



Tilbud til pasienter med behandlingsresistent hypertensjon

Prof. Sverre E. Kjeldsen, MD, Dr. Med., FAHA, FESC

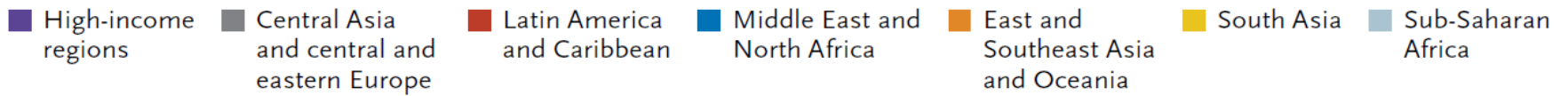
Department of Cardiology

Oslo University Hospital, Oslo, Norway,

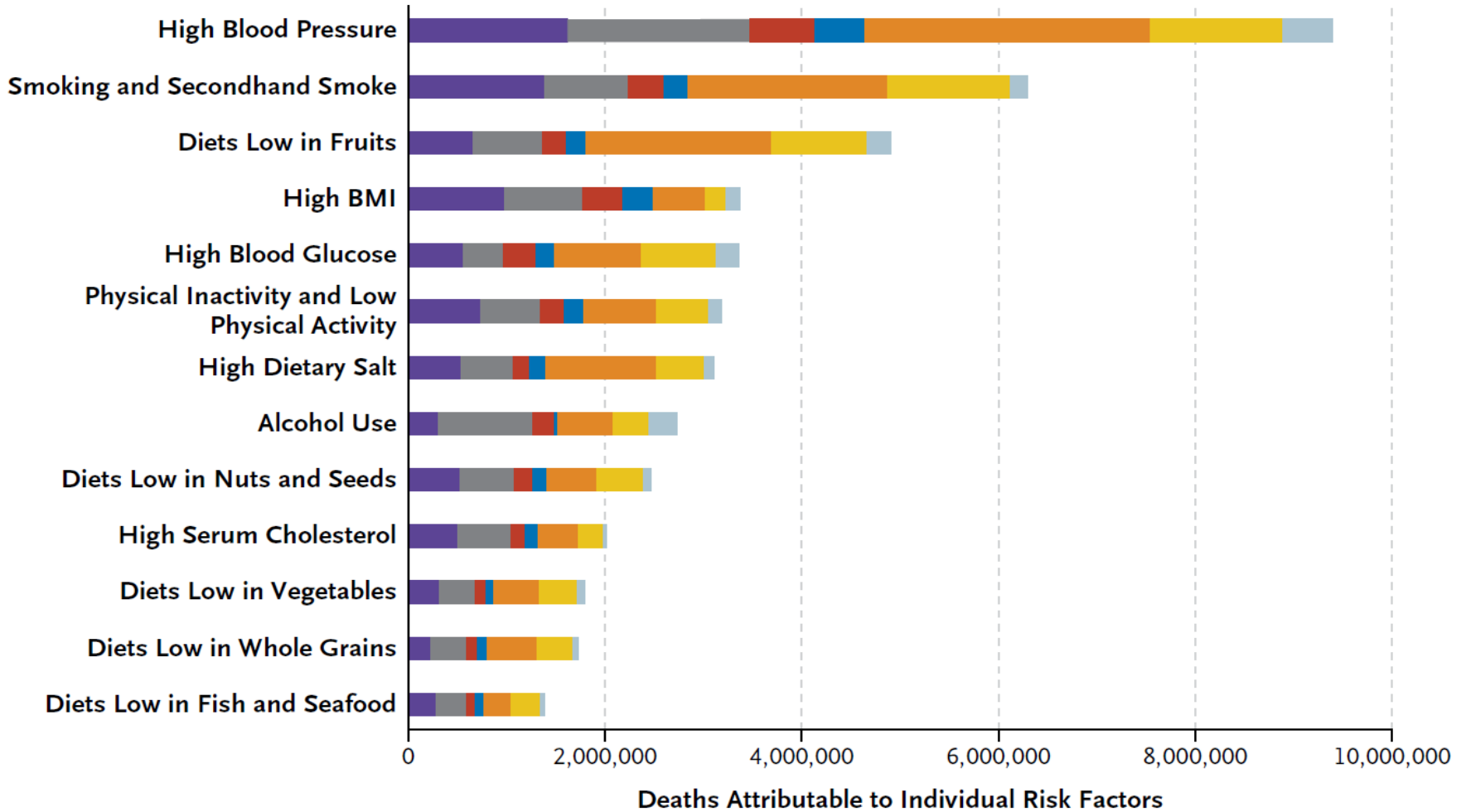
Division of Cardiovascular Medicine, University of Michigan,

Ann Arbor, Michigan

Past-President of European Society of Hypertension



A Deaths



Definition of Resistant Hypertension

Uncontrolled Hypertension

- Includes all patients who lack BP control on treatment, including those on inadequate treatment regimens, those with poor adherence, those with undetected secondary hypertension, as well as those with true treatment resistance¹

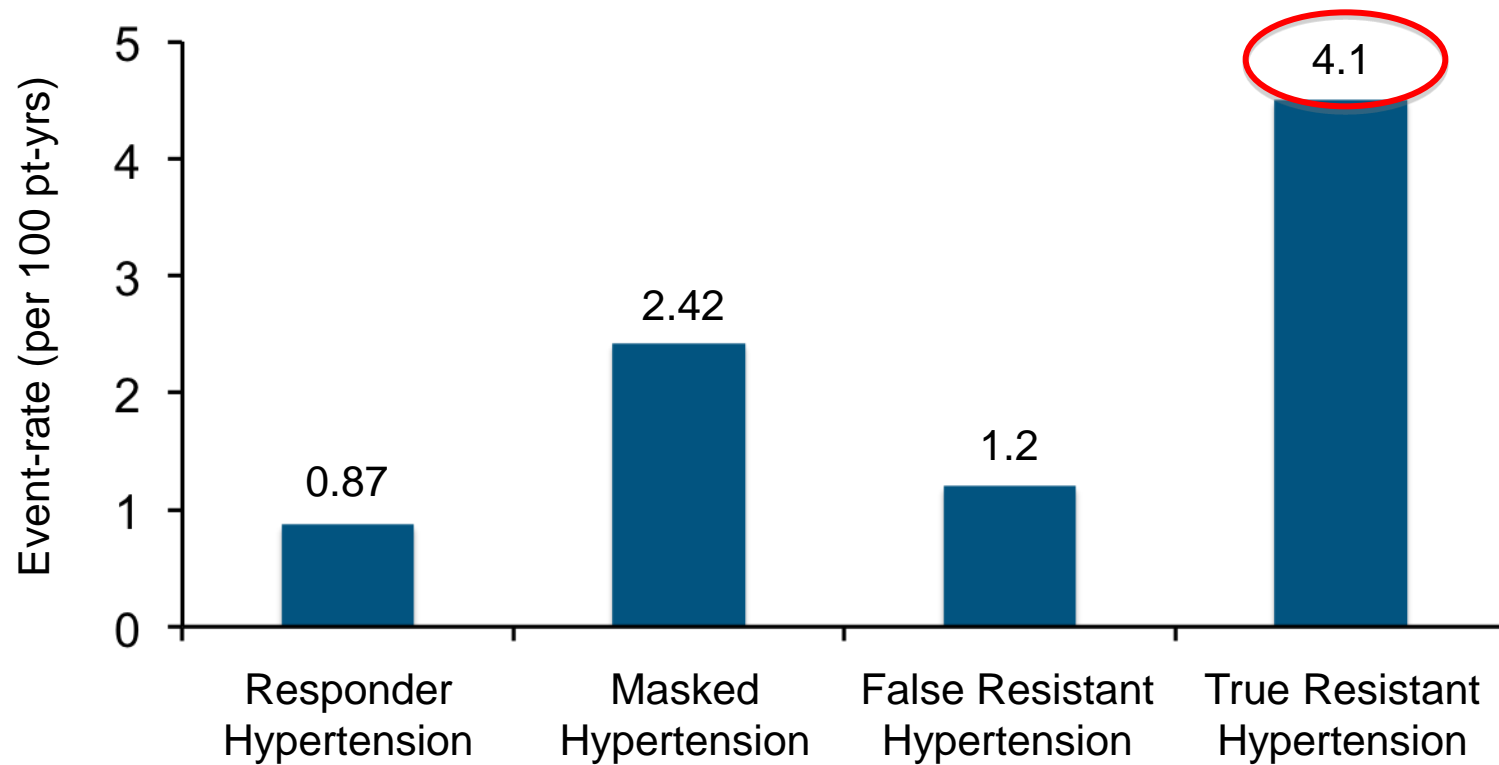
Resistant Hypertension

- **BP that remains above goal in spite of compliance with full doses of ≥ 3 antihypertensive medications of different classes; ideally, 1 of the 3 agents should be a diuretic¹**
 - The treatment plan must include attention to lifestyle measures²
- **Includes those patients who achieve BP control but require ≥ 4 antihypertensive agents to do so¹**

1. Calhoun DA, et al. *Circulation*. 2008;117:e510-e526.

2. Mancia G, et al. *Eur Heart J*. 2007;28:1462-1536.

Patients With True Resistant Hypertension are at Dramatically Increased Risk for CV Events



CV=cardiovascular.

