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## Introduction

Primary aldosteronism (PA) is one of the causes of hypertension. Blood aldosterone level and the aldosterone / direct renin concentration (DRC) ratio are routinely used as a screening tests for PA.

## Aim of the study

Aim of the study was to determine whether it matters if aldosterone concentration is determined in serum or plasma samples.

## Material and method

145 male blood donors (age mean  $\pm$  SD 35,7  $\pm$  9,4; range 19 - 61 years) were investigated. All blood donors had blood collection after walking (in up-right position). At each collection, blood was withdrawn into one EDTA<sub>2</sub>K tube (plasma) and one with a clot activator (serum). After blood collection, the tube for renin concentration was transported to the laboratory in a cool state (within 10 minutes), and centrifuged in cool condition (4°C, 3500 rpm, 10 minutes). The other tube for aldosterone concentration was transported at ambient (room) temperature, and within 30 minutes after clotting it was centrifuged at room temperature (3500 rpm, 10 minutes). The obtained biological material (serum and EDTA<sub>2</sub>K-plasma) was frozen under - 30°C and stored until being assayed.

The ADRR was expressed as the ratio of serum or plasma aldosterone concentration to direct plasma renin concentration (ng/L) / (ng/L).

Aldosterone was measured by radioimmunoassay (RIA) (ZenTech, RIAZENco, Belgium). Renin was measured by radioimmunometric kit (IRMA) manufactured by CISbio International (France).

Data are expressed as median (and the range) and mean  $\pm$  SD. The paired Student-t test and Wilcoxon test were performed to estimate differences between groups. The relationship between the compared results was expressed using Spearman's rank correlation analysis and Pearson linear correlation analysis. A p-value of < 0,05 was considered to be significant and p < 0,01 highly significant. All statistical analysis were performed using statistical software (PQStat ver. 1.4.2.324).

## Results

In blood donors, the median (and the range) of aldosterone concentration determined for serum samples was 145 pg/ml (56-369 pg/ml) and for plasma samples was 289,0 pg/ml (172-664 pg/ml). The differences between serum and plasma ranged 16%–75% (median 50%) (Table I). Plasma aldosterone levels were significantly higher in relation to serum aldosterone levels (p<0,0001) (Fig. 1). Correlation of aldosterone in serum and plasma was r=0,9089; r<sup>2</sup>=0,9385; p<0,01 (Fig. 2).

In blood donors, the median (and the range) of serum aldosterone / DRC ratio was 13 (2-45 [ng/L]/[ng/L]) and plasma aldosterone/DRC ratio was 26 (5-99 [ng/L]/[ng/L]). The differences between serum and plasma aldosterone/DRC ratio ranged 43%-80% (median 50%) (Table II). Plasma aldosterone/DRC ratio was significantly higher in relation to serum aldosterone/DRC ratio (p<0,0001) (Fig. 3). Correlation of both indices was r=0,9523; r<sup>2</sup>=0,9429; p<0,0001 (Fig. 4).

