UNIVERSITA' DEGLI STUDI DI TORINO
DIPARTIMENTO DI SCIENZE MEDICHE
CATTEDRA MEDICINA INTERNA
CENTRO IPERTENSIONE ARTERIOSA
AO CITTA' SALUTE E SCIENZA
TORINO

Renal denervation for refractory hypertension hype or hope?

Franco Veglio

Torino, 26 Ottobre 2012

DEFINIZIONI **ESH-JNC-AHA-BHS**

- **IPERTENSIONE PSEUDO RESISTENTE**:

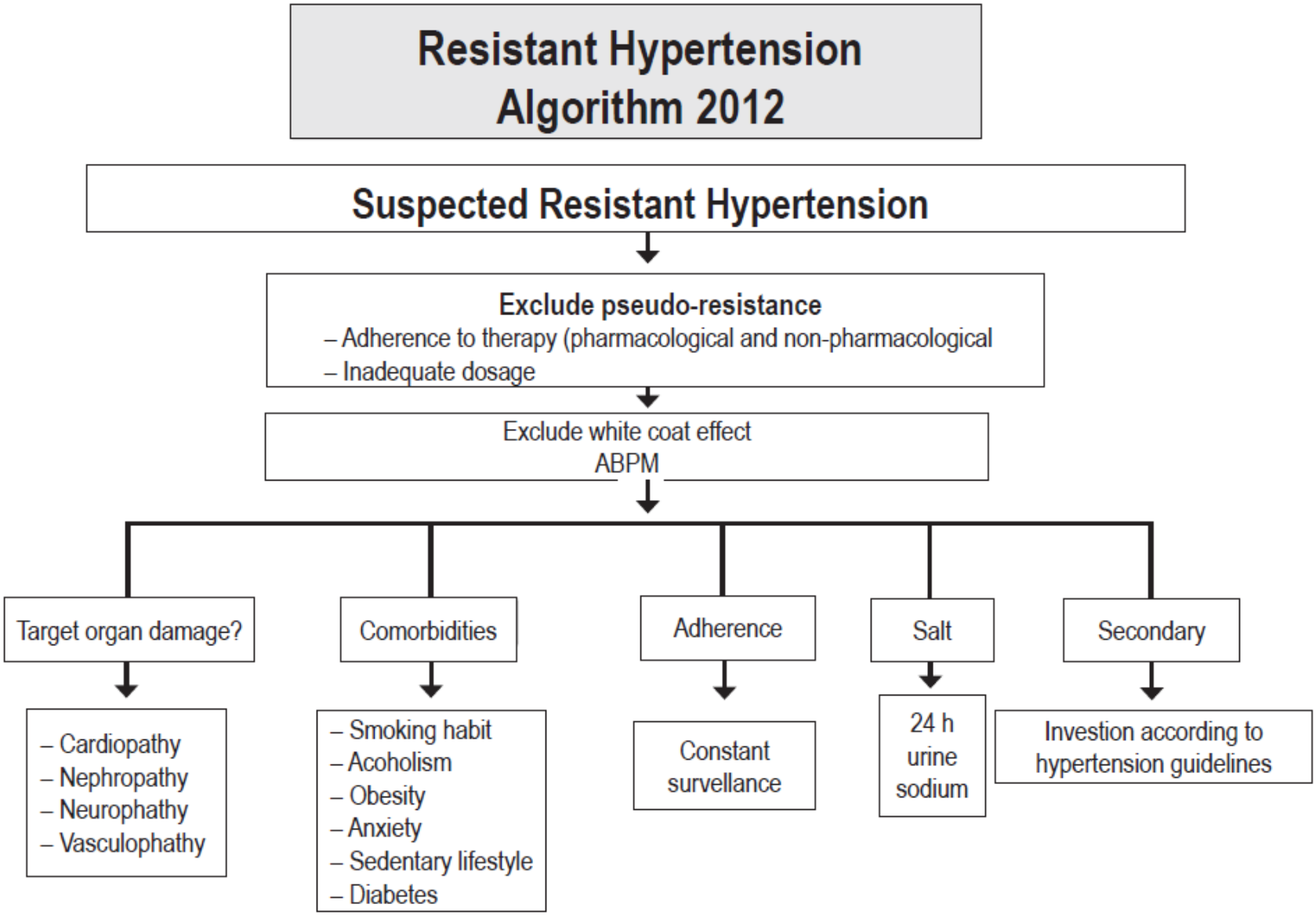
mancato controllo pressorio, nonostante terapia in pazienti che non hanno ipertensione resistente

- **IPERTENSIONE RESISTENTE**: PAOS e/o PAOD

≥140/90 mmHg (o 130/80), nonostante terapia con almeno tre farmaci a dosaggio pieno incluso un diuretico.

Fattori ASSOCIATI: farmaci, eccessiva assunzione di sale o alcool, obesità, ipertensione secondaria ,OSAS.

NON MODIFICABILI: **IPERTENSIONE RESISTENTE VERA**



De Souza, Ar Br Cardiol 2012

CLINICAL STRATEGIES IN RESISTANT HYPERTENSION

ADD-ON THERAPY or ON TOP THERAPY APPROACH

→ **GUIDELINES BASED**

⋮

EMPIRICAL PHARMACOLOGICAL APPROACH

→ **PATHOPHYSIOLOGICAL WORK-UP**

⋮

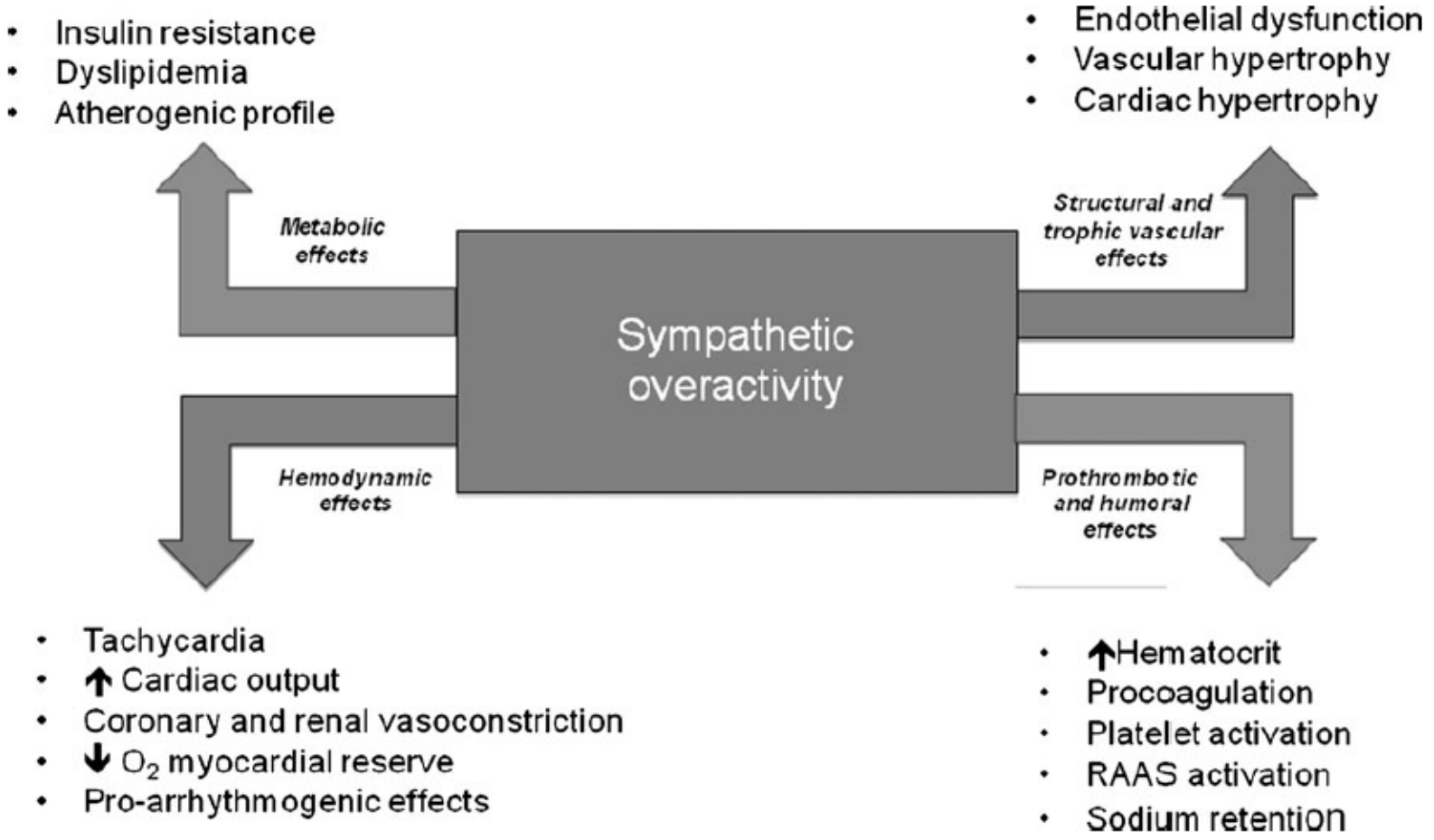
INVASIVE APPROACH

→ **RENAL DENERVATION**

BAROREFLEX ACTIVATION THERAPY (BAT)

Renal Denervation Background

Sympathetic Cardiovascular Drive in Human Hypertension



Grassi, Curr Hypertens Rep, 2012

Concept Validated by Surgical History

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

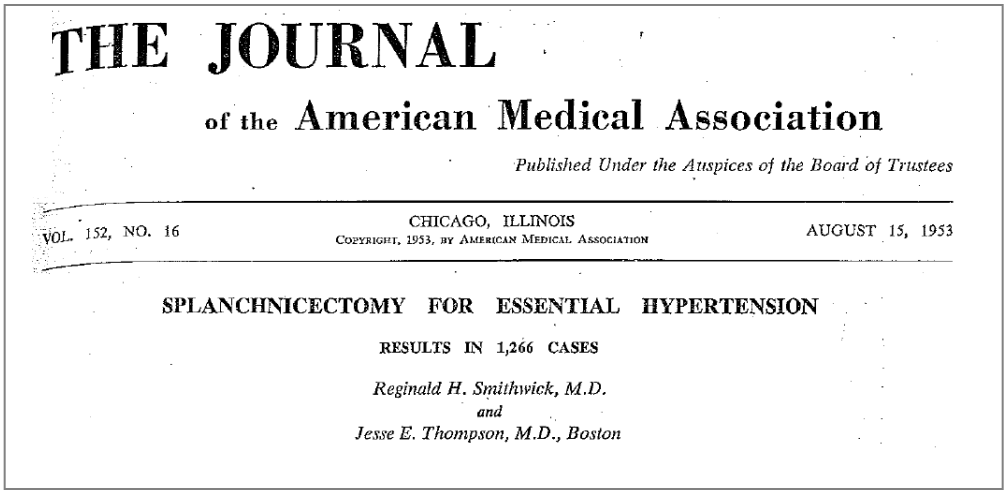
THE BRITISH JOURNAL OF SURGERY

1952

SYMPATHECTOMY IN THE TREATMENT OF BENIGN AND MALIGNANT HYPERTENSION*

A REVIEW OF 76 PATIENTS

By C. J. LONGLAND and W. E. GIBB



THE JOURNAL

of the American Medical Association

Published Under the Auspices of the Board of Trustees

VOL. 152, NO. 16 — CHICAGO, ILLINOIS — AUGUST 15, 1953

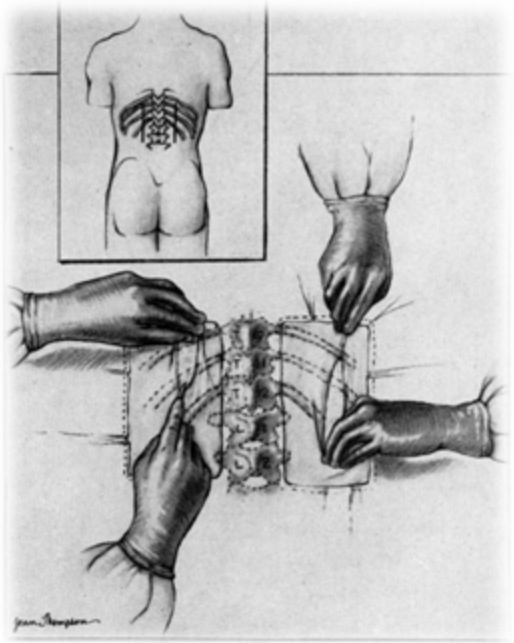
SPLANCHNICECTOMY FOR ESSENTIAL HYPERTENSION

RESULTS IN 1,266 CASES

Reginald H. Smithwick, M.D.
and
Jesse E. Thompson, M.D., Boston

Effective, but significant morbidity

Simpatectomia: un vecchio concetto



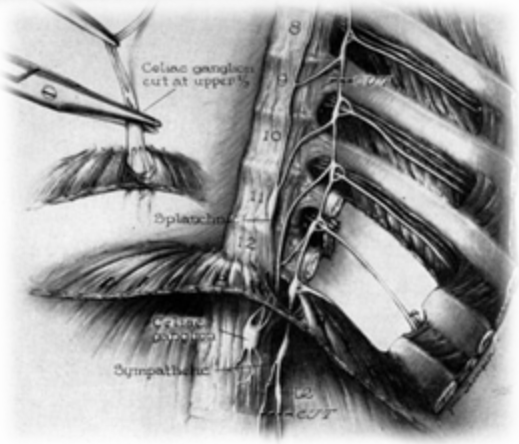
THE MEDICAL AND SURGICAL TREATMENT OF HYPERTENSION*†

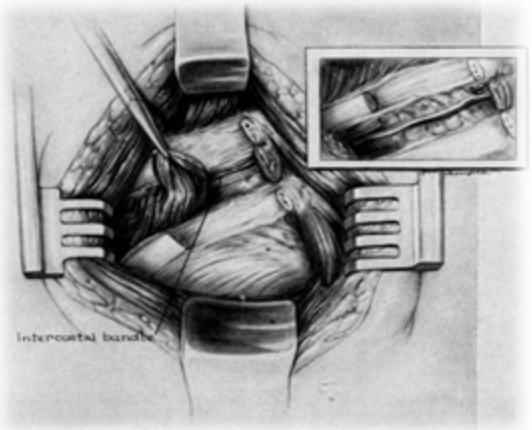
F. L. Reichert, V. Richards, E. Holman, A. L. Bloomfield, T. Addis, D. A. Rytand, and J. K. Lewis

