

The Novel Quick, Accurate and Sensitive Measurement of Plasma Aldosterone and Active Renin Concentrations Will Be Beneficial for Diagnosing Primary Aldosteronism and for Drug Selection

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The measurement of plasma aldosterone concentration (PAC) and renin activity (PRA) or active renin concentration (ARC) is clinically important not only for detection of primary aldosteronism (PA) but also for the selection of antihypertensive agents to treat patients successfully. However, it has taken about 7 days for clinicians to get the results. Of late, we developed the novel rapid assays of PAC and ARC, which are measurable in 10 minutes. We intended to investigate the utility and accuracy of the new methods. Both PAC and ARC were simultaneously measured by chemiluminescent enzyme immunoassay (CLEIA) system machine with their specific monoclonal antibodies and were automatically washed by the immobilized magnetic particles. We compared RIA-assayed PAC, PRA, ARC and LC-MS/MS-measured PAC with CLEIA-measured PAC and ARC in patients with PA (n=125) and essential hypertension (n=75). Measurements of PAC by CLEIA were significantly correlated with those of LC-MS/MS (Spearman's $r = 0.988$, $p < 0.0001$). Measurements of PAC by RIA were also correlated with those of LC-MS/MS (Spearman's $r = 0.963$, $p < 0.0001$) and the degree of correlation was better in the comparison between CLEIA and LC-MS/MS. Bland-Altman plot analysis revealed the bias of 13.7 and the limits of agreement were 10.85 and 16.55 with 95% confidence interval when comparing CLEIA and LC-MS/MS. The comparison between RIA and LC-MS/MS revealed the bias of 33.4 with the limits of agreement of 15.2 and 51.5. There was the smaller systemic error in CLEIA when compared to RIA. Measurements of ARC by CLEIA were significantly correlated with those by RIA (Spearman's $r = 0.930$, $Y = 0.960 X + 1.128$, $p < 0.0001$). The bias of -0.97 and the limits of agreement were -1.087 and -0.8671 with 95% confidence interval when comparing CLEIA-ARC and RIA-ARC. The lower detection limit of CLEIA-ARC was 0.25 pg/mL and much lower than that of RIA-ARC (2 pg/mL). CLEIA-ARC were also correlated with those of RIA-PRA (Spearman's $r = 0.912$, $Y = 4.082 X + 0.549$, $p < 0.0001$). The bias of -0.97 and the limits of agreement were -1.087 and -0.8671 with 95% confidence interval when CLEIA-ARC and PRA. The 10 minutes CLEIA measurements of PAC and ARC will be beneficial for diagnosing PA or for medication, because of their quickness, accuracy and sensitivity.

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