**Table I.**

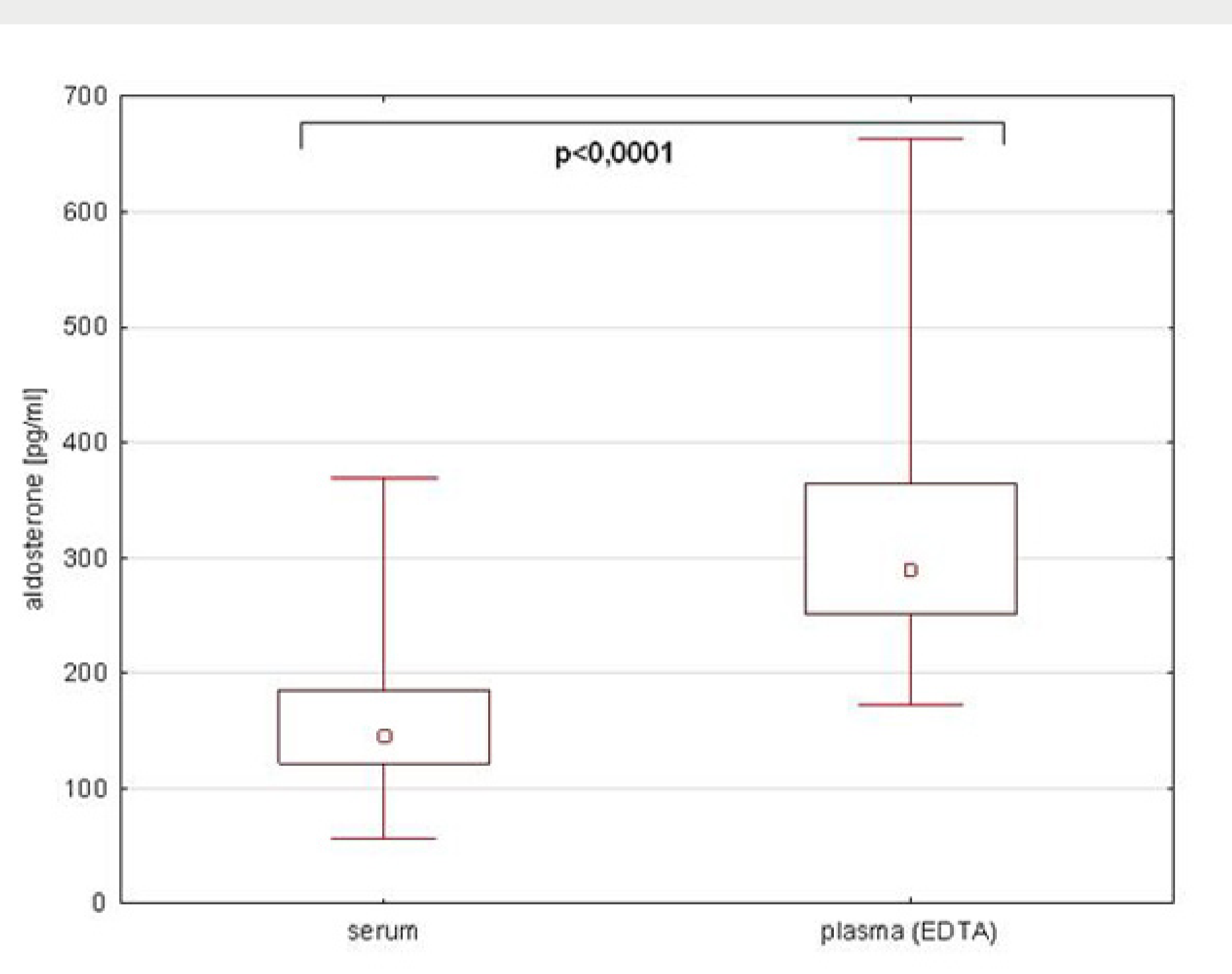
Comparison of the aldosterone median (and the range) and mean  $\pm$  SD in serum and plasma (EDTA<sub>2</sub>K).

Serum [ng/ml] (n = 145)			Plasma (EDTA <sub>2</sub> K) [ng/ml] (n = 145)		
median	range	mean $\pm$ SD	median	range	mean $\pm$ SD
145	56-369	163 $\pm$ 62	289	172-664	325 $\pm$ 106
Difference 16 – 75% (median 50%) p < 0,0001					

