



# Leptin as a biomarker in renal cell carcinoma



Sobotka R., Čapoun O., Hanuš T.

Department of Urology, General Teaching Hospital, 1. Faculty of Medicine, Charles University, Prague

## Aim:

Definition of the leptin serum levels in newly diagnosed renal cell carcinoma (RCC) and its correlation with histological subtype, tumor stage and grade.

## Material and methods:

The total of 113 patients underwent surgery for kidney tumor from September 2011 to March 2013. We have prospectively recorded demographic characteristics and measured laboratory values. Histological examination included determination of the type and size of the tumor, grade and other histological findings. The control group consisted of 50 subjects without presence of malignancy. In all patients, fasting blood testing was performed in the morning before the procedure, the control group was managed in the comparable period. Serum was frozen and the leptin levels were determined by ELISA at the same time. Correlation of serum leptin levels was evaluated by using the nonparametric ANOVA method (Wilcoxon test).

## Results:

The average age of the patients was 65 years (22-84), the total of males were 79 patients (70%), mean body mass index (BMI) was 28.2 (18.9 to 38.5), current smokers were 30 patients (26.5%).

Benign tumor was diagnosed in 12 (10.6%) patients, clear cell RCC in 74 (65.5%), papillary and chromophobe RCC in 11 and 5 patients, respectively. A total of 11 patients (9.7%) with generalized RCC underwent cytoreductive nephrectomy. The most common grade for localized RCC was G2 (51.8%), followed by G1 and G3 (both 20.0%). Clinical stages I, II, III and IV were detected in 57.1%, 10.2%, 23.5% and 9.2%, respectively. Serum leptin levels were statistically different between the histological subtypes of RCC ( $p = 0.0419$ ) and between localized and metastatic RCC ( $p = 0.0324$ ). The leptin levels were also different between the grades of RCC ( $p = 0.0270$ ) and clinical stages of RCC ( $p = 0.0323$ ). Serum leptin levels positively correlated with body mass index (BMI). However, BMI did not differ between the tested groups.

Table 1. Distribution of cases (n=113)

	n (113)	%
<b>Sex</b>		
Male	79	69.91
Female	34	30.09
<b>Smoking status</b>		
Current	30	26.55
Former	31	27.43
non-smoker	52	46.02
<b>n</b> <b>No. of pack years</b>		
Current smokers	30	32
Former smokers	44	15
<b>BMI</b>		
<20	2	0.02
20-25	37	32.74
>25-30	49	43.36
>30	25	22.12
<b>Symptomatology</b>		
none	84	74.34
Haematuria	16	14.16
Paraneoplastic	5	4.42
Lumbalgia	8	7.08

n (113)	n	%
Non-metastatic RCC (M0)	102	90.27
Primary metastatic RCC (M+)	11	9.73

Table 2. Histopathological characteristics (n = 113)

	n (113)	%
<b>Histology of localised RCC (n = 102)</b>		
Clear renal cell	73	71.57
Papillary renal cell type	11	10.78
Chromophobe renal cell	5	4.90
Multilocular cystic	1	0.98
Iuxtaglomerular tumor	1	0.98
Benign tumor	11	10.78
<b>Pathological stage (a total of 99)</b>		
pT1a	35	35.35
pT1b	22	22.22
pT2a	11	11.11
pT2b	2	2.02
pT3a	22	22.22
pT3b	3	3.03
pT4	4	4.04
<b>Grade (a total of 99)</b>		
G1	18	18.18
G2	48	48.48
G3	23	23.23
G4	8	8.08
Unknown	2	2.02
<b>Clinical stages (a total of 113)</b>		
I	64	56.64
II	11	9.73
III	27	23.89
IV	11	9.73

Table + diagram 3. Leptin and histology (n=163)

Histology	N	Mean Score
Clear RCC	74	88.358108
chromo	5	36.700000
papillar	11	90.954545
metastatic	11	51.818182
benign	12	71.750000
controls	50	84.250000

