

**INCREASE MALNUTRITION AWARENESS:
CHALLENGE FOR THE FUTURE**

**CONGRESSO
NAZIONALE**

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Introduction

A novel model for predicting diabetes remission after bariatric surgery based on the measurement of C-peptide and creatinine in serum.

- Bariatric surgery is an effective treatment for both obesity and type 2 diabetes (T2D)
- Not all patients achieve remission or improved glycaemic control after surgery
- C-peptide, a marker of beta cell function and insulin secretion, has the potential to predict T2D remission following bariatric surgery.
- However, C-peptide levels can be misleading in patients with chronic kidney disease due to impaired clearance.

AIM

This study investigates the association between C-peptide, corrected for serum creatinine, and T2D remission and glycaemic control after bariatric surgery.

Study population

144 patients with severe obesity who underwent RYGB were included

Inclusion criteria were:

- age between 18 and 65 years
- BMI ≥ 40 kg/m² or ≥ 35 kg/m² with obesity-related comorbidities
- obesity duration ≥ 5 years.
- HbA1c $> 6.5\%$ or established T2D

84/144 (58%) had T2D

	T2D non-Remittent (N=14) (SD)	T2D Remittent (N=51) (SD)	All (N=65) (SD)	P value
Sex, M [N] (%)	5 (36%)	26 (31%)	21 (32%)	0.76 ²
Age [years] (SD)	56.9 (7.5)	47.6 (10.3)	49.6 (10.4)	0.003 ¹
BMI [kg/m²] (SD)	40.6 (5.7)	44.1 (5.2)	43.3 (5.5)	0.035 ¹
Waist Circumference [cm] (SD)	126.7 (10.6)	126 (12.9)	126.1 (12.3)	0.84 ¹
HbA1c [%] (SD)	7.8 (1.3)	6.1 (1.1)	6.4 (1.4)	<0.001 ¹
HOMA-IR (SD)	4.0 (3.7)	4.3 (3.7)	4.3 (3.6)	0.79 ¹
C-peptide [ng/mL] (SD)	2.4 (2.1)	3.4 (1.1)	3.2 (1.4)	0.011 ¹
Creatinine [mg/dL] (SD)	0.8 (0.3)	0.7 (0.3)	0.8 (0.3)	0.185 ¹

1. Linear Model Anova comparison; 2. Pearson's Chi-Squared test.

Abbreviations: BMI, Body Mass Index; HOMA-IR, homeostasis model assessment of insulin resistance index; HbA1c, glycated hemoglobin; T2D, Type 2 Diabetes Mellitus.

Methods

- Diabetes remission was defined as HbA1c below 6.5% without any medication after bariatric surgery.
- Optimal glycemic control was defined as HbA1c below 7%.
- Blood samples were collected after an overnight fast.
- Insulin resistance was determined using the HOMA-IR index.

Statistical Analysis

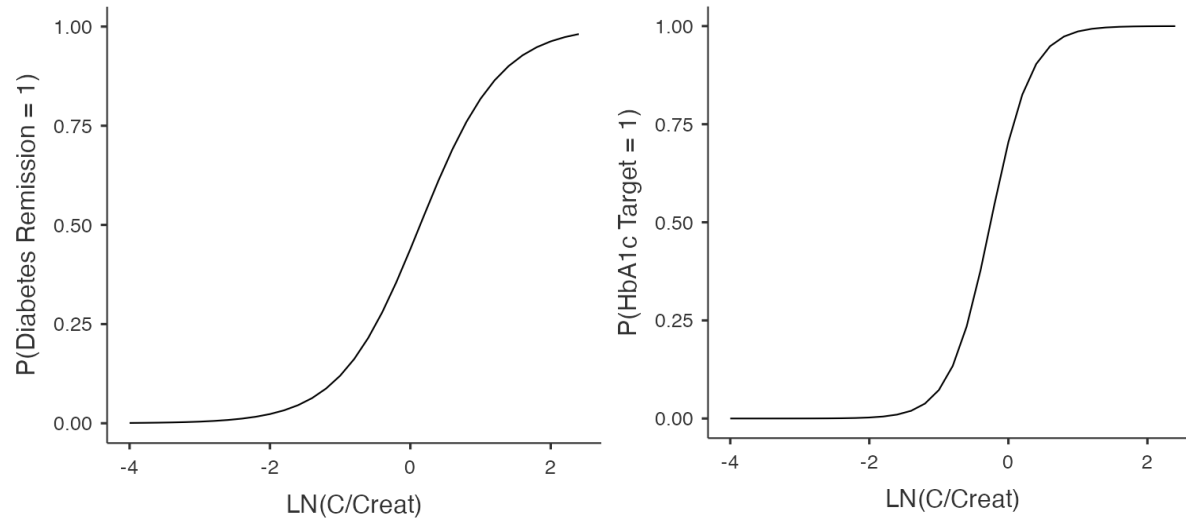
- Multiple variable linear regression and binomial regression analyses were performed using Jamovi and SPSS software.
- A surrogate marker for predicting diabetes remission was calculated as the natural logarithm of the ratio of serum C-peptide to serum creatinine.

