An 83-Year-Old Woman with Discordant Urine Protein Results

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CASE DESCRIPTION

An 83-year-old woman presented to the emergency department with weakness and weight loss. A urinalysis was ordered. The urine was clear and light yellow. A urine protein estimate obtained with reagent strips (Clinitek Atlas¹; Siemens) was 30 mg/dL; however, quantitative measurement of the total protein concentration (UniCel² DxC 800; Beckman Coulter) of a second urine sample yielded a value of 980 mg/dL. Using reagent strips (Multistix³ 10 SG; Siemens) on the second sample again yielded a urine protein estimate of 30 mg/dL.

QUESTIONS
1. What are the differences between semiquantitative (reagent strip) and quantitative urine protein methods?
2. In what disorder do urine reagent strip methods frequently underestimate the total protein concentration?
3. What follow-up testing can help explain these discrepant urine protein results?

The answers are below.

Fig. 1. Urine protein electrophoresis (PEP) and immunofixation electrophoresis (IFE).
(A), Image of the patient’s urine PEP result. A Hydragel Protein 15/30 kit (Sebia) was used. A faint albumin band is detected near the anode (top). A prominent monoclonal spike (M-spike) is detected on the gel and is visible on the corresponding electropherogram. The area under the curve (as a percentage) is multiplied by the total protein concentration as measured quantitatively with the pyrogallol red–molybdate assay to quantify the albumin band and M-spike concentrations (in milligrams per deciliter). (B), Image of the patient’s urine IFE result. A Hydragel 9 IF kit (Sebia) was used. Monoclonal free κ light chains are detected. Reagent antisera are anti-γ (G), anti-α (A), anti-μ (M), anti-κ (κ), and anti-λ (λ). The acid-fixed lane (ELP) is also shown. [Note: The anode (+) and cathode (−) are indicated on the right side of the PEP and IFE gels. The top right portion of the IFE image was deleted to remove patient identifiers.]
Reagent strips use the principle of protein error of pH indicators to detect protein (1, 2). This method is sensitive for albumin but is less sensitive to immunoglobulins (1). In the quantitative assay used on the UniCel analyzer, the absorption peak of a pyrogallol red–molybdate complex shifts when bound to protein (3, 4). Quantitative assays can have improved sensitivity for immunoglobulins and Bence Jones proteins (4, 5). Urine protein and immunofixation electrophoresis (Fig. 1) demonstrated strong monoclonal free κ light chains. Multiple myeloma was subsequently diagnosed.

Author Contributions: All authors confirmed they have contributed to the intellectual content of this paper and have met the following 3 requirements: (a) significant contributions to the conception and design, acquisition of data, or analysis and interpretation of data; (b) drafting or revising the article for intellectual content; and (c) final approval of the published article.

References


Call for Nominations

AACC’s Nominating Committee is accepting nominations for the 2012 Association election. The president-elect, treasurer, 2 positions on the Board of Directors, and 4 positions on the Nominating Committee are to be elected to serve, beginning January 1, 2013. Nominations should be sent in writing to: James Ritchie PhD, Emory University Hospital, Rm. F-147B EUH, 1364 Clifton Rd., NE, Atlanta, GA 30322-1061. E-mail jritchi@emory.edu.

You should indicate the office for which the nominee is proposed and include 1 or 2 sentences explaining the nomination. A nomination form will be available on the AACC website January 1. All nominations must be received by January 31, 2012. The Nominating Committee will obtain each candidate’s consent to run for office.

According to the association bylaws, in this election, members of the Michigan, New York Upstate, Pacific Northwest, and San Diego sections are not eligible for election to the Nominating Committee for the term beginning January 2013.

Members of the 2012 Nominating Committee are: James Ritchie, PhD (Chair); Graham Beastall, PhD; Robert Fitzgerald, PhD; Veronica Luzzi, PhD; Christopher McCudden, PhD; Bonny Lewis Van, PhD; Shirley Welch, PhD; and Steven Zibrat, MS.