Declaration of conflict of interest
Prevalence and main features of resistant hypertension in Central and Eastern Europe: data from the BP-CARE Study

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⁶ Department of Hypertension and Diabetology, Medical University of Gdansk, Gdansk, Poland;
⁷ Internal Medicine, Hospital Clinico, University of Valencia, Valencia, Spain.
Hypertension is usually defined resistant or refractory to treatment when a therapeutic plan that has included attention to lifestyle measures and the prescription of at least three drugs (including a diuretic) in adequate doses has failed to lower systolic and diastolic blood pressure to goal.

2007 Guidelines for the Management of Arterial Hypertension: The Task Force for the Management of Arterial Hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC)


J Hypertens 2007;25:1105-1087

“Hypertension is usually defined resistant or refractory to treatment when a therapeutic plan that has included attention to lifestyle measures and the prescription of at least three drugs (including a diuretic) in adequate doses has failed to lower systolic and diastolic blood pressure to goal”
“... In the unadjusted analysis, patients with resistant hypertension were significantly more likely to suffer the combined outcomes of death, MI, CHF, stroke or CKD (18.0% vs. 13.5%, p<0.001, unadjusted HR 1.54, 95% CI 1.40-1.69). Following multivariable adjustment including baseline patient demographics, comorbidities, study site, and year of study entry, resistant hypertension was associated with increased risk of adverse CV outcomes (HR 1.47, 95% CI 1.33-1.62, p<0.001)...”


<table>
<thead>
<tr>
<th>Confirm Treatment Resistance</th>
</tr>
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<tbody>
<tr>
<td>Office blood pressure &gt;140/90 or 130/80 mm Hg in patients with diabetes or chronic kidney disease and</td>
</tr>
<tr>
<td>Patient prescribed 3 or more antihypertensive medications at optimal doses, including if possible a diuretic or</td>
</tr>
<tr>
<td>Office blood pressure at goal but patient requiring 4 or more antihypertensive medications</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Exclude Pseudoresistance</th>
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<tbody>
<tr>
<td>Is patient adherent with prescribed regimen?</td>
</tr>
<tr>
<td>Obtain home, work, or ambulatory blood pressure readings to exclude white coat effect</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Identify and Reverse Contributing Lifestyle Factors</th>
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<tbody>
<tr>
<td>Obesity</td>
</tr>
<tr>
<td>Physical inactivity</td>
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<tr>
<td>Excessive alcohol ingestion</td>
</tr>
<tr>
<td>High salt, low fiber diet</td>
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<table>
<thead>
<tr>
<th>Discontinue or Minimize Interfering Substances</th>
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<tbody>
<tr>
<td>Non-steroidal anti-inflammatory agents</td>
</tr>
<tr>
<td>Sympathomimetics (diet pills, decongestants)</td>
</tr>
<tr>
<td>Stimulants</td>
</tr>
<tr>
<td>Oral contraceptives</td>
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<tr>
<td>Laxatives</td>
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<tr>
<td>Ephedra</td>
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<table>
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<tr>
<th>Screen for Secondary Causes of Hypertension</th>
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<tbody>
<tr>
<td>Obstructive sleep apnea (witnessed apneas, excessive daytime sleepiness)</td>
</tr>
<tr>
<td>Primary aldosteronism (elevated aldosterone/renin ratio)</td>
</tr>
<tr>
<td>Chronic kidney disease (creatinine clearance &lt;60 ml/min)</td>
</tr>
<tr>
<td>Renal artery stenosis (young female, known atherosclerotic disease, worsening renal function)</td>
</tr>
<tr>
<td>Pheochromocytoma (episodic hypertension, palpitations, diaphoresis, headache)</td>
</tr>
<tr>
<td>Cushing’s syndrome (moon face, central obesity, abdominal striae, inter-scapular fat deposition)</td>
</tr>
<tr>
<td>Acute exacerbation (diffuse brachial or femoral pulses, systolic boot)</td>
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</tbody>
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<thead>
<tr>
<th>Pharmacologic Treatment</th>
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<tbody>
<tr>
<td>Maximize diuretic therapy, including possible addition of mineralocorticoid receptor antagonist</td>
</tr>
<tr>
<td>Combine agents with different mechanisms of action</td>
</tr>
<tr>
<td>Use of loop diuretics in patients with chronic kidney disease and/or patients receiving potent vasoconstrictors (e.g., mineraloid)</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Refer to Specialist</th>
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<tbody>
<tr>
<td>Refer to appropriate specialist for known or suspected secondary causes of hypertension</td>
</tr>
<tr>
<td>Refer to hypertension specialist if blood pressure remains uncontrolled after 6 months of treatment</td>
</tr>
</tbody>
</table>
Resistant Hypertension

