

Ferritin as an independent mortality predictor in patients with pancreas cancer. Results of a pilot study.

Marta Kalousová, Tomáš Krechler, Marie Jáchymová, Aleš Žák and Tomáš Zima



1st Faculty of Medicine
Charles University Prague
Czech Republic



Background and aims

- Prognosis of patients with pancreas cancer is very poor
- **Aim:** to test the significance of laboratory parameters in the prognosis of patients with pancreas cancer

Studied group

- 57 patients with pancreas cancer
 - 31 men, 26 women
 - mean age 65 ± 9 years
- Blood was collected at the time of diagnosis of pancreas cancer
- Patients were followed up until death – median survival 147 days (min 8, max 585)

Clinical characteristics of the patients

- **All patients – newly diagnosed tumour**
- **Diabetes mellitus – 29 patients**
 - No difference in survival of patients with and without DM
- **Staging – T2 – 8 pts, T3 – 26 pts, T4 – 23 pts**
 - No difference in survival of patients in different stages

Laboratory methods

- **Routine biochemical parameters**
 - Modular, Roche
- **Tumour markers incl. Ferritin**
 - ADVIA:Centaur, Siemens

Significance of parameters for patients' prognosis – univariate analysis

Significant

- Ferritin
- Iron
- Albumin
- Prealbumin
- Cholinesterase
- Haemoglobin
- C-reactive protein
- Alkaline phosphatase
- Carcinoembryonic antigen

Not significant

- CA 19-9
- Bilirubin
- Liver tests
- Pancreas enzymes
- Kidney tests
- Lipids

Parameter significant for survival	Patients with pancreas cancer	Reference range
Ferritin (µg/L)	378 (230-740)	M 22-322, W 10-291
Iron (µmol/L)	10.4±5.0	M 7.2-29.0, W 5.5-28.0
Albumin (g/L)	39.9±5.6	35.0-53.0
Prealbumin (g/L)	0.16±0.06	0.2-0.4
Cholinesterase (µkat/L)	101±33	87-190
Haemoglobin (g/L)	134±17	M 135-174, W 116-163
CRP (mg/L)	15.9(4.8-54.8)	0.0-7.0
ALP (µkat/L)	3.87±2.82	0.66-2.2
CEA (µg/L)	4.6 (2.5-8.8)	0.0-5.0, smokers up to 20.0

Parameter not significant for survival	Patients with pancreas cancer	Reference range
CA 19-9 (kU/L)	287.6 (53.2-2174.9)	0.0-37.0
Bilirubin (μmol/L)	15.2 (10.6-65.2)	2.0-17.0
ALT (μkat/L)	0.79 (0.37-1.44)	0.10-0.78
AST (μkat/L)	0.56 (0.45-1.18)	0.10-0.72
Amylase (μkat/L)	0. 24 (0.10-0.66)	0.30-1.67
Lipase (μkat/L)	0.7(0.4-1.3)	0.0-1.0
Urea (mmol/L)	5.2±2.5	M 2.8-8.0, W 2.0-6.7
Creatinine (μmol/L)	69.4±19.7	M 44.0-110.0, W 44.0-104.0
Cholesterol (mmol/L)	4.7 (4.0-5.7)	3.8-5.2
Triglycerides (mmol/L)	1.94±1.22	0.68-1.69