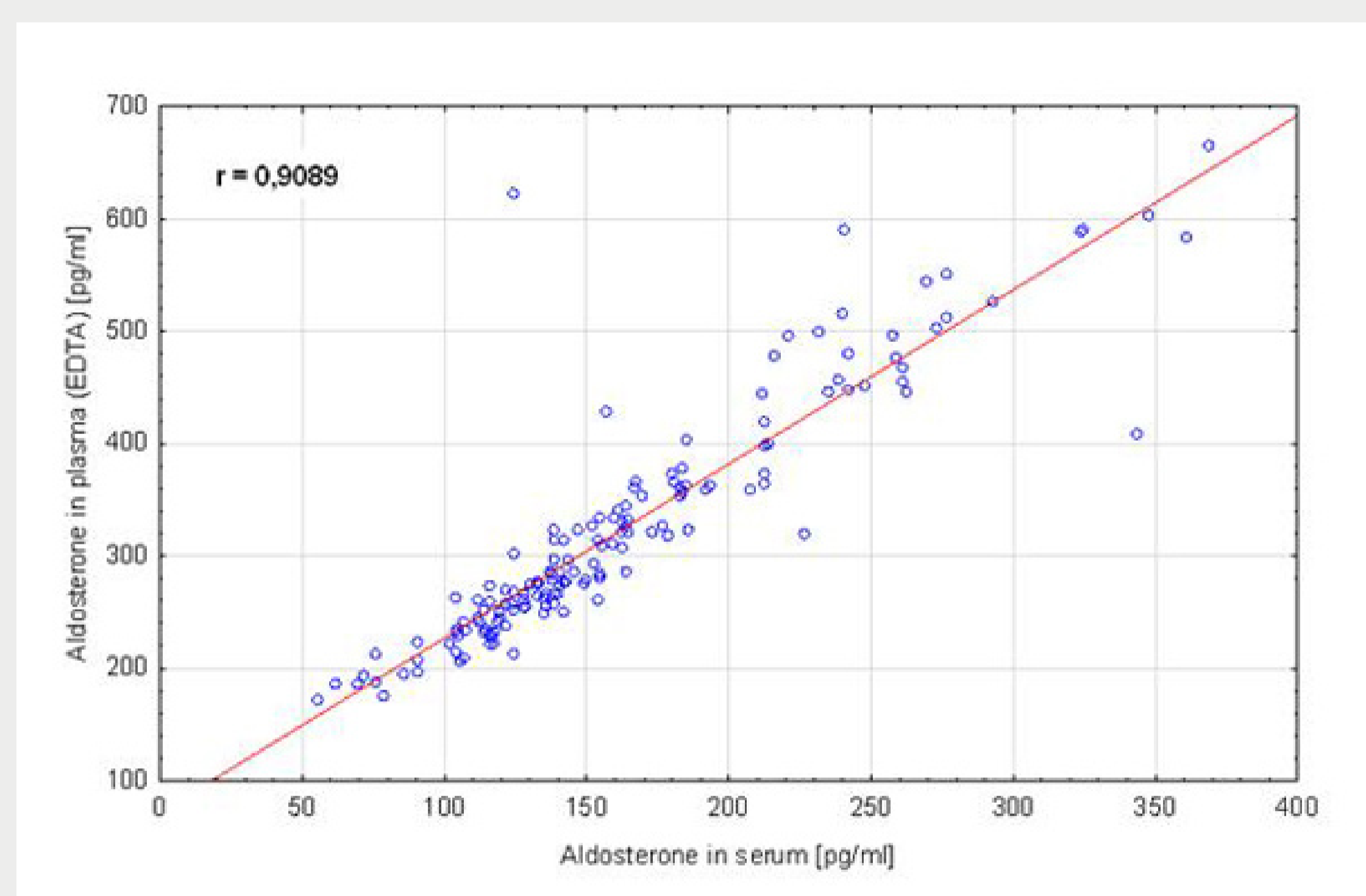
**Table II.**

Comparison of the serum aldosterone / DRC and plasma aldosterone / DRC ratios.

