Case presentation

Patient aged 45, hypertensive for 1 year, without comorbidities
On HCTZ 25, amlodipine 10 and irbesartan 300, average diurnal ambulatory BP 158/89 mmHg and serum potassium 3.4 mmol/l

JNC7 and ESH guidelines recommend screening patients with resistant hypertension for secondary hypertension
The JNC7, ESH and Endocrine Society recommend screening patients with hypokalemia for primary aldosteronism (PA)
Resistance to triple Rx

Side effects
Non-compliance
Sub-optimal Rx
Pressor agents
Low GFR

Pay attention, inform, adapt drug regimen, use loop diuretics, refer to nephrologist

Perform ABPM

Day-time BP <135/85 mmHg

White-coat HTN

Step 4 medication
Renal denervation

Consider etiologic treatment

Aldo/renin ratio metanephrines CT- or MR-angio

Curable HTN?
Hypokalemic or resistant HTN

- **ARR**
  - no
  - yes: salt po or iv, captopril or fludro

- **Non-suppressible aldosterone excess**
  - yes
  - no

- **CT**
  - yes
  - no

- **AVS**
  - yes
  - Surgery considered
  - no
  - carcinoma

- **Surgery**
  - yes
  - lateralized
  - no

Funder JW et al, JCEM 2008;93:3266
Prevalence of PA by BP and sK levels

PA prevalence by BP level

- At goal: 7.2%
- grade 1: 6.7%
- grade 2: 15.5%
- grade 3: 19.0%

Prevalence of PA subtypes and K ≤3.5

- EH: 7.1%
- IHA: 16.9%
- Conn adenoma: 48.0%

Rossi GP et al, JACC 2006;48:2293
PAPY, a cooperative study of 1125 hypertensives (126 with PA)
Case presentation, continued

Initial workup, July 2012

On prazosin 5 + verapamil 240 mg/day: serum K 3.7 mmol/l, plasma active renin concentration twice <1 mU/l, plasma aldosterone concentration 822 then 1022 pmol/l, 452 pmol/l after saline infusion

Adrenals within normal limits on CT-scan
Adrenal vein sampling procedure

The patient was given eplerenone 200 + verapamil 240 and referred for right adrenalectomy.

Aldo to cortisol ratio 3.8 in the right adrenal vein.

Aldo to cortisol ratio 0.1 in the left adrenal vein.
History of CV events and kalemia

<table>
<thead>
<tr>
<th>Event</th>
<th>History of sK &lt;3.6 mmol/l</th>
</tr>
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<tbody>
<tr>
<td>Atrial Fibrillation</td>
<td>Yes 12.3 No 7.8</td>
</tr>
<tr>
<td>Angina</td>
<td>Yes 9.0 No 2.1</td>
</tr>
<tr>
<td>CHF</td>
<td>Yes 5.5 No 2.1</td>
</tr>
<tr>
<td>MI</td>
<td>Yes 3.6 No 4.1</td>
</tr>
<tr>
<td>Stroke</td>
<td>Yes 4.2 No 7.8</td>
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</tbody>
</table>

German Conn’s registry (553 patients with PA)
Born-Frontsberg E et al, JCEM 2009;94:1125
Rationale for screening patients with resistant HTN for PA

There is a higher prevalence of PA (10 to 20%) in resistant HTN
There is a higher prevalence of Conn adenomas and cardiac events in hypokalemic PA
Laparoscopic adrenalectomy induces a large and permanent reduction in BP levels
Screening for PA, using the ARR and CT, is easily performed
The final step – documenting unilateral PA – may require referral to hypertension specialists
Rationale for adrenal vein sampling (AVS)

A lateralized image predicts a lateralized secretion with limited sensitivity and specificity
A lateralized secretion is the best predictor of BP outcome

## HTN cure in series with > 50 patients

<table>
<thead>
<tr>
<th>BP &lt; 160/95 mmHg / No definition</th>
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<tbody>
<tr>
<td>Obara (1992)</td>
<td>62 [50;73]</td>
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<tr>
<td>Stowasser (1994)</td>
<td>55 [42;67]</td>
</tr>
<tr>
<td>Proye (1998)</td>
<td>56 [46;66]</td>
</tr>
<tr>
<td>Shen (1999)</td>
<td>85 [76;92]</td>
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</tbody>
</table>

Subtotal (I-squared = 86.9%) > 65 [49;79]

<table>
<thead>
<tr>
<th>BP &lt; 140/90 mmHg</th>
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<tbody>
<tr>
<td>Gleason (1993)</td>
<td>70 [60;80]</td>
</tr>
<tr>
<td>Sawka (2001)</td>
<td>33 [24;43]</td>
</tr>
<tr>
<td>Lumachi (2005)</td>
<td>72 [63;81]</td>
</tr>
<tr>
<td>Pang (2007)</td>
<td>34 [22;47]</td>
</tr>
<tr>
<td>Rossi (2008)</td>
<td>30 [18;43]</td>
</tr>
<tr>
<td>Letavernier (2008)</td>
<td>32 [25;39]</td>
</tr>
<tr>
<td>Zarnegar (2008a)</td>
<td>35 [26;45]</td>
</tr>
<tr>
<td>Zarnegar (2008b)</td>
<td>43 [32;55]</td>
</tr>
</tbody>
</table>

Subtotal (I-squared = 91.3%) > 44 [31;56]

Overall (I-squared = 92.4%) > 51 [40;62]

BP as a continuous variable: reductions in SBP and Rx score by 20 to 40 mmHg and 1, respectively
History of CV events: PA vs essential HT

OR for CV events in 124 patients with PA (65 with APA) vs 465 age, sex, and SBP-matched hypertensive controls

- Echo-LVH: 2.9
- Stroke: 4.2
- MI: 6.5
- Atrial fibrillation: 12.1

Milliez P et al, JACC 2005;45:1243
A case of surgically-remediable resistant hypertension

PF Plouin, Hypertension unit
HEGP and Paris-Descartes University

I have no conflict of interest regarding this presentation