

# EFFECT OF HORMONAL CHANGES ON EXOCRINE PANCREATIC FUNCTION IN GIRLS WITH ANOREXIA NERVOSA

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## INTRODUCTION

Anorexia nervosa (AN) is a good biological model of chronic malnutrition. Although some reports according to the gastrointestinal disturbances in response to starvation have been published so far, the exocrine function of pancreas in patients with AN has not been studied thoroughly, yet. There is also no data on the effect of hormonal changes in AN on it.

## OBJECTIVES

- Evaluation of pancreatic exocrine function in patients with anorexia nervosa and control group of healthy girls in the <sup>13</sup>C-labeled triglycerides breath test (MTG-BT).
- Analysis of the relationships between the results of the breath test and the hormonal parameters in the studied groups of girls.

## METHODS

- 31 patients with AN and 30 healthy controls aged 12-17 years
- **Anthropometric** measurements (height, weight, BMI)
- **Biochemical assays** (lipid profile, fasting glucose and insulin, alanine and asparagine aminotransferase, bilirubin, GGTP and amylase)
- **Hormonal assays** (serum insulin, leptin, soluble leptin receptor, fT<sub>4</sub>, cortisol, FSH, LH, estradiol)
- HOMA-IR and total leptin (serum leptin+soluble leptin receptor) values were calculated
- **Breath samples** were collected before and every 30 minutes after the ingestion of 150 mg of the <sup>13</sup>C mixed triglycerides for 360 minutes. The cumulative percentage of <sup>13</sup>C recovered in the breath during the 360 minute collection (CP360) as well as time to peak (TTP) of <sup>13</sup>C recovery were established using IRIS analyzer (Wagner GmbH, Bremen, Germany)

## RESULTS

Table I. Clinical characteristics of the examined groups of girls

Parameter	AN n=31	C n=38	p
	mean ± SD (min-max)		
age [years]	15,1±1,6 (12,3-17,4)	15,9±0,89 (13,4-17,7)	0,08
body weight [kg]	40,9±6,42 (27,5-55,1)	55,4±7,19 (40,6-73,0)	<0,0001
height [m]	1,62±7,88 (1,43-1,82)	1,63±6,22 (1,49-1,74)	0,45
BMI [kg/m <sup>2</sup> ]	15,38±1,46 (10,7-17,58)	20,59±2,06 (15,66-25,40)	<0,0001
max body weight before the disease onset [kg]	58,0±12,75 (32,00-90,00)	-	
disease duration [months]	9,5±7,12 (2,0-34,0)	-	
body weight loss [kg]	17,1±8,73 (4,5-37,2)	-	
body weight loss velocity [kg/m-c]	2,3±1,42 (0,4-6,9)	-	
duration of amenorrhea [months]	5,4±2,44 (1,0-10,0)	-	

Table II. Results of biochemical assays

Parameter	AN n=31	C n=38	p
	mean ± SD (min-max)		
ALT [U/L]	21,2±18,81 (7,4-88,9)	12,4±4,68 (5,0-28,1)	0,003
AST [U/L]	22,5±13,83 (12,8-84,6)	18,0±3,1 (13,8-28,2)	0,21
GGTP [U/L]	14,4±12,37 (6,0-70,0)	12,3±5,35 (6,0-35,0)	0,57
total bilirubin [μmol/l]	10,4±6,38 (2,5-27,0)	11,8±11,2 (8,1-2,2)	0,53
amylase [U/L]	54,53±25,43 (22,0-149,0)	63,7±21,8 (25,0-112,0)	0,11
glukose [mg/dl]	79,75±7,34 (53,3-91,0)	90,4±8,7 (75,0-109,0)	<0,0001
insulin [μU/ml]	4,62±2,49 (1,32-12,9)	10,82±3,57 (4,61-18,62)	<0,0001
HOMA IR	0,92±0,53 (0,25-2,68)	2,44±0,88 (0,94-4,38)	<0,0001
total cholesterol [mmol/l]	4,77±1,26 (2,53-7,95)	4,28±0,72 (3,14-5,95)	0,05
HDL-cholesterol [mmol/l]	1,73±0,38 (1,12-2,54)	1,61±0,34 (1,03-2,67)	0,2
LDL-cholesterol [mmol/l]	2,54±0,97 (0,64-5,2)	2,27±0,6 (1,2-3,67)	0,16
triglycerides [mmol/l]	1,09±0,57 (0,35-3,10)	0,89±0,29 (0,37-1,95)	0,06