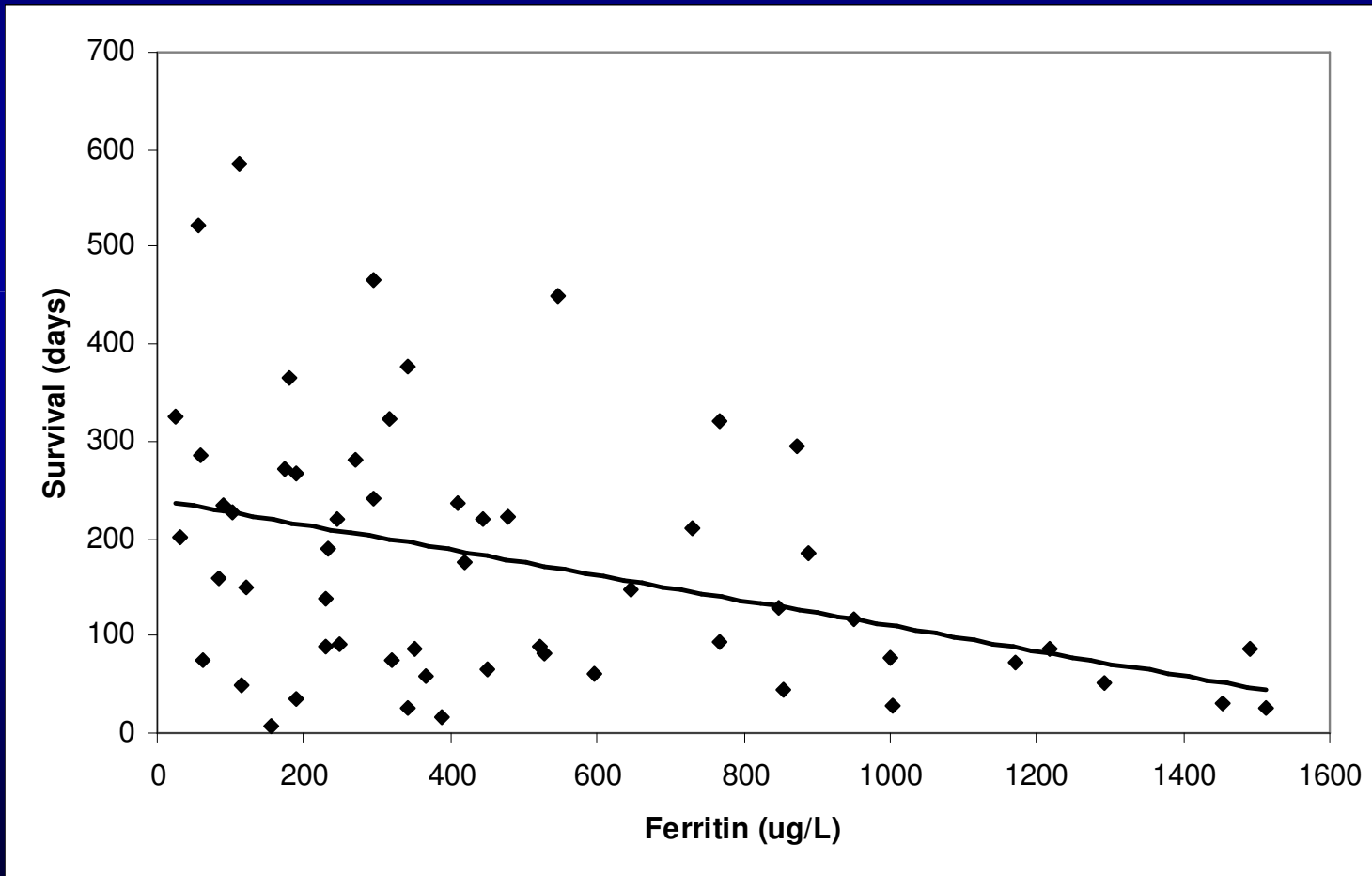
Significant independent mortality predictors - RR(95% CI), per unit

Parameter	RR(95% CI), per unit	Significance
Ferritin	1.001 (1.000-1.002)	p=0.002
Albumin	0.943 (0.892-0.996)	p=0.035
Iron	0.936 (0.890-0.985)	p=0.010

