Albumin to Creatinine Ratio (ACR)

What is ACR?

Albumin to creatinine ratio is a urine test. Normal daily (24 hour) urine albumin excretion is less than 30 mg in adults. If the 24 hour urine albumin excretion results are between 30-300 mg it becomes defined as microalbuminuria (MAU). This may occur with kidney damage arising from diabetes mellitus. When collection of 24 hour urine is not feasible, a random urine sample for simultaneous measurement of albumin and creatinine can determine an albumin to creatinine ratio (ACR). This test determines whether MAU or excessive loss of albumin is present. These results can be used to identify individuals at higher risk of developing progressive kidney disease. In healthy adult males, ACR is less than 2.0 mg albumin/mmol creatinine, while in healthy adult females it is less than 2.8 mg/mmol. MAU therefore refers to a specific range of ACR that exceeds these cutoffs and lies between 2.0-20.0 mg/mmol for males and 2.8-28.0 mg/mmol for females. ACR levels above 20.0 mg/mmol for males and 28.0 mg/mmol for females corresponds to a urine albumin level in excess of 300 mg/day (i.e. macroalbuminuria) and are consistent with overt diabetic nephropathy. ACR can be used to determine urine albumin loss in non diabetic kidney disease and is used instead of a total protein to creatinine ratio on a random urine sample.

Albumin or protein in the urine is a marker of both progression of kidney disease, as well as increased risk of cardiovascular events. Patients with diabetes should have annual random urine samples for ACR. ACR should be repeated to determine if albumin excretion is increasing or decreasing. ACR can be ordered instead of a 24 hour urine, if routine urinalysis is positive for protein.

Table 1. Stages of classic diabetic nephropathy according to urinary albumin level

<table>
<thead>
<tr>
<th>Stage of nephropathy</th>
<th>Urine dipstick for protein</th>
<th>Urine ACR (mg/mmol)</th>
<th>24-urine collection for albumin* (mg/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Negative</td>
<td>&lt; 2.0 (men)</td>
<td>&lt;30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt; 2.8 (women)</td>
<td></td>
</tr>
<tr>
<td>Microalbuminuria</td>
<td>Negative</td>
<td>2.0 – 20.0 (men)</td>
<td>30-300</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.8 – 28.0 (women)</td>
<td></td>
</tr>
<tr>
<td>Overt nephropathy</td>
<td>Positive</td>
<td>&gt; 20.0 (men)</td>
<td>&gt;300</td>
</tr>
<tr>
<td>(Macroalbuminuria)</td>
<td></td>
<td>&gt; 28.0 (women)</td>
<td></td>
</tr>
</tbody>
</table>

* Values are for urinary albumin, not total urinary protein, which will be higher than urinary albumin levels. ACR results may be elevated with conditions other than diabetic nephropathy.

When should an ACR be ordered?

Refer to Detection, Monitoring & Referral of Chronic Kidney Disease available from the Nova Scotia Renal Program website: www.nsrp.gov.ns.ca.

Do all Nova Scotia laboratories offer ACR testing?

The regional laboratory sites in each District Health Authority in Nova Scotia offer ACR testing. ACR should be ordered as a request test and the specimen will automatically be routed to the regional laboratory site in your district.

What happens if I order Microalbuminuria (MAU)?

Microalbuminuria will be reported in addition to the ACR.

Where can I find additional information to help me understand albumin in the urine?

Refer to Detection, Monitoring & Referral of Chronic Kidney Disease available from the Nova Scotia Renal Program website: www.nsrp.gov.ns.ca.


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