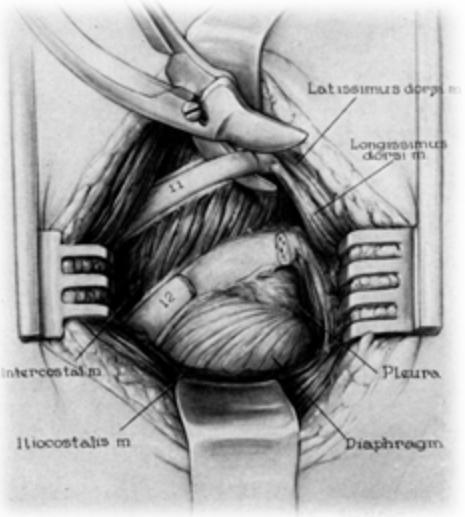
San Francisco, California

FROM THE DEPARTMENTS OF SURGERY AND MEDICINE, STANFORD UNIVERSITY SCHOOL OF MEDICINE, SAN FRANCISCO, CALIFORNIA

† Read at the 4th Congress of the Pan-Pacific Surgical Association, Honolulu, T. H., September 2, 1948.







Linee Guida di Consenso sulla Denervazione Renale

United Kingdom[1]

Joint Societies Statement on Renal Denervation for Resistant Hypertension.

The Joint UK Societies' Consensus Statement on Renal Denervation for Resistant Hypertension.

BHS British Hypertension Society · British Cardiovascular Society · BCIS · British Society of Interventional Radiology · THE RENAL ASSOCIATION founded 1950

Steering Group: Mark Caulfield[1] (Chair), Mark de Belder[2], Trevor Cleveland[3], David Collier[3], John Deanfield[4], Huon Gray[3], Charles Knight[3], Melvin Lobo[3], Matthew Matson[3], Jon Moss[3], Neil Poulter[1], Iain Simpson[3], Charles Tomson[6], Bryan Williams[1].

On behalf of the British Hypertension Society[1], the British Cardiovascular Intervention Society[2], the British Society for Interventional Radiology[3], National Institute for Clinical Outcomes Research[4], the British Cardiovascular Society[5], and the Renal Association[6].

This statement was developed with the guidance and advice from patients who had undergone this procedure at Barts and The London NIHR Cardiovascular Biomedical Research Unit and are members of the Patients and Public Engagement Group. The Joint UK Societies wish to express their thanks to Mr John Bold and Mr Anthony Henry.

This statement is intended to be read alongside NICE IP 418.
http://guidance.nice.org.uk/IPG418

Issue 1: Live on web 26th January 2012
Final version.

Any correspondence to:
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http://www.whri.qmul.ac.uk/index.html

1

Germany[2]

MEDICINE

REVIEW ARTICLE

Treatment Strategies for Resistant Arterial Hypertension

Felix Mahfoud*, Frank Himmel*, Christian Ukena, Heribert Schunkert, Michael Böhm, Joachim Weil

SUMMARY

Background: Resistant hypertension is defined as blood pressure above the target range set by current guidelines despite the concurrent use of three or more antihypertensive drugs of different classes, including a diuretic, at their maximum or highest tolerated doses. This problem affects 5% to 15% of all hypertensive patients and is thus commonly seen by both primary care physicians and specialists.

Methods: Review of current guidelines and pertinent literature revealed by a selective Medline search.

Results: The treatment of resistant hypertension is multimodal, involving systematic identification of secondary causes of hypertension as well as the exclusion of pseudoresistance (inadequate treatment). Non-pharmacological treatment includes weight loss, dietary salt restriction, exercise, and abstinence from alcohol. Drug treatment consists of an individualized combination of antihypertensive agents with different mechanisms of action. Activation of the sympathetic nervous system is considered to be a major element in the pathogenesis of resistant hypertension; a new interventional treatment, selective denervation of the renal sympathetic nerves, results in clinically relevant and sustained blood pressure reduction in ca. 84% of the patients undergoing the procedure (a mean decrease of office systolic blood pressure by 32 mm Hg and by 12 mm Hg at six months, p <0.001). Among the 206 patients who underwent this procedure in the setting of published studies, 5 had complications; these included pseudoaneurysm of the femoral artery and dissection of the renal artery during the introduction of the ablation catheter.

Conclusion: The treatment of resistant hypertension is interdisciplinary and multimodal. The new and promising option of interventional renal sympathetic denervation can be considered for patients whose high blood pressure is inadequately controlled with medication.

► Cite this as:
Mahfoud F, Himmel F, Ukena C, Schunkert H, Böhm M, Weil J: Treatment strategies for resistant arterial hypertension. Dtsch Arztebl Int 2011; 108(43): 725–31. DOI: 10.3238/arztebl.2011.0725

Arterial hypertension is one of the most frequent chronic diseases in the industrialized nations of the West and represents a major risk factor for cardiovascular morbidity and mortality.

In Germany, only 5% to 17% of patients treated for hypertension achieve lasting control of their blood pressure (1, 2). Around 5% to 15% of all patients with high blood pressure have resistant arterial hypertension (3). Care must be exercised to distinguish between true resistance to treatment and so-called pseudoresistance, which may result from poor compliance with treatment, situationally evoked blood pressure elevation (isolated office hypertension, also known as "white-coat hypertension"), or incorrect choice of medications.

In many patients with resistant hypertension there is a secondary, potentially reversible cause of high blood pressure. Thus, systematic evaluation of organic causes of hypertension is an essential part of the treatment program. The goal of this article is to review the treatment of resistant hypertension as reflected in current guidelines and in pertinent literature revealed by a selective Medline search, with particular emphasis on interventional renal sympathetic denervation.

Definition

Resistant arterial hypertension is defined as high blood pressure that cannot be adequately controlled according to the current guidelines (i.e., pressure of >140/90 mm Hg in general; >130–139/80–85 mm Hg in patients with diabetes mellitus, >130/80 mm Hg in chronic renal disease) despite concurrent use of three or more antihypertensive drugs of different classes, including a diuretic, at their maximum or highest tolerated doses (3, 4). Cases of pseudoresistance, which may result from poor compliance with treatment, inadequate antihypertensive medication, incorrect means of measurement, or white-coat hypertension, must be identified. White-coat hypertension is present if the patient's blood pressure is 140/90 mm Hg or lower when measured at home but >140/90 mm Hg in the doctor's office or the hospital.

Epidemiology

The prevalence of arterial hypertension in Germany is 10% to 35% in the age group 30 to 59 years, rising to 65% in those over 60 years of age (1). The exact prevalence of resistant hypertension is unknown (3). In the Study of

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Medizinische Klinik II, Universitätsklinikum Schleswig-Holstein, Campus Lübeck, Lübeck: Dr. med. Himmel, Prof. Dr. med. Schunkert, Prof. Dr. med. Weil

*Both authors contributed equally to the preparation of this manuscript.

Deutsches Ärzteblatt International | Dtsch Arztebl Int 2011; 108(43): 725–31

725

Poland[3]

W Polsce/In Poland

Kardiologia Polska 2011; 69, 11: 1208–1211 ISSN 0022–9032

Stanowisko grupy ekspertów w sprawie zabiegów przezskórnej denerwacji nerek w leczeniu nadciśnienia tętniczego w Polsce

Catheter-based renal sympathetic denervation for the treatment of resistant arterial hypertension in Poland — experts consensus statement

Adam Witkowski[1], Andrzej Januszewicz[2], Jacek Imiela[3], Krzysztof Narkiewicz[4], Grzegorz Opolski[5], Olgierd Rowiński[6], Jerzy Sadowski[7], Dariusz Dudek[8], Leszek Bryniarski[9], Robert J. Gil[10], Marcin Adamczak[11], Stefan Grajek[12], Jacek Kądziela[1], Aleksander Prejbisz[2], Maciej Nowicki[13]

[1]Klinika Kardiologii i Angiologii Interwencyjnej, Instytut Kardiologii, Warszawa; [2]Klinika Nadciśnienia Tętniczego, Instytut Kardiologii, Warszawa; [3]Oddział I Wewnętrzny i Nefrologii, Międzyleski Szpital Specjalistyczny, Warszawa; [4]Zakład Nadciśnienia Tętniczego, Gdański Uniwersytet Medyczny, Gdańsk; [5]I Katedra i Klinika Kardiologii, Warszawski Uniwersytet Medyczny, Warszawa; [6]Zakład Radiologii Klinicznej, Warszawski Uniwersytet Medyczny, Warszawa; [7]Klinika Chirurgii Serca, Naczyń i Transplantologii, Collegium Medicum, Uniwersytet Jagielloński, Kraków; [8]Pracownia Hemodynamiki Szpitala Uniwersyteckiego, Collegium Medicum, Uniwersytet Jagielloński, Kraków; [9]Klinika Kardiologii i Nadciśnienia Tętniczego, Instytutu Kardiologii, Collegium Medicum, Uniwersytet Jagielloński, Kraków; [10]Klinika Kardiologii Inwazyjnej, Centralny Szpital Kliniczny, MSWiA, Warszawa; [11]Klinika Nefrologii, Endokrynologii i Chorób Przemiany Materii, Śląski Uniwersytet Medyczny, Katowice; [12]I Klinika Kardiologii, Uniwersytet Medyczny, Poznań; [13]HTA Audit

WSTĘP

Dnia 15 czerwca 2011 r. w Warszawie odbyło się spotkanie ekspertów w dziedzinie kardiologii, hipertensjologii, nefrologii, chorób wewnętrznych, radiologii i kardiochirurgii poświęcone zabiegom przezskórnej (przezcewnikowej) denerwacji nerek (PDN) w leczeniu opornego nadciśnienia tętniczego (ONT). Celem spotkania było zaprezentowanie dotychczasowego stanu wiedzy na temat metod diagnostyki i terapii prawdziwie opornego nadciśnienia tętniczego, określenie roli i znaczenia zabiegów PDN w leczeniu ONT, próba zdefiniowania liczebności grupy docelowej pacjentów z ONT w Polsce, którzy mogliby zostać poddani zabiegowi PDN, oraz omówienie strategii postępowania mającego na celu wprowadzenie zabiegów PDN „do koszyka" świadczeń gwarantowanych w Polsce.

DEFINICJA, WYSTĘPOWANIE, DIAGNOSTYKA I FARMAKOTERAPIA ONT

Zagadnienie ONT jest w ostatnich latach problemem o rosnącym znaczeniu klinicznym, m.in. ze względu na stosunkowo wysoką częstość występowania w populacji chorych na nadciśnienie tętnicze. Należy odnotować coraz większą liczbę opracowań dotyczących tego zagadnienia, które ukazując się na łamach czasopism medycznych, znacząco pogłębiają wiedzę o częstości występowania, przyczynach i następstwach ONT. Obecnie najczęściej stosowana tradycyjna definicja określa ONT jako sytuację, w której mimo stosowania w odpowiednich dawkach i we właściwym skojarzeniu co najmniej 3 leków hipotensyjnych, z wykorzystaniem diuretyku, nie udaje się obniżyć ciśnienia tętniczego do pożądanych wartości [1–4].

