

ALDOSTERONE / RENIN STUDIES: SCREENING PROTOCOL

INTRODUCTION

Aldosterone and renin levels are useful in investigation of suspected disorders of aldosterone production such as primary hyperaldosteronism and hyporeninaemic hypoaldosteronism.

WHO SHOULD BE SCREENED?

1. Patients with severe hypertension who do not respond to two or more antihypertensives.
2. Hypertensives with hypokalaemia (and inappropriate urinary loss of potassium of >35 mmol/24hrs).
3. Diagnosis / differentiation between, primary and secondary causes of hyper- or hypoaldosteronism.
4. Family history of hypertension.
5. Management of renal artery stenosis (renin).
6. Diagnosis and location of renin secreting tumours (renin).

PATIENT PREPARATION

The renin-aldosterone axis is primarily regulated by renal blood flow. Patients under investigation should therefore be normally hydrated, have an adequate sodium intake and be normokalaemic or maximum potassium level obtainable (gross potassium depletion inhibits aldosterone production and may give artefactually low results). Correction of potassium should be with potassium supplements **not** potassium sparing diuretics. Any potassium replacement should be stopped the day before the test.

Ideally patients should not be taking any drugs that interfere with fluid balance or potassium (see appendix). Doxazosin or prazosin do not interfere and patients requiring hypotensive agents can receive these. When used as a screening investigation it is often impractical to stop all interfering drugs and results may be interpreted with knowledge of current medications.

Please ensure that all relevant clinical details (e.g. blood pressure) and current medication is noted on the request form. Failure to give adequate clinical information will delay sample analysis. It is imperative that Biochemistry are informed beforehand so that arrangements can be made for specimen handling.

PROTOCOL

This test should not be performed on inpatients unless agreed with Consultant Biochemist.

1. Patient should delay morning medication until after samples have been taken.
2. Samples to be collected early morning (8.00 to 10.00 am) at Basildon only.
3. Allow the patient to rest quietly for at least 10 minutes before taking blood.
4. Take blood samples for:
Aldosterone & Renin 7ml EDTA (purple top) tube.
For children less than 6 years of age a minimum of one full paediatric EDTA (red top) tube
U&E's 7ml SST tube (yellow top)
5. Take samples to Biochemistry laboratory immediately.

INTERPRETATION

If the ratio of aldosterone (pmol/l) to renin (pmol/ml/h) is greater than 2,000 and plasma aldosterone above 250 pmol/L, the patient almost certainly has primary hyperaldosteronism.

If the ratio is between 800 and 2,000 and patient was on anti-hypertensives affecting the aldosterone-renin system then change to an alpha-blocker and repeat the test after at least 2 weeks (6 weeks if spironolactone is discontinued) – see appendix note 2. Consider retesting using the [overnight inpatient protocol](#). If the ratio is less than 800 then this is normal.

APPENDIX 1: Notes about Aldosterone / Renin Studies.

Effect of drugs²

Drug group	Examples	Effect on renin	Effect on aldosterone	Comments
Non-steroidal anti-inflammatory drugs (NSAIDs)	Aspirin, ibuprofen, indomethacin		↓	Generally consistent effect, probably mediated via renal prostaglandins
β-Blockers	Atenolol, carvedilol, metoprolol, propranolol	↓	↓	Generally consistent effect
Potassium-sparing diuretics	Amiloride, spironolactone, trimterene	↑	↑	Very large increases in renin observed.
ACE inhibitors	Captopril, cilazapril, enalapril, fosinopril, lisinopril, perindopril, ramipril	↑	↓	Consistent and large increases in renin nearly always seen; effects on aldosterone inconsistent.
Thiazide diuretics	Chlorthalidone, hydrochlorothiazide, metolazone, xipamide	↑	↑	Generally consistent effect with renin; more variable with aldosterone
Loop diuretics	Frusemide	↑	↓	Only small changes seen; effect on aldosterone variable
Calcium channel antagonists	Felodipine, licidipine, nifedipine, nifedipine	↑↓ None	↑↓ None	Very variable effects; significant increases and decreases have been reported, as well as no significant differences
Laxatives	Most types when used in excess	↑	↑	Probably linked to dehydration with abuse
Oestrogen Preparations		↑	↑	

Notes

1. Renin is lowered by increased BP, erect to supine, salt loading, β-blockers, PG synthetase inhibitors and hypokalaemia.
2. Ideally discontinue medication interfering with the aldosterone-renin system for at least 2 weeks before the test (or 6 weeks if spironolactone or oestrogens discontinued), but an alpha-blocker such as doxazosin is allowed. If unable to stop for 2 weeks then stop for 1-2 days (except spironolactone which must be stopped for 6 weeks) and then collect screening test samples.
3. If the patient's hypertension is such that all drug therapy cannot be withdrawn a best pragmatic approach is to stop ACE inhibitors, beta-blockers for 2 weeks and to avoid Ca-channel blockers on the day of the test.

REFERENCES

1. Supra-regional assay service – aldosterone test information
<http://www.sas-centre.org/assays/hormones/aldosterone.html> (accessed 29/03/17)
2. Cartledge S, Lawson N. Aldosterone and renin measurements. *Ann Clin Biochem* 2000; **37**: 262-278

CONTACT

Biochemist: x 3025 / 3038 / 3029