

# Kidney Injury Molecule-1 (KIM-1)

Acute kidney injury (AKI) is defined as a condition in which the kidney function and structure are suddenly affected. It is a serious disease but with a timely treatment can be reversible. AKI is common complication with critically ill patients (1) and it is also recognized as a life-threatening pathology closely associated with metabolic syndrome and cardiovascular diseases (2). AKI can occur in a variety of clinical settings and is common complication in patients after cardiac surgery (3).

Currently, serum creatinine is measured to diagnose AKI as it provides information of the glomerular filtration rate. However, serum creatinine levels do not change until ~50% of kidney function is lost (4). Furthermore, its inter-individual variability is high. This makes it a suboptimal biomarker of AKI in which the early diagnosis can significantly improve the outcome.

## KIM-1 as a diagnostic biomarker

Kidney injury molecule-1 (KIM-1) has been suggested as one of the biomarkers that could improve the early diagnosis of AKI. KIM-1 levels are undetectable in normal kidneys, whereas elevated levels of KIM-1 expression was detected in the ischemic kidney in an animal model of disease (5), as well as in humans (6–8). In urine, KIM-1 concentration was shown to increase up to 3-7 ng/ml from its normal concentration of less than 1 ng/ml following an ischemic kidney injury. KIM-1 levels begun to increase as early as 6 hours after an ischemic insult and remained elevated for a period of 48 hours post-injury (9).

In addition, KIM-1 has been suggested to have predictive value for AKI in patients undergoing cardiac surgery (10). It might also be utilized as a nephrotoxicity biomarker in preclinical studies of drug candidates (11) since kidney tissue may suffer from ischemia as a result of drug-related response. The Food and Drug Administration has recognized KIM-1 as an appropriate biomarker for renal injury in preclinical studies of pharmacologic agents (12). According to some publications, KIM-1 could also be used for detecting certain types of cancer (13,14).

## MONOCLONAL ANTIBODIES SPECIFIC TO KIM-1

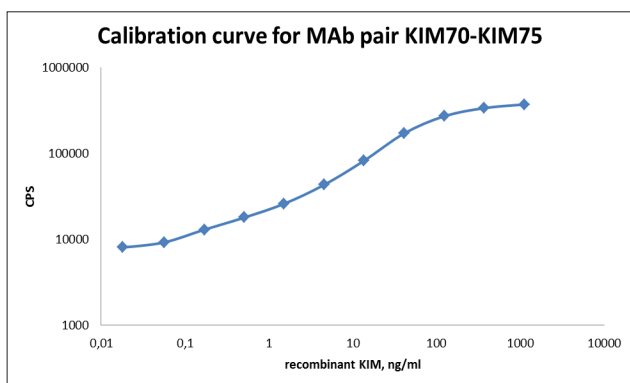
Hytest provides two monoclonal antibodies (MAbs) specific to the ectodomain of human KIM-1. They are suitable for a quantitative detection of KIM-1 in urine using a sandwich ELISA.

## CLINICAL UTILITY

- **Acute kidney injury (AKI)**

## Quantitative sandwich immunoassay

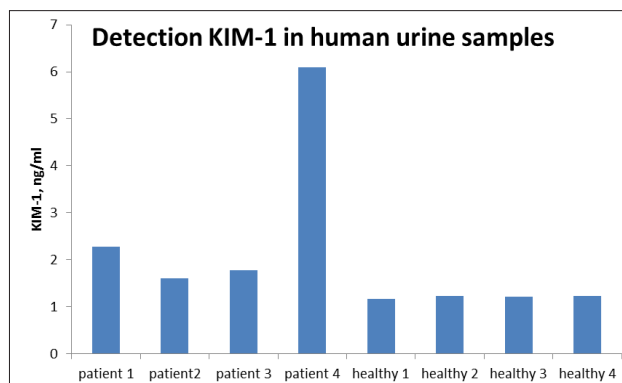
Calibration curve for KIM70-KIM75 (capture-detection) is shown in Figure 1. The limit of detection for this pair in fluoroimmunoassay is ~0.2 ng/ml.



**Figure 1.**

**Calibration curve for KIM70-KIM75 fluoroimmunoassay.** The MAb KIM70 was used for capture (1 µg/well), detection MAb KIM75 was labeled with stable Eu<sup>3+</sup> chelate (0.2 µg/well). Recombinant human KIM-1 ectodomain (in-house preparation) in a buffer containing 0.1% sodium deoxycholate and 10 mM glucose was utilized as an antigen.

The prototype assay was also tested for its ability to detect native KIM-1 in urine samples from patients with cardio-renal syndrome, trauma, and pyelonephritis (Figure 2).



**Figure 2.**

**Detection of KIM-1 in human urine samples by the KIM70-KIM75 sandwich fluoroimmunoassay.** Urine samples were obtained from patients with trauma (patient 1), with pyelonephritis (patient 2), and with cardio-renal syndrome (patients 3 and 4). In addition, urine samples from four apparently healthy volunteers (healthy 1, 2, 3, 4) were tested. All samples were diluted 1:1 with a buffer containing 0.1% sodium deoxycholate and 10 mM glucose. A recombinant human KIM-1 ectodomain (in-house preparation) was used as a calibrator.

## REFERENCES

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## ORDERING INFORMATION

### MONOCLONAL ANTIBODIES

Product name	Cat. #	MAb	Subclass	Remarks
Kidney injury molecule-1 (KIM-1)	4KMI	KIM70	IgG1	EIA, WB
		KIM75	IgG1	EIA, WB