Należy jednak odnotować, że ostatnio zaproponowano inne określenie, zgodnie z którym oporność na terapię oznacza konieczność przyjmowania 4 i więcej leków hipotensyjnych w celu zapewnienia kontroli ciśnienia tętniczego. Badania przeprowadzone w Stanach Zjednoczonych i w Europie wskazują na sięgający blisko 13% odsetek występowania ONT w populacji chorych leczonych na nadciśnienie tętnicze [1–4].

Pacjent z ONT charakteryzuje się zazwyczaj częstszą obecnością powikłań narządowych w porównaniu z osobą ze skutecznie leczonym nadciśnieniem tętniczym — dotychczasowe badania wskazują zwłaszcza na wyższe ryzyko wystąpienia udaru mózgu i innych poważnych powikłań w układzie sercowo-naczyniowym [1–4].

W diagnostyce ONT osiągnięto postęp dzięki upowszechnieniu metod całodobowej rejestracji ciśnienia tętniczego i stosowania pomiarów domowych — umożliwia to potwierdzenie prawdziwej oporności i wykluczenia rzekomej [1–4].

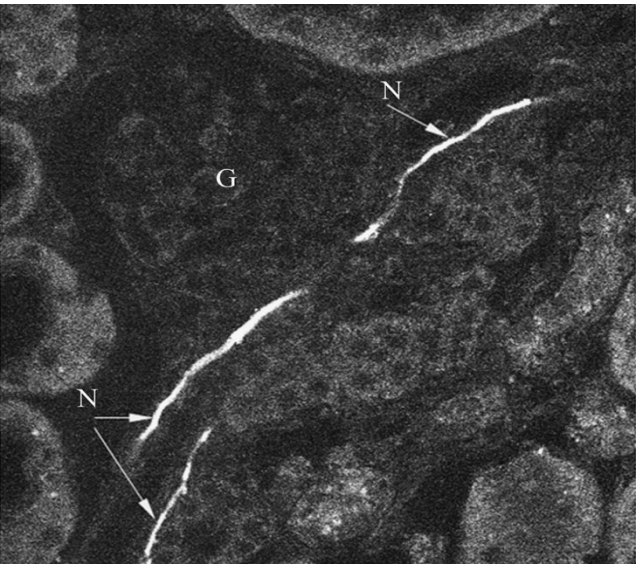
Adres do korespondencji:
prof. dr hab. n. med. Adam Witkowski, Klinika Kardiologii i Angiologii Interwencyjnej, Instytut Kardiologii, ul. Alpejska 42, 04-628 Warszawa, tel: +48 22 34 34 127, faks: +48 22 34 34 506, e-mail: witkowski@ihbz.pl

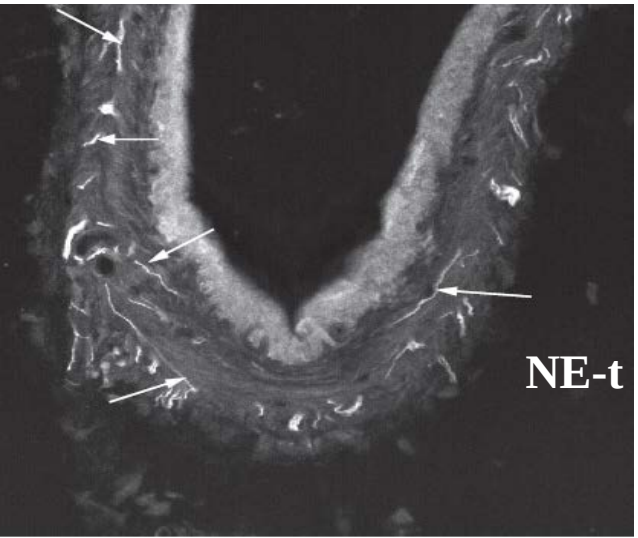
www.kardiologiapolska.pl

1. Caulfield M et al. Available at http://www.bhsoc.org/docs/Joint-UK-Societies-Summary-on-Renal-Denervation.pdf;
2. Mahfoud F et al. *Dtsch Arztebl Int*. 2011;136:2418;
3. Witkowski A et al. *Kardiolgia Polska*. 2011;69:1208-1211.

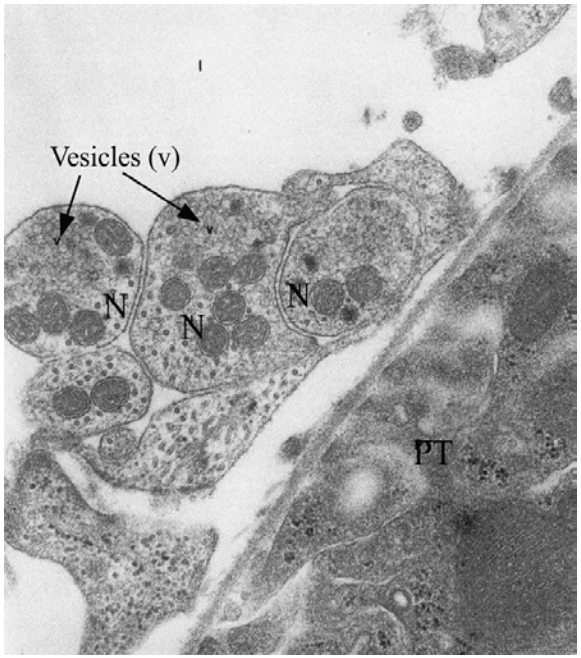
Renal sympathetic nerve endings

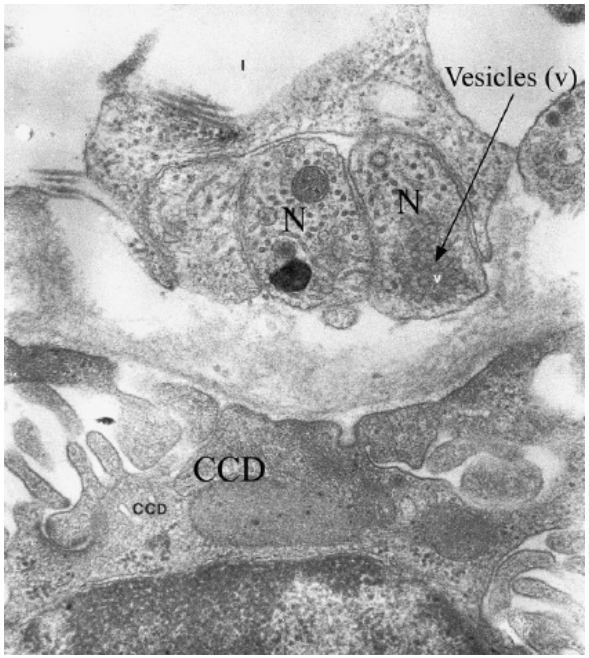
Sympathetic nerve fibers (N)





