A Brief Note

A Screening Test for the Presence of Urinary Lysozyme (Muramidase)

By I. Snapper and D. Seld

Osserman and Lawlor\(^1\) have indicated the growing importance of metabolic disturbances in hematologic disorders by demonstrating that, in monocytic leukemia, several grams of lysozyme (muramidase) are eliminated in the 24 hour urine. Lysozyme (molecular weight MW 14500) and Bence Jones protein (MW approximately 25000) are completely different proteins, but since both are small polypeptides, they may have some physical and chemical qualities in common. We actually found not only similarities but also differences, which are summarized in Table 1. These findings led to the following screening test for lysozyme.

A urine specimen is mixed with an equal amount of 3 percent sulfosalicylic acid. If a precipitate of at least 2+ develops, the turbid solution is heated in a waterbath to 70 C. At this temperature, the precipitation of albumin and globulin is increased while lysozyme is dissolved but Bence Jones protein has not yet gone into solution. Whether or not partial clearing is observed at or below 70 C.,* the specimen must be kept at 70 C. and filtered through a funnel heated to the same temperature. The presence of lysozyme is highly probable if the filtrate (1) is clear while being collected in a test tube placed in a water bath of 70 C., (2) becomes turbid while cooling to 35-40 C., and (3) clears again when heated to 60-70 C.

When the presence of lysozymuria must be considered but the addition of 3 percent sulfosalicylic acid causes only 1 to 2 plus turbidity, the urine should be concentrated.

To 100 ml. of urine, an equal volume of 20 percent sulfosalicylic acid is added. The mixture is centrifuged. The supernatant is discarded. The precipitate is mixed with 8 ml. of sulfosalicylic acid 20 percent. Then, as in the previous test, the mixture is heated to 70 C. and filtered hot. The first 5 or 6 drops of the filtrate are discarded and the rest of the filtrate is collected at 70 C. in a hot water bath. Again, lysozyme is probably present if a precipitate forms in the clear filtrate during cooling and disappears at 60-70 C.

Comment

This test has been successfully performed with (1) pure lysozyme dissolved in saline, (2) urine of patients whose urine contained both lysozyme and albumin.

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*In many specimens of lysozyme-containing urine so much albumin is present that no clearing at 70 C. can be detected even by careful scrutiny.
URINARY LYSOZYME

Table 1.

<table>
<thead>
<tr>
<th></th>
<th>Lysozyme*</th>
<th>Bence Jones Protein¹</th>
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</thead>
<tbody>
<tr>
<td>Precipitates at pH 4.9⁰ and 60 C.</td>
<td>No</td>
<td>Precipitates</td>
</tr>
<tr>
<td>Addition of sulfosalicylic acid</td>
<td>Precipitates</td>
<td>Yes</td>
</tr>
<tr>
<td>SSA precipitate</td>
<td>Dissolves</td>
<td>Dissolves</td>
</tr>
<tr>
<td>Heating</td>
<td>60–70 C.</td>
<td>Boiling</td>
</tr>
<tr>
<td>Precipitates while cooling</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*Kindly provided by Dr. Osserman.

min, (3) albuminous urine to which pure lysozyme has been added.

We estimate that the screening test of the non-concentrated urine is positive when more than 100–150 mcg. of lysozyme per ml. are present. This test will therefore give very satisfactory results in cases of monocytic dyscrasia, conditions in which the lysozyme content of the urine is usually considerably higher than 150 mcg. per ml. Until now, we have not encountered a positive test in other hematologic disorders, including myeloma with or without Bence Jones proteinuria.

Lysozymuria develops occasionally in sarcoidosis but we have found a clear cut positive screening test only after concentration of the urine.

SUMMARY

A screening test for increased concentrations of lysozyme (muramidase) in the urine is described.

SUMMARIO IN INTERLINGUA

Es describite un test de detection primari pro augmentos del concentration urinari de lysozyma (muramidase).

REFERENCES

Brief Note: A Screening Test for the Presence of Urinary Lysozyme (Muramidase)

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