$p = 0.0419$

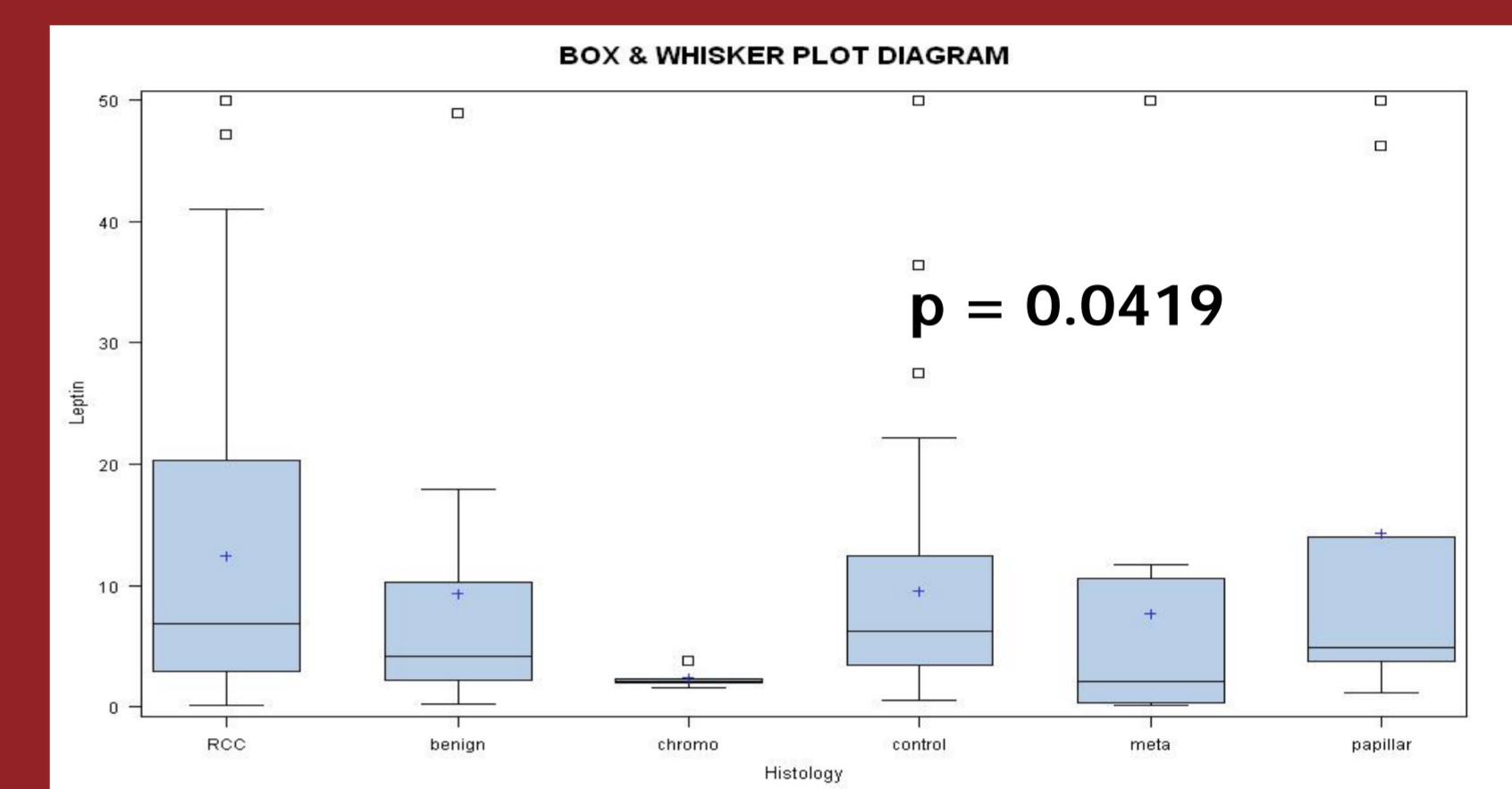


Table + diagram 4. Leptin and localised vs metastatic RCC (n=101)