Sympathetic nerves terminals



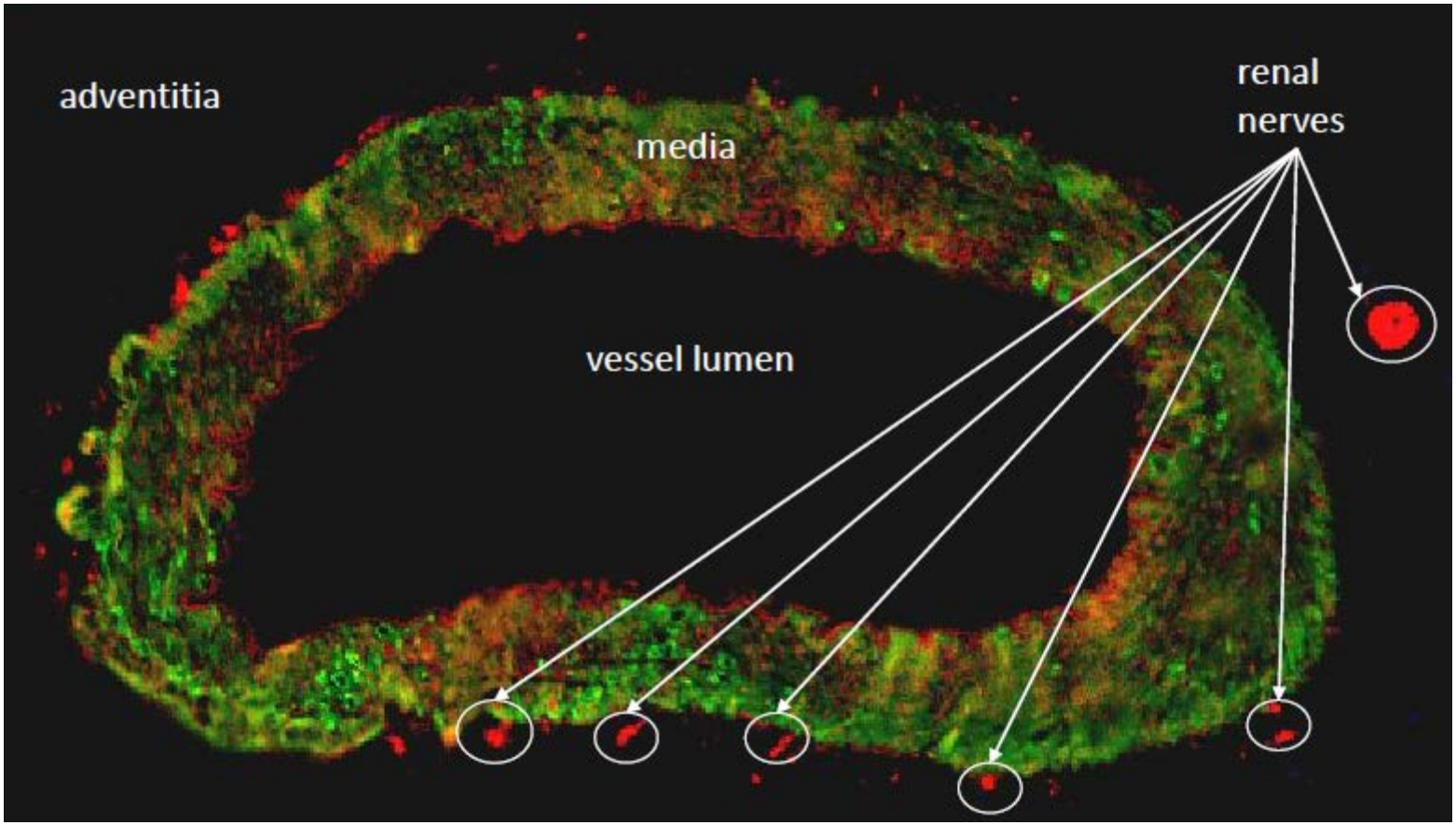


Sympathetic nerve fibers

Kopp, Int Syst Physiol, 2011

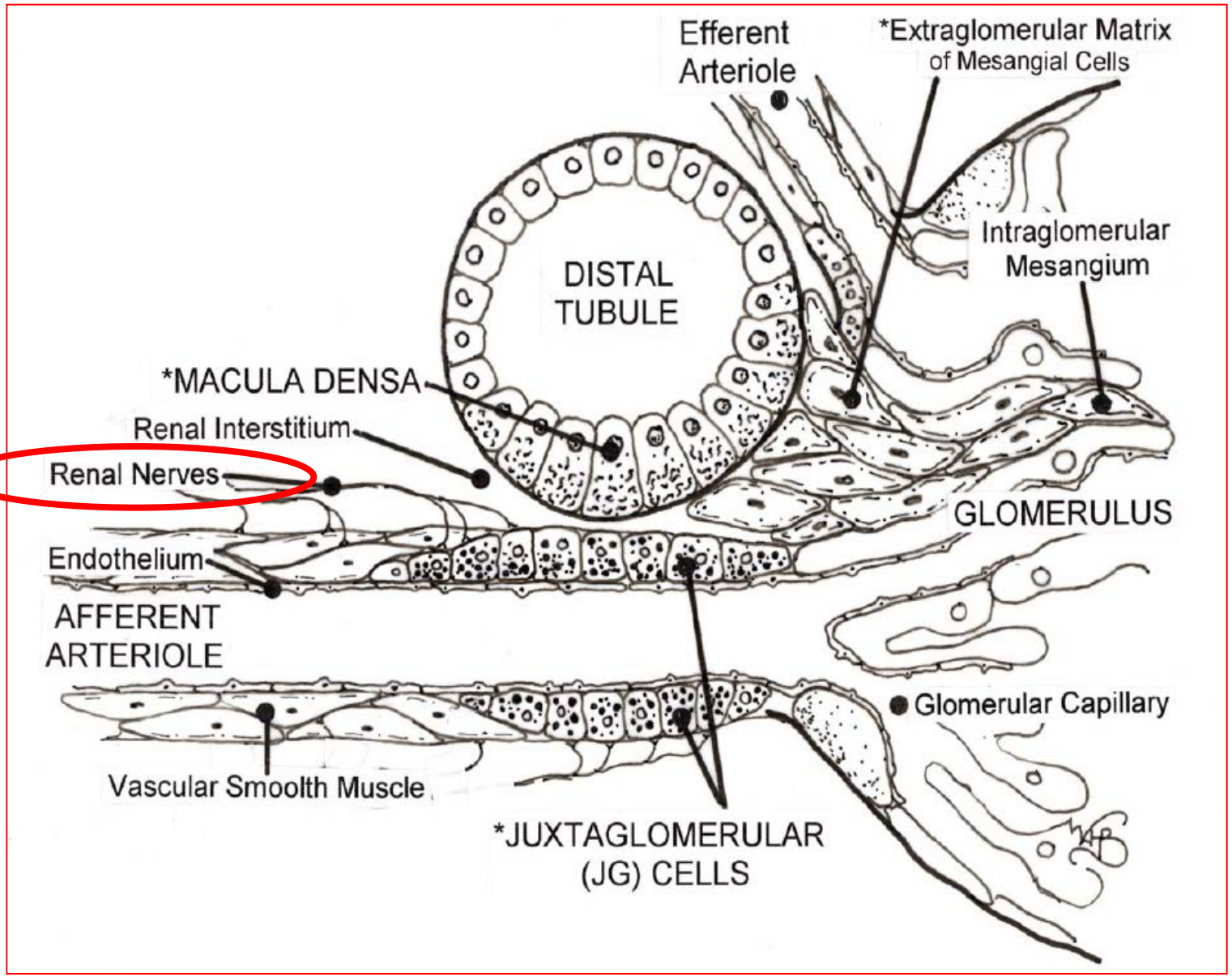
SYMPATHETIC ANATOMY

NERVES IN ADVENTITIA OF RENAL ARTERY



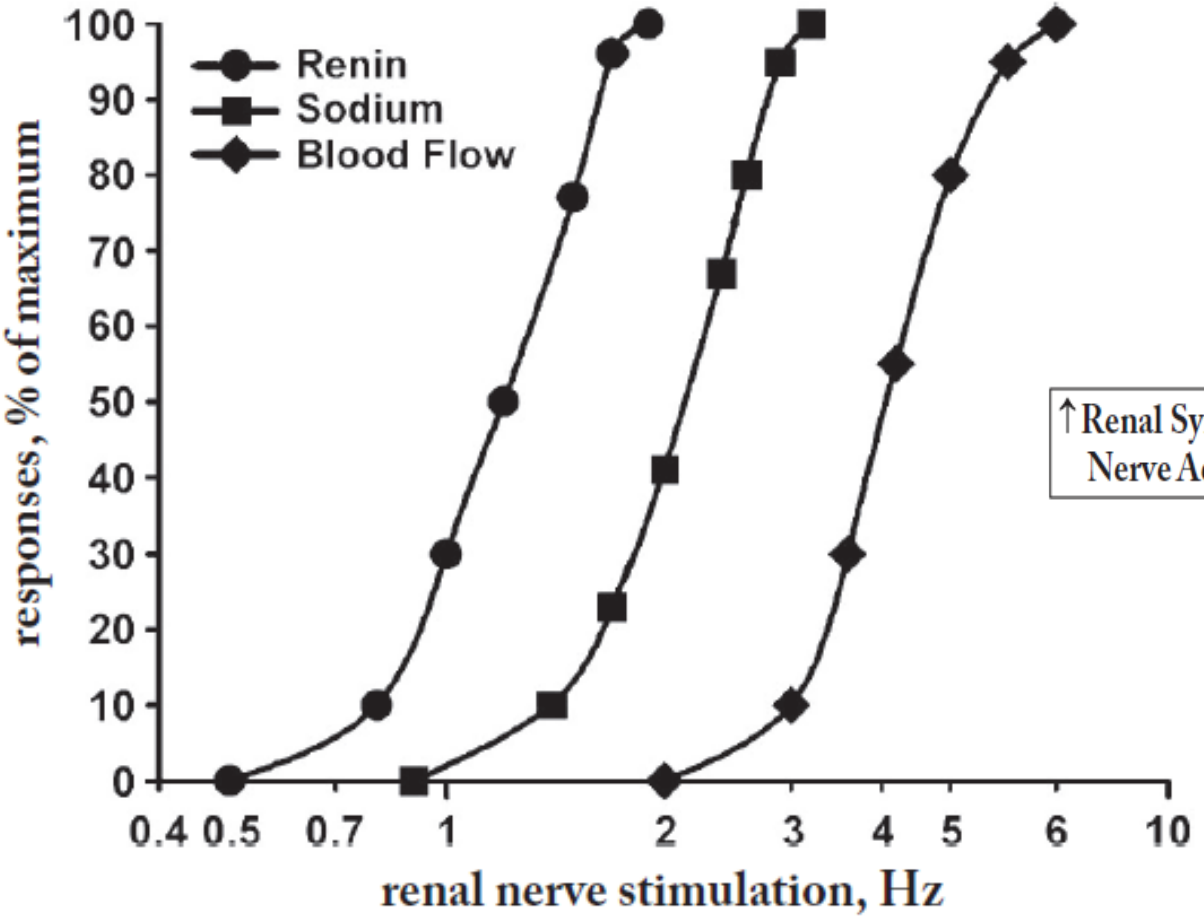
***Kopp, Int Syst Physiol*, 2011**

Anatomical juxtaposition of the juxtaglomerular apparatus



Beierwaltes, Am J Physiol Renal Physiol, 2009

Surrogate of Neural renal function



↑Renal Sympathetic Nerve Activity →

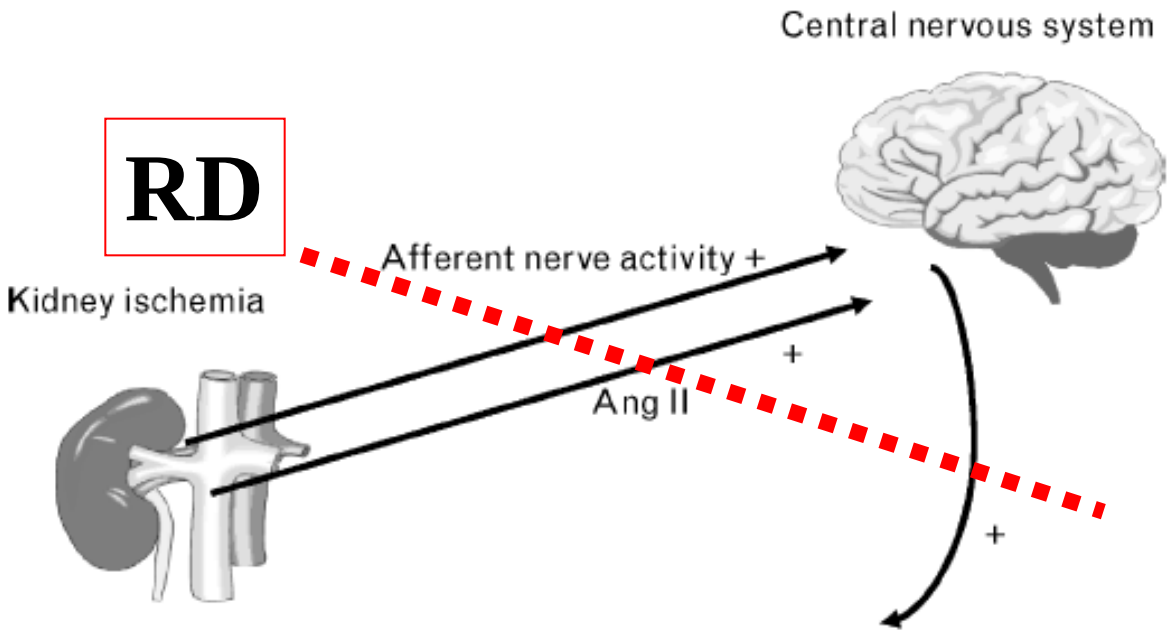
↑renin secretion rate (β_1-adrenoceptors)

↓urinary sodium excretion (α_{1B}-adrenoceptors)

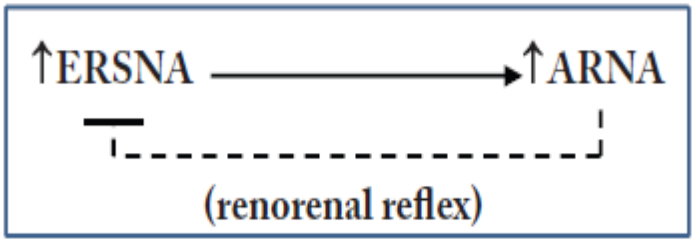
↓renal blood flow (α_{1A}-adrenoceptors)

***Kopp, Int Syst Physiol*, 2011**

RENORENAL REFLEX



Efferent Renal Sympathetic Nerve Activity (ERSNA)
& Afferent Renal Nerve Activity (ARNA)



***Kopp, Int Syst Physiol*, 2011**

Interventional Hypertension Renal Denervation Systems

ESH Position Paper: Renal denervation an interventional therapy of resistant hypertension

- First step: Exclude
- False resistant hypertension (peudoresistance) by using 24 h ambulatory
- blood pressure monitoring (ABPM) and home BP monitoring.
- Secondary arterial hypertension
- Causes which maintain high BP values and might be removed (obstructive
- sleep-apnea, high salt intake, BP raising drugs, severe obesity

- Second step: Optimize antihypertensive treatment with at least three (or
- better four) tolerated drugs including a diuretic and an antialdosterone drug

- Third step: Consider anatomic contraindications due to unresolvesd safety
- issues (avoid RDN in case of multiple renal arteries, main renal artery
- diameter of less than 4mm or main renal artery length less than 20mm,
- significant renal artery stenosis, previous angioplasty or stenting of renal
- artery). Likewise, eGFR should be > 45 ml/min/1.73m2

- Overall:
- Perform the procedure in very experienced hospital centers, such as
- hypertension excellence centers
- Use devices which have demonstrate efficacy and safety in clinical studies

