deficiency. It is not applicable to newborn or mass screening with use of filter paper specimens, but is satisfactory for liquid urine screening.

In one variant of sulfite oxidase deficiency, due to a defect of its molybdate cofactor metabolism, the concentration of uric acid in serum is decreased. Thus, an unexplained low serum uric acid, especially in a young patient with neurologic abnormalities, is an indication for a urine thiosulfate test.

References


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Sodium Drift in the Beckman Astra-8

To the Editor:

Further to the Letters (1, 2) reporting problems with the Beckman Astra-8, we wish to report our experiences with a problem of severe within-batch imprecision in the sodium channel. We have been calibrating our instrument by the use of Beckman proteinaceous standards containing ethylene glycol, which enables us to assay total protein, albumin, and calcium as well as urea nitrogen, creatinine, sodium, and potassium—the latter four analytes having previously been satisfactorily determined with the use of primary standards containing no protein. The same analytical reagents, supplied by Beckman Instruments, were used throughout. On using the proteinaceous standards, we were dismayed to find an upward drift of 10 to 20 mmol/L in results for sodium, which was reproducible on a batch-to-batch basis, but which could not be solved by the usual trouble-shooting procedures such as change of electrodes, electronic checks, or the use of fresh proteinaceous standards and different batches of reagents. Finally, we replaced the Beckman wash solution with one of our own formulation. This has given more satisfactory within- and between-batch performance on the basis of internally and externally assessed quality-control programs. The composition of the wash solution is as follows and has the added advantage that it is considerably cheaper than the proprietary product:

"Paraben" (p-hydroxybenzoic acid butyl ester) 100 mg
Sodium chloride 78 g
Potassium chloride 3.7 g
Calcium chloride • 6H2O 5.5 g
Magnesium sulfate • 7H2O 2.5 g
dilute to 1000 mL with distilled water

This stock solution is diluted 10-fold before use with distilled water to which a suitable wetting agent has been added, such as Brij 35 (5 mL/L).

We believe the sodium drift was caused by the presence of both ethylene glycol (used as an antifreeze agent in the serum standard, making it more viscous than human sera) and the manufacturer's essentially ion-free wash solution. Together these created a microenvironment that interfered with the estimation of sodium. Flushing the sample module with sodium hypochlorite solution (100 g/L) will temporally solve this drift, but we believe the ideal answer is to use a different wash solution. The solution proposed has been used for the past six months in this laboratory with a consequent improvement in analytical performance and without any deleterious effect being seen on either the life of the sodium electrode or interference in any of the other channels.

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More on Reliability of Reagent-Strip Urinalyses for Glucose

To the Editor:

The principal advantage of reagent-strip-stick measurements of glucose in urine is the ease of test-performance; the failure rate, as pointed out by Gupta et al. (1) generally receives less attention.

Usually the "abnormality" of such an analytical result (e.g., hemoglobin in blood) is estimated by comparing the numerical value with a chosen reference interval for that quantity. Not so for glucose in urine, where it is the change of color of a strip, most often read visually under variable conditions of light, temperature, stress, etc., that determines whether glucosuria is present or not.

The upper reference limit for glucose in urine from fasting healthy subjects is about 1 mmol/L (2) or 1.4 mmol/L for urine collected at random (3). For urines collected at random from non-fasting healthy pregnant women at different gestational ages we obtained the following upper reference limits, as determined by the glucose dehydrogenase procedure (4): 10–20 weeks: 2.0 mmol/L (n = 158); 21–30 weeks: 2.3 mmol/L (n = 124); 31–42 weeks: 2.7 mmol/L (n = 245).

The color change (E50) of strip analyses varies from 1.5 to 12 mmol/L for different brands and the range for E10 to E90 is from 1 to 7 mmol/L (3). The use of such estimations of glucose in urine is therefore difficult to reconcile with a reference interval, especially as it varies with the type of patient studied.

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Should Routine Microscopic Examination of Urine Be Discontinued?

To the Editor:

The usefulness of microscopic examination of all urine samples is an issue that is important to all laboratories performing urinalysis. Schumann and Greenberg (1) suggested that microscopic examination may not be re-
quired for all urines, and more recently
Benham and O'Kell (2) reported that
chemical testing for leukocyte may
eliminate the need for routine micro-
scope examination.

Important clinical as well as eco-
nomic factors must be carefully evalu-
ated before making a decision to dis-
continue the microscopic examination
of urine specimens as a routine pro-
dure. A study was conducted in our
laboratory to help resolve this timely
dilemma.