	N	Mean Score
Clear RCC + papillar + chromo	90	53.216667
metastatic	11	32.863636

$p = 0.0324$

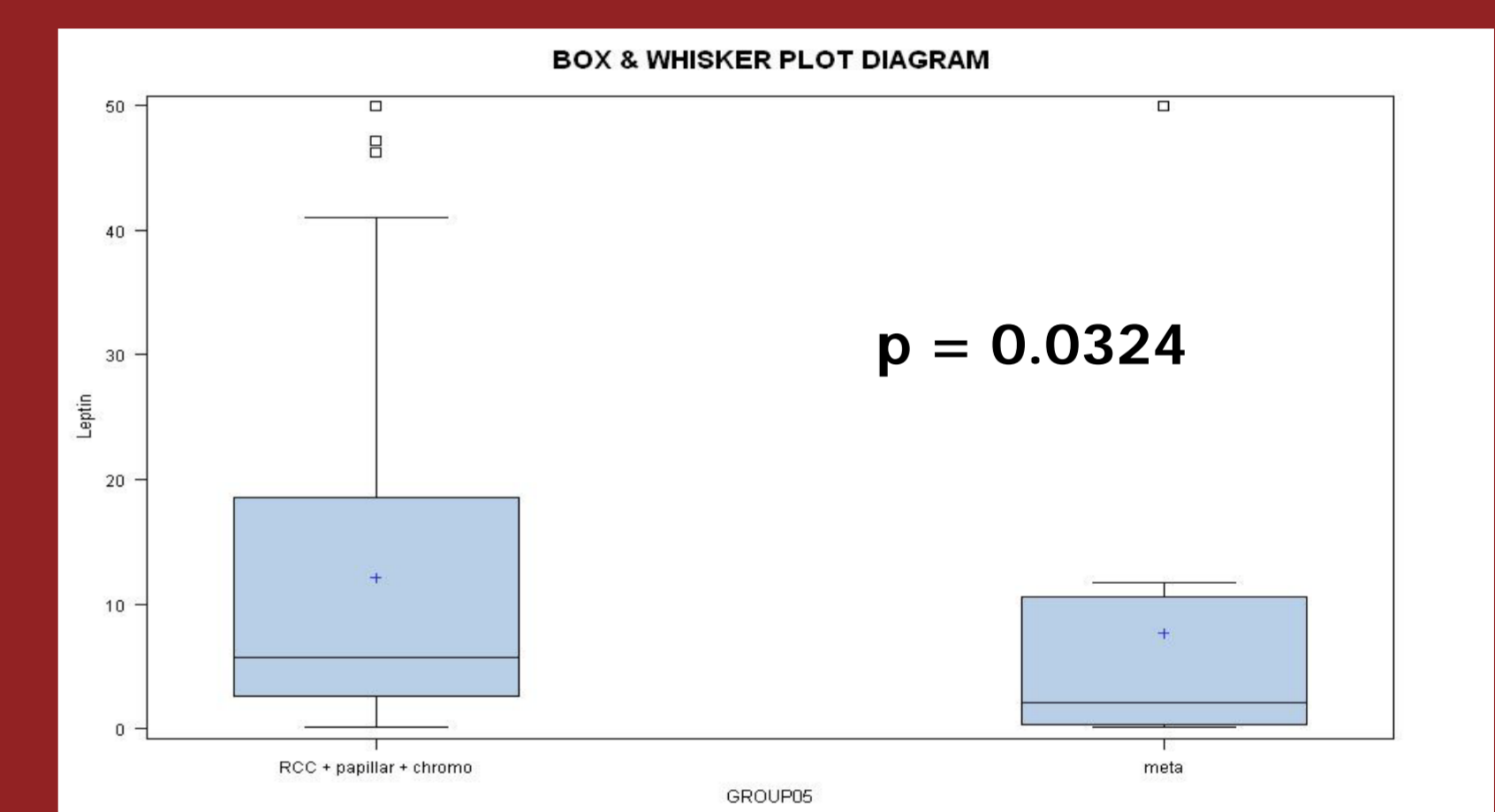


Table + diagram 5: Leptin and grade (n= 97)

