

# Discordant Trajectories in Urine Albumin and NGAL Excretion with Addition of Gastric Bypass Surgery to Best Medical Therapy for Type 2 Diabetic Kidney Disease

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## Background

Large-scale observational studies with extended follow-up have consistently demonstrated that metabolic surgery reduces albuminuria in individuals with obesity and type 2 diabetes mellitus (T2DM). However, the renal tubular impact of metabolic surgery in individuals with T2DM is not well characterised. Urinary neutrophil gelatinase-associated lipocalin (NGAL) identifies renal tubular injury.

## Objective

To quantify urinary NGAL before and after metabolic surgery in individuals with T2DM.

## Methods

In the Microvascular Outcomes after Metabolic Surgery (MOMS) clinical trial, 100 individuals with T2DM, albuminuria, and BMI 30-34.9 kg/m<sup>2</sup> were randomised to combined gastric bypass surgery with medicine (CSM, n=51) or medical therapy alone (MTA, n=49).

Albumin and NGAL concentrations were measured in spot urine samples of MOMS participants at baseline and 6 months, adjusted for urinary creatinine, and compared using Wilcoxon signed-rank tests. NGAL outliers < Q<sub>1</sub>-1.5×IQR or > Q<sub>3</sub>+1.5×IQR were excluded.

## Baseline Characteristics

	CSM	MTA	p
N (%) female	23(45.1%)	22(44.9%)	0.98
N (%) caucasian	46 (90.2%)	34 (69.4%)	0.18
Body-mass index (kg/m <sup>2</sup> )	32.5±2.0	32.8±2.2	0.47
Glycated haemoglobin (mmol/mol)	72.6±20.3	74.2±21.6	0.53
Serum creatinine (µmol/L)	71.6±19.2	74.4±23.6	0.53
Urine albumin:creatinine ratio (ACR) (mg/mmol)	8.1 [9.9]	8.2 [13.1]	0.53
Urine NGAL: creatinine ratio (NCR) (ng/mmol)	582.5 [1529.5]	831.0 [1044.6]	0.36

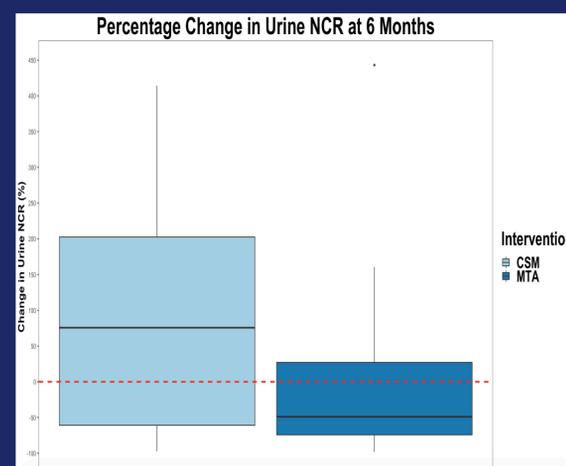
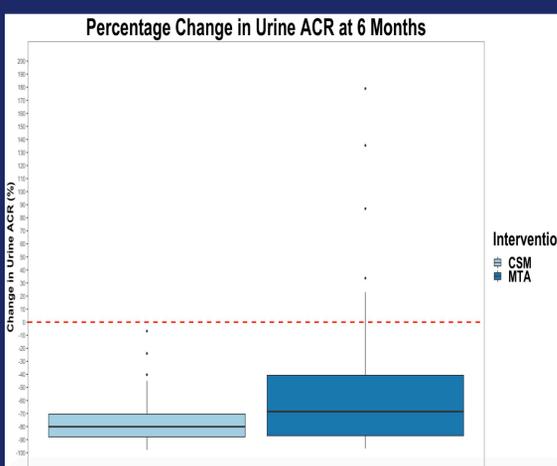
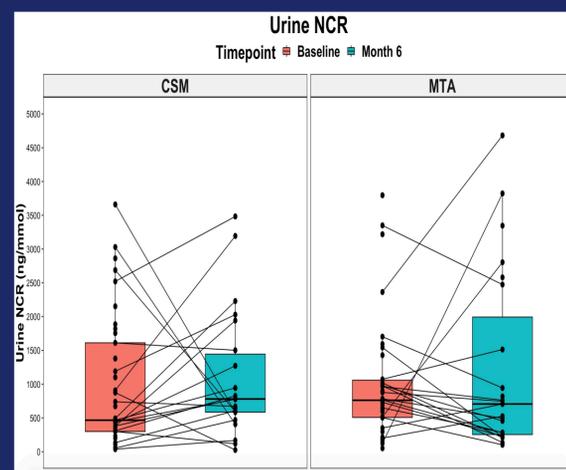
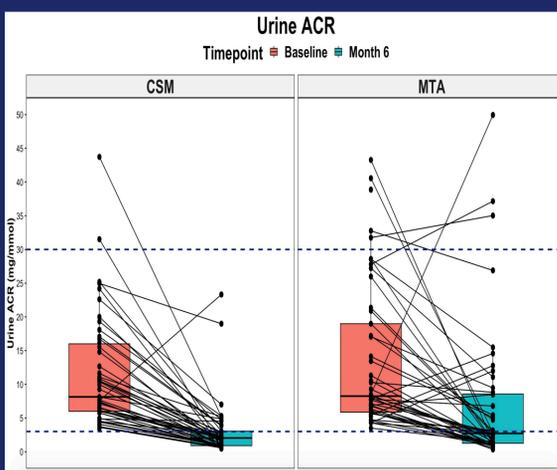
## Urine Albumin and NGAL Trajectories

	CSM		p
	Baseline	Month 6	
Urine ACR (mg/mmol)	8.1 [9.9]	2.0 [2.1]	<0.001
Urine NCR (ng/mmol)	466.0 [1312.8]	780.0 [857.9]	0.29

	MTA		p
	Baseline	Month 6	
Urine ACR (mg/mmol)	8.2 [13.1]	2.7 [7.3]	<0.001
Urine NCR (ng/mmol)	761.3 [551.8]	705.9 [1739.7]	0.35

## Percentage Change

	CSM	MTA	p
Δ Urine ACR (%)	-79.5 [18.1]	-68.1 [51.0]	0.075
Δ Urine NCR (%)	+75.7 [263.5]	-49.0 [101.3]	0.056



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## Conclusions

Urine NGAL excretion is increased at 6 months post-CSM but not MTA in T2DM, despite similar reductions in albuminuria. This may reflect early subclinical renal tubular injury with combined medical and surgical therapy for diabetic kidney disease. Ongoing preclinical studies will determine whether increased urinary NGAL after CSM is of pre-renal or intra-renal origin.