Salt intake and blood pressure response to percutaneous renal denervation in resistant hypertension

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MP-107 Clinical Hypertension

Introduction

- Patient selection might in part explain the neutral findings in renal denervation (RDN) trials.
- Dietary sodium intake is known to influence sympathetic drive.
- Diminished sympathetic activity is expected to influence salt sensitivity in hypertension.

Objectives

- to study whether baseline sodium intake predicts change in blood pressure (BP) after RDN
- to investigate change in salt sensitivity after RDN

Methods: subjects

- Resistant hypertension: daytime systolic blood pressure (SBP) ≥135 mm Hg despite use of ≥3 BP lowering drugs or <3 antihypertensive drugs due to intolerance
- SYMPATHY: multicenter randomized controlled trial, renal denervation plus usual care (intervention) versus usual care (control)

Measurements

- 24h ambulatory blood pressure measurement (ABPM) at baseline and at 6 months
- Office SBP at baseline and at 6 months
- Paired 24h urine samples for sodium and creatinine excretion measurement, representing dietary sodium intake
- Antihypertensive drug use was recorded using defined daily dosages (DDD) representing the average maintenance dose per day for the main indication

Intervention

- RDN was performed within 1 month after the baseline visit (intervention group)
- Antihypertensive drug remained stable unless change was necessary for clinical reasons (described in the protocol)

Analyses

- Accuracy of 24h urine collection was assessed by comparing measured 24h creatinine excretion (mUCr) with the estimated 24h creatinine excretion (eUCr) for the participants' age, weight and sex.
- Multivariable adjusted regression analysis was used to assess the relationship of measured urinary sodium excretion (mUSod) with change in BP after RDN.
- In secondary analysis estimated 24h sodium excretion (eUSod) calculated by the TANAKA formula for spot urine samples was used in the regression analysis
- Change in the sodium intake-measured BP relationships at 6 months versus baseline was used as a measure of salt sensitivity.

Sex (m)	53%
Age (y)	62 (12)
Race (white)	96%
Diabetes mellitus	33%
Cardiovascular disease	47%
Body mass index (kg/m2)	28.5 (5.0)
eGFR (ml/min/1.73m^2)	78 (18)
mUsod (mmol/d)	154 (65)
eUSod (mmol/d)	167 (30)
24h SBP (mm Hg)	159 (15)
24h DBP (mm Hg)	90 (14)
Office SBP (mm Hg)	170 (25)
Office DBP (mm Hg)	94 (16)
Office PP (mm Hg)	76 (19)
Change in 24h SBP (mm Hg)	-7.5 (-12.9 to -2.1)
Change in 24h DBP (mm Hg)	-4.5 (-7.7 to -1.3)
Change in office SBP(mm Hg)	-8.1 (-13.7 to -2.5)
Change in office DBP (mm Hg)	-4.1 (-7.4 to -0.9)

Table 1 Baseline characteristics

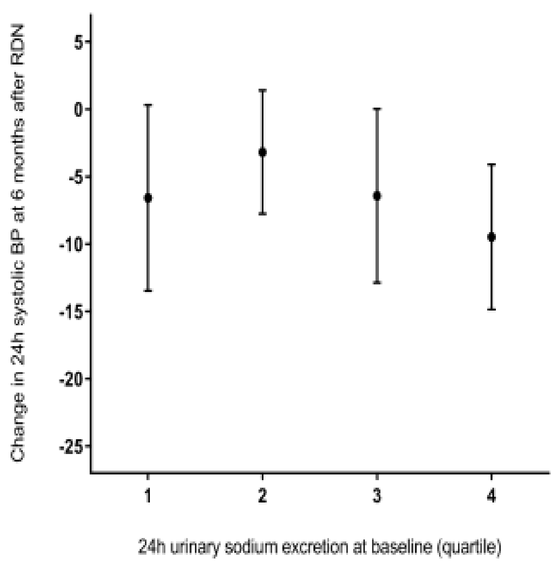

Figure 1 Baseline sodium excretion and change in BP after RDN
Mean change, whiskers indicate standard errors.