Table III. Results of hormonal assays

Parameter	AN n=31	C n=38	p
	mean ± SD (min-max)		
cortisol [μg/dl]	21,46±6,73 (10,28-44,62)	14,4±5,94 (2,28-31,38)	<0,0001
FSH [mIU/ml]	2,96±2,53 (0,51-8,84)	4,96±1,95 (1,0-10,53)	0,001
LH [mIU/ml]	0,75±1,83 (0,1-9,14)	7,91±4,52 (0,92-20,12)	<0,0001
estradiol [pg/ml]	10,64±8,93 (5,0-44,34)	107,62±66,39 (16,88-258,3)	<0,0001
TSH [μIU/ml]	2,47±1,41 (0,54-5,97)	2,59±1,29 (0,99-5,55)	0,72
fT <sub>4</sub> [ng/dl]	1,0±0,15 (0,6-1,23)	1,16±0,13 (0,91-1,47)	<0,0001
leptin [ng/ml]	1,26±1,57 (0,12-7,42)	11,51±6,59 (1,16-25,28)	<0,0001
soluble leptin receptor [ng/ml]	12,13±5,62 (6,79-33,42)	6,27±1,72 (3,57-13,32)	<0,0001
total leptin [ng/ml]	13,39±5,64 (7,92-33,93)	17,78±6,59 (6,83-31,57)	<0,0001

Fig. 1 The CP360 values during MTG-TB

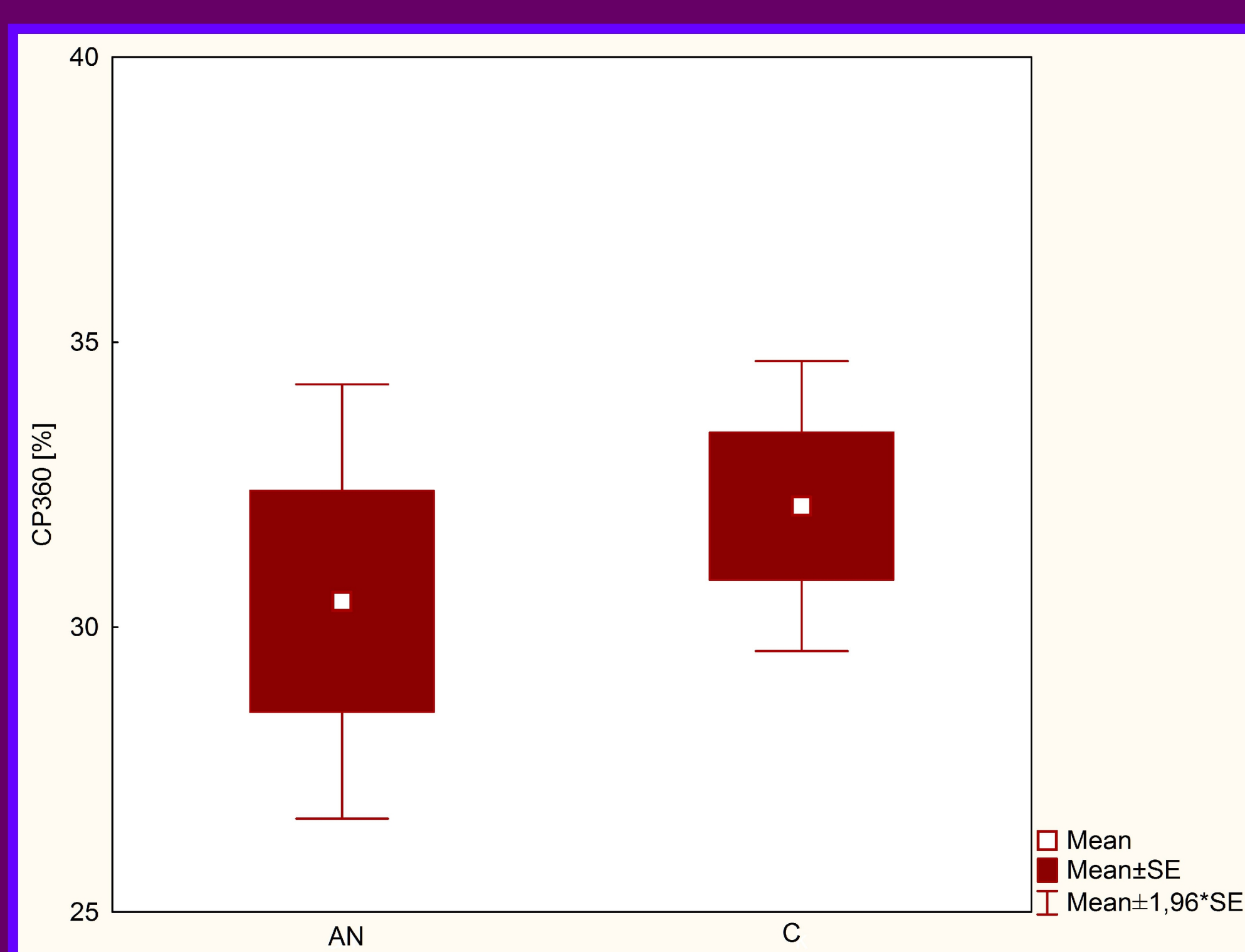


Fig. 2 The TTP values during MTG-BT (p=0,03)