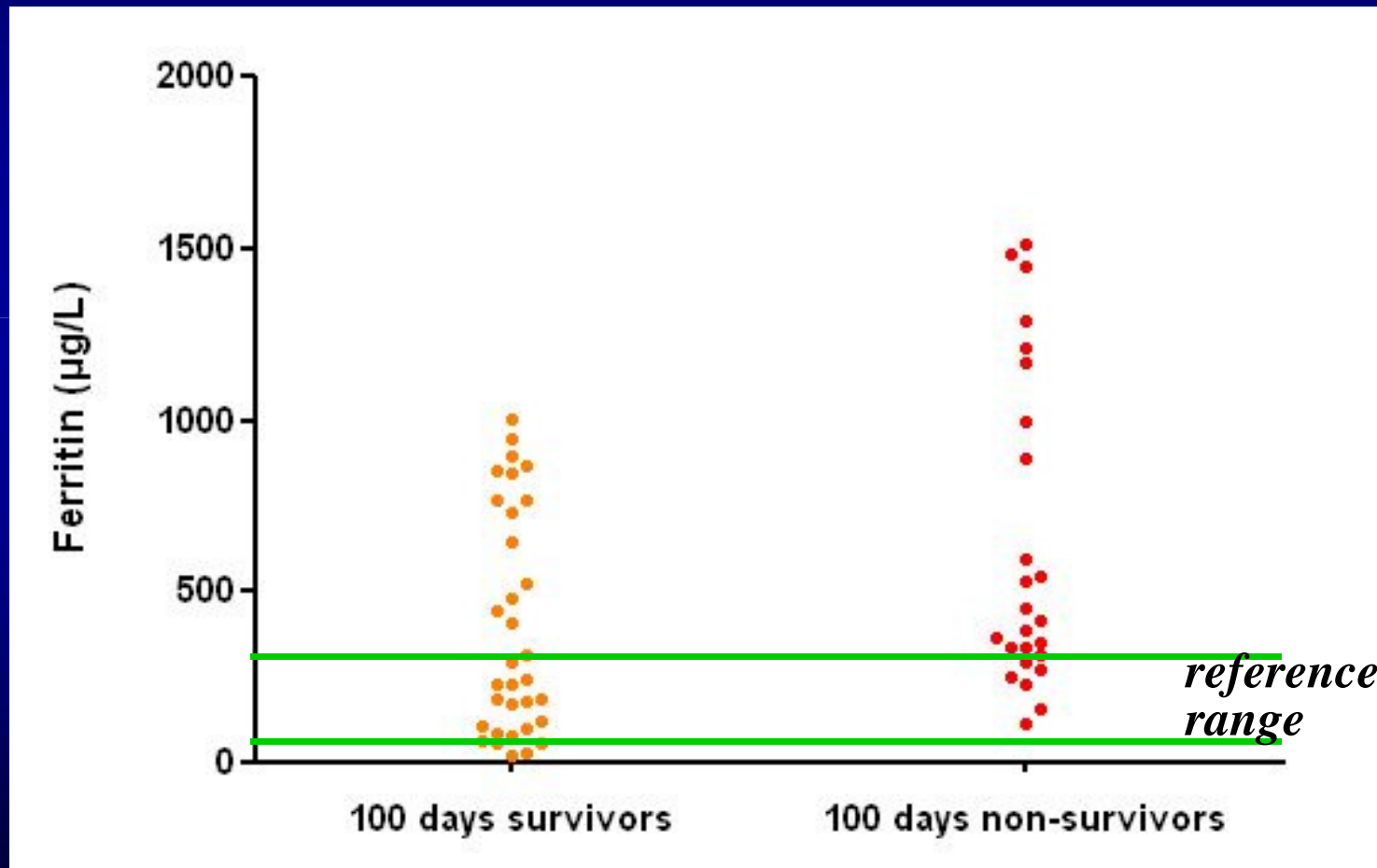
Correlations between independent predictors

- Iron vs. albumin $r=0.397$, $p=0.002$
- Ferritin vs. iron not significant
- Ferritin vs. albumin not significant

