DYNAMIC OF ALBUMIN LEVEL DURING FIRST WEEK OF PARENTERAL NUTRITION AMONG THE PATIENTS WITH ADVANCED CANCER HAVE A PROGNOSTIC AND PREDICTIVE VALUE

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BACKGROUND

During administration of parenteral nutrition (PN) in advanced cancer patients, there is a problem not only in PN indication, but also in termination of it. Utilisation of nutrition substrates is a factor enabling to decide whether to indicate, not indicate or terminate PN. We anticipate that utilisation of substrates, an anabolic potential (Prado 2013). by patient after PN administration will result in increase of synthesis of binding, muscular proteins and will be reflected by increased albumin level and improved patient functioning in clinical picture. Decrease in albumin level after PN administration and formation of oedema/anasarca indicates that the patient does not utilize PN substrates and will not have any profit of it. Functioning is another criterion signalling whether to indicate, not indicate or terminate PN. In praxis, a therapeutic test can help decide for or against PN indication. If the patient condition will improve clinically, the result is positive. The question is if there is available a biochemical parameter as a criterion of improvement?

PATIENTS AND METHODS

We performed an analysis of 57 patients who were given parenteral nutrition at the Palliative care department of the National Cancer Institute in Bratislava. The analysis covered a period from 1 January 2012 until 31 December 2014. There were 57 patients with gastrointestinal dysfunction and advanced cancer that were given parenteral nutrition support.

During the first phase of parenteral nutrition we **defined a treatment goal** and performed a **biochemical analysis for determination of level of albumin** (albumin 1). A second value of albumin level (albumin 2) **was obtained during the first week** of parenteral nutrition. **On day 30 we registered if the therapeutic goal of the patient was reached and obtained a final value of albumin level** (albumin 3).

Then we categorized the patients into two groups. The first group of patients who **achieved the treatment goal was labeled as Th1. The second group who did not fulfill the treatment goal was labeled Th2.**

We performed an analysis to correlate the baseline level of albumin with the levels during the first week and the level of the fulfilled treatment goal. We also linked fulfillment of the treatment goal with the survival rate. We used a regression analysis linear model to correlate between figures in the group, which is expressed as p-value.

As for type of cancer, there were cases with gastric cancer (19 patients), colon cancer (13 patients), ovarian cancer (5 patients), pancreas cancer (4 patients), throat cancer (4 patients), hepatic and biliary duct cancer (3 patients), uterine cancer (3 patients), tongue cancer (1 patient), lung cancer (1 patient), renal cancer (1 patient), 1 patient had a carcinoma of unknown origin and two patients had non-hodgkin lymphomas in advanced phase.

The average age of patients was 61.5 years (range: 23-87 years).

As for sex of patients, there were 29 (50.88%) women and 28 (49.12%) men.

FIGURE

Kaplan-Meyer's curve of survival

y axis – weeks of survival, x axis – numbers of patients, **blue curve** – Th1 cohort (fulfilment of the treatment goal), **red curve** – Th2 cohort (not-fulfillment of the treatment goal), **p = 0,002**

RESULTS

Results in terms of comparisons of cohorts

The set of 57 patients was assigned into two cohorts – 28 patients **reached the therapeutic goal** (cohort Th1) and 29 patients did not (cohort Th2).

Table 1: Comparison of cohort Th1 (fulfilled therapeutic goal) and cohort Th2 (not fulfilled therapeutic goal) – non-significant (ns) differences in particular characteristics of patients between cohorts

	Cohort Th 1	Cohort Th 2	p-value
Number of patients	28	29	
Age (average, years)	61.1	61.9	
Cholinesterase	109.89 ukat/l	91.06 ukat/l	p = 0.351 (ns)
BMI	18.822	21.29	p = 0.229 (ns)
GPS	number of patients: 0 4 - 14.3% 1 12 - 42.85% 2 12 - 42.85%	number of patients: 2 - 6.9% 11 - 37.9% 16 - 55.2%	p = 0.531 (ns)
Albumin 1	26.57 g/l	28.03 g/l	p = 0.197 (ns)
Albumin 2	27,019 g/l	26,211 g/l	p=0,530 (ns)
Albumin 3	28,9 g/l	26,2 g/l	p=0,300 (ns)

Table 2: Dynamics of albumin level after one week of PN administration in cohort Th1 (patients with fulfilled therapeutic goal) and cohort Th2 (patients with not fulfilled therapeutic goal)

	Cohort Th 1	Cohort Th 2	p-value
Number of patients	28	29	
Increase in albumin level	17 patients (60.7%)	7 patients (24.4%)	p = 0.005
Decrease in albumin level	11 patients (39.3%)	22 patients (75.6%)	p = 0.005
Median survival (days)	90 days	26,6 days	p = 0,002

Results in terms of regression analysis of correlation with survival:

Table 3: Correlation of albumin levels with survival

	albumin 1 vs survival	albumin 2 vs survival	albumin 3 vs survival
correlation (regression analysis)	0,20 (ns)	0,17 (ns)	0,42 (ns)
increasing		→ by 185%	→ by 137%

We have found out by means of regression analysis that **survival does not correlate** with BMI (p = 0.090, correlation coefficient – 0.26), nor with cholinesterase activity (p = 0.272, correlation coefficient 0.17), nor – as given above – with level of Albumin 1 (p = 0.142, correlation coefficient -0.20) nor with level of Albumin 2 (p = 0.206, correlation coefficient 0.17). Regression analysis showed that survival **correlates** with level of Albumin 3 – level obtained after one month of PN administration. In regression analysis of correlation between levels of Albumin 1, Albumin 2, Albumin 3 and survival an **increase of correlation** coefficient was detected.

CONCLUSION

As far as BMI, weight loss and Glasgow prognostic score are concerned, patients in our set of patients would have worse prognosis and they should not profit from parenteral nutrition. Obviously, in case of consideration of PN indication only from the prognostic point of view, PN should not be administered to these patients (Bozzetti 2014). Baseline albumin level was in most patients lower, almost all patients had weight loss more than 5%. Patients of our set of patients could be classified into a phase of refractory cachexia (Fearon 2011). However, it is clear that advanced cancer patients have exploitable anabolic potential (Prado 2013(b)).

We have confirmed by evaluation of our results that the dynamics of change in albumin level during first week of PN administration in the patient with advanced, progressive cancer disease correlates with achievement of therapeutic goal – level of statistical significance p = 0.005. When we have to decide whether a particular patient has an anabolic potential, we will not use static values of parameters (albumin level, cholinesterase level, BMI, GPS), but exactly a dynamics of albumin level after one week of administration of PN substrates.

Fulfillment of therapeutic goal as a way of assessment in clinic trial respects heterogeneity problem in palliative patients, it is measurable in a simple way. It correlates with survival, which is in connection with studies of malnutrition and cachexia, the only meaningful objective. (Baracos 2012)

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Abbreviations used: BMI – Body Mass Index, CRP – C-reactive protein, DPV – Home Parenteral Nutrition, GPS – Glasgow prognostic score, CHE – Cholinesterase, NOÚ – National Oncology Institute, ns – non-significant, p – level of statistical significance, p-value, PN – parenteral nutrition