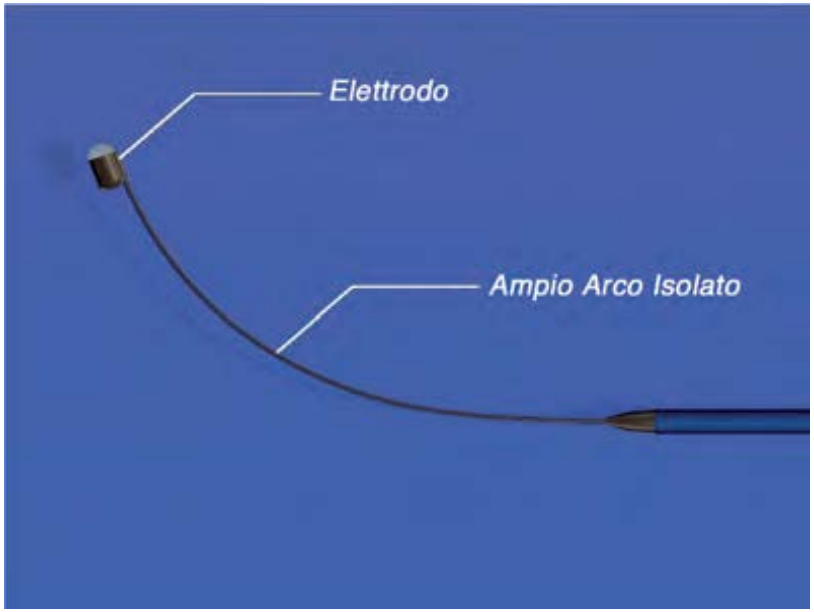
Schmieder, J Hypertension 2012

ESH Position Paper: Renal denervation
Anatomical Contraindications

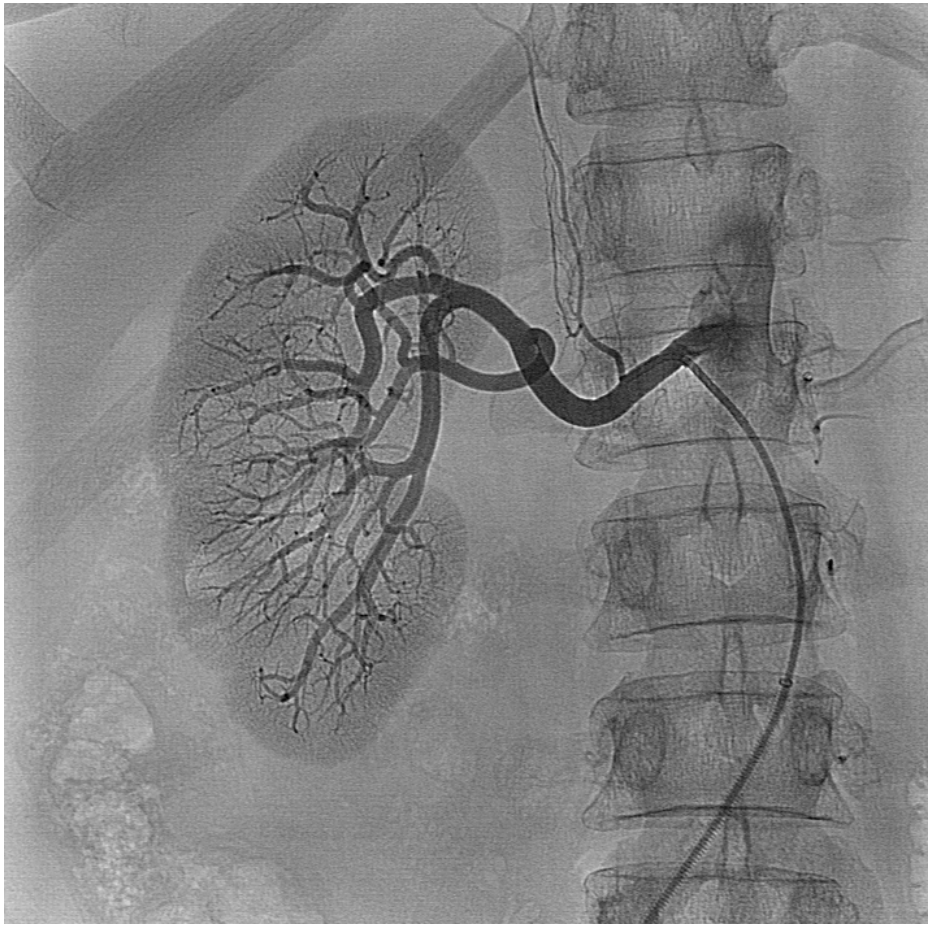
- Multiple renal arteries,
- Main renal artery diameter of less than 4mm or main renal artery length less than 20mm,
- Significant renal artery stenosis,
- Previous abdominal aortic grafts, angioplasty or stenting of renal artery

Schmieder, J Hypertension 2012

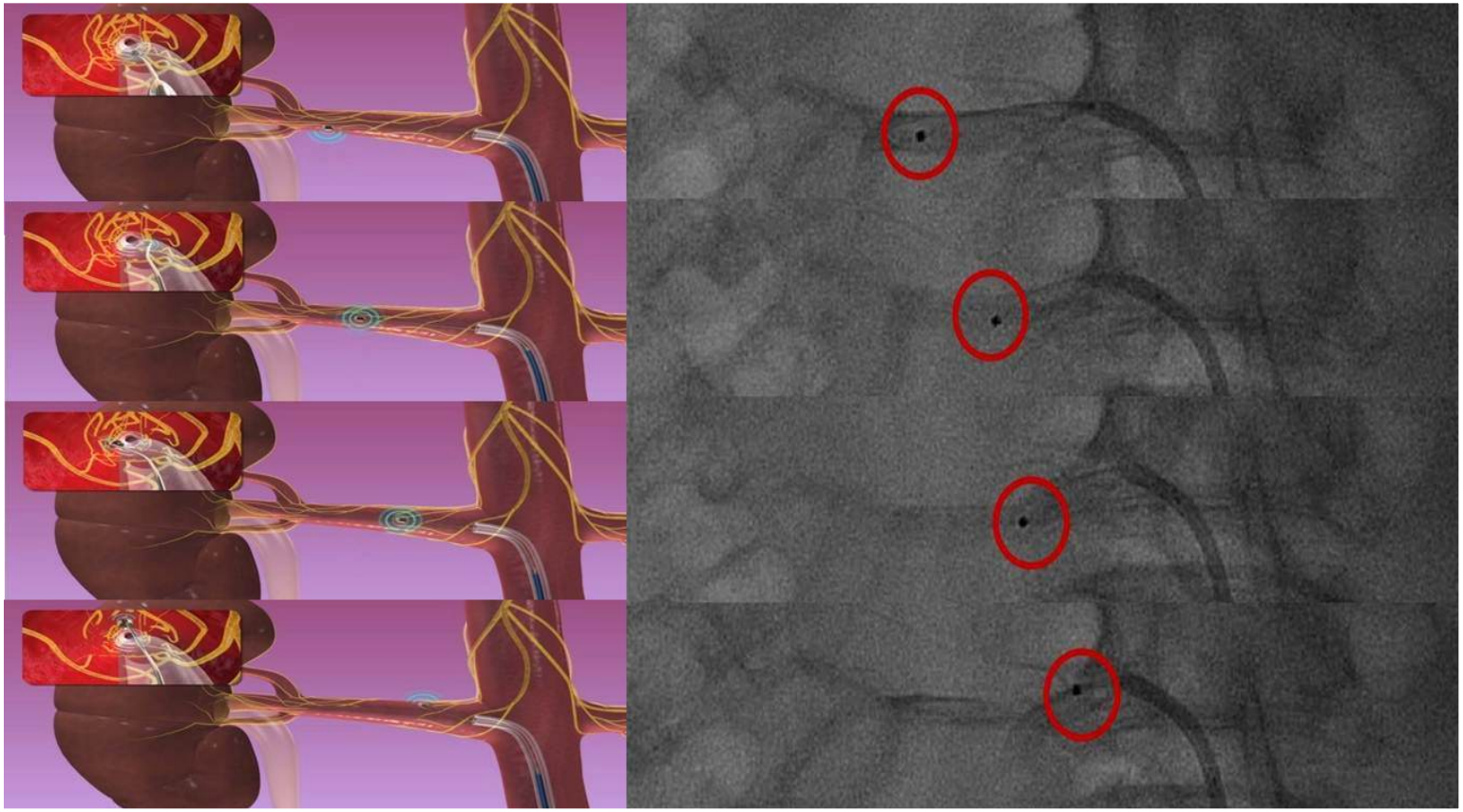
Medtronic Symplicity™ Point-by-Point Approach



Posizionamento del catetere guida in arteria renale

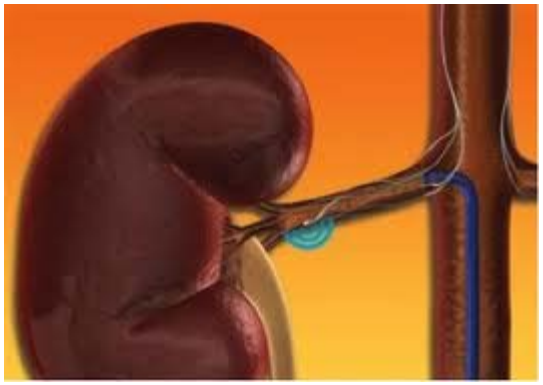


PROCEDURA DI RF RENALE



Serie di ablazioni endovascolari con intervalli di retrazione di circa 5 mm e di rotazione di circa 45° del catetere Symplicity

DATI OPERATIVI



53,3 ± 15,3 min. (range 45 - 70)

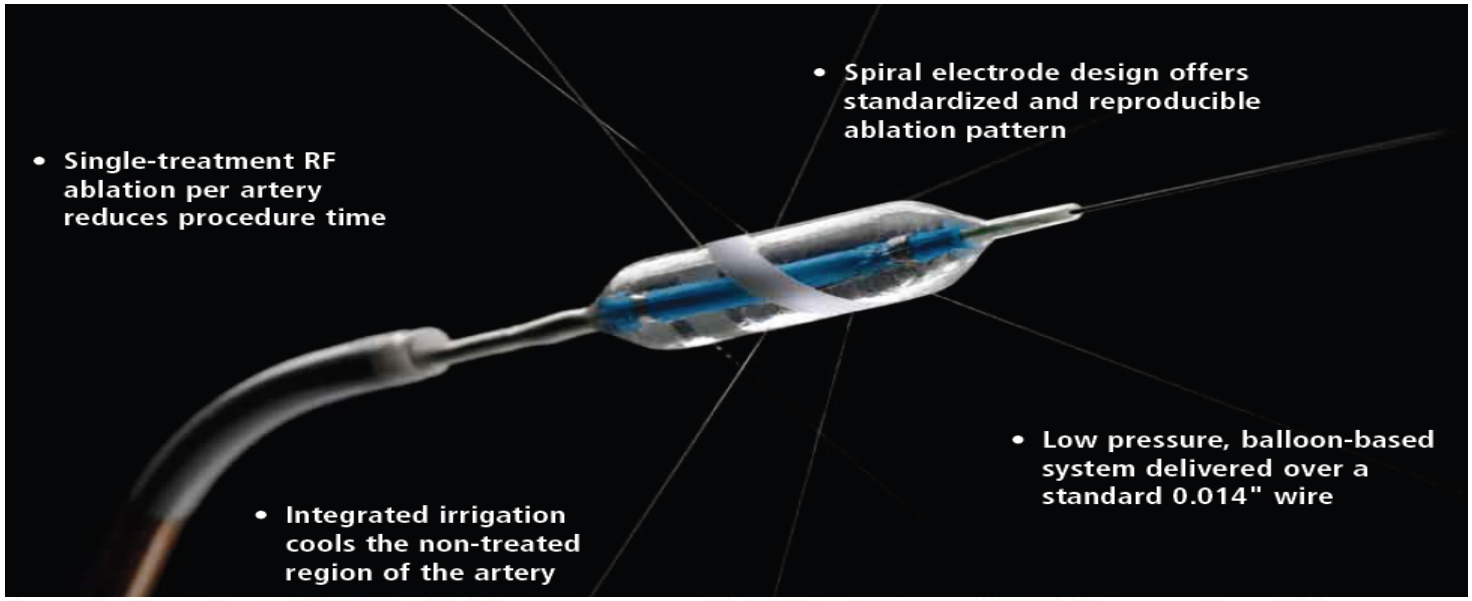
105 ± 22,9 ml (range 85 – 130 ml) mdc Iomeron 300

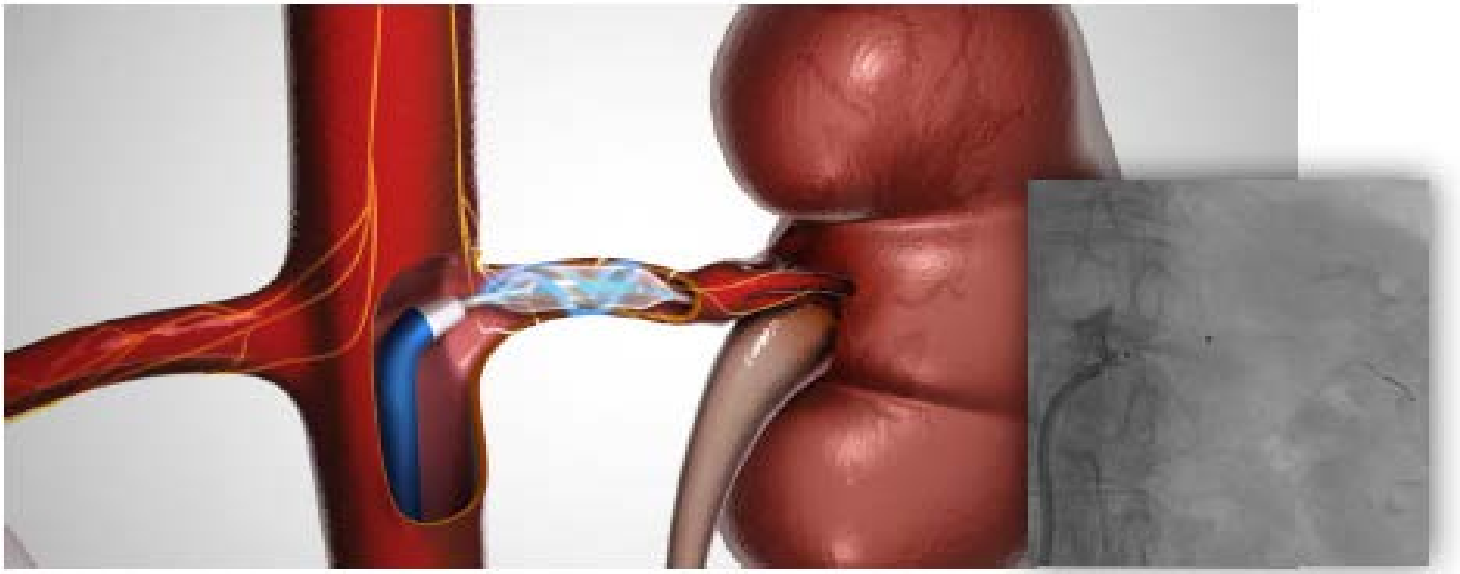
2500 UI EBPM i.a. ± boli 2500 UI sec. ACT

200 µg di Nitroglicerina selettivi in a. renale a bolo

8,3 ablazioni con RF per arteria (range 6-11)