Pierdomenico SD et al. *Am J Hypertens.* 2005;18:1422-1428.

Sympathectomy: An Early Surgical Precedent



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SPLANCHNICECTOMY FOR ESSENTIAL HYPERTENSION

RESULTS IN 1,266 CASES

Reginald H. Smithwick, M.D.

and

Jesse E. Thompson, M.D., Boston

THE EFFECTS OF PROGRESSIVE SYMPATHECTOMY ON BLOOD PRESSURE

BRADFORD CANNON

From the Laboratories of Physiology in the Harvard Medical School

Received for publication March 24, 1931

THE BRITISH JOURNAL OF SURGERY

1952

SYMPATHECTOMY IN THE TREATMENT OF BENIGN AND MALIGNANT HYPERTENSION*

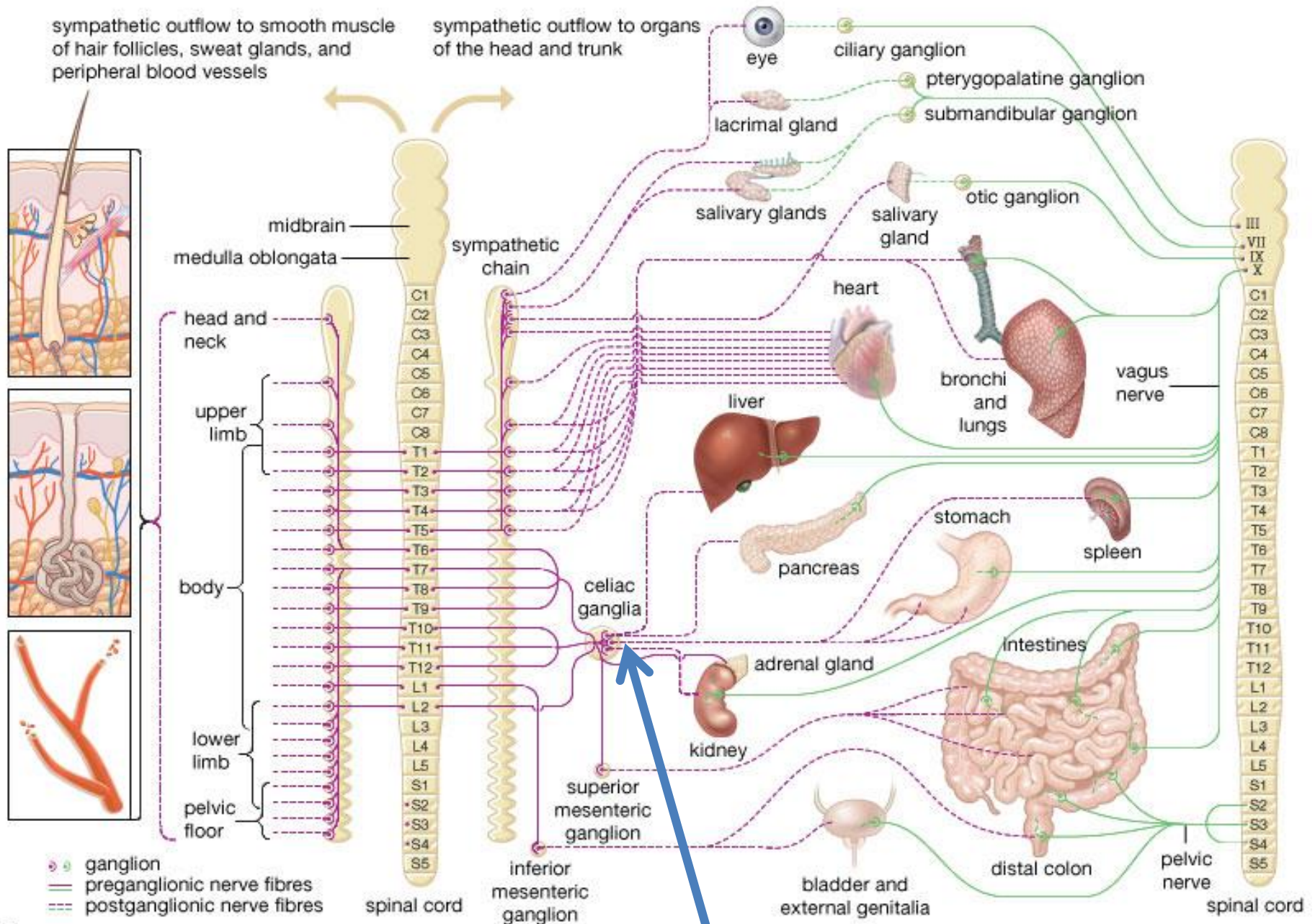
A REVIEW OF 76 PATIENTS

BY C. J. LONGLAND AND W. E. GIBB

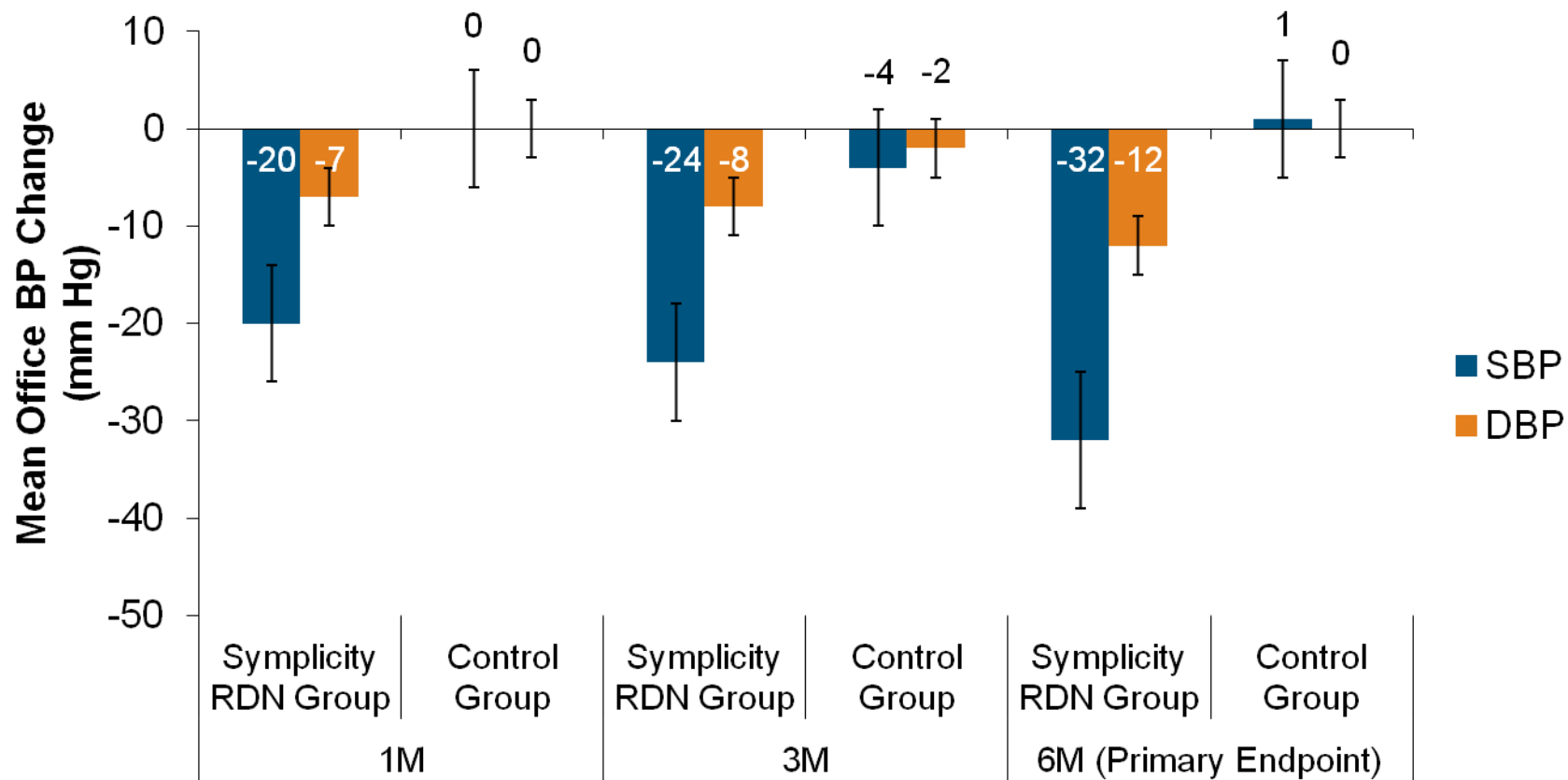
Photo of Dr. Smithwick reproduced with permission from *JAMA*.