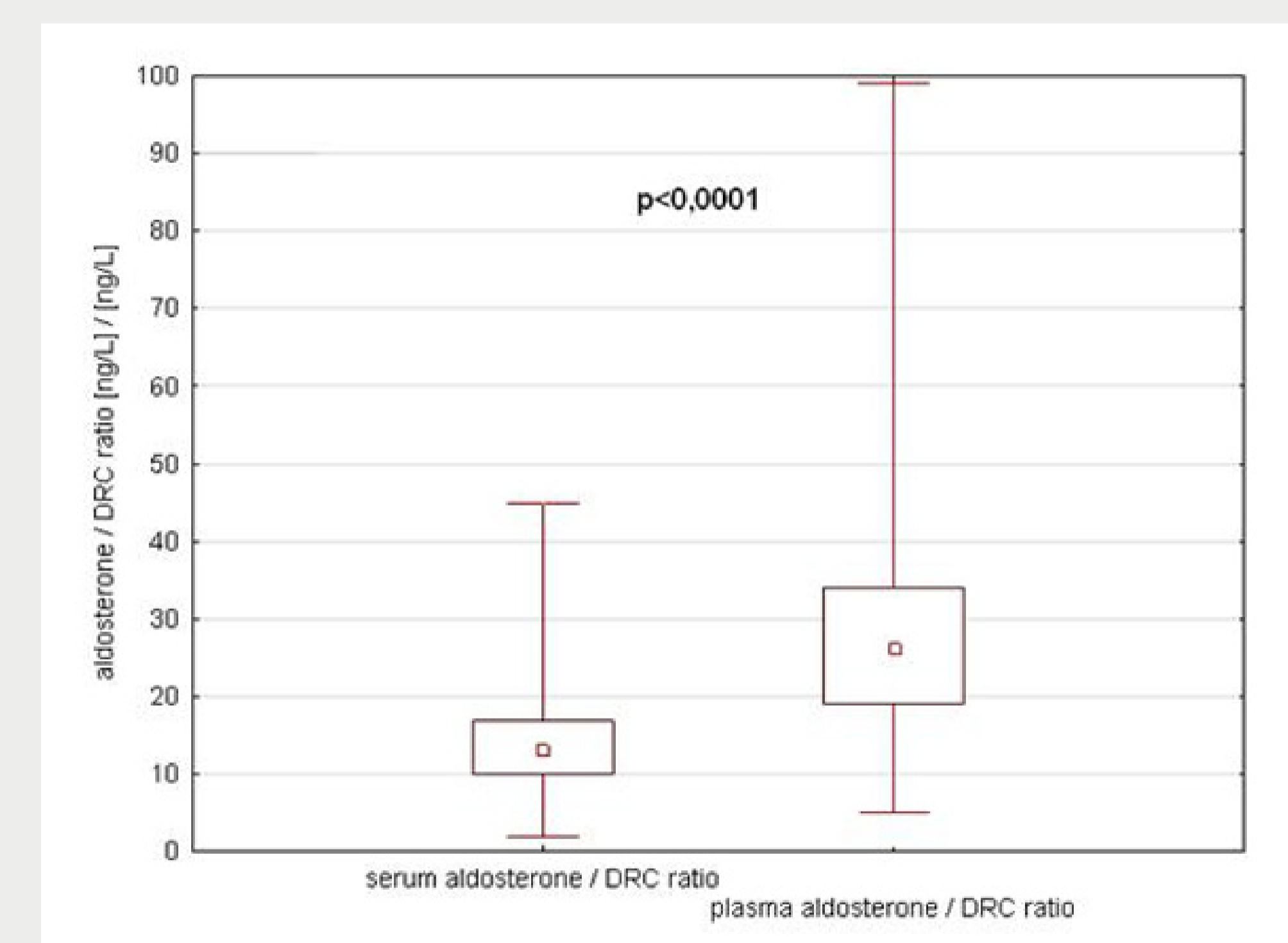
Serum aldosterone / DRC (n = 145)			Plasma aldosterone / DRC (n = 145)		
median	range	mean $\pm$ SD	median	range	mean $\pm$ SD
13	2-45	14 $\pm$ 7	26	5-99	28 $\pm$ 14
Difference 43 – 80% (median 50%) p < 0,0001					