Macroscopic ("Bili-Labstix for Clini-
Tek"; Ames Division, Miles Labora-
tories, Inc.) and microscopic examination
was performed on 2580 specimens.
The microscopic observations were tab-
ulated for 1204 of these urine (47%) that
were negative by chemical analy-
sis (negative results for protein, glu-
cose, bilirubin, and hemoglobin) and
appeared clear or non-turbid:

1–5 erythrocytes/ high-power field
(hpf), in males 12 1.0%
>10 hyaline casts/ low-power field
(lpf) 2 0.2%
1–5 granular casts/ lpf 4 0.3%
trichomonads 3 0.2%
1–5 leukocytes/lpf 160 13.3%
6–20 leukocytes/lpf 61 5.1%
>20 leukocytes/lpf 25 2.1%
no significant finding 937 77.8%

When the leukocyte observations
were adjusted for possible contamin-
ation during specimen collection (as evi-
denced by squamous epithelial cells
seen in the microscopic examination) the
number of clinically significant
findings was greatly reduced:

1–5 leukocytes/lpf 19 1.6%
6–20 leukocytes/lpf 11 0.9%
>20 leukocytes/lpf 7 0.6%

Over all, 22.2% of urines with nega-
tive macroscopic examinations had
positive microscopic observations; when adjusted for possible contamin-
ation this percentage was reduced to
4.2%. Urines were not tested for leuko-
cyte esterase in this study; the practi-
cal 60-s assay for leukocyte esterase is
not yet commercially available. How-
ever, Benham and O'Kell (2) reported a
5% false-negative rate with the leuko-
cyte esterase test, of which 4% were
apparently due to contamination. Our
data suggest that an additional 1.7% of
urines with negative macroscopic ex-
amination would be positive for ele-
ments other than leukocytes: hyaline
casts, granular cast, trichomonads, and
erthrocytes in males. We think that a
minimum 2.7% yield (1% leukocytes, as
suggested by Benham and O'Kell,
plus 1.7%, other elements) justifies
performing microscopic urinalysis in
our laboratory, but we plan to re-exam-
ine our position when the 60-s leuko-
cyte esterase test becomes commercial-
ly available.

Another study in our laboratory has
revealed much difference in opinion as
to what constitutes a clinically signifi-
cant microscopic observation (unpub-
lished results), so we urge readers to
interpret these data with respect to
their own standards of clinical signifi-
cance.

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High Serum Ceruloplasmin Activity
in Pulmonary Tuberculosis

To the Editor:

Assessment of disease activity in
pulmonary tuberculosis is very diffi-
cult. Erythrocyte sedimentation rate
(ESR) has long been used as a nonspe-
cific index of disease activity but its
reliability is open to question. Report-
dedly, the α₂-globulin concentration in
serum increases in pulmonary tuber-
culosis and declines after anti-tuber-
culosis chemotherapy (1). We evaluated
serum ceruloplasmin (a copper-con-
taining α₂-globulin) as a possible index
of disease activity in pulmonary tuber-
culosis.

We measured serum ceruloplasmin activity (2) in 58 patients with pulmo-
nary tuberculosis before institution of
specific chemotherapy and in 20 age-
and sex-matched controls. The diagno-
sis of pulmonary tuberculosis was con-
firmed by demonstration of acid-fast
bacilli in the sputum of patients. Other
conditions that could affect serum ceru-
lopasmin activity were excluded by
clinical examination and relevant in-
vestigations. The data were analyzed
statistically by use of Student's t-test.

The mean (and SD) serum cerulo-
plasmin activity was 76.6 (10.7) U/L in
the control group and 185.1 (55.0) U/L
in the patients with pulmonary tuber-
culosis, a statistically significant (p <
0.001) difference. All except two of the
patients had serum ceruloplasmin ac-
tivity exceeding the mean plus 2 SD for
our control group.

To examine serum ceruloplasmin ac-
tivity in relation to the severity of the
disease, we divided the patients into
three groups—minimal lesions (n =
12), moderately advanced lesions (n =
24), and far-advanced lesions (n =
22)—according to the criteria of the
National Tuberculosis Association of
the U.S.A. (3). The mean (and SD) serum ceruloplasmin activity in these
groups was 130.6 (20.1), 165.9
(29.8), and 235.9 (47.1) U/L, respectiv-
ely. Each mean differed significantly (p
< 0.001) from the other two.

The mean (and SD) ESR (Westergren)
was 54.4 (12.6) mm/h for patients with
minimal lesions, 66.3 (15.5) mm/h for
patients with moderately advanced
lesions, and 70.5 (15.5) mm/h for
patients with far-advanced lesions. The
difference between the first two groups
was significant (p < 0.02) but that
between the last two groups was not
(p > 0.05).

Evidently, serum ceruloplasmin ac-
tivity is a better index of disease activity
in pulmonary tuberculosis than is the
ESR.

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Improved Sample Preparation
before Liquid-Chromatographic
Determination of Probeneicid in
Cerebrospinal Fluid

To the Editor:

Our recently described (1) liquid-
chromatographic method for probene-
cid in human cerebrospinal fluid (CSF)
requires solvent-extraction and evapo-
ration steps in sample preparation.
More recently, small packed columns
("SEP-PAK" cartridge; Waters Asso-