"VasCalc SCORE" COMBINED WITH NUTRITIONAL MARKERS—
A SIMPLE PROGNOSTIC MARKER IN HAEMODIALYSIS PATIENTS

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INTRODUCTION

•Vascular calcification is known to be associated with higher mortality in haemodialysis patients.

•However, we often observe patients with severe vascular calcification surviving over many years.

•A simple but reliable way to detect high-risk vascular-calcified patients is required.

METHODS

•VasCalc Score is a sum of vascular calcification scores on the plain bone films (the bilateral hands, the lumbar spines and the pelvis). The Score covers the vascular calcification both the peripheral (proper and common palmar digital, radial, ulnar, splenic, and internal and external iliac arteries) and the central (i.e., aorta) arteries.

•The degree of vascular calcification on each film is ranked as none, mild or severe. Automatic summing up of the total film score yields the VasCalc Score, which is 0 (none), 0.5 (focal or patchy), 1 (diffuse but mild) and 2 (diffuse and severe both in peripheral and central) [Fig 1]. This score, as reported in ERA-EDTA 2015, is known to have mild intra-individual fluctuations but an increase over time is minimal as far as serum Ca and P are controlled [Fig 2].

•The patients were mostly on 5-hr bicarbonate-bath haemodialysis, with phosphate binders (CaCO3, Ca acetate, sevelamer) and vitamin Ds (oral or iv, strictly keeping the serum calcium below 10.1 mg/dL)

•Semi-annual nutritional assays include malnutrition-inflammation score (MIS), triceps skinfold thickness (%TSF), arm muscle area (%AMA), body mass index (BMI) and serum albumin, all of which were averaged during the period.

Features of VasCalc Score

–Very simple, no need for CT; can be done in a small clinic

–Requires only 3 films, once a year

–Assessing both the aorta and the peripheral arteries

–Including both intimal and medial calcifications

RESULTS

•A total of 90 patients (68.0±12.7 (69.0) years old, m±SD (median); M:F = 59:31), who received thrice-weekly regular haemodialysis in the Dialysis Unit and had VasCalc Score measured annually over 3 or more years, were included, which comprised more than 90% of the patients in the Unit.

•VasCalc Score, averaged during the period, ranged from 0.0 to 2.0, with a median of 0.87. Nutritional indices were as follows: MIS 6.5±3.6 (5.43), %TSF 92±35 (88), %AMA 101±21 (100), BMI 21.4±3.0 (21.2) kg/m^2 and serum albumin 3.7±0.3 (3.75) g/dL.

•Sixteen patients died during the period from 2009 to 2015, with a 2.51±0.82 (2.73) year follow-up after the last Score. Mortality was significantly higher in the population with VasCalc Score 1.0 or more (Odds ratio, OR, 1.83).

