NHANES 1999-2000 Public Data Release (June 2002)

Laboratory 16 – Urinary Creatinine and Albumin

Description

Urinary albumin and creatinine are measured. Related survey questionnaire data include information on analgesic product use and incontinence.

Eligible Sample

- Participants aged 6 years and older

Data Collection Methods

A casual urine specimen is collected from the participant. In the laboratory, the urine specimen is processed, stored, and shipped to the University of Minnesota for analysis.

Examination Protocol

Detailed specimen collection and processing instructions are discussed in the NHANES Laboratory/Medical Technologists Procedures Manual (LPM). Vials were stored under appropriate frozen (-20 degrees Centigrade) conditions until they were shipped to University of Minnesota for testing. The analytical methods are described in the Analytic methodology section.

Analytic Methodology

Urinary Creatinine

Creatinine analysis uses a Jaffé rate reaction, in which creatinine reacts with picrate in an alkaline solution to form a red creatinine-picrate complex. The reaction is measured with a CX3 analyzer. The rate of the color development is measured 25.6 sec after sample injection at 520 nm and at 560 nm. The rate difference between the two wavelengths is proportional to the concentration of creatinine in the reaction cup. The procedures described below are the standard protocols of the Fairview University Medical Center (FUMC)[1,2,3,4,5].

Creatinine, the waste product derived from creatine, is released into the plasma at a relatively constant rate. The amount of creatinine per unit of muscle mass is constant; therefore, creatinine is the best indicator of impaired kidney function.

Urinary Albumin

A solid-phase fluorescent immunoassay for the measurement of human urinary albumin is described by Chavers et al.[6]. The fluorescent immunoassay is a non-competitive, double-antibody method for the determination of human albumin in

urine. Antibody to human albumin is covalently attached to derivatized polyacrylamide beads. The solid-phase antibody is reacted with a urine specimen. The urine albumin-antigen complexes with the solid-phase antibody. This complex then reacts with fluorescein-labeled antibody. Remove the unattached fluorescent antibody by washing during centrifugation. Determine the fluorescence of the stable solid-phase antibody complex with a fluorometer. The fluorescence is directly proportional to the amount of urine albumin present. The standard curve is 0.5-20 µg/mL albumin.

Increased microalbuminuria is a sign of renal disease and may be predictive of nephropathy risk in patients with insulin-dependent diabetes. Results of the fluorescent immunoassay (FIA) are reproducible, and the test is accurate and sensitive for the detection of human urinary albumin excretion. It is especially useful for measurement of low levels of urinary albumin not detectable by dipstick methods. The FIA assay resembles the radio-immunoassay (RIA) in technique and sensitivity without the potential health hazards associated with the handling of isotopes in the laboratory[6].

References

1.Creatinine Measurement Module Operating and Service Instructions, Beckman ASTRA. Brea (CA): Beckman Instruments, Inc., 1979.

2.Operating and Service Instructions, Beckman ASTRA. Brea (CA): Beckman Instruments, Inc., 1986.

3.Maintenance Guide, Beckman ASTRA. Brea (CA): Beckman Instruments, Inc., 1982.

4.Tietz NW, editor, Textbook of clinical chemistry. Philadelphia: WB Saunders Company, 1986:775-85, 1173-202, 1266-81, 1347-55, 1386-92.

5.Kaplan LA, Pesce AJ, editors, Clinical Chemistry Theory, Analysis and Correlation. St. Louis: CV Mosby Company, 1984:416-8, 1032-5, 1044-5, 1051-6, 1075-8, 1234-9, 1247-53, 1257-61.

6.Chavers BM, Simonson J, Michael AF. A solid-phase fluorescent immunoassay for the measurement of human urinary albumin. Kidney Int. 1984;25:576-8.