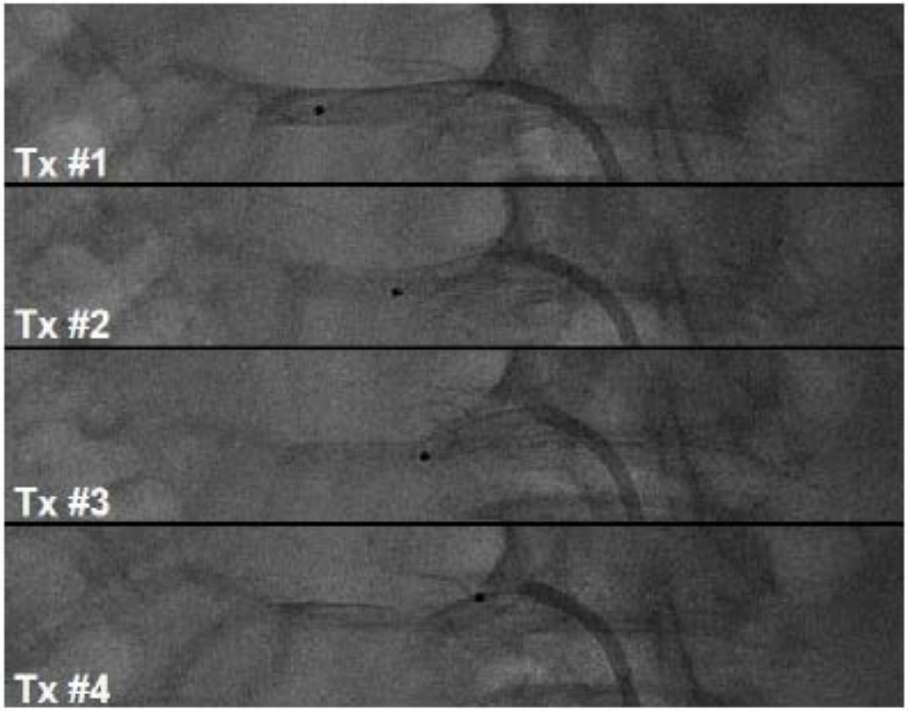
The Covidien OneShot™ renal denervation system



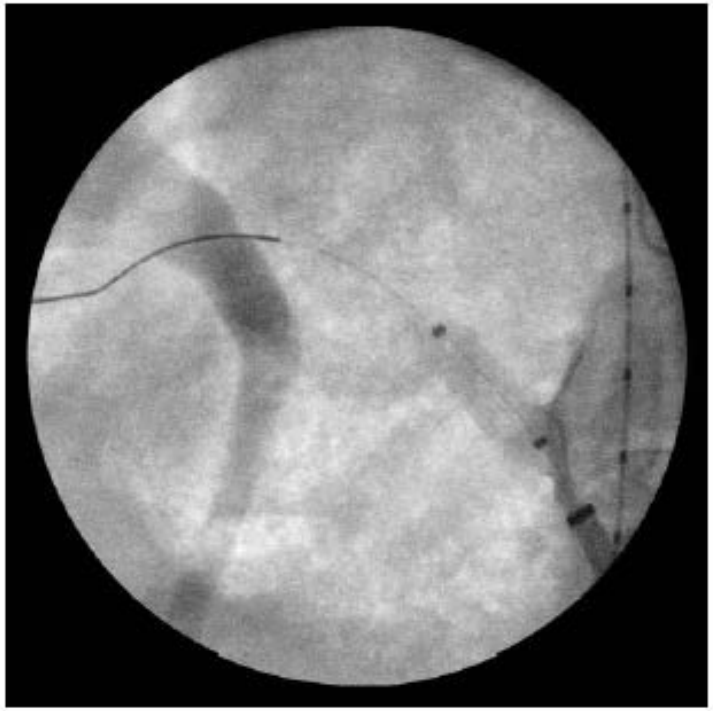


Fluoroscopy Images During Renal Denervation

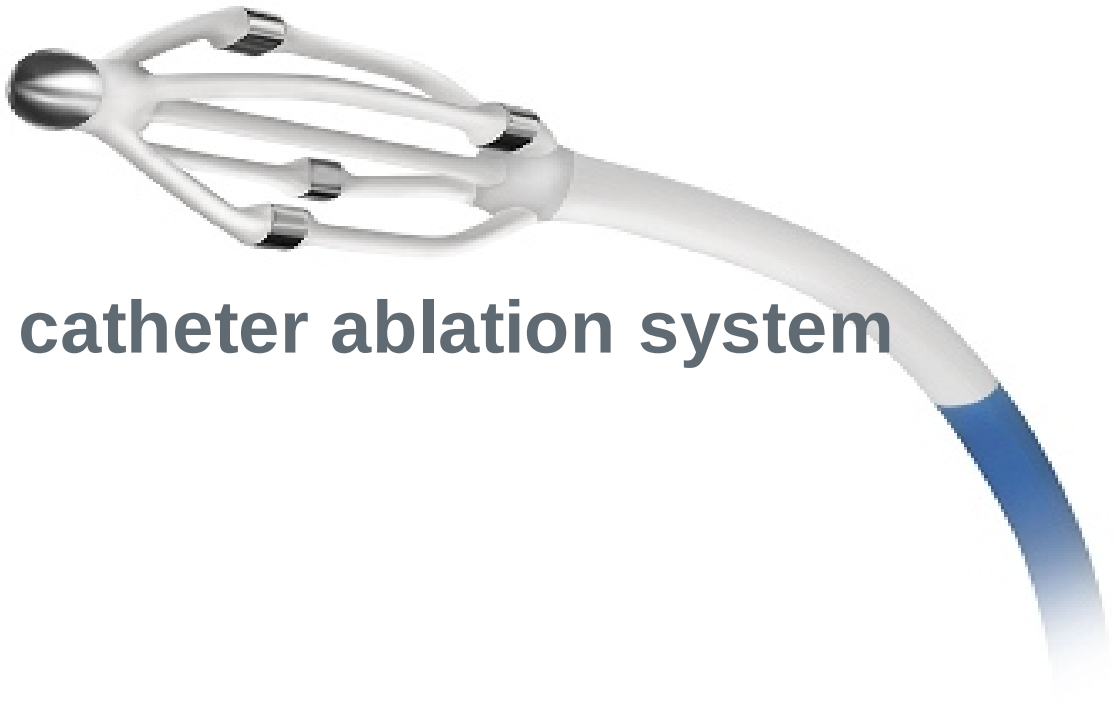
Medtronic Symplicity™ point-by-point based treatment



Covidien OneShot™ balloon based treatment



ENLIGHTN™ Multi-Electrode System



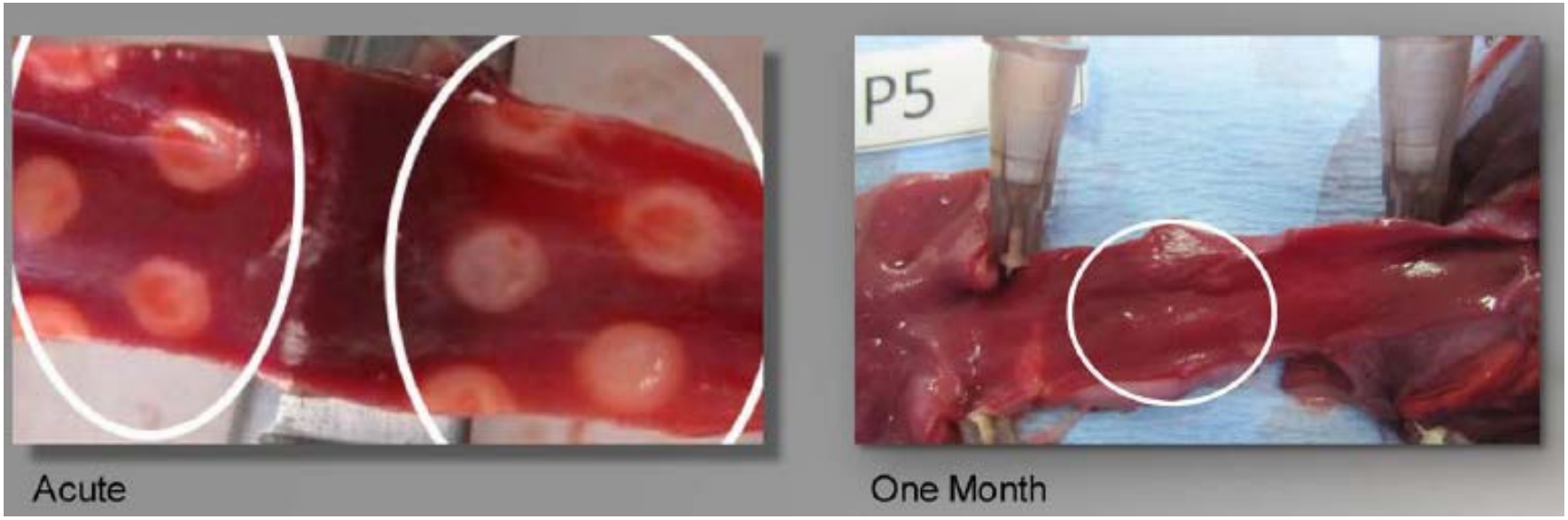
Multi-electrode catheter ablation system

ST. JUDE MEDICAL™
MORE CONTROL. LESS RISK.

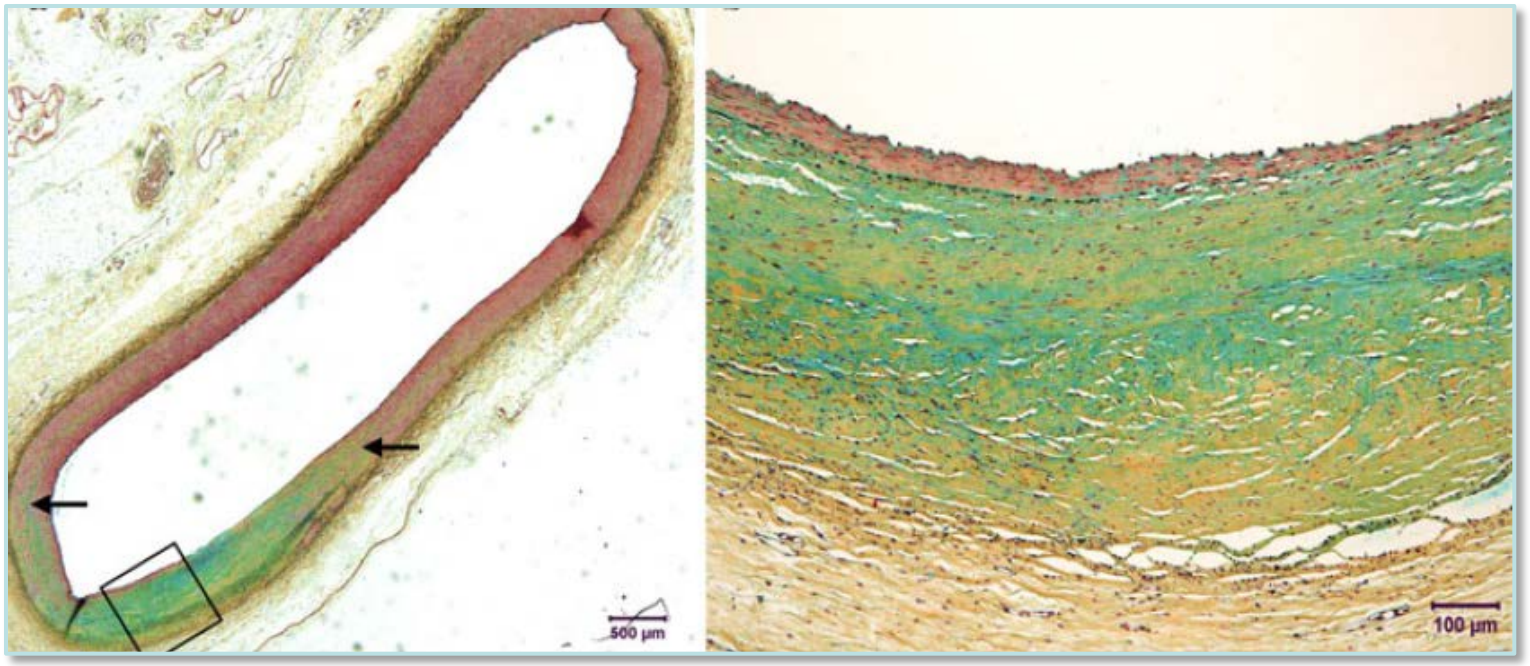
Cooled tip 7F quadripolar radiofrequency ablation (IBI/St Jude) catheter