Persell SD.
*Hypertension* 2011; 57: 1076-1080

Uncontrolled and apparent treatment resistant hypertension in the United States, 1988-2008
Egan Bm, Zhao Y, Axon Rn, Brzezinski WA, Ferdinand KC.
*Circulation* 2011;124:1046-1058

Clinical features of 8295 patients with resistant hypertension classified on the basis of ambulatory blood pressure monitoring
de la Sierra A, Segura J, Benegas JR, Gorostidi M, de la Cruz JJ, Amario P, Oliveras A, Ruilope LM
*Hypertension* 2011; 57: 898-902

Incidence and prognosis of resistant hypertension in hypertensive patients
Daugherty SL, Powers D, Magid DJ, Tavel HM, Masoudi FA, Margolis KL, O’Connor PJ, Selby JV, Ho M
*Circulation* 2012; published online February 29, 2012.
Evaluate the prevalence and clinical characteristic of resistant hypertension in the population of the BP-CARE study (9 European eastern countries)
Blood Pressure Control Rate and Cardiovascular Risk Profile (BP-CARE)

1 February to 30 March 2008
9 countries involved
About 800 doctors involved
(General practitioners and specialists)
7923 patients enrolled

Data collection form:
- Personal history
- Demographic parameters
- Anthropometric parameters
- Drug history
- Values of blood pressure
- Glycemic and lipid profile
  (last 12 months)
- Laboratory Tests
  (last 12 months)
Prevalence of resistant hypertension in a BP-CARE subpopulation n=1312

- HT controlled: BP ≤ 140/90 mmHg
- HT uncontrolled: BP > 140/90 mmHg, and
  - N° of drugs < 3 or
  - N° of drugs > 3 (without diuretic)
- Resistant Ht: BP > 140/90 mmHg, and
  - N° of drugs ≥ 3 (with diuretic), or
  - N° of drugs ≥ 4 (with diuretic)

HT controlled: n=521
HT uncontrolled: n=423
Resistant Ht: n=368

Non compliant (n=70)
Non compliant and WCH (n=34)
WCH (n=64)

True Resistant Hypertension (aTRH) (n=255, 19.4%)
Demographic and anthropometric variables

- **Years**: 80
- **Age**: 80%
- **BMI**: Kg/m² 40
- **WC**: Cm 120

Legend:
- Green: Controlled HT
- Yellow: Uncontrolled HT
- Red: TRH

*BP-CARE Study*
Hemodynamic parameters

BP-CARE Study

Controlled HT
Uncontrolled HT
TRH

SBP
DBP
HR

**
*

BP-CARE Study
Pharmacologic treatments

**Use of different class of antihypertensive drugs**

- **Controlled HT**
- **Uncontrolled HT**
- **TRH**

**BP-CARE Study**
Resistant Hypertension and comorbidities

BP-CARE Study
Resistant Hypertension and comorbidities

- CHD
- CHF
- STROKE
- TIA

**BP-CARE Study**
## Metabolic profile

<table>
<thead>
<tr>
<th></th>
<th>Controlled HT</th>
<th>Uncontrolled HT</th>
<th>TRH</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Cholesterol</strong></td>
<td>220 mg/dl</td>
<td>250 mg/dl</td>
<td>300 mg/dl</td>
</tr>
<tr>
<td><strong>HDL Cholesterol</strong></td>
<td>60 mg/dl</td>
<td>70 mg/dl</td>
<td>80 mg/dl</td>
</tr>
<tr>
<td><strong>Triglycerides</strong></td>
<td>120 mg/dl</td>
<td>130 mg/dl</td>
<td>140 mg/dl</td>
</tr>
<tr>
<td><strong>Glycaemia</strong></td>
<td>90 mg/dl</td>
<td>100 mg/dl</td>
<td>110 mg/dl</td>
</tr>
</tbody>
</table>

*BP-CARE Study*
Renal Function

Controlled HT
Uncontrolled HT
TRH

BP-CARE Study
The present study provides evidence that the prevalence of TRH in Central and Eastern European countries is superimposable to that of Western Europe and USA. It also shows
1) the very high cardiovascular risk profile of TRH and
2) the high association of this condition with overweight, obesity, diabetes, renal failure and a history of previous cardiovascular events.
RHT and BP values at diagnosis

BP-CARE Study