Sympathetic nervous system

Parasympathetic nervous system



Symplicity HTN-2 Trial: Office BP Reduction

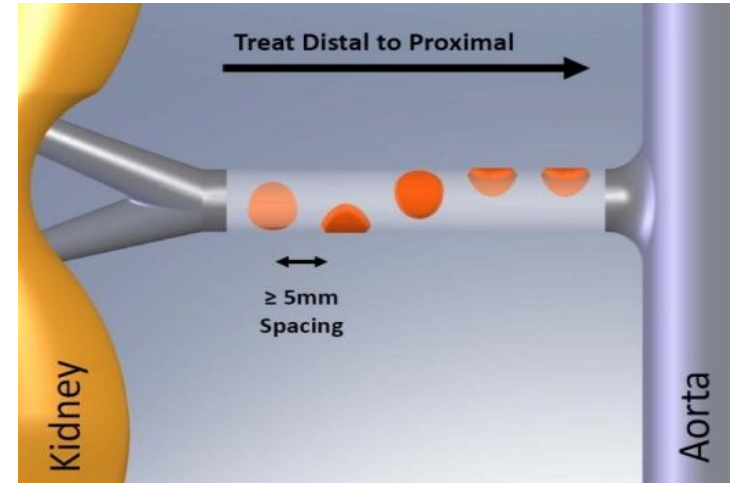
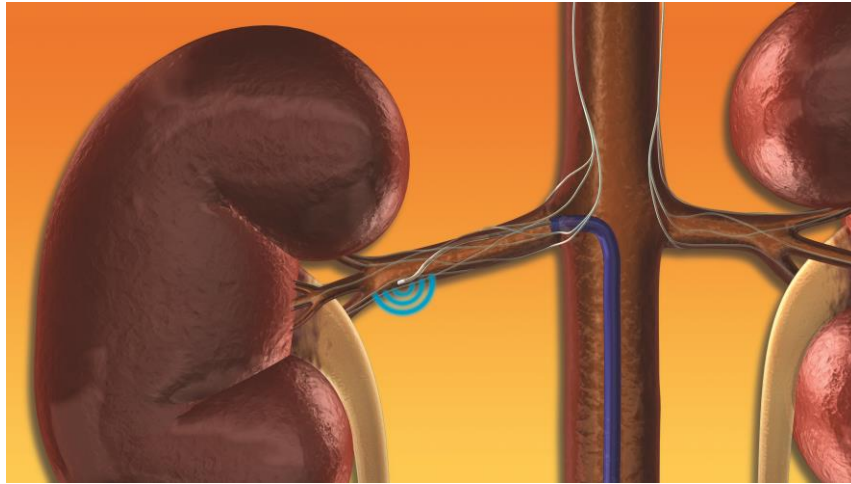


Total n=106 (intervention group n=52, control group n=54)

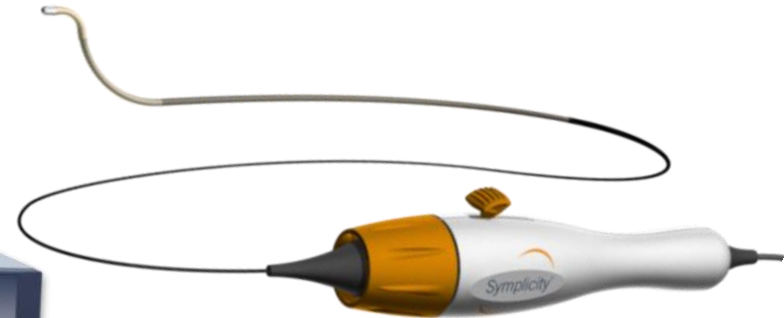
$P \leq 0.005$ for changes in SBP and DBP at all time points between Symplicity RDN and control groups; error bars represent 95% CIs.

Symplicity HTN-2 Investigators (Esler M et al.) *Lancet*. 2010;376:1903-1909.

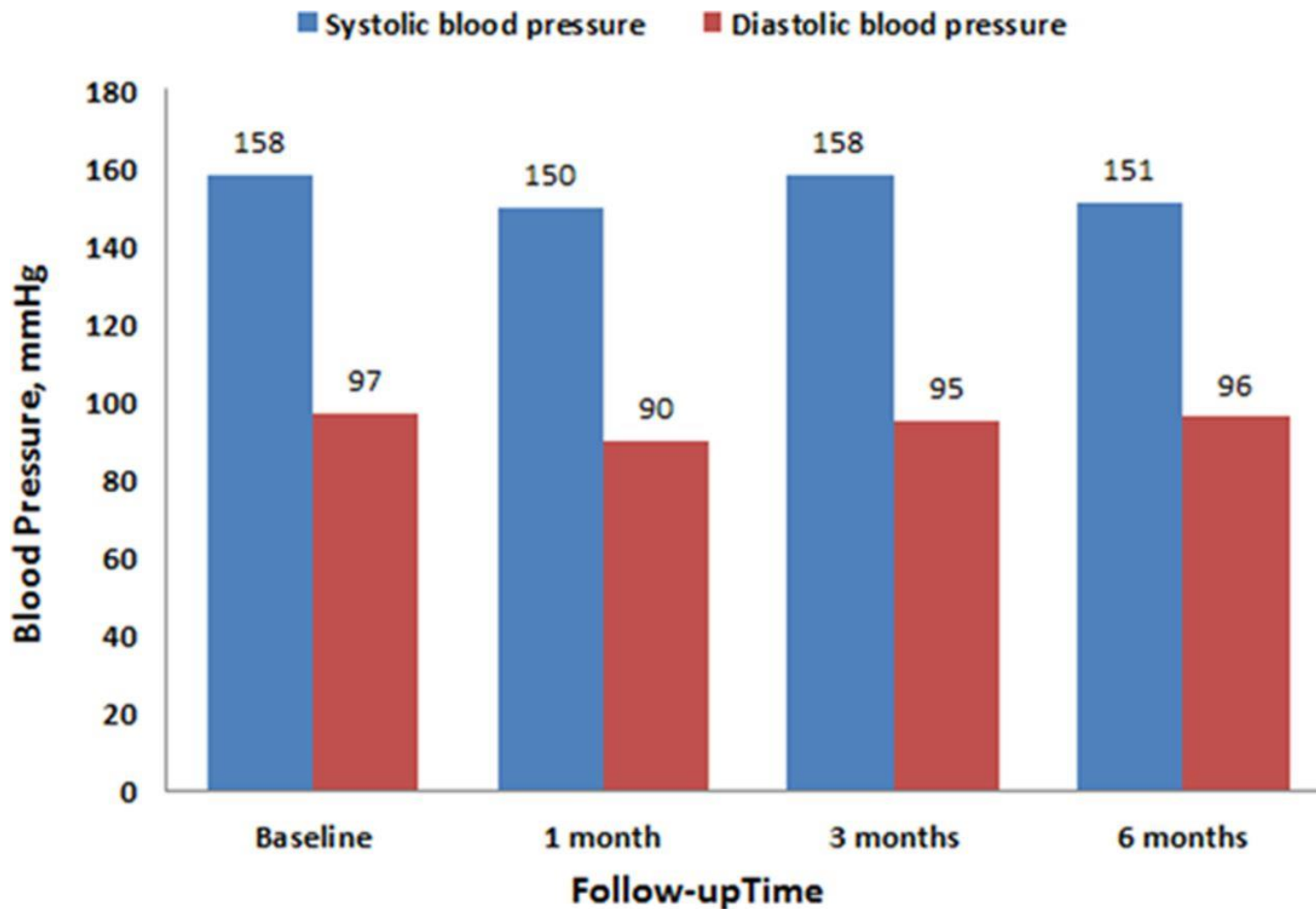
Renal Nerve Anatomy Allows a Catheter-Based Approach



- Standard interventional technique
- 4-6 two-minute treatments per artery
- Proprietary RF Generator
 - Automated
 - Low-power
 - Built-in safety algorithms



Office mean systolic and diastolic blood pressures at baseline and 1, 3, and 6 months after renal denervation (n=6).