•The risk of death markedly elevated when VasCalc Score was combined with MIS (VasCalc Score >=1.0 and MIS >= 8.0, OR 10.4), with BMI (VasCalc Score >=1.0 and BMI <21.4, OR 12.6) or with serum albumin (VasCalc Score >=1.0 and serum albumin <3.5, OR 42.0), an elevation more than any of those nutritional markers alone. [Table 1, Fig 3].
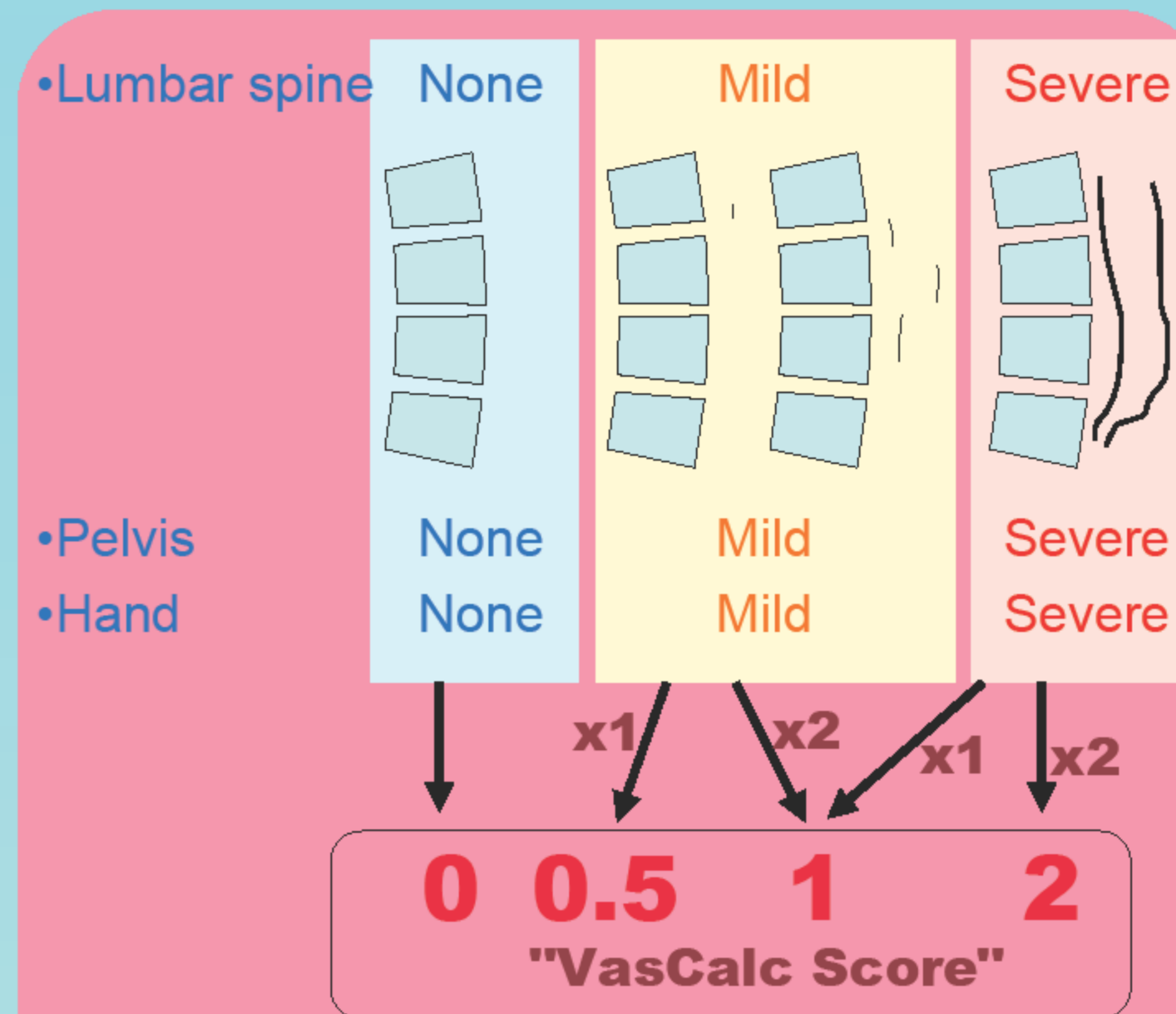