Grade	N	Mean Score
1	18	55.205882
2	48	44.284091
3	23	33.176471
4	8	29.142857

$p = 0.0270$

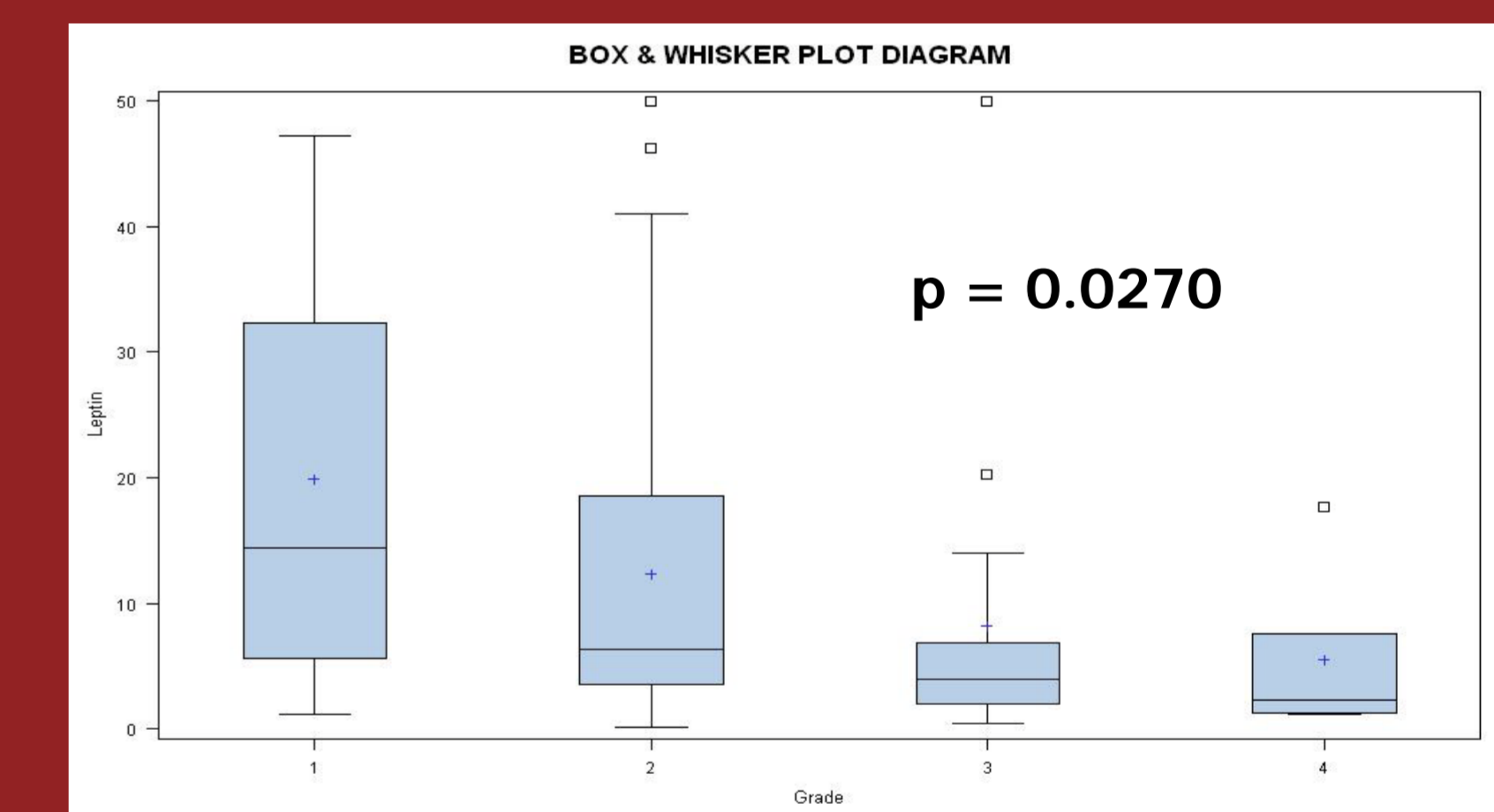


Table + diagram 6 Leptin and stage (n= 113)

Stage	N	Mean Score
I	64	56.750000
II	11	38.000000
III	27	41.934783
IV	11	36.500000