Fadl Elmula F et al. Hypertension 2013;62:526-532

Hypertension

JOURNAL OF THE AMERICAN HEART ASSOCIATION



Adjusted Drug Treatment Is Superior to Renal Sympathetic Denervation in Patients With True Treatment-Resistant Hypertension

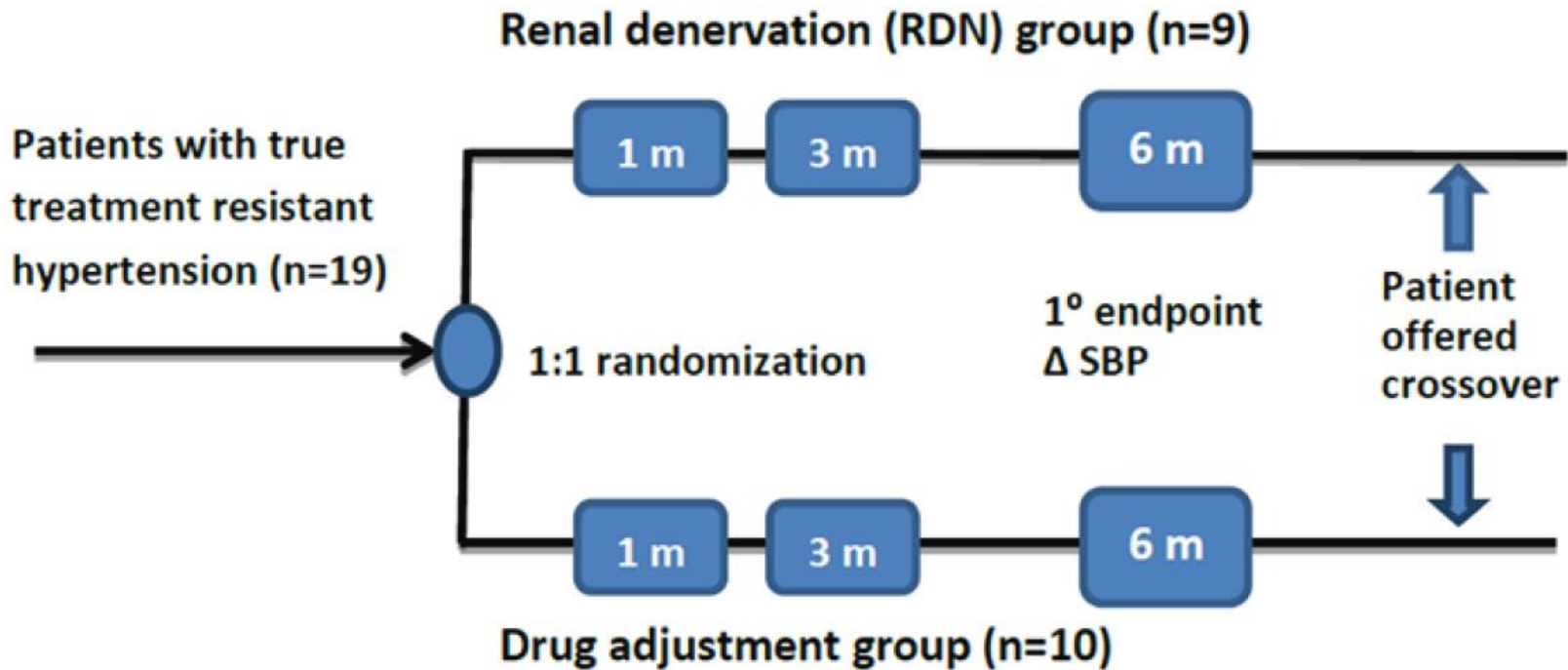
Fadl Elmula M. Fadl Elmula, Pavel Hoffmann, Anne C. Larstorp, Eigil Fossum, Magne Brekke, Sverre E. Kjeldsen, Eyvind Gjønnæss, Ulla Hjørnholm, Vibeke N. Kjær, Morten Rostrup, Ingrid Os, Aud Stenehjem and Aud Høieggem

Hypertension. published online March 3, 2014;

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Control Methods: Integrated Non-Invasive Hemodynamic Management Using the HOTMAN[®] System to guide improvement and adjustment of drug treatment

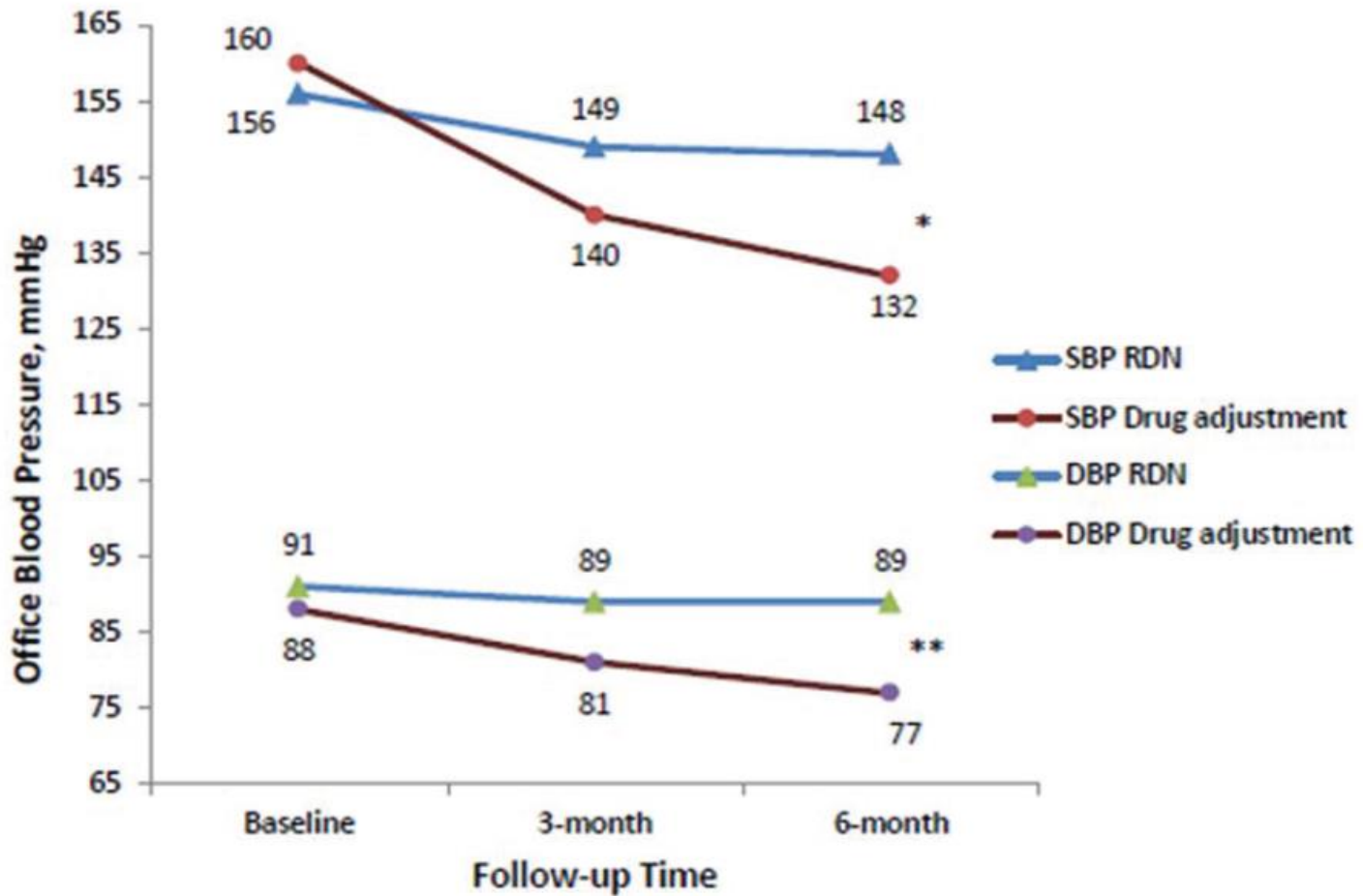
Methods 3

Witnessed Intake of Antihypertensive Drugs

- Patients were asked to bring their prescribed medication to the clinical visit
- Medication was documented and administered by the investigator and swallowed by the patient under continuous observation
- Patients were then continuously under the observation by the investigator

