

Hemodynamics of Resistant Hypertension in the Current Era

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Introduction

- The availability of new and potent medications has been advocated to eradicate treatment (Rx) failures in hypertensive patients.
- While noncompliance or a secondary cause is often suspected, the most common cause for resistant hypertension (Res-HTN) is a suboptimal medical regimen.

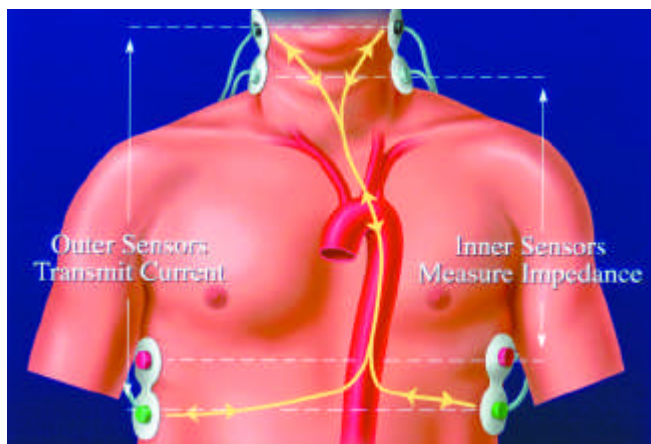
Aim

We sought to characterize Res-HTN by examining clinical and hemodynamic features in a referral HTN clinic in 1998.

Methods

- We measured blood pressure, noninvasive hemodynamics (Thoracic Electrical Bioimpedance-TEB), and renal function (Screat) in 38 patients referred for refractory HTN.
- Postural change in baseline impedance (Δ TEB) was used as a guide to cardiopulmonary volume (CPV).

Thoracic Electrical Bioimpedance (TEB)



- An alternating current is transmitted through the chest
- The current seeks the path of least resistance: the blood filled aorta
- The BioZ Systems measure the baseline impedance to this current
- With each heartbeat, blood volume & velocity in the aorta change
- The BioZ Systems measure the corresponding change in impedance
- The BioZ Systems use the baseline & changes in impedance to measure & calculate hemodynamic parameters

Result

- Mean age was 66 ± 2 years.
- Blood Pressure: $168 \pm 3 / 88 \pm 2$ mm Hg on drug Rx with an average of 3.6 medications per patient.
- Cardiovascular risk was high with multiple comorbidities (37% diabetic, 39% hyperlipidemic).
- Rx included diuretics (92%) and vasodilators, i.e., calcium antagonists (61%) and ACEI or AIIRB agents (87%).

Table 1

	Res-HTN	Normal
CI L/min/m ²	2.95 ± 0.10	2.77 - 4.69
SVRI d/sec/cm ⁻³ /m ⁻²	3147 ± 109	1455 - 2567
D TEB ohms	3.0 ± 0.3	≥ 2.5
Screat mg/dL	1.35 ± 0.08	0.6 - 1.2

Conclusion

- Hemodynamic measurements demonstrated persistent systemic vasoconstriction and expanded CPV reflected by low Δ TEB and plasma renin (52% < 0.6).
- These results argue that despite potent blood pressure medications available, Rx failure reflects combined disturbances of volume and vascular tone.