EVALUATION OF URINARY CHITINASE 3-LIKE PROTEIN 1 AS A NOVEL DIAGNOSTIC BIOMARKER FOR ACUTE KIDNEY INJURY IN ADULT CARDIAC SURGERY PATIENTS

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Objectives:

This is a translational study aiming to confirm the results from a mouse urinary proteomics study which identified chitinase 3-like protein 1 (CHI3L1) as a promising novel early *injury* biomarker for sepsis-induced acute kidney injury (AKI).[1] A novel mouse-sepsis model[2] was used as tool to obtain distinct urine pools for use in this mouse proteomics study.

Methods:

In this single center prospective cohort study conducted in a university hospital, blood and urine were collected from patients that underwent elective cardiac surgery and this at different time points between preoperative (baseline) and 48 h after ICU admission. Exclusion criteria were: age < 18 y; AKI based on KDIGO SCr and urine output criteria; CKD stage 5; and renal transplantation ≤ 3 months before cardiac surgery. AKI was defined on KDIGO SCr criteria only, using the latest available preoperative SCr as baseline. Serum CHI3L1 results represent absolute values. Urinary CHI3L1 was normalized to urinary creatinine and relative changes measured from baseline expressed as 'relative change' along with absolute values are reported. Data are expressed as median (Q1-Q3), and number (%).

Results:

This interim analysis was performed on data available from 129 patients. Fourthy-six patients (35.7 %) developed AKI: 36 patients (27.9 %) reached KDIGO stage-1, 7 patients (5.4 %) stage-2 and 3 patients (2.3 %) stage-3. **AKI** was **diagnosed** on **SCr** criteria at **15 h (7-24 h)** after ICU admission.

		AKI status			
		AKI	non-AKI	Total	% AKI within subcategory or total cohort
Sex	Female	15	28	43	34.9*
	Male	31	55	86	36.0*
	Total	46	83	129	35.7
Pump during surgery	On-pump	43	76	119	36.1**
	Off-pump	3	7	10	30.0**
	Total	46	83	129	35.7

*p=0.897; **p=0.697

	Baseline serum CHI3L1 (ng/mL)
AKI	44.58 (31.94-81.44)
non-AKI	30.11 (18.66-52.23)

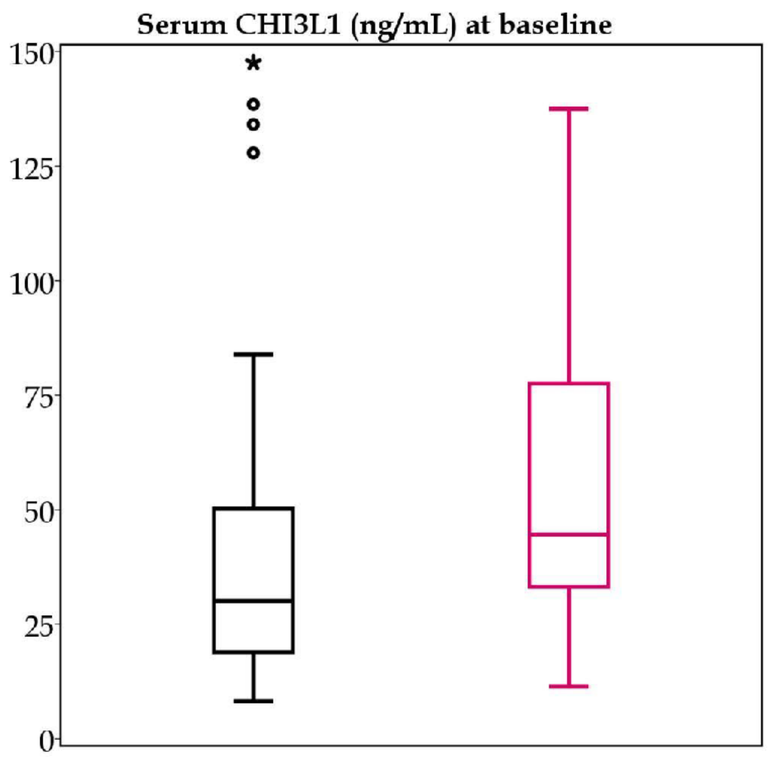
Data are expressed as median (Q1-Q3); p=0.001; parameter is statistically different at all time points

