Pacific Biomarkers
The Value of Expertise

Creatinine, Urine

Analyte: Creatinine

Specimen Type: Urine *see note

Optimum Volume: 0.5 mL

Stability:

2-8 Degrees C	-20 Degrees C	-70 Degrees C
7 days	6 months	3 years

Reporting Units: mg/dL (random); mg/24hr (24hr urine)

Method: Enzymatic

Biological or Clinical Significance:

Creatinine is a waste product formed by the spontaneous dehydration of body creatine. Most of the body creatine is found in muscle tissue where it is present as creatinine phosphate and serves as a high-energy storage reservoir for conversion to adenosine triphosphate. The rate of creatinine formation is fairly constant with about 2 percent of the body creatine being converted to creatinine every 24 hours. Serum creatinine and urea levels are elevated in patients with renal malfunction, especially decreased glomerular filtration. In the early stages of kidney damage, the rise in serum urea levels usually precedes the increase in serum creatinine. Serum urea levels are affected by factors such as diet, degree of hydration, and protein metabolism. Serum creatinine levels, on the other hand, tend to be constant and unaffected by factors affecting serum urea levels. Thus, serum creatinine is more reliable as a renal function screening test than serum urea. The amount of creatinine excreted in the urine each day is directly related to muscle mass and approximately proportional to the lean body mass. Thus, the level of many substances produced at rates that are proportional to body size may be normalized by using creatinine excretion as an index of body size. While the ratio of biomarker to creatinine in a 24-hour urine collection would be a better index than the ratio in a spot urine, use of the biomarker: creatinine ratio in a spot urine correlates well with the 24-hour value. This allows the excretion of these markers to be compared to reference ratios obtained from individuals of varying body sizes.

Because creatinine is produced at a constant rate, urinary creatinine may be used to monitor glomerular filtration rate using the equation:

Ccreat = Ucreat x Uvol / Pcreat

Where Ccreat equals the creatinine clearance, Ucreat is the urinary creatinine concentration, and Uvol is the urine volume (these are usually for a 24-hour quantitative urine collection); Pcreat is the plasma creatinine concentration.

It should be emphasized the serum creatinine does not increase until a large fraction of normal kidney is lost. Thus, some newer urinary and serum biomarkers are better indices of compromised urine function than serum creatinine or creatinine clearance (see references 1 and 2).

Principle of Test Method:

The urine creatinine assay is an automated enzymatic method. *Note: If creatinine is to be used for

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normalization (to account for variations in urine flow) of another marker; pleaser refer to collection requirements for that marker as a stabilizer may be recommended. Contact PBI for further collection information.

References:

1. Devarajan P. The use of targeted biomarkers for chronic kidney disease. Adv Chronic Kidney Dis. 2010; 17:469-479.

2. Goldstein SL. Acute kidney injury biomarkers: renal angina and the need for a renal troponin I. BMC Med. 2011; 9:135.