$p = 0.0323$

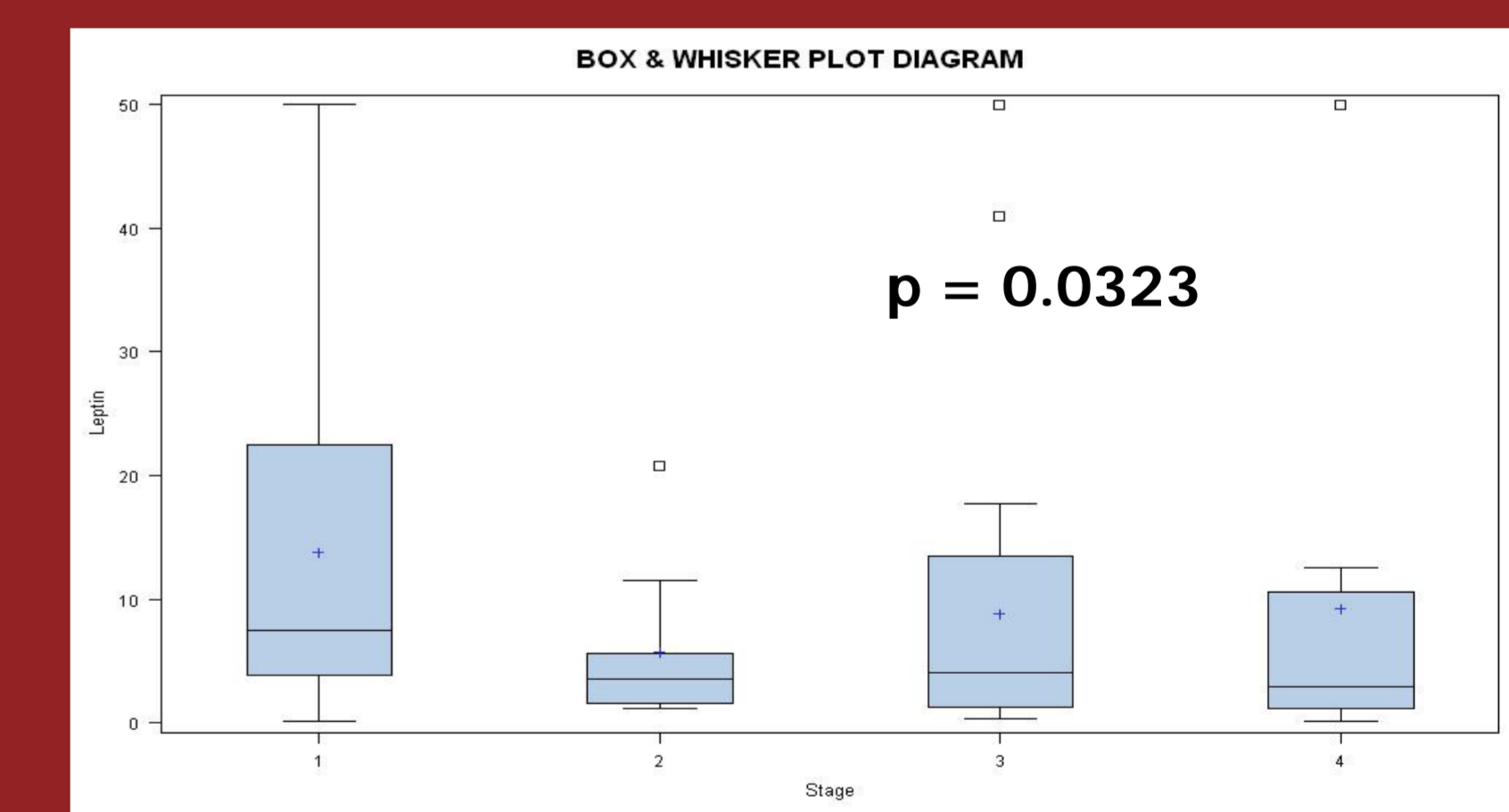