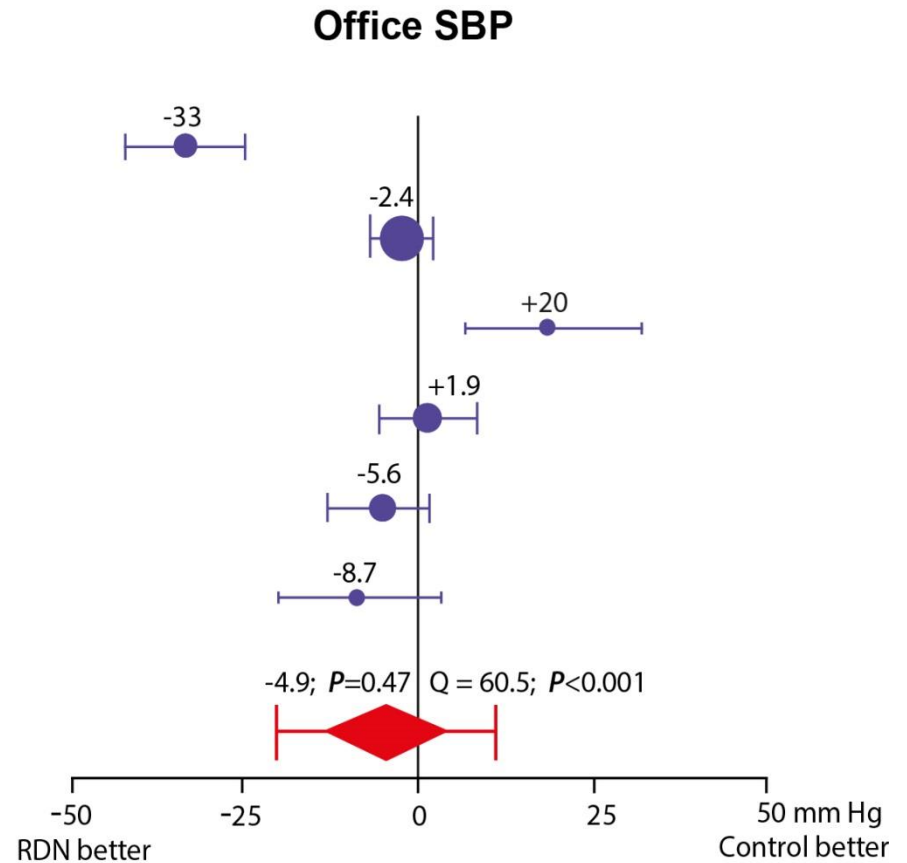


Office BPs at 3 and 6 months



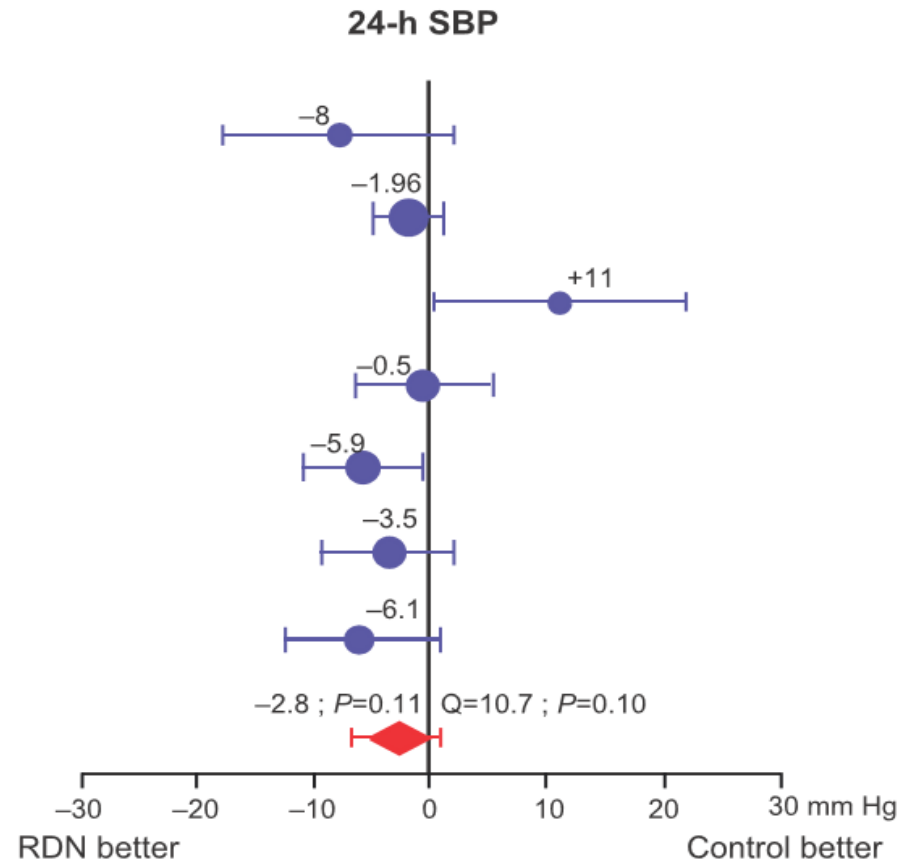
Effect of RDN on 6 Months Office SBP

	Control		RDN	
	N°	Δ (SD)	N°	Δ (SD)
SYMPPLICITY-2	51	+1.0 (21)	49	-32 (23)
SYMPPLICITY-3	171	-11.7 (26)	353	-14.1(24)
OSLO	10	-28 (13)	9	-8 (15)
PRAGUE	54	-14.3 (20)	52	-12.4 (17)
DENER	53	-9.5 (20)	48	-15.1 (20)
SYMPPLICITY-J	19	-7.9 (21)	22	-16.6 (19)
ALL	358	-11.6 (-20.3,-2.8) <i>P</i> =0.019	533	-16.5 (-24.0,-9.0) <i>P</i> =0.024