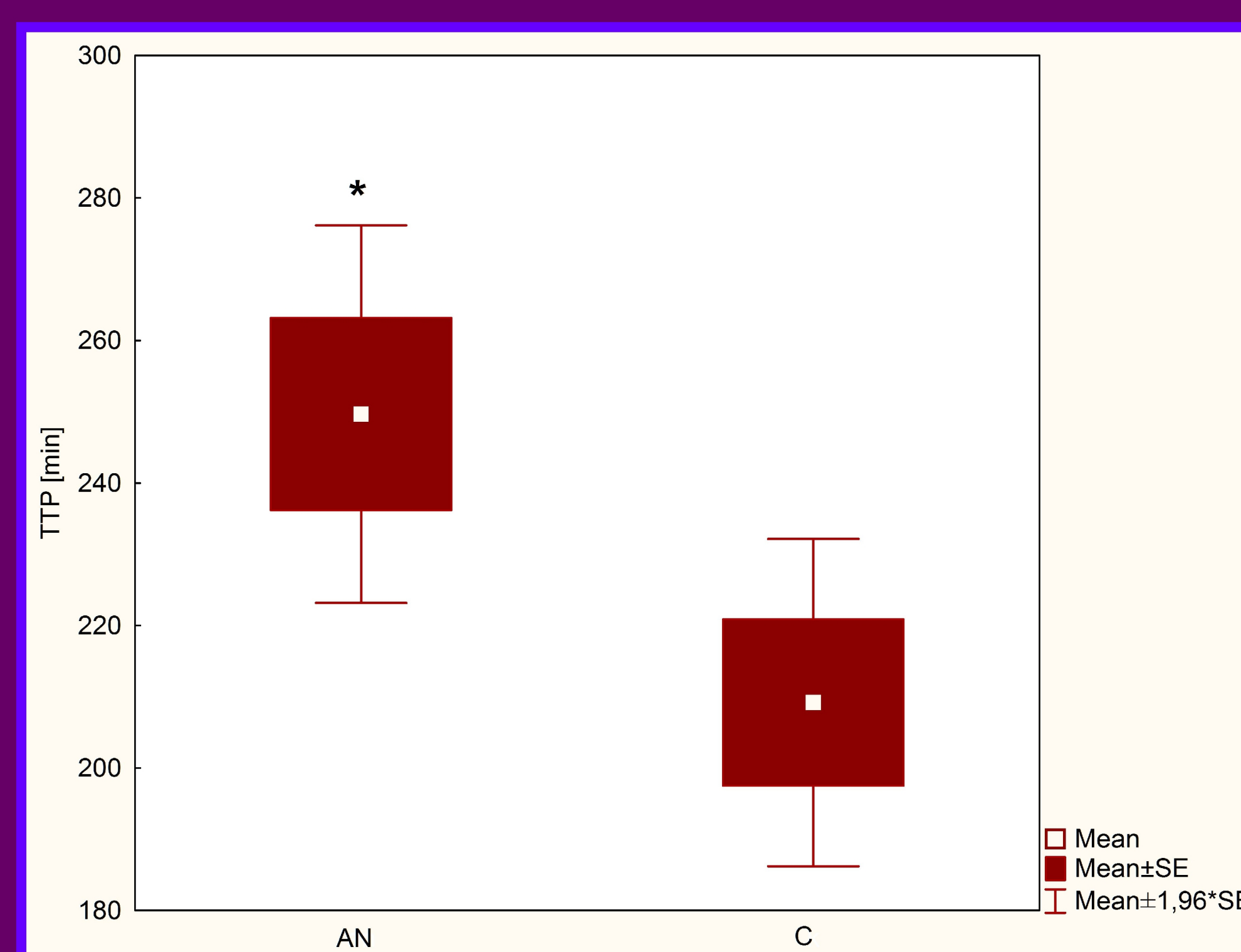


Table IV. Significant correlations between CP360 and TTP and hormonal parameters

Parameter	Examined group			
	AN (n=31)		C (n=38)	
	CP360	TTP	CP360	TTP
insulin [μU/ml]	r=-0,18 p=0,31	r=-0,11 p=0,94	r=-0,11 p=0,50	r=-0,36 p=0,02
HOMA IR	r=-0,16 p=0,36	r=-0,01 p=0,94	r=-0,07 p=0,68	r=-0,36 p=0,02
LH [mIU/ml]	r=-0,13 p=0,48	r=-0,39 p=0,02	r=-0,07 p=0,66	r=0,09 p=0,56
soluble leptin receptor [ng/ml]	r=0,01 p=0,99	r=-0,38 p=0,03	r=0,02 p=0,87	r=-0,13 p=0,42
total leptin [ng/ml]	r=-0,20 p=0,27	r=-0,37 p=0,03	r=-0,13 p=0,43	r=-0,25 p=0,13

## CONCLUSIONS:

- 1) In girls with AN kinetics of pancreatic secretion of lipase is disturbed;
- 2) These disorders are dependent on the degree of energy deficit measured by serum total leptin concentration;
- 3) The abnormalities observed in patients with AN may result from impaired pancreatic endo-exocrine axis.

## DISCLOSURE STATEMENT

Speaker's name: Małgorzata Stojewska

□ I have the following potential conflicts of interest to report:

□ Research Contracts □ Consulting □ Employment in the Industry □ Stockholder of a healthcare company □ Owner of a healthcare company □ Other(s)

x I declare that I have no potential conflict of interest.