Lewalter, Hypertension 2012

RENAL DENERVATION



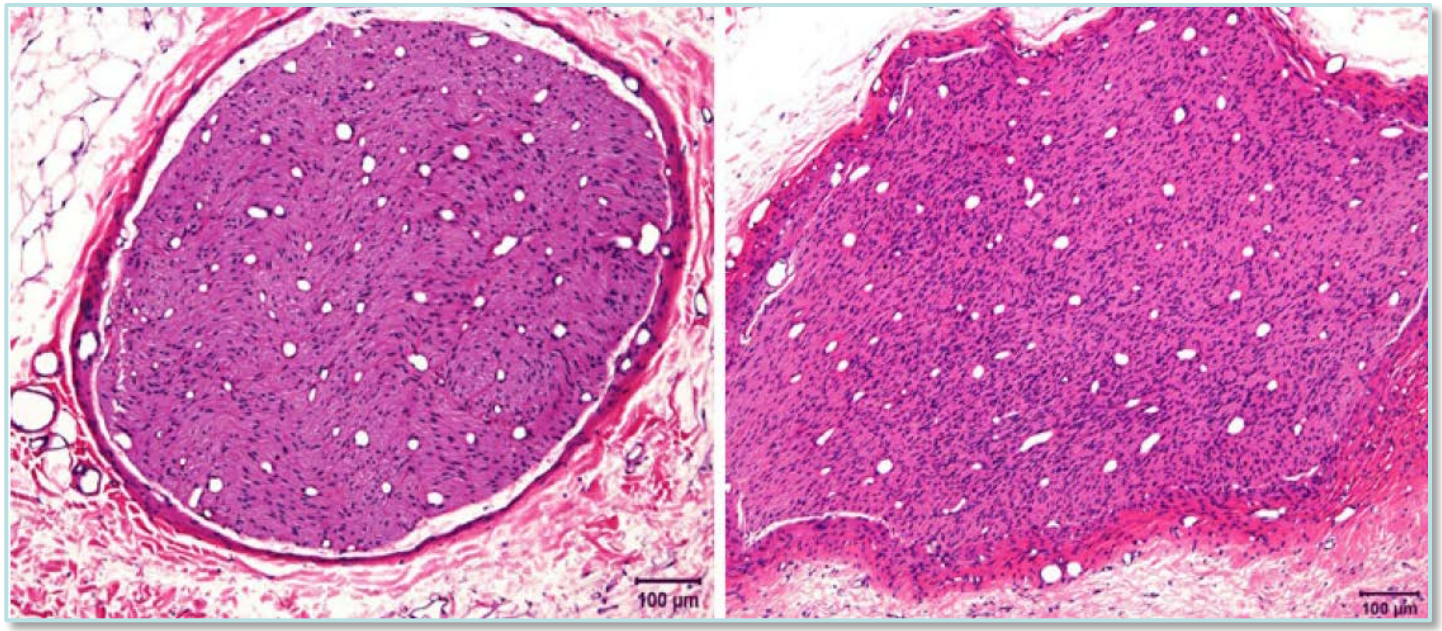
Six Month Post-Renal Denervation Histology (Porcine Model)



Rippy, *Clin Res Cardiol*. 2011

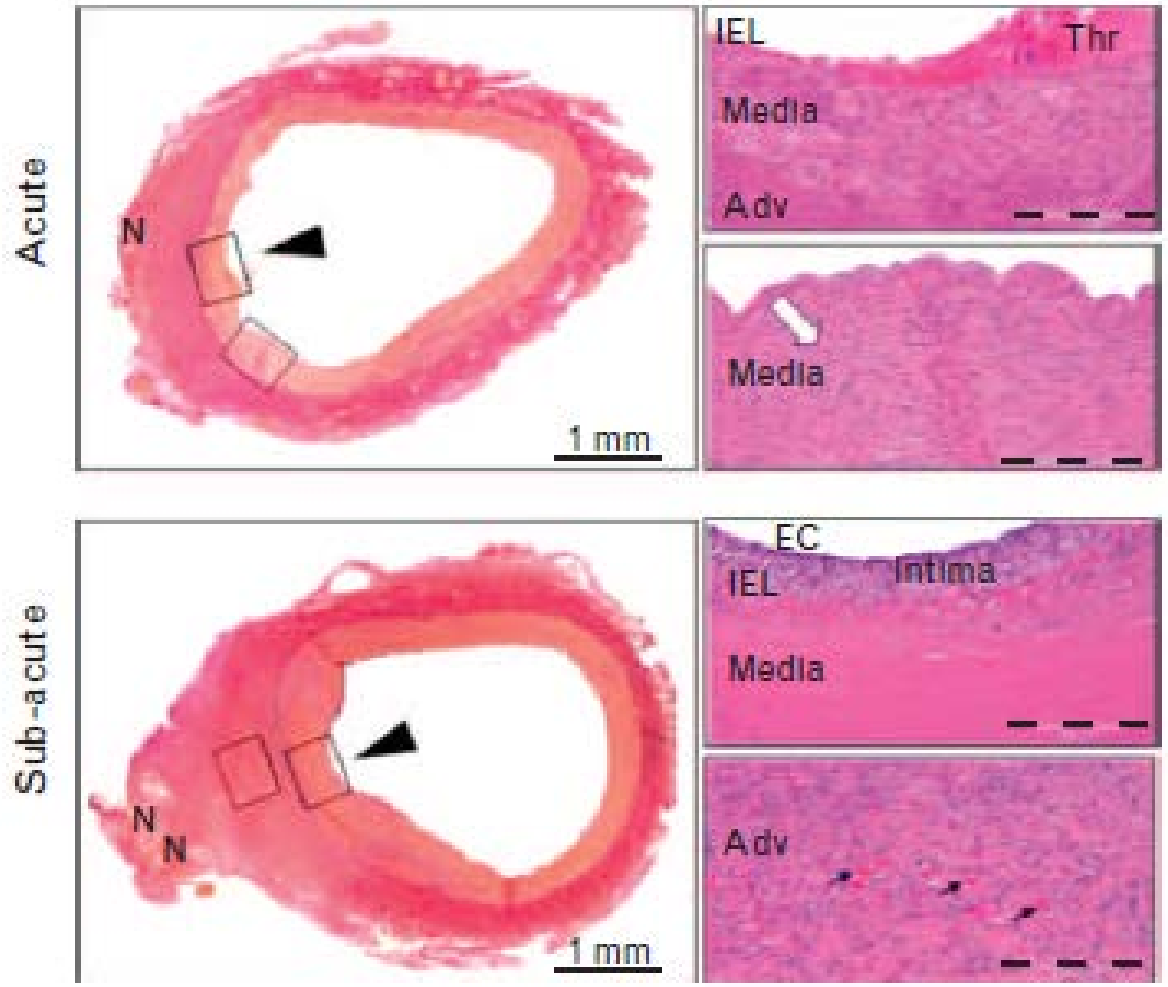
Six Month Post-Renal Denervation Nerve Histology (Porcine Model)