Quartiles of sodium excretion are ≤107, 108-145, 146-193, ≥194 mmol/d

Results

- Of 95 participants randomized to RDN, 76 had baseline 24h urine samples and 65 were well collected.
- No relationship was found for baseline sodium excretion and change in BP after RDN (table 1)

	Change in office SBP		Change in 24h SBP	
	B	95%CI	B	95%CI
Model 1: crude				
mUSod (10mmol/24u)	-0.20	-1.11, 0.71	-0.56	-1.58, 0.47
USod quartile	-0.75	-5.83, 4.34	-0.83	-6.52, 4.86
eUSod (10 mmol/24h)	-0.25	-2.15, 1.64	-0.004	-1.80, 1.79
Model 2: baseline SBP				
mUSod (10mmol/24u)	-0.43	-1.28, 0.41	-0.50	-1.54, 0.54
USod quartile	-1.46	-6.16, 3.23	-0.68	-6.40, 5.04
eUSod (10 mmol/24h)	-0.80	-2.57, 0.97	0.13	-1.70, 1.97
Model 3: baseline SBP, age, gender				
mUSod (10mmol/24u)	-0.53	-1.55, 0.48	-0.20	-1.43, 1.03
USod quartile	-1.85	-7.23, 3.52	1.17	-5.24, 7.59
eUSod (10 mmol/24h)	-0.67	-2.48, 1.15	0.42	-1.46, 2.29
Model 4: baseline SBP, age, gender, race, BMI, eGFR				
mUSod (10mmol/24u)	-0.60	-1.64, 0.45	-0.39	-1.70, 0.91
USod quartile	-2.35	-7.92, 3.21	0.20	-6.70, 7.09
eUSod (10 mmol/24h)	-0.83	-2.73, 1.06	0.05	-1.97, 2.06
Model 5: baseline SBP, age, gender, race, BMI, eGFR, total no. DDD				
mUSod (10mmol/24u)	-0.59	-1.65, 0.46	-0.39	-1.69, 0.92
USod quartile	-2.64	-8.12, 2.84	0.13	-6.53, 6.80
eUSod (10 mmol/24h)	-0.61	-2.57, 1.35	0.04	-2.05, 2.12

Table 2 Baseline sodium excretion and change in BP after RDN

- mUSod was marginally lower at 6 months (-16 mmol/d, SD 70)
- BP was 8 mm Hg lower with similar sodium intake after RDN, suggesting a decrease in salt sensitivity (figure 2a and 2b)
- However, the change was similar in the control group

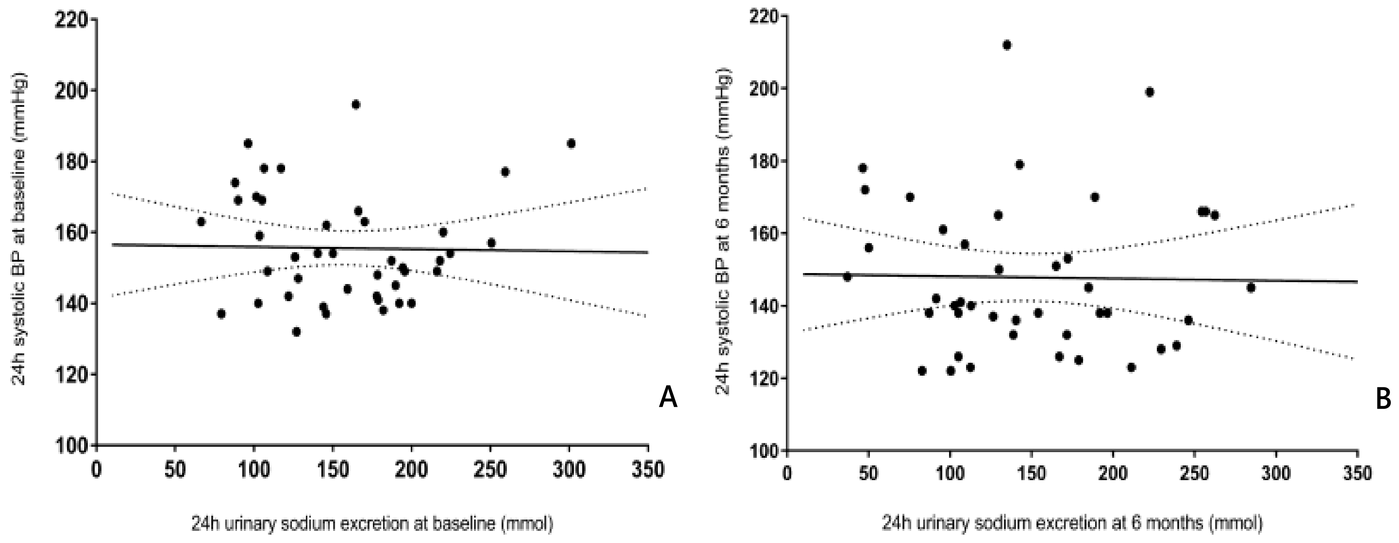

Figure 2 24h urinary sodium excretion and mean 24h systolic BP levels, A at baseline B at 6 months

Conclusions

- Dietary sodium intake cannot be used to identify patients that benefit from RDN
- Salt sensitivity decreased during follow-up, but the change is not attributable to RDN

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