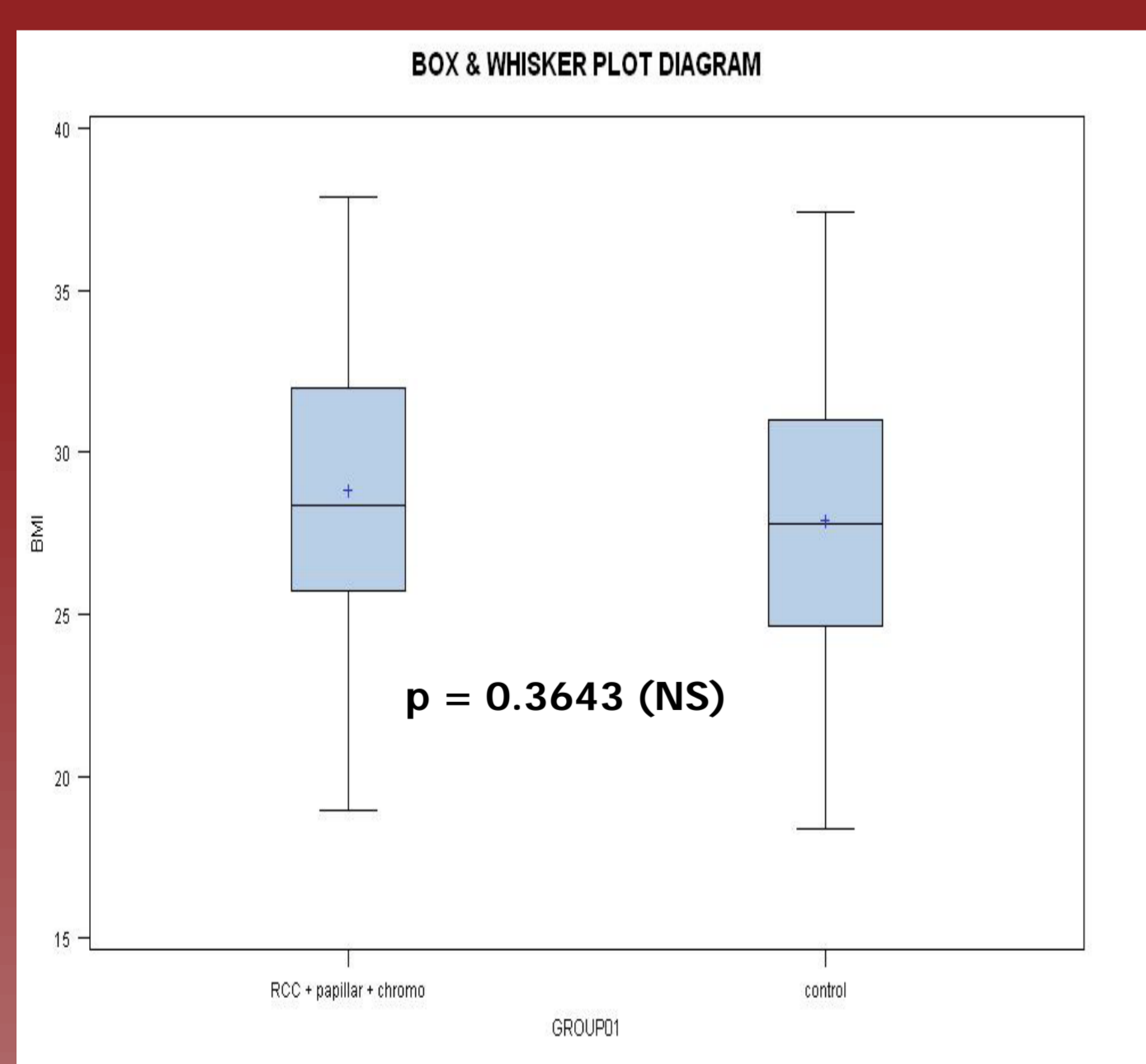
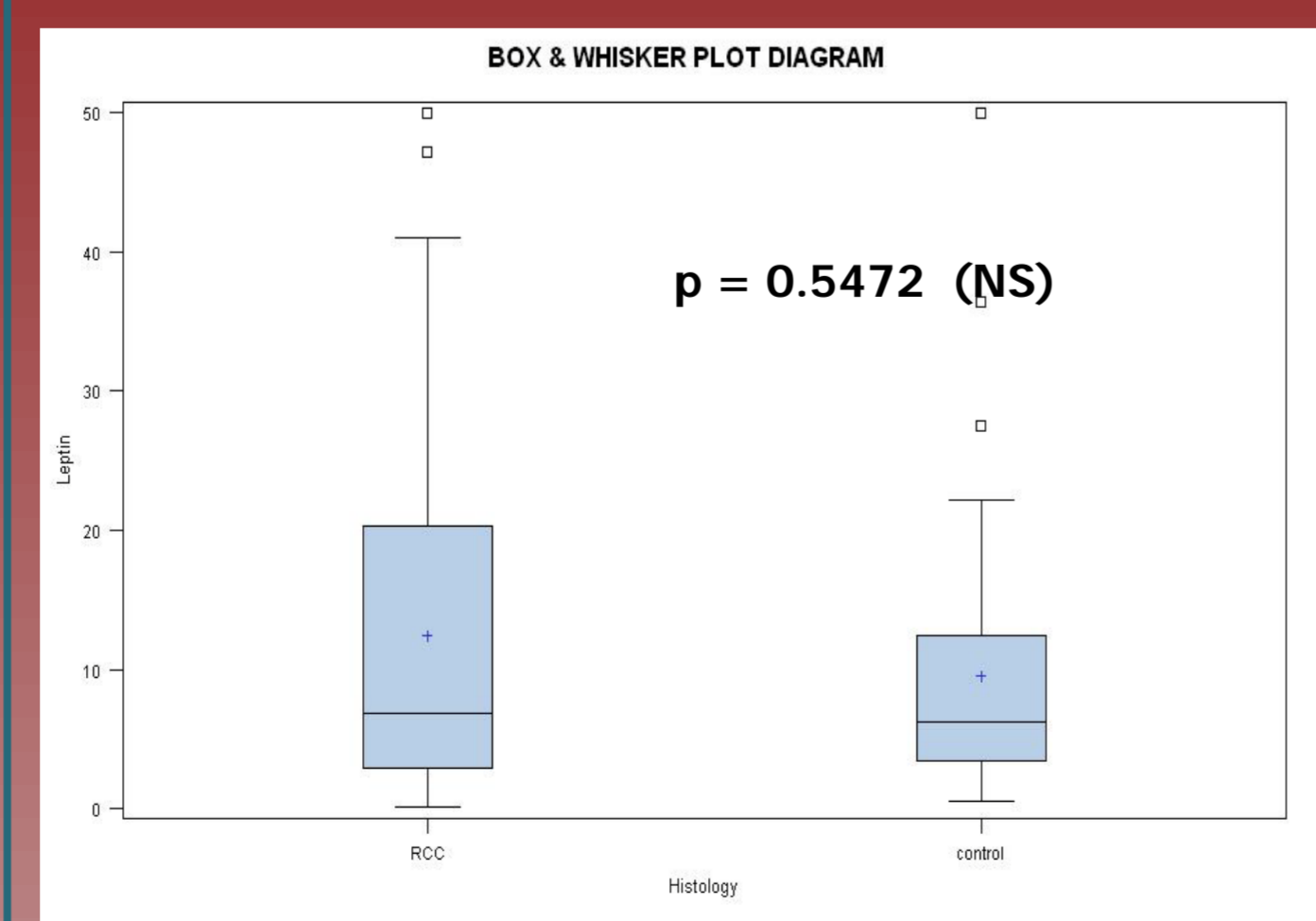