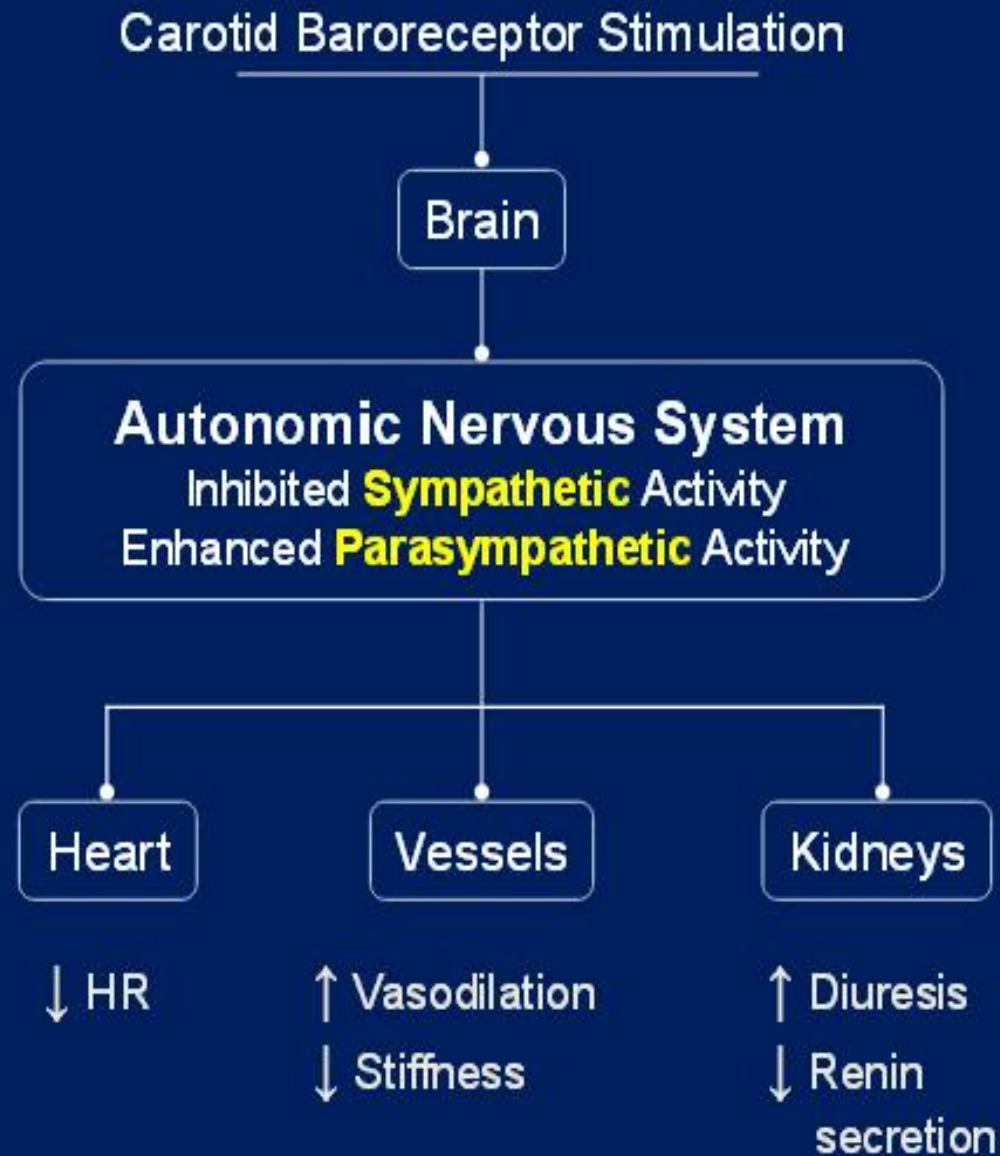
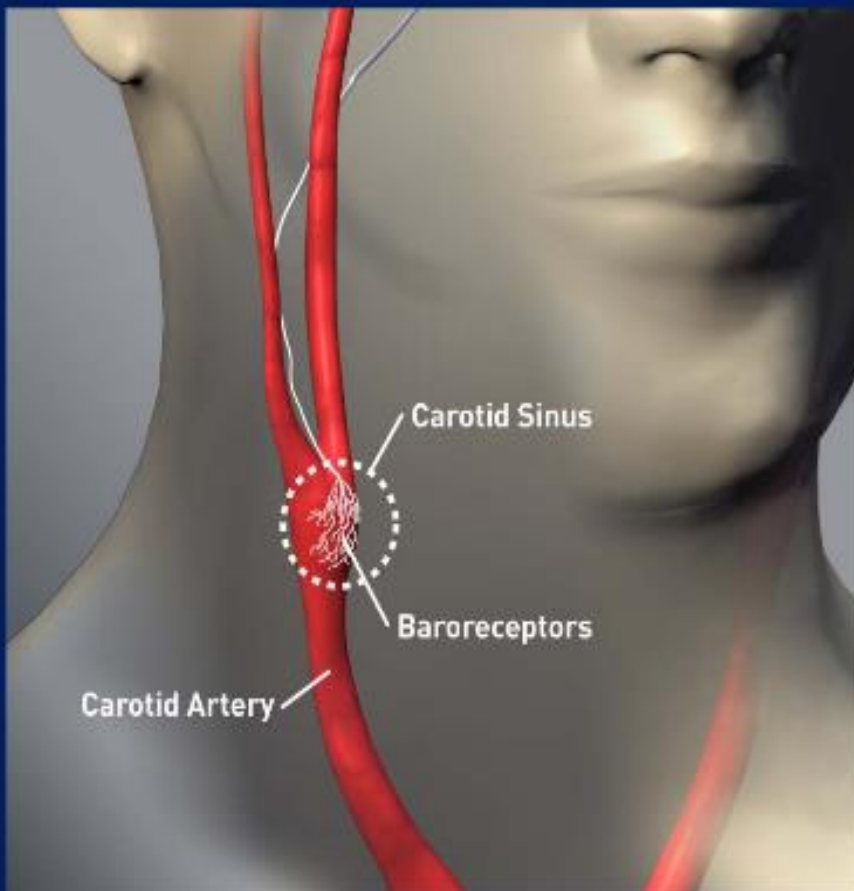
Effect of RDN on 6 Months 24-hour BP

	Control		RDN	
	N°	Δ (SD)	N°	Δ (SD)
SYMPPLICITY-2	25	-3 (19)	20	-11 (15)
SYMPPLICITY-3	162	-4.8 (17)	329	-6.8 (15)
OSLO	10	-21 (13)	9	-10 (11)
PRAGUE	54	-8.1 (17)	52	-8.6 (12)
DENER	53	-9.5 (13)	48	-15.4 (13)
SYMPPLICITY-F	35	-3.5 (10)	32	-7.0 (11)
SYMPPLICITY-J	19	-1.4 (10.2)	22	-7.5 (12)
ALL	358	-6.7 (-11.2, -2.2)	512	-9.2 (-12.2, -6.2)
		<i>P</i> =0.011		<i>P</i> <0.001

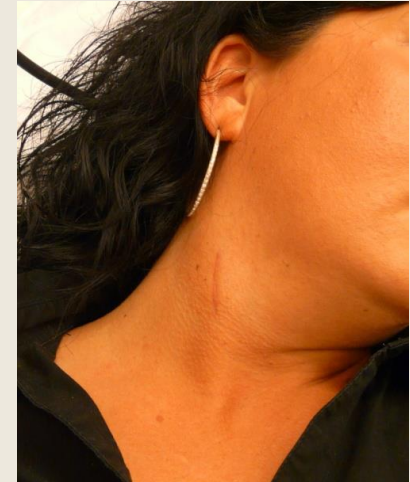
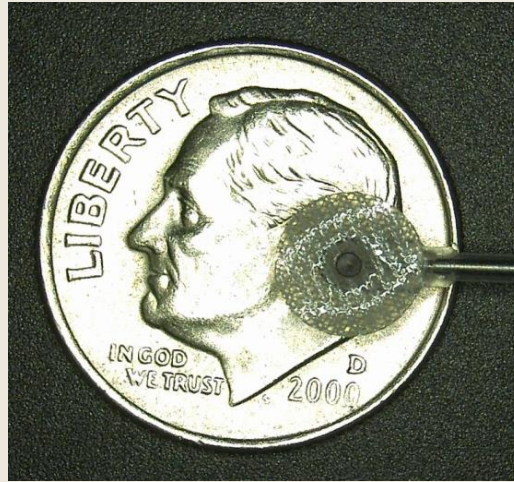


Baroreflex Activation Therapy (BAT)

Continuously Modulates the Autonomic Nervous System



The Barostim *neo*™ System



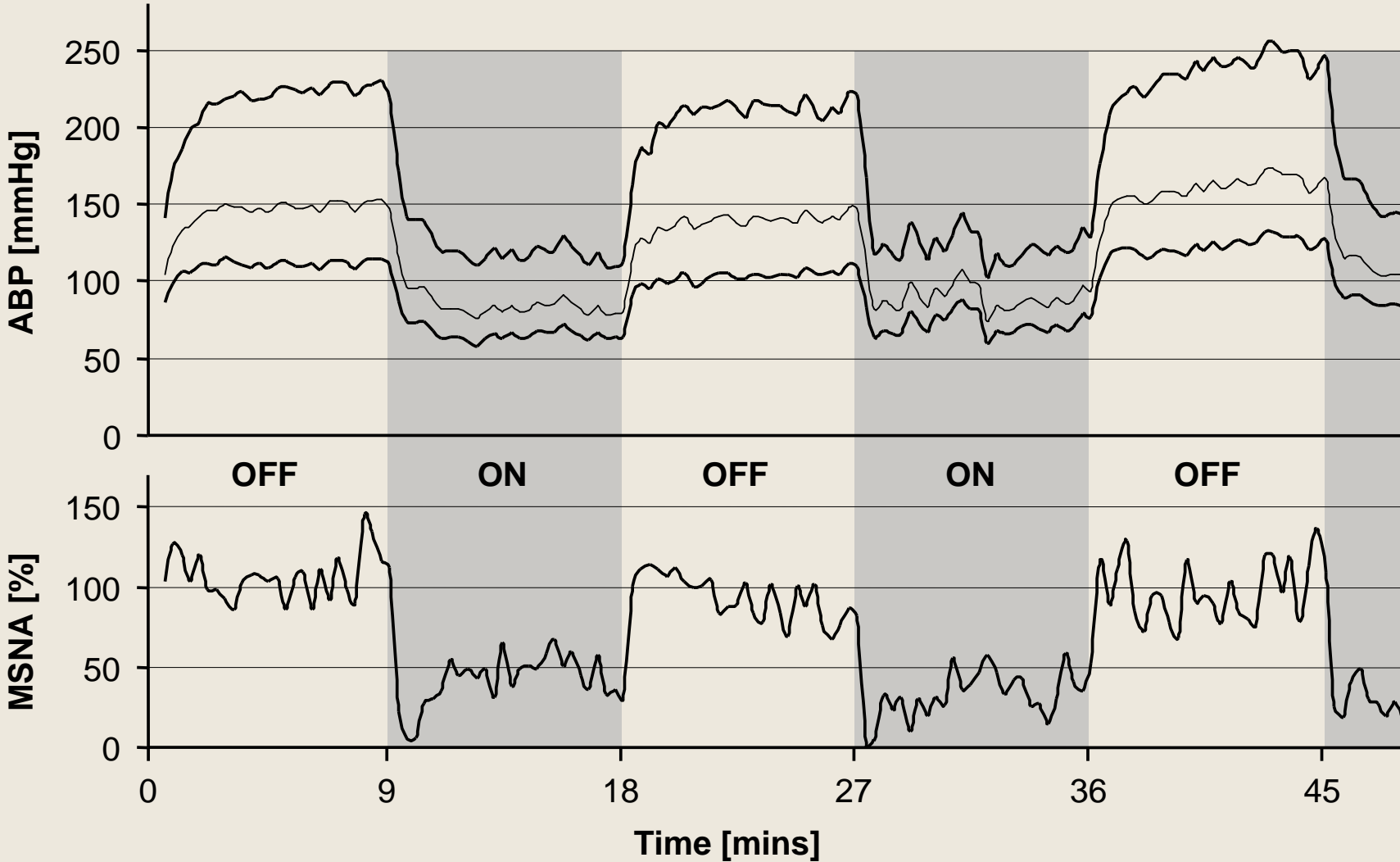
- Electrically activates the baroreflex by stimulating carotid baroreceptors
- Unilateral implant
- 2 mm-diameter electrode (7 mm backer)
- Small neck incision (2.5 – 5 cm)
- Programmable via radio-frequency telemetry
- Therapy individually optimized

Barostim *neo*™ is CE marked for hypertension. Use of Barostim *neo* for heart failure is exclusively investigational.

