

## Albumin Creatinine Ratio (ACR)

Albumin is one of the major proteins in the blood and is normally found in very low concentrations in the urine, as it is too large to be filtered by the kidneys. Damage caused to the glomerular basement membrane results in increased permeability and higher levels of albumin are detected. The ratio of albumin to creatinine in a random urine sample is preferred over total albumin concentration in a 24h collection as this is more convenient for the patient, subject to fewer inaccuracies in collection (missed samples) and has been demonstrated to correlate closely with outcome measures from studies using 24h collections. Guidelines exist with recommendations for measuring ACR in renal disease, diabetic nephropathy, hypertension and pregnancy.

### General information

**Collection container:** Sarstedt urine monovette®

**Type and volume of sample:** Random, preferably early morning urine. Minimum of 5mL.

**Specimen transport/special precautions:** N/A

### Laboratory information

**Method principle:** An immunoturbidimetric assay is used on the main laboratory analysers. This method has been standardized against the certified reference material in human serum of the IRMM (Institute for Reference Materials and Measurements) ERM - DA470k/IFCC.

Measured at all MFT Biochemistry sites.

#### Biological reference range or cut off:

<3.0 mg/mmol creatinine

Albuminuria categories:

A1 - <3 mg/mmol

A2 - 3-30 mg/mmol

A3 - >30 mg/mmol

#### Turnaround times:

Same day as receipt

## Division of Laboratory Medicine

### Biochemistry

#### Clinical information

##### Factors known to significantly affect the results:

Bloodstained samples will have falsely elevated albumin levels and in this case, the patient should have urgent investigation of the potential cause of haematuria.

In very rare cases, gammopathy, in particular type IgM (Waldenström's macroglobulinemia), may cause unreliable results

Raised ACR may also be seen with a fever, urinary tract infection, several immune disorders, dehydration, certain drugs and other conditions causing blood in the urine. Temporarily elevated results may also be caused by vigorous exercise.

##### Clinical decision points:

Frequency of monitoring is determined by several factors including the initial ACR, patient age and rate of disease progression. Referral to Nephrology should be made when:

ACR 30 mg/mmol or more (ACR category A3), together with haematuria

ACR 70 mg/mmol or more, unless known to be caused by diabetes and already appropriately treated

##### Frequency of monitoring of GFR (number of times per year by GFR and ACR category for people with, or at risk of category CKD):

		<3	3-30	>30
eGFR	Stage/Albumin	A1	A2	A3
≥ 90	G1	1 if CKD	1	≥1
60-89	G2	1 if CKD	1	≥1
45-59	G3a	1	1	2
30-44	G3b	2	2	≥2
15-29	G4	2	2	3
<15	G5	4	≥4	≥4

## Division of Laboratory Medicine

### Biochemistry

Risk of cardiovascular disease and renal progression increases as GFR stage advances and albuminuria stage progresses  
Children with diabetes should have annual ACR measured (from age 12 in type 1).

#### References

Chronic kidney disease in adults: assessment and management. Clinical guideline [CG182]  
<https://www.nice.org.uk/guidance/cg182/chapter/1-recommendations>

Guidelines on pregnancy, including those with hypertension and gestational diabetes where ACR monitoring may be appropriate: <https://www.nice.org.uk/guidance/conditions-and-diseases/fertility--pregnancy-and-childbirth/pregnancy/products?GuidanceProgramme=guidelines>

Diabetes (type 1 and type 2) in children and young people: diagnosis and management. NICE guideline [NG18]. <https://www.nice.org.uk/guidance/ng18/chapter/1-Recommendations#diagnosis>

**(Last updated December 2021)**