAST TRACK

### The Fast-Trac Conception

Fast track method is closely related to the surgery, what explains the second synonymous name of this systemic procedure, called in some scientific publications as a fast track surgery. This method was introduced for the first time in 1990', as a multifactorial concept of assuming of the acceleration of surgical treatment and early mobilization of patients with shorter duration of hospitalization. The initial development of this concept was mainly associated with increasing use of minimally invasive techniques, and later with significant needs related to the increasing implementation of surgical methods alternative to the radical treatment used in oncological surgery. Now this concept with all its constituent techniques is one of the most important pillars of the correct and comprehensive perioperative systemic therapy. [9,10]. Clinical nutrition and proper individual diet selection, designed especially for each patient, are very important factors of overall concept parts of Fast Track method. Gianotti and Braga (2011) suggest that the specific nutrition program introduced among the fast track conception is a very important aspect of systemic surgical therapy. Among the examples of exchanges, the authors focus on more rapid return of bowel function and thus, safe tolerating

of oral re-feeding within 1-3 days even after major operations [11].

Proceedings of this type have a significant impact on the patient's early return to social activity, improved mood and increased the level of quality of life after surgical treatment. Most importantly, target of use a clinical nutrition aspects in a fast track method is shortening duration of hospitalization and minimizing the possible complications or dysfunctions associated with malnutrition or dysfunctions of the digestive system. These methods are evaluated by many authors as positive and important, because they bring real economically benefits correlated with reducing the time of hospitalization without compromising patient complications[12].

A standard Fast track program consists of following main steps [13]:

- A) patient education and clear information procedure,
- B) optimization of anesthetic procedure,
- C) use an application of the minimally invasive surgical methods,
- D) proceeding and limiting nausea or vomiting,
- E) minimize postoperative pain,
- F) early introduction of nutrition and physiotherapy program,
- G) Supplementation of important nutritional substrates, also correlated with or based on artificial diet product therapies,
- H) Early construction of a plan for patient discharge.

Methods of fast track are also a key element supporting many surgical fields to minimize postoperative morbidity and mortality, also based on a special introduction of uniform methods including the use of industrial (artificial) diet nutritional supplements [14, 15].

## ARTIFICIAL NUTRITION

Supplementation is very important in the period before the operation. Gianotti L. et al. reported that intravenous glutamine supplementation does not affect the effect of nutritional status after surgery [16] Wiley W. et al. suggested that pharmacologic supplementation of glutamine is beneficial for patients with cancer and accelerates the regeneration process after surgery [17]. Ward N. reported that glutamine supplementation reduces duration of hospital stay [18]. Yoshida et al. conducted a study with the following

results: oral glutamine supplementation in patients with esophageal cancer increases lymphocyte function and decreases the permeability of the gut during radiochemotherapy [19] Van Bokhorst-de van der Schueren M. et al. reported that eicosapentaenoic acid (EPA) plays a role in preventing malnutrition and improves immunity and effects of treatment of patients with cancer[20].

If a normal intake of food is not possible, it is recommended to use an enteral intake through artificial diet products. The diet should be individualized for each patient in terms of weight, protein-calorie status and physical condition. Nutrition begins with dietary administration of peptide, which prevents the loss of body weight. In order to supplement the shortage of omega-3 products containing a sufficient dose of omega-3 fatty acids such as FortiCare (Nutricia) are recommended. Modulation is the resistance diet, used by the gastrointestinal tract, complete, hypercaloric (1.6 kcal / ml) in a milk drink. Additionally, it is recommended that supplementation of nutritional supplements (Nutridrink), which provide casein, fat LCT, are free from fiber and lactose-free options.

High value in the form of casein protein formulation provides Nutrison Advanced Protison, additional free from lactose, gluten-free and contains maltodextrin slowly absorbed and high content of trace elements and vitamins. Advanced Nutrison Peptisorb peptide is a diet that provides 47% MCT fat and free amino acids; in addition it is also free of lactose, gluten-free and free of fiber. Receiving this type of preparation can prevent the increase in weight, improves the nutritional status and deficiencies in the body compensates [21].

## CONCLUSION

From this review it can be concluded that the use of modern industrial diet and preparations with the use of Fast-Track in oncological surgery of cancer of the esophagus and the stomach is extremely important. In patients with cancer who find it very hard to follow their daily diet, it is necessary to supplement the artificial diet in order to meet the daily demand for energy, protein, fats, carbohydrates and vitamins and minerals. The use of enteral nutrition before surgery significantly lowers incidence of complications and malnutrition. It is important that patients with cancer of the esophagus and stomach are already fed properly in the period before surgery, which shortens the period

of hospitalization. The use of artificial nutritional reduces the risk of complications of protein-calorie malnutrition of patients and prevents rapid loss of muscle mass. Enteral nutrition, which involves the use of gastrointestinal motility, seems to be the most physiological process of food intake.

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