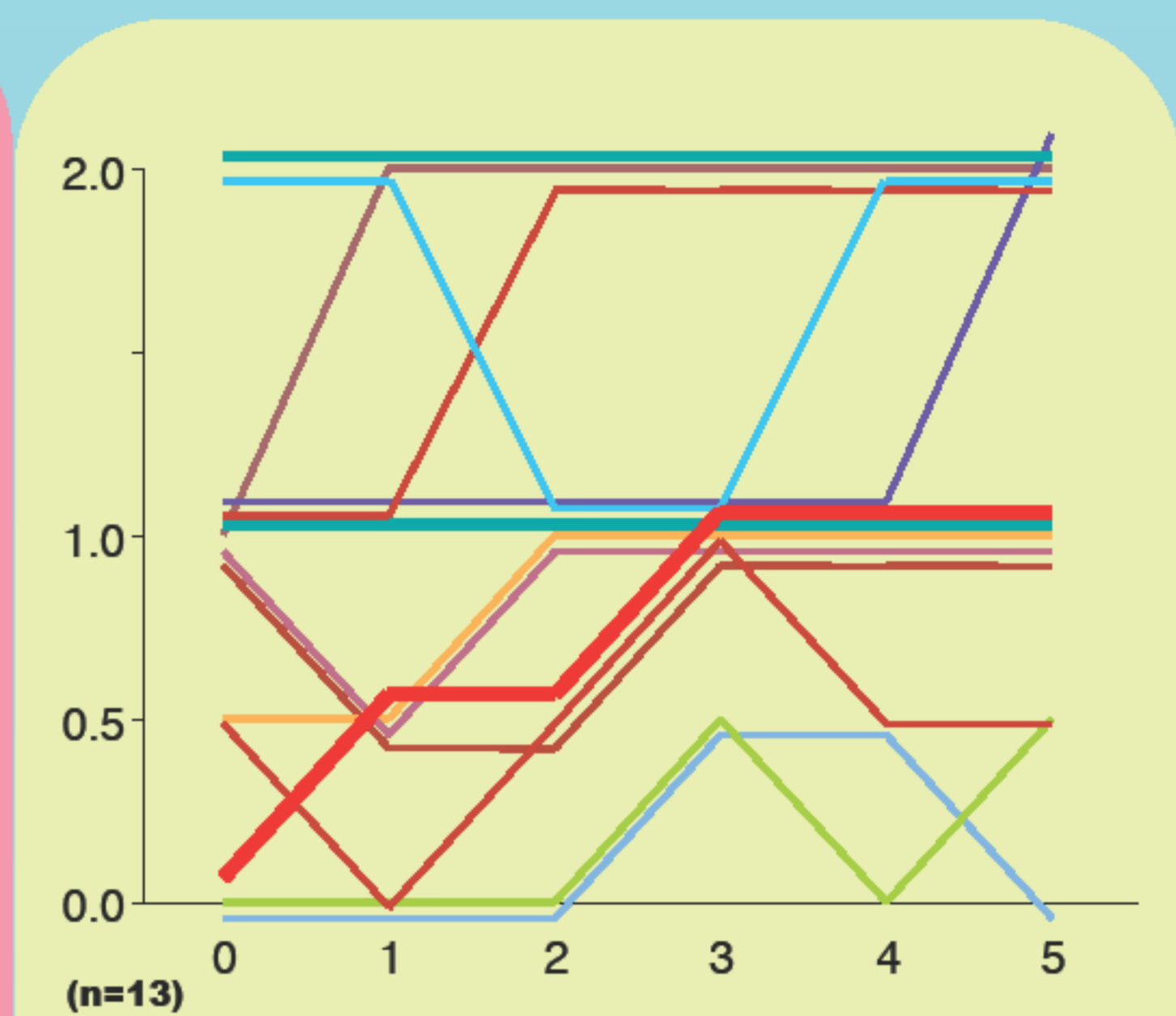Fig 1. Scoring method

•Lumbar spine — None / Mild / Severe
•Pelvis — None / Mild / Severe
•Hand — None / Mild / Severe

x1 x2 x1 x2

0 0.5 1 2
"VasCalc Score"

Fig 2. Reproducibility and the course over 5 years (representative 13 patients) (Tanaka, ERA-EDTA2015) (n=13)

(n=90)		mean (SD)	(min, median, max)	cutoff		Nutritional marker alone	OR with VasCalc Score >1
MIS	[-]	6.48 (3.62)	(1.71, 5.43, 21.0)	>= 8.00	(arbitrary)	5.74	10.4
%TSF	[-]	0.92 (0.35)	(0.09, 0.88, 2.6)	< 0.88	(median)	1.26	2.22
%AMA	[-]	1.01 (0.21)	(0.43, 1.00, 1.7)	< 1.00	(median)	1.82	3.57
BMI	[kg/cm2]	21.4 (3.03)	(13.5, 21.2, 30.3)	< 21.2	(median)	6.60	12.55
Alb	[g/dL]	3.69 (0.31)	(2.75, 3.75, 4.5)	< 3.75	(median)	17.0	42.0
Dry weight	[kg]	57.5 (12.1)	(30.8, 57.4, 110.5)	< 57.4	(median)	6.96	NA
DW loss	[kg/6mo]	-0.95 (4.52)	(-32.0, -0.50, 6.8)	< -0.50	(median)	4.22	5.29

Table 1. VasCalc Score combined with nutritional markers, each with Odds Ratio (OR) against mortality.