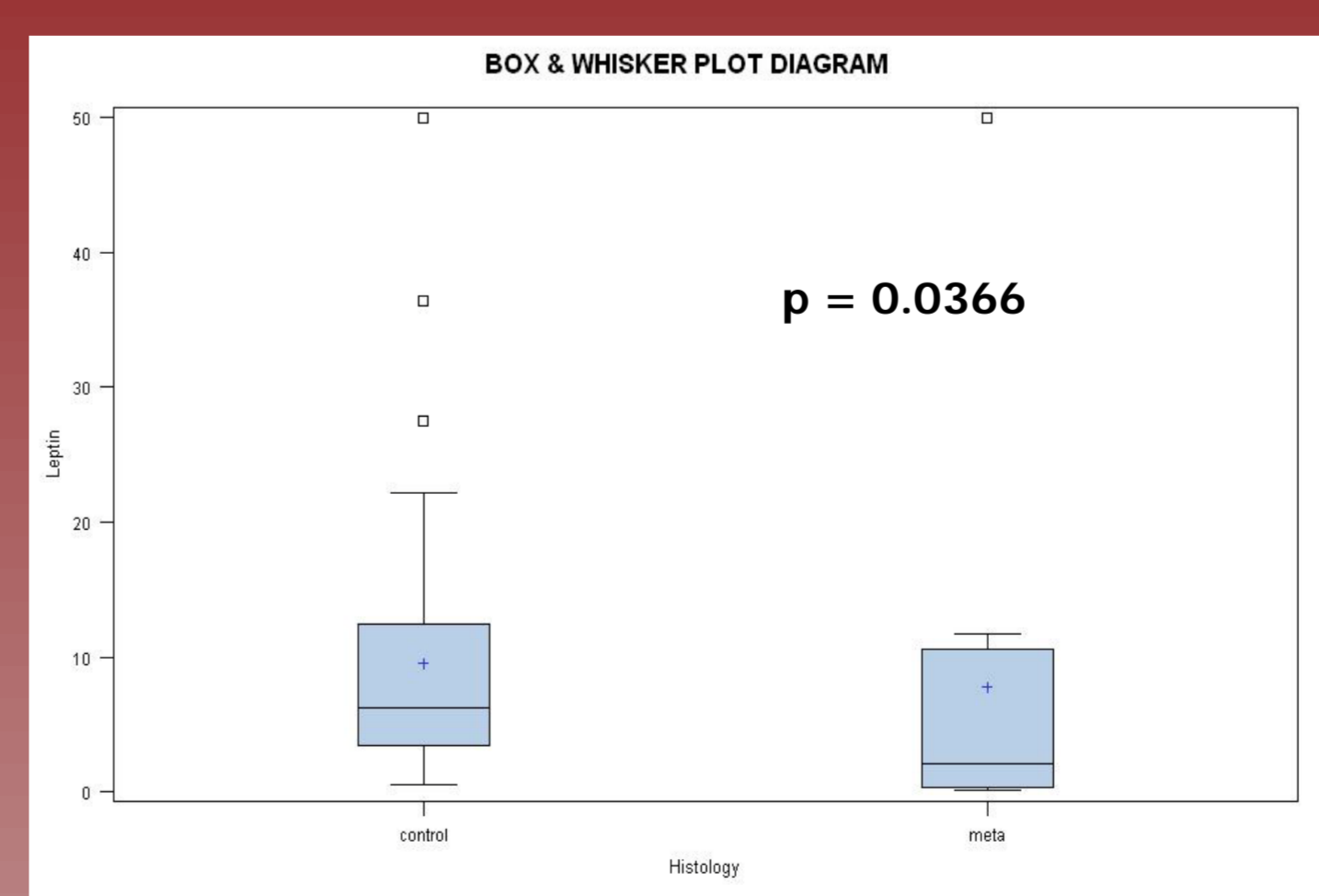
Diagram: BMI: RCC vs controls



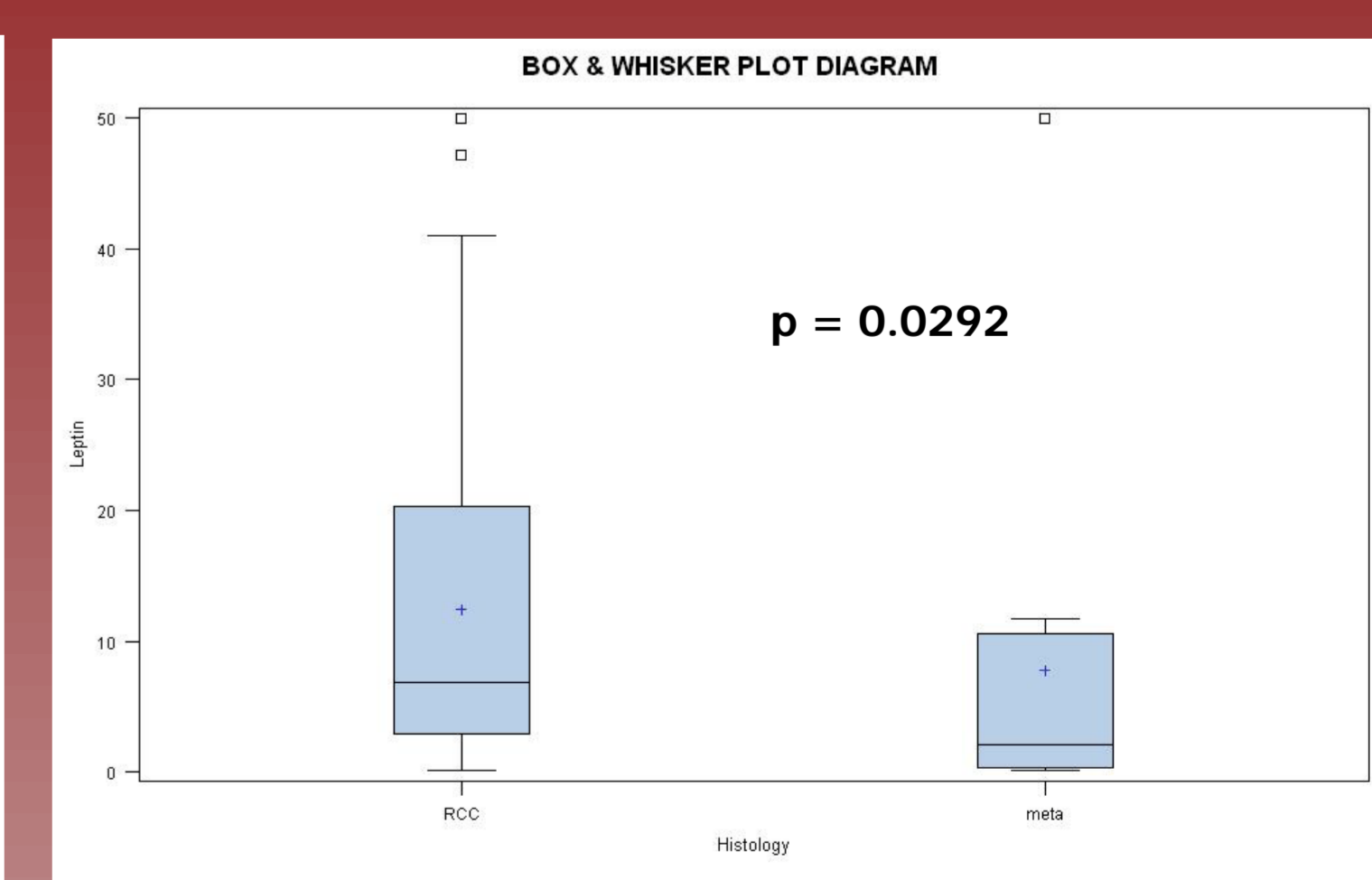
Picture 1: Leptin: RCC vs Controls



Picture 2: Leptin: Controls vs metastatic RCC



Picture 3: Localised vs metastatic RCC



**Abbreviations:**  
RCC = renal cell cancer  
chromo = chromophobe renal cell cancer  
papillar = papillary renal cell cancer  
benign = oncocytoma, angiomyolipoma + iuxtaglomerular tumor

## Conclusion:

Serum leptin was significantly lower in patients with advanced RCC, the lowest leptin levels were detected in the most aggressive grades. However we were not able to differentiate between patients with localised tumor and negative controls, therefore it seems that leptin is not suitable for renal cell cancer screening but may be effective in active surveillance programs.

The work was supported by grants MPO TIP FR-TI3/666 and VZ MSM 0021620808.