	Age (y)	Preoperative SCr (mg/dL)
AKI	75.5 (67.5-81.3)*	1.05 (0.82-1.15)**
non-AKI	68.0 (59.0-75.0)*	0.86 (0.76-0.98)**

Data are expressed as median (Q1-Q3); *p=0.000; **p=0.001

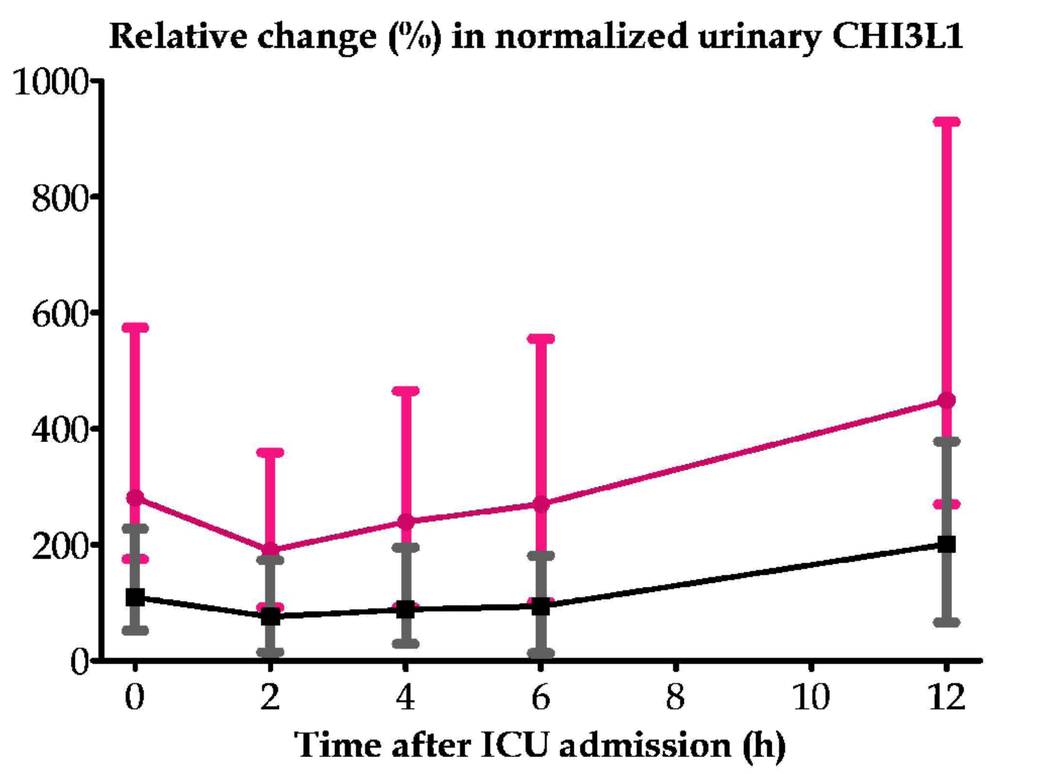
	Urinary CHI3L1 (ng/mg)		Relative change (%) in normalized urinary CHI3L1
	Baseline	ICU admission	ICU admission
AKI	0.59 (0.38-1.03)*	2.69 (1.70-5.54)**	281 (175-574)***
non-AKI	0.65 (0.43-1.13)*	1.53 (1.03-2.62)**	109 (52-228)***

Data are expressed as median (Q1-Q3); *p=0.447; **p=0.001; ***p=0.000 with **AUC-ROC of 0.75 (95%CI: 0.66-0.84)**; parameters are statistically different at all time points starting from ICU admission



Left figure:
Box and whisker plots represent baseline serum CHI3L1 concentrations in non-AKI (black) vs. AKI (colored) patients.

Right figure:
Colored bullets represent medians of AKI group with Q1-Q3.
Black squares represent medians of non-AKI group with Q1-Q3.



Conclusions:

- In this interim analysis we found that *urinary* CHI3L1 was a *very early injury* biomarker for AKI in this specific cohort.
- In addition we found that *serum* CHI3L1 measured at baseline was already increased in patients who developed AKI. Serum CHI3L1 may therefore have *potential* as an AKI *risk factor* in adult elective cardiac surgery patients.

References & Acknowledgments

1. Maddens et al. Crit Care Med 2012; 40:2638-2646.
2. Maddens et al. Mol Cell Proteomics 2012; 11:1-13.

This work was supported by FWO and IOF.