MIS: $y = 2.1393x + 4.5897$, $R^2 = 0.0893$
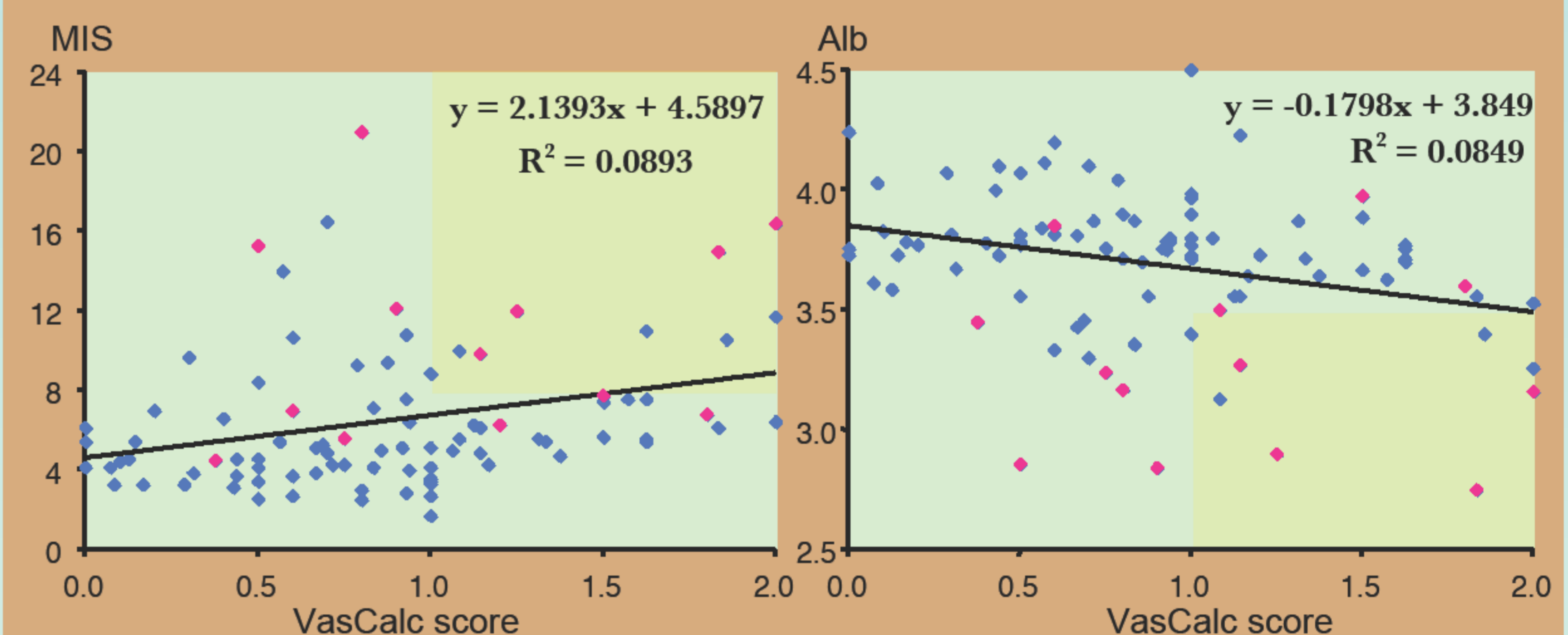Alb: $y = -0.1798x + 3.849$, $R^2 = 0.0849$

Fig 3. VasCalc Score vs nutritional markers. Red dots indicate dead patients. Patients in the yellow areas have the highest mortality.

CONCLUSIONS

• VasCalc Score, combined with a nutritional marker of either MIS, BMI or serum albumin, can be a simple and strong indicator for mortality in haemodialysis patients.

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