St. Paul's Hospital Laboratory is pleased to announce a new assay for plasma/serum aldosterone by Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS). The method was developed in-house based on a number of previously published works (1)(2)(3). The move to LC-MS/MS overcomes a major problem with method-specific bias that has hampered appropriate screening for primary aldosteronism (PA) (4) and has contributed to widely different published thresholds for a “positive” aldosterone to plasma renin activity ratio (5).

Our method is based on a liquid-liquid extraction pipetted on the Hamilton Starlet liquid handling robot followed by chromatography on a Shimadzu UFLC system and detection on the ABSciex API-5000 mass spectrometer. Total imprecision is less than 5% at typical clinical levels with a lower reportable limit of 50 pmol/L. The method has been extensively compared with the commercial radioimmunoassay (RIA) for aldosterone which we previously employed. Not surprisingly, the LC-MS/MS produces results that are slightly lower on average. However, for certain patients the difference between RIA and LC-MS/MS results can be marked. For example, we have found that the RIA gives results approximately double those of LC-MS/MS in patients with chronic kidney disease. We have seen similar overestimation by the RIA in a case of congenital adrenal hyperplasia—a phenomenon previously documented (6).

A normal range study has been performed and confirms that the normal range for ambulatory adults on an unrestricted salt diet is 70-660 pmol/L. The normal range for supine collections (2 or more hours recumbent) remains 30-415 pmol/L.

As we have for many years, St. Paul's Hospital offers renin determination by the gold-standard of plasma renin activity (PRA). For upright ambulatory patients whose aldosterone is greater than 300 pmol/L, an aldosterone to PRA ratio of greater than 2500 pmol/L per ng/L/s is considered a positive screen for PA. In general, patients who have screened positive for PA must have the diagnosis confirmed by provocative testing, most often in the form of an IV saline or oral fludrocortisone suppression test (7).

We advise collection before 10 am and after at least 1 hr of ambulation and/or upright posture. There is no need to alter the patient's sodium intake from their normal diet during the screening phase. Supine collections are generally unnecessary for screening purposes unless the patient happens to be immobile or hospitalized. Numerous antihypertensives affect the renin-angiotensin-aldosterone system (8) and, where medically safe, some consideration can be given to withholding of medications for an appropriate period prior to testing. Above all, aldosterone and PRA cannot be meaningfully assessed in patients taking potassium sparing diuretics (spironolactone, eplelrenone, triamterene, amiloride) (7). Patients screened for PA must be free of these four medications for a period of approximately 4 weeks with appropriate substitutions made where indicated.
The preferred specimen type is serum collected in a red-top container. Minimum specimen volume is 750 μL but smaller volumes can be handled in extenuating circumstances (eg neonates, adrenal vein collections).

Clinicians are encouraged to review the Endocrine Society Guideline for specifics on the investigation of PA (7). As always, with this improvement in analysis, we look forward to better care for patients being investigated for PA and numerous other conditions affecting the renin-angiotensin system. If you have any questions about the investigation of your patient, the interpretation of aldosterone and PRA results, the use of provocative testing or arrangement of adrenal venous sampling, please do not hesitate to contact me at 604 806 8919.

Currently, specimens collected at hospitals in Northern Health, Fraser Health, Vancouver Island Health, Vancouver Coastal Health/PHSA, Valley Medical Laboratories, and any BC Biomedical Laboratories Service Centre are referred to St. Paul's Hospital for aldosterone analysis.

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