Relationship between ferritin and survival



Serum ferritin in patients with survival < and > 100 days



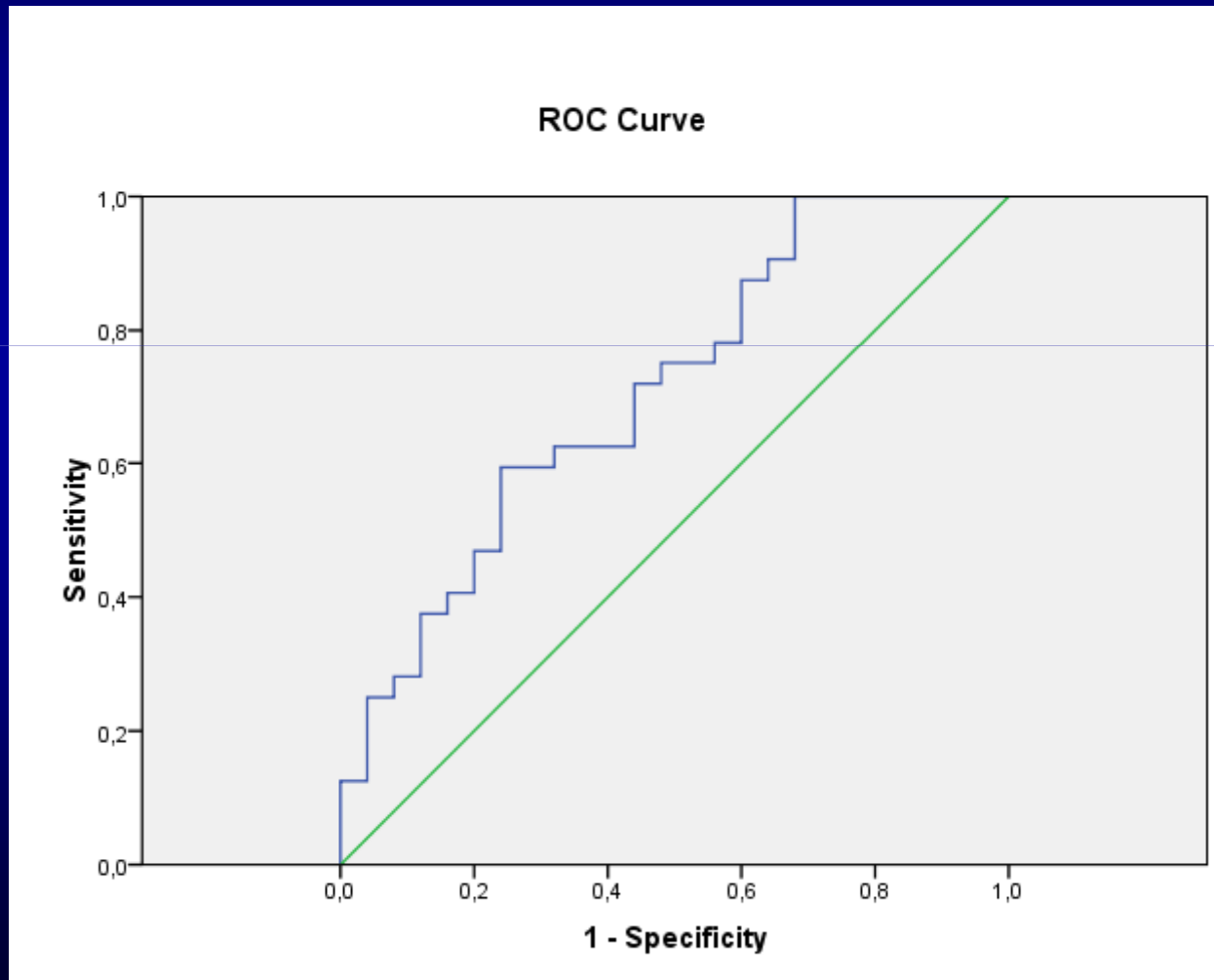
$p=0.014$ 100 days survivors vs. non-survivors

Differences between patients with survival < and > 100 days

Parameter	Survival < 100 days	Survival > 100 days	Significance
Patients group	25 pts (16m, 9w), 65±10 y.	33 pts (15m, 18w), 65±9 y.	
Ferritin (µg/L) <i>M 22-322</i> <i>W 10-291</i>	435 (336-1042)	246 (112-647)	p=0.014
Iron (µmol/L) <i>M 7.2-29.0</i> <i>W 5.5-28.0</i>	10.0±4.7	10.8±5.3	p=0.064, n.s.
Albumin (g/L) <i>N 35.0-53.0</i>	38.4 ± 5.3	41.7 ± 5.3	p=0.029

Ferritin for 100 days survival

ROC analysis: AUC 0.710, $p=0.007$



ROC analysis: areas under the curve for 100 and 200 days survival

Parameter	100 days survival	200 days survival
Ferritin	AUC 0.710 p=0.007	AUC 0.725 p=0.004
Albumin	AUC 0.639 p=0.073, n.s.	AUC 0.756 p=0.001
Iron	AUC 0.658 p=0.043	AUC 0.692 p=0.014

Ferritin in prognosis of patients with pancreas cancer

- Significantly increased (median above the upper reference limit)
- Significant in both univariate as well as multivariate Cox regression
- Significant differences between patients who survived 100 days and non-survivors
- Significant in ROC analysis – AUC for 100 and 200 days survival

Conclusion

- Ferritin is an independent mortality predictor in patients with pancreas cancer – high serum levels at the time of diagnosis indicate bad prognosis of the patient
- Albumin and iron are significant as well, however they are within reference range!

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