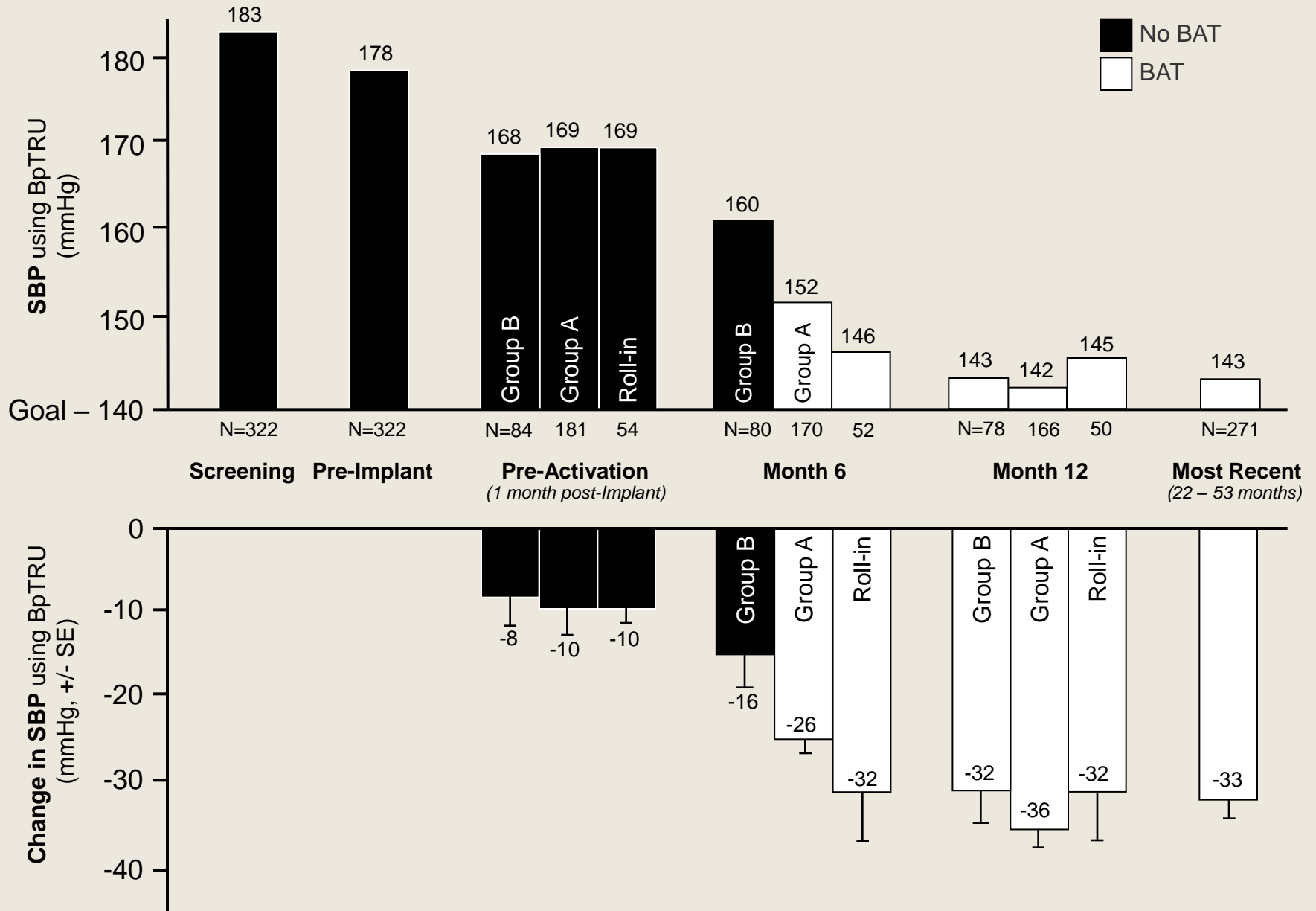
Gronda, AHA 2013 CAUTION: Barostim *neo*™ is an investigational device and is limited by United States law to investigational use.

Intended to Inhibit Sympathetic Activity

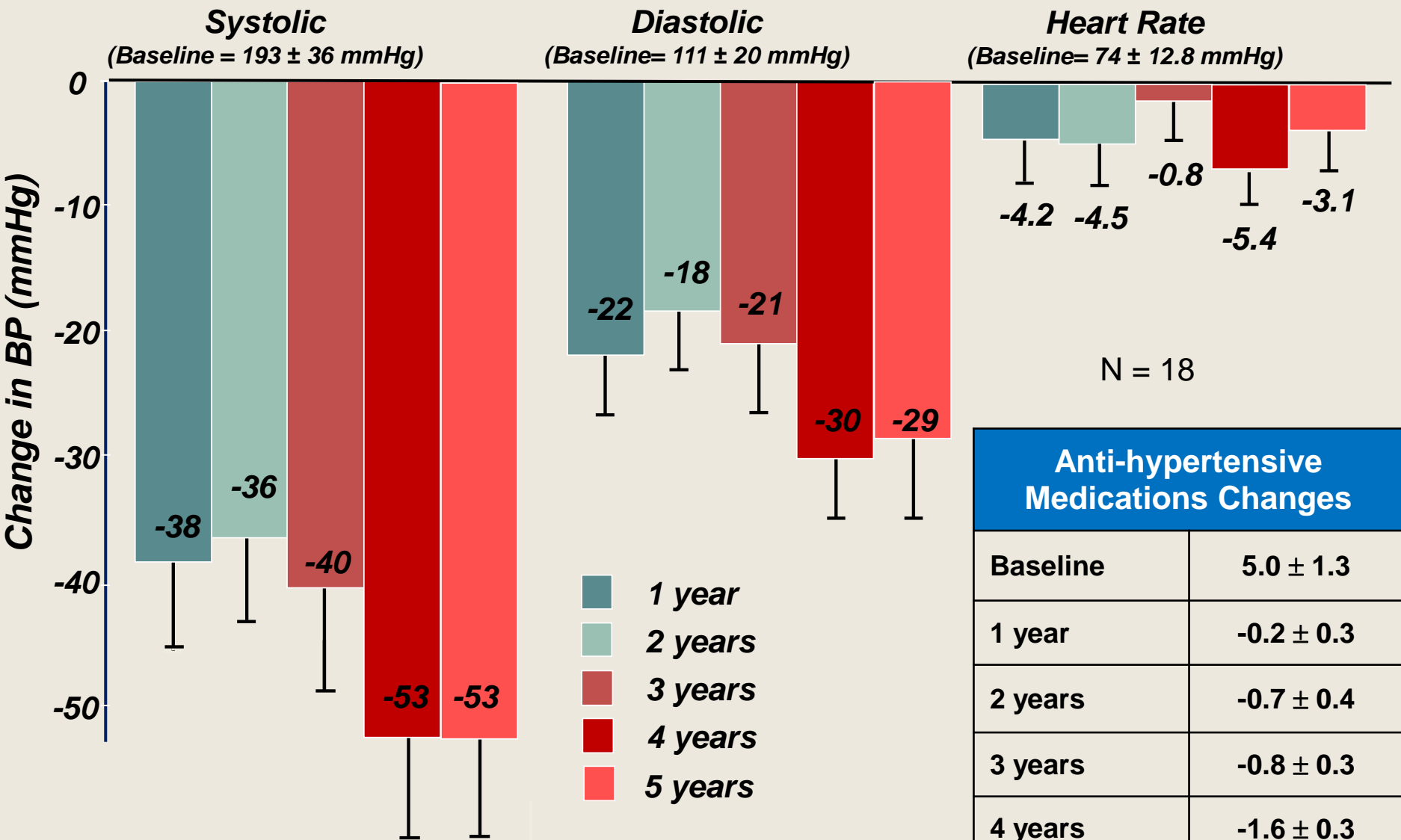
Acute Muscle Sympathetic Nerve Activity After 3 Months of Therapy