$\ln(\text{serum C-peptide}/\text{serum creatinine})$

[Serum C-peptide]= ng/mL

[Serum creatinine] = mg/dL

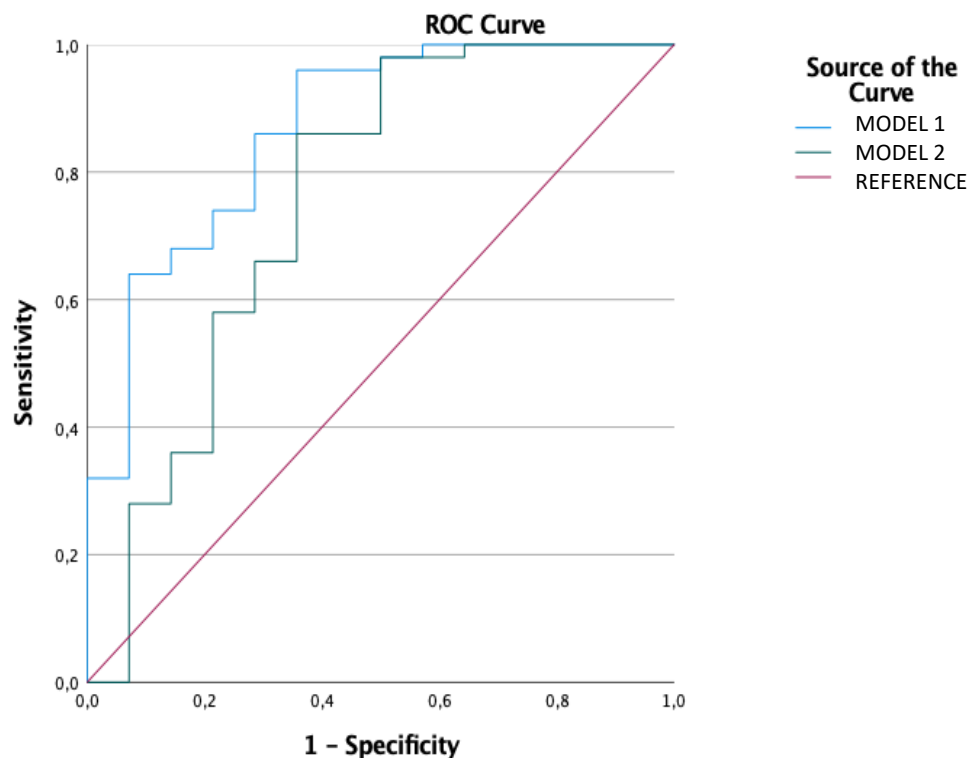
Results



A multiple variable binomial regression model for diabetes remission 6 months after bariatric surgery showed a significant association ($X^2=24.6$, $AIC=48.7$, $p=0.001$) with $\text{Ln}(\text{C-peptide/creatinine})$ (estimate=1.8, $OR=5.745$, $p<0.001$)

This model was also able to accurately predict achievement of HbA1c target of 7% (53mmol/mol), 6 months after surgery based on a $\text{Ln}(\text{C-Peptide/Creatinine})$ and age with an AUROC of 0.96 ($X^2=28.8$, AIC 21.4, $p<0.001$).

Results



➤ 84/144 (58%) had T2D

➤ AUROC for diabetes remission predicted by Ln(C-peptide/creatinine) and age was 0.87 ($p < 0.001$) (Model 1), which was more accurate than AUROC based on C-Peptide alone (Model 2, AUROC 0.75, $p = 0.004$) (Figure 1 and Table 2).

	AUC	P value	C.I.	PPV	NPV
Model 1	0.87	<0.001	0.76 – 0.98	98%	50%
Model 2	0.75	0.004	0.58 – 0.93	100%	21%

Characteristics of ROC curves for prediction of diabetes remission. Model 1: (Ln(C-peptide/creatinine) and age as covariates); Model 2: C-peptide (unadjusted).

Discussion

- The natural logarithm of the C-peptide/creatinine ratio ($\text{Ln}(\text{C-peptide/creatinine})$) has potential as a predictor of diabetes remission and HbA1c target achievement after bariatric surgery.
 - The Ln transformation normalizes the data and reduces the impact of outliers, making it a more reliable measure of beta cell function.
 - Further validation is required in larger cohorts with longer follow-up periods before $\text{Ln}(\text{C-peptide/creatinine})$ can be widely used in clinical practice.
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