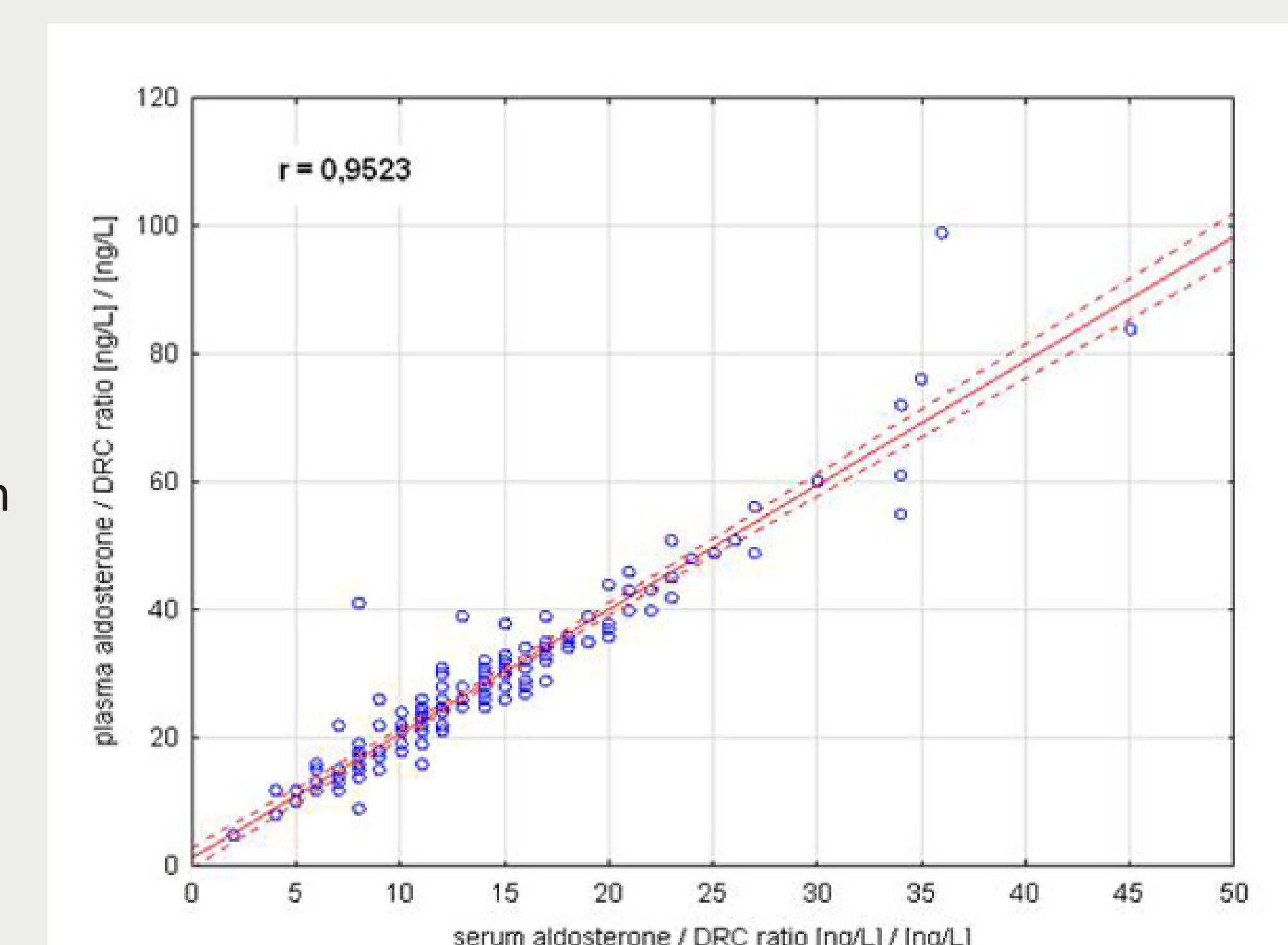
**Fig. 1.** Aldosterone levels in serum and plasma (EDTA).



**Fig. 2.** Correlation of aldosterone in serum and plasma (EDTA).



**Fig. 3.** Comparison of serum and plasma aldosterone to direct renin concentration ratios (ADRR).



**Fig. 4.** Correlation of serum and plasma aldosterone / direct renin concentration ratios (ADRR).

## Conclusions

1. Marked differences between the serum and plasma aldosterone levels demand application of separate reference ranges.
2. Aldosterone / DRC ratio may differ significantly depending on whether aldosterone levels are measured in serum or plasma.