Phase-2 Long Term Data in Resistant HTN



DEBuT-HT study:



Anti-hypertensive Medications Changes	
Baseline	5.0 ± 1.3
1 year	-0.2 ± 0.3
2 years	-0.7 ± 0.4
3 years	-0.8 ± 0.3
4 years	-1.6 ± 0.3
5 years	-1.6 ± 0.4

193/111 mmHg \Rightarrow 140/82 mmHg at 5 Years

Economic Benefits of Barostim

Original Article

OPEN

Cost-effectiveness of Barostim therapy for the treatment of resistant hypertension in European settings

Oleg Borisenko^a, Joachim Beige^b, Eric G. Lovett^c, Uta C. Hoppe^d, and Staffan Bjessmo^e

- **Additional life-years gained = +1.66 vs. optimal medical therapy**
- **Additional Quality-Adjusted Life-years gained = +2.17 vs. optimal medical therapy**
- **Cost per QALY gained: EUR 7,797 vs. standard threshold of EUR 35,000 per QALY**
- **Deemed cost effective relative to optimal medical therapy**

Barostim

QALY Gain	+2.17
<i>Reduces rate of:</i>	<i>By:</i>
Myocardial Infarction	19%
Stroke	35%
Heart Failure	12%
End Stage Renal Disease	23%

Barostim is a Cost-Effective Therapeutic Option Over the Long-Term

Source: Borisenko et al, Journal of Hypertension, 2013

Gjennomføring av BAT behandling

- Samarbeid mellom:

- Hjertemedisinsk avd

- Nyremedisinsk avd

} **Medisinsk Klinikk**

- Pasient utredning og seleksjon til å få BAT behandling skjer på Nyremed. Avd
- Implantasjon og kontroll av BAT system skal foregår på PM seksjon ved Hjertemed avd. Medisinsk klinikk

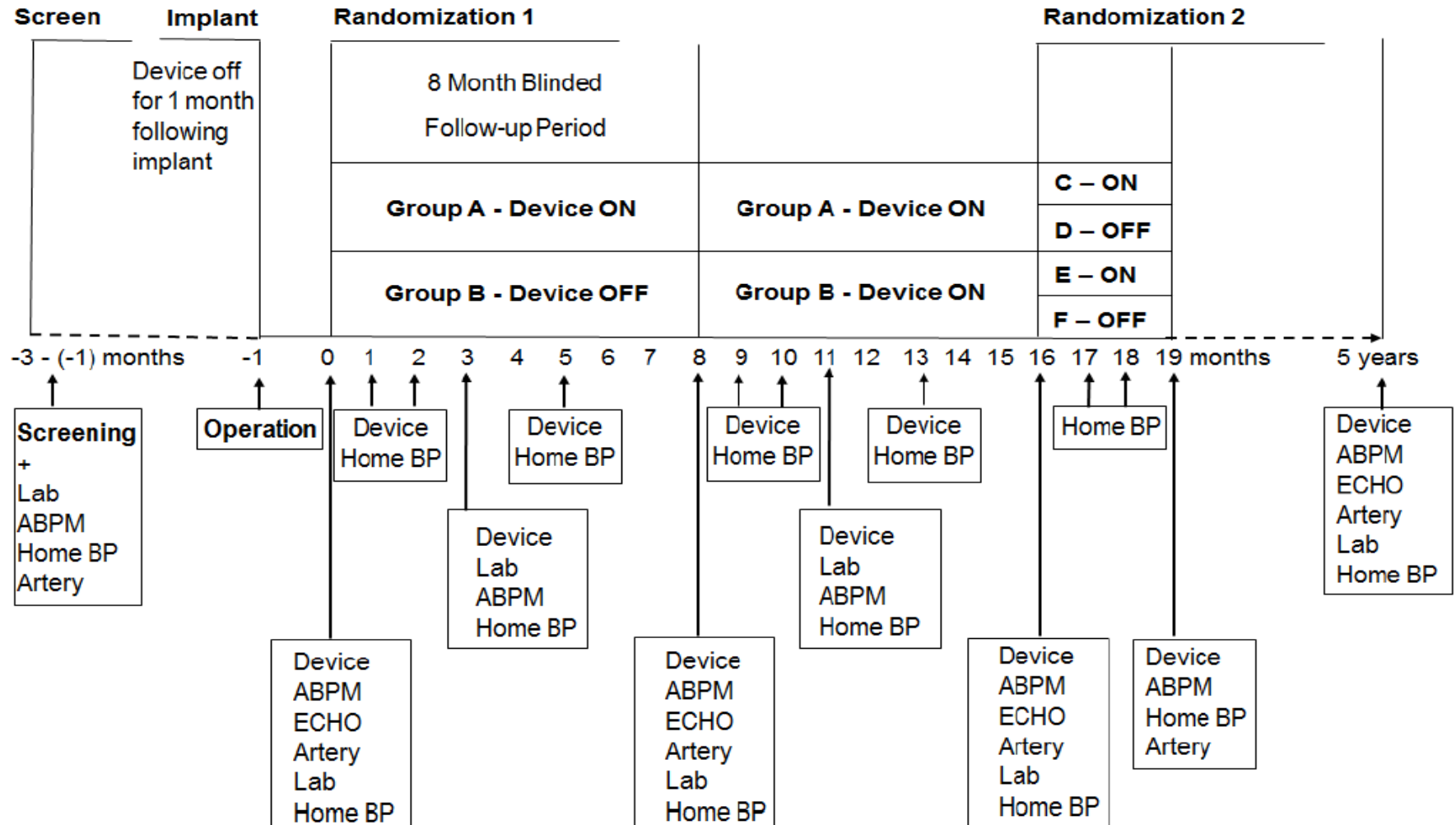
* Støtte fra en karkirurg, Thorax-karkirurgisk avd

** I tillegg skal vi samarbeider og utveksler erfaring med Nordisk land; Finland, Danmark og Sverige hvor behandlingstilbud er etablert.

“Nordisk BAT samarebids prosjekt”

THE EFFECTS OF BAROREFLEX ACTIVATION THERAPY ON BLOOD PRESSURE AND SYMPATHETIC FUNCTION IN PATIENTS WITH REFRACTORY HYPERTENSION – THE RATIONALE AND DESIGN OF THE NORDIC BAT STUDY

BAROREFLEX ACTIVATION THERAPY AND BLOOD PRESSURE



Baroreseptor Aktiverende Terapi (BAT) ved Behandlingsresistent Hypertensjon

- Pasienter med slik alvorlig hypertensjon, som ikke responderer på medikamenter, har ingen behandlingstilbud i dag og ender opp med hjerneslag og hjertesvikt.
- Ullevål har vært internasjonalt ledende i arbeidet med å vise at renal denervering (RDN) ikke har effekt. Dette må antas å ha spart samfunnet for store midler og ikke minst (desperate) pasienter for unødvendig invasive prosedyrer.
- Baroreseptor aktiverende terapi (BAT) har sterkere fysiologisk rasjonale enn RDN og viser lovende resultater med mulig store blodtrykksreduksjoner i visse ledende sentra i USA, Tyskland, Holland....
- Men mer data bør akkumuleres før man bør erklære BAT for etablert behandling til pasienter med alvorlig hypertensjon – særlig etter at teknikken ble forenklet fra bilateral til unilateral (2. generasjon).
- Utviklingen er relativt kostbar. Produsenten er et lite teknologisk firma som ikke har investeringskapital til å finansiere randomiserte kliniske studier men kan bidra med ekspertise og «rimelig» teknisk utstyr.
- Det er vår mening at et ledende universitetssykehus bør kunne tillate denne utviklingen inkludert i sin virksomhet, spesielt tatt i betraktning sykdommens alvorlighetsgrad og at dette kan være det eneste behandlingstilbudet for å unngå hjerneslag og hjertesvikt.
- Det er vår mening at OUS Ullevål – med sin meget lange tradisjon i omsorgen for pasienter med høyt blodtrykk – bør kunne bidra med noen pasienter i det nordiske samarbeidet – spesielt tatt i betraktning at alle nordiske pasienter blir inkludert i en selvfinansiert prospektiv randomisert og kontrollert studie for å dokumentere om BAT virkelig er løsningen for denne pasient gruppen.