

**DEPARTMENT OF BIOCHEMISTRY**

Title of Document: Investigation of proteinuria in non-pregnant adults

Q Pulse Reference N<sup>o</sup>: BS/CB/DCB/PROTOCOLS/26Version N<sup>o</sup>: 6

Authoriser: Michelle Young

**INVESTIGATION OF PROTEINURIA IN NON-PREGNANT ADULTS****PRINCIPLE OF THE PROCEDURE**

Proteinuria is a possible indication of renal pathology, either due to a damaged glomerulus, damaged tubules or both. The magnitude of proteinuria, in conjunction with other tests for kidney damage and the clinical history, determines the further investigation, influences choice of pharmacotherapy and urgency of patient referral.

Testing for proteinuria in pregnancy is not covered by this document, refer to NICE CG107 (Hypertensive disorders in pregnancy: diagnosis and management).

**Who should be tested?**

Analysis of urine ACR along with GFR estimation is indicated as part of initial assessment in patients with:

- diabetes
- an eGFR of  $<60$  ml/min/1.73m<sup>2</sup>
- hypertension
- cardiovascular disease (ischaemic heart disease, chronic heart failure, peripheral vascular disease and cerebral vascular disease)
- structural renal tract disease, renal calculi or prostatic hypertrophy
- multisystem diseases with potential kidney involvement – for example, systemic lupus erythematosus
- family history of stage 5 CKD or hereditary kidney disease
- opportunistic detection of haematuria or proteinuria.
- prescribed drugs known to be nephrotoxic.

**In addition, patients with diabetes or CKD (eGFR  $<60$  ml/min/1.73m<sup>2</sup>) should have at an annual ACR.**

**Specialist monitoring for proteinuria is also required for patients receiving treatment with gold and penicillamine. Recommended frequency (as in BNF) is as follows:**

Penicillamine: before starting treatment, then every 1-2 weeks for first 2 months, thereafter monthly, and in the week after any dose increase

Intramuscular gold: before starting treatment and then before each intramuscular injection.

**SPECIMEN REQUIREMENTS**

Specimens should not be collected during an acute illness or menstruation, an **early morning urine (EMU)** is preferred but a random urine sample in a plain container (beige top) is acceptable.

**NB** Samples in boric acid (olive green or red top) containers are not suitable.

Twenty-four hour collections are not necessary.

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**RECOMMENDED PROCEDURE**

ACR should be requested in preference to PCR in all non-pregnant adults who are being screened for proteinuria.

PCR can be used as an alternative to ACR for monitoring and follow-up of patients with established proteinuria.

The use of reagent strips (dipsticks) to identify proteinuria in non-pregnant adults is not recommended, unless they are capable of measuring albumin at low levels and expressing the result as ACR.

The use of dipsticks is recommended for the assessment of haematuria.

**Action**

All patients with a raised ACR/PCR should have their urine checked for non-visible haematuria (urine dipstick).

All patients with a new finding of an ACR of >3 but <70 should be followed up by confirmatory testing on a repeat EMU. A confirmed ACR of 3 mg/mmol or more is considered clinically important proteinuria.

**NB:** a UTI rarely causes a raised PCR, and will not usually cause a raised ACR. Repeat on an EMU confirms that the proteinuria is persistent and not due to a postural effect, (usually modest), which in itself carries no adverse prognosis.

If nephrotic syndrome is identified for the first time (typically ACR  $\geq$ 250, PCR  $\geq$ 300, with a low serum albumin), an urgent renal outpatient referral is indicated.

All new findings of nephrotic syndrome in primary care should be phoned by the DCB.

A summary of the recommended actions is given in Table 1.

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**Table 1: ACR and PCR thresholds in non-pregnant adults**

Finding (mg/mmol)	Action
ACR <3	No evidence of proteinuria Continue annual monitoring if patient has diabetes or CKD (eGFR <60 ml/min/1.73m <sup>2</sup> ).
PCR <50	<b>(PCR &gt;30 mg/mmol is significant proteinuria in pregnancy)</b> PCR >15 mg/mmol is an abnormal finding and may indicate clinically significant proteinuria during drug therapy, For other indications including diabetes and CKD, ACR should be tested in preference to PCR.
ACR >3 but <30 (Confirm on EMU)	Clinically important proteinuria Suffix A2 on CKD stage. Adequate to define CKD G1 or G2.
ACR ≥30 but <70 (PCR ≥50 but <100) (Confirm on EMU; if PCR, exclude UTI)	Clinically important proteinuria Suffix A3 on CKD stage If haematuria is present, renal referral is indicated
ACR ≥70 but <250 (PCR ≥100 but <300) (no need to confirm on repeat EMU)	Clinically important proteinuria Routine renal referral indicated (unless diabetic and managed according to local diabetes pathway)
ACR ≥250, (PCR ≥300)	Heavy proteinuria indicating nephrotic syndrome (also low serum albumin) Urgent renal referral indicated DCB to ring result to GP (GP results come to clinical validation at this level)

An ACR of 70 or PCR of 100 is approximately equal to 1 g protein per 24h.  
Below this level the relationship is non-linear.

**Abbreviations**

CKD – Chronic Kidney Disease

ACR – Albumin:creatinine ratio (mg/mmol)

PCR – Protein:creatinine ratio (mg/mmol)

EMU – early morning urine

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DCB – Duty Clinical Biochemist

**References and Useful links**

1. NICE Chronic Kidney Disease Clinical Guideline CG182 (July 2014)
2. UK Renal Association eGuide, accessed October 2018  
<https://renal.org/information-resources/the-uk-eckd-guide/proteinuria/>
3. NICE Hypertension in Pregnancy: Diagnosis and Management CG107 (August 2010)

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**Appendix 1****Interpretative comments issued with ACR/PCR reports:****ACR comments****ACR <30**

Confirmed ACR of 3 mg/mmol or more is clinically important proteinuria. Initial ACR results between 3 and 70 mg/mmol should be confirmed on an early morning urine.

**ACR  $\geq$  30 and < 70**

Confirmed ACR of 3 mg/mmol or more is clinically important proteinuria. Initial ACR results between 3 and 70 mg/mmol should be confirmed on an early morning urine. If haematuria is also present and ACR > 30mg/mmol, specialist referral is indicated.

**ACR  $\geq$  70 and < 250**

ACR > 70 mg/mmol: Significant proteinuria present  
Unless previously known and appropriately managed, consider referral for a renal opinion. If diabetic, manage according to local diabetes pathway.

**ACR  $\geq$  250**

ACR > 250 mg/mmol: Nephrotic range proteinuria  
Unless previously known and appropriately managed, an urgent renal referral is indicated.

**PCR comments****PCR < 50**

PCR of 50 mg/mmol or greater (30 mg/mmol or greater in pregnancy) is clinically important proteinuria.

Please note that albumin:creatinine ratio (ACR) testing is recommended in preference to protein:creatinine ratio (PCR) for proteinuria screening in patients with risk factors for the development of CKD.

**PCR  $\geq$  50 - <100**

PCR of 50 mg/mmol or greater (30 mg/mmol or greater in pregnancy) is clinically important proteinuria.

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**PCR  $\geq$ 100 -  $<$ 300**

PCR > 100 mg/mmol: Clinically important proteinuria present

Unless previously known and appropriately managed, consider referral for a renal opinion. If diabetic, management according to local diabetes pathway.

**PCR  $>$ 300**

PCR > 300 mg/mmol: Nephrotic range proteinuria

Unless previously known and appropriately managed, an urgent renal referral is indicated.