Nerve from Untreated Vessel **Nerve from Treated Vessel**



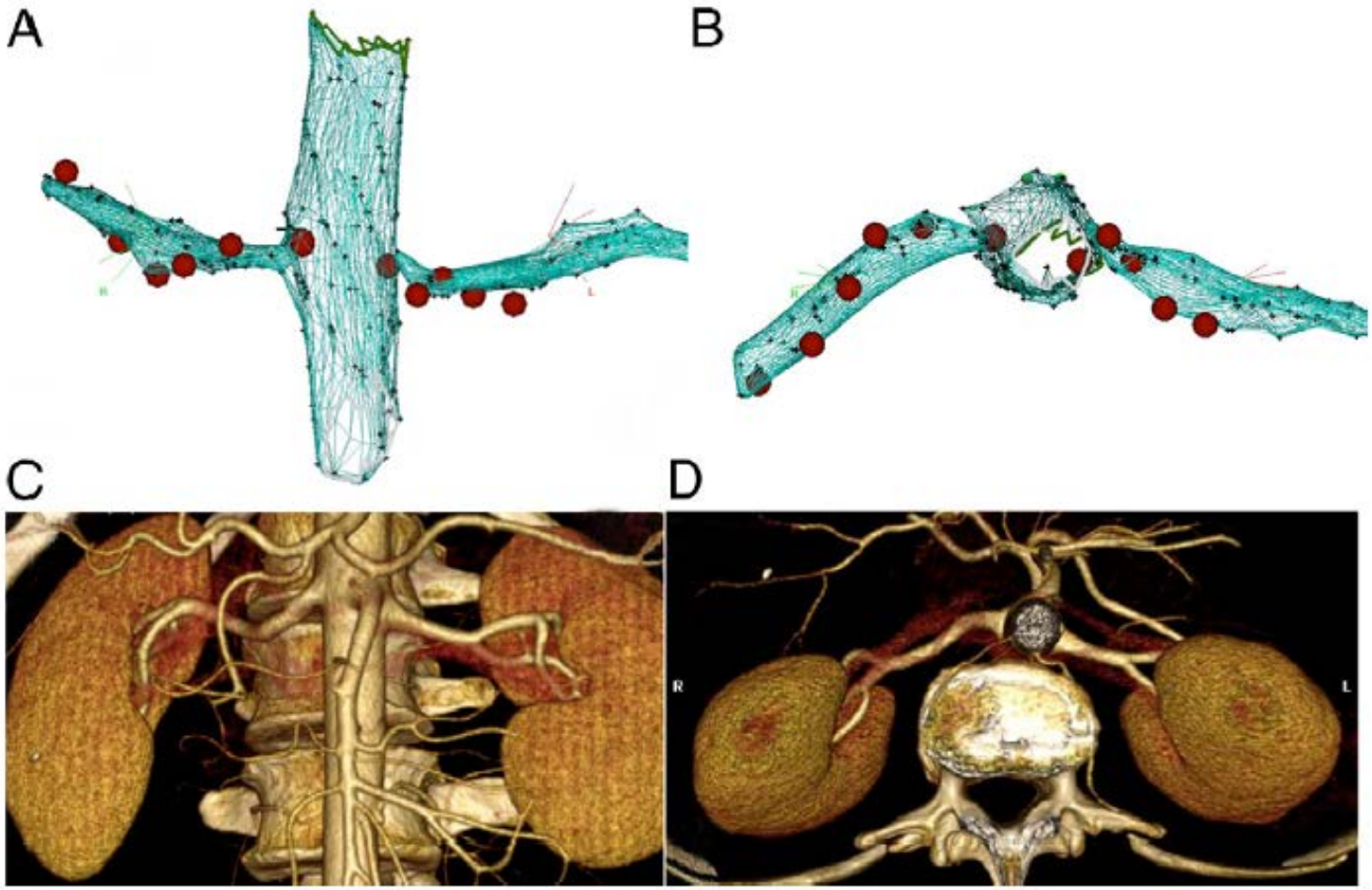
Rippy, *Clin Res Cardiol*. 2011

Porcine histological cross-sections of the treated renal arteries



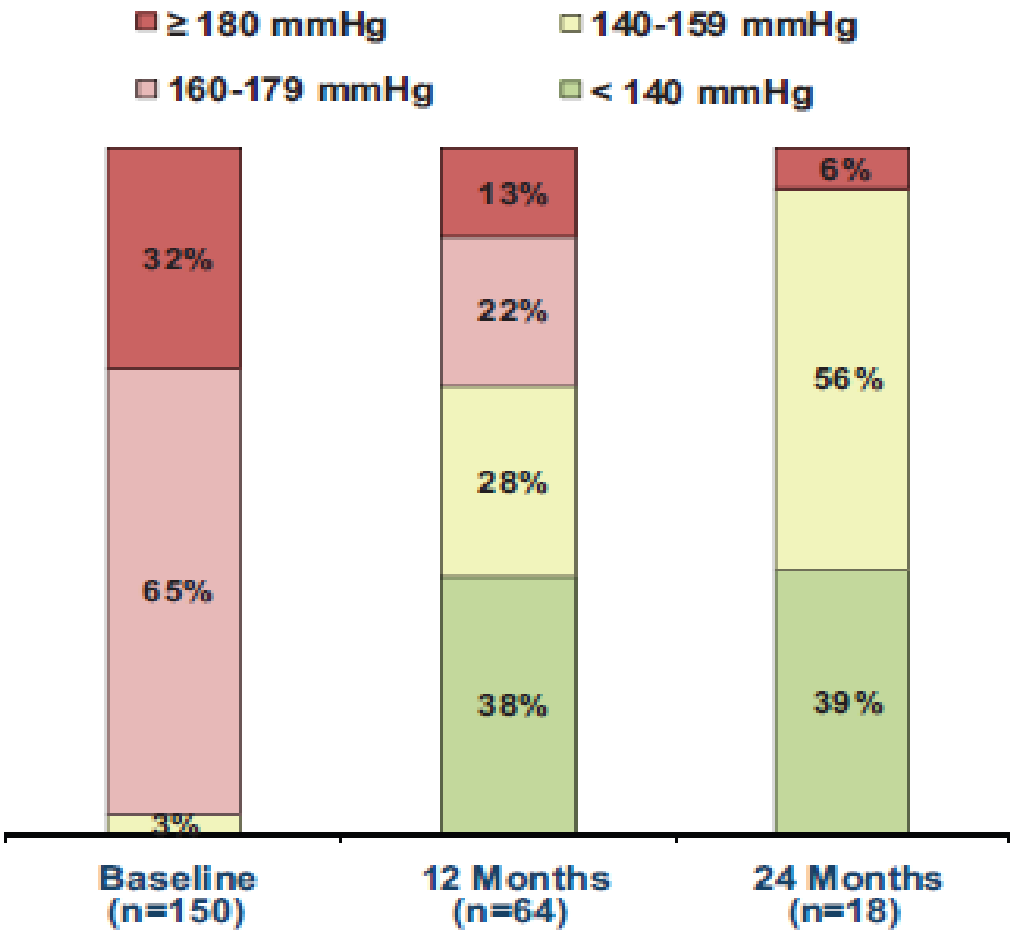
Steigerwald, J Hypertension 2012

Imaging of Renal Arteries Before and After Ablation



Pokushalov, JACC 2012

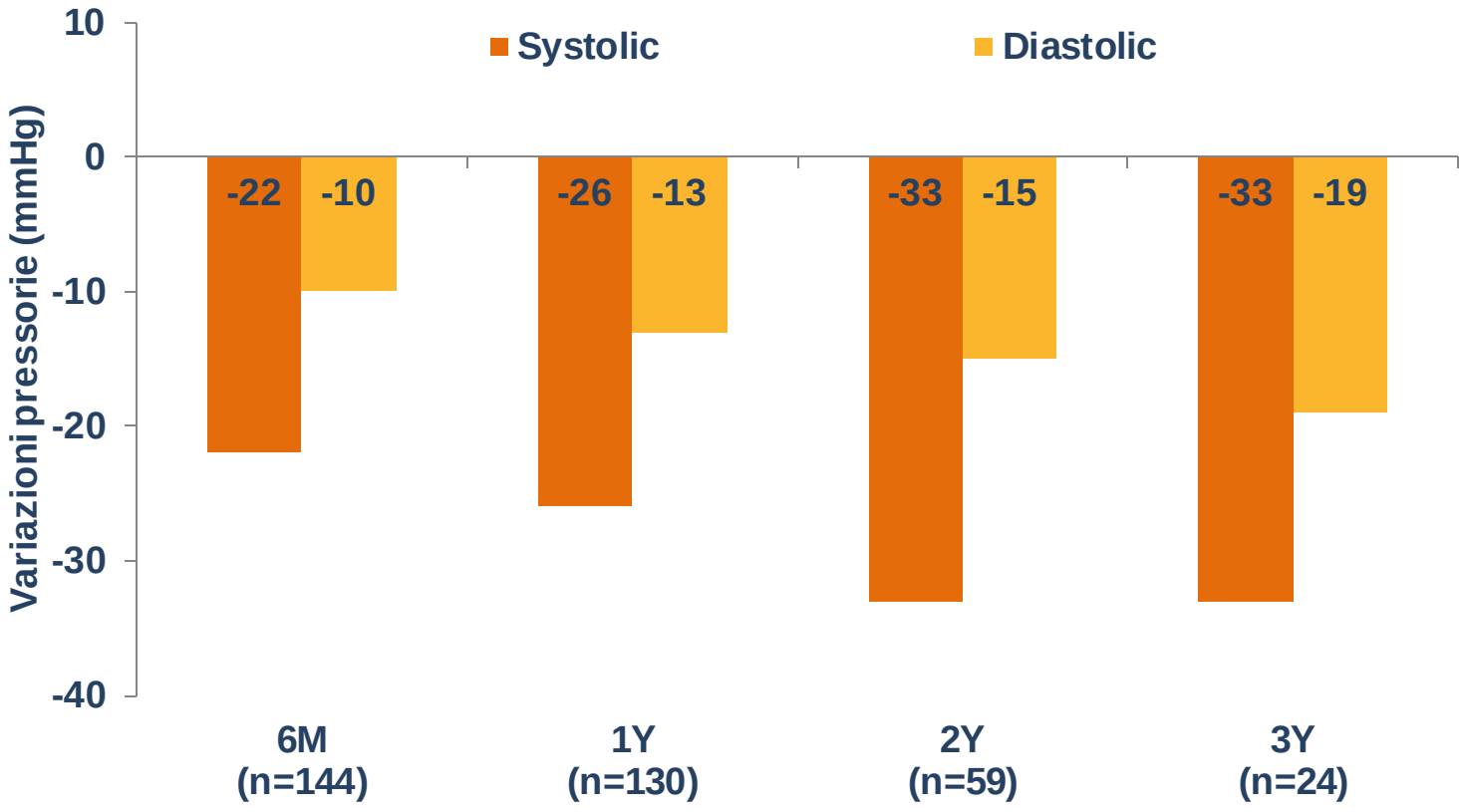
Symplicity HTN-1
24-Month Renal Denervation



Krum, Hypertension 2011

Interventional Studies
Hypertension Renal Denervation

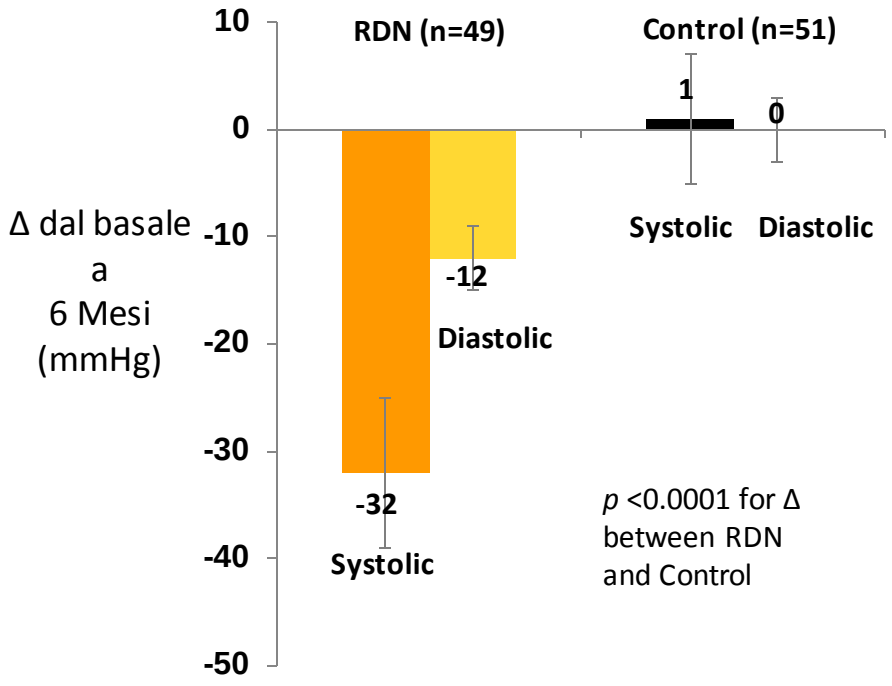
Symplicity HTN-1: follow up a 3 anni



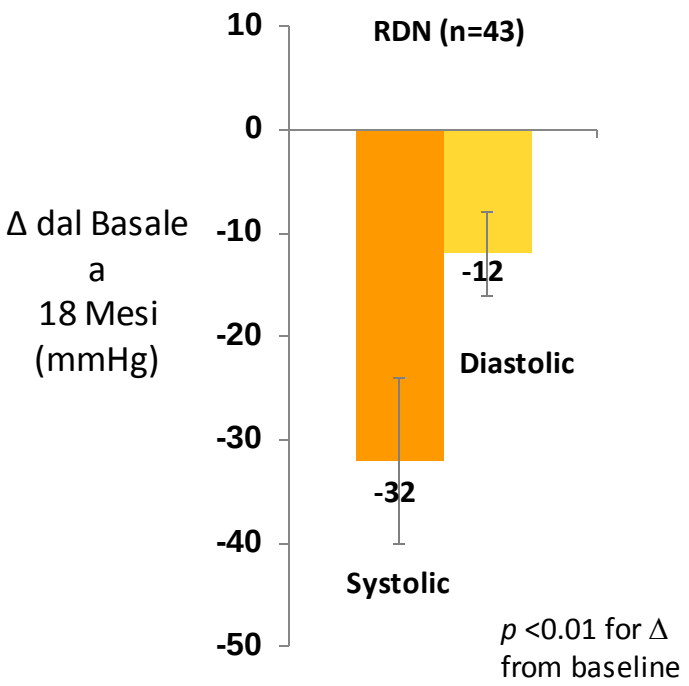
p <0.01 differenze significative per tutti I FU rispetto al valore di baseline

Symplicity HTN-2: Controllo a 18 mesi

Endpoint Primario
(6M post Randomisation)



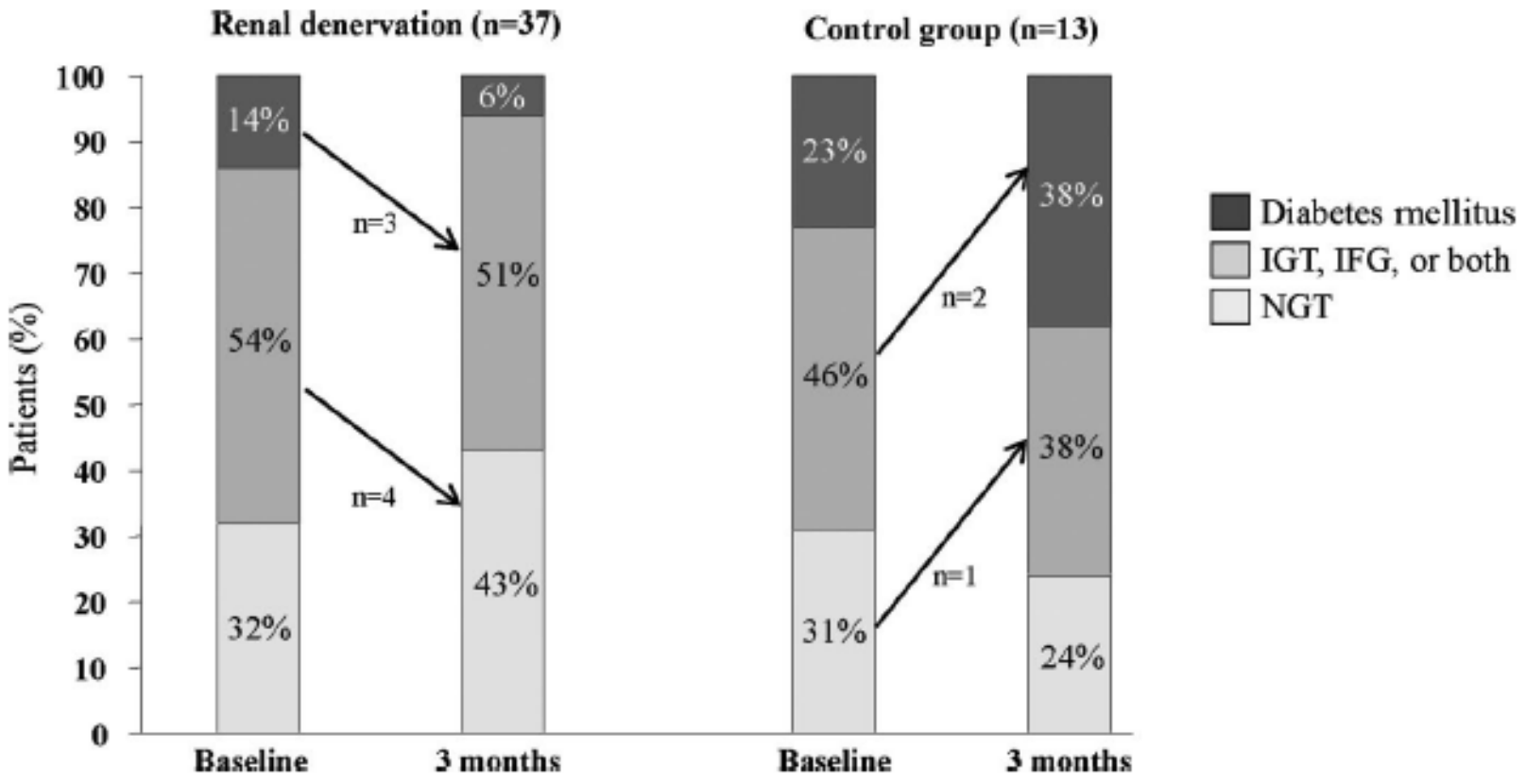
Ultimo Follow-up
(18M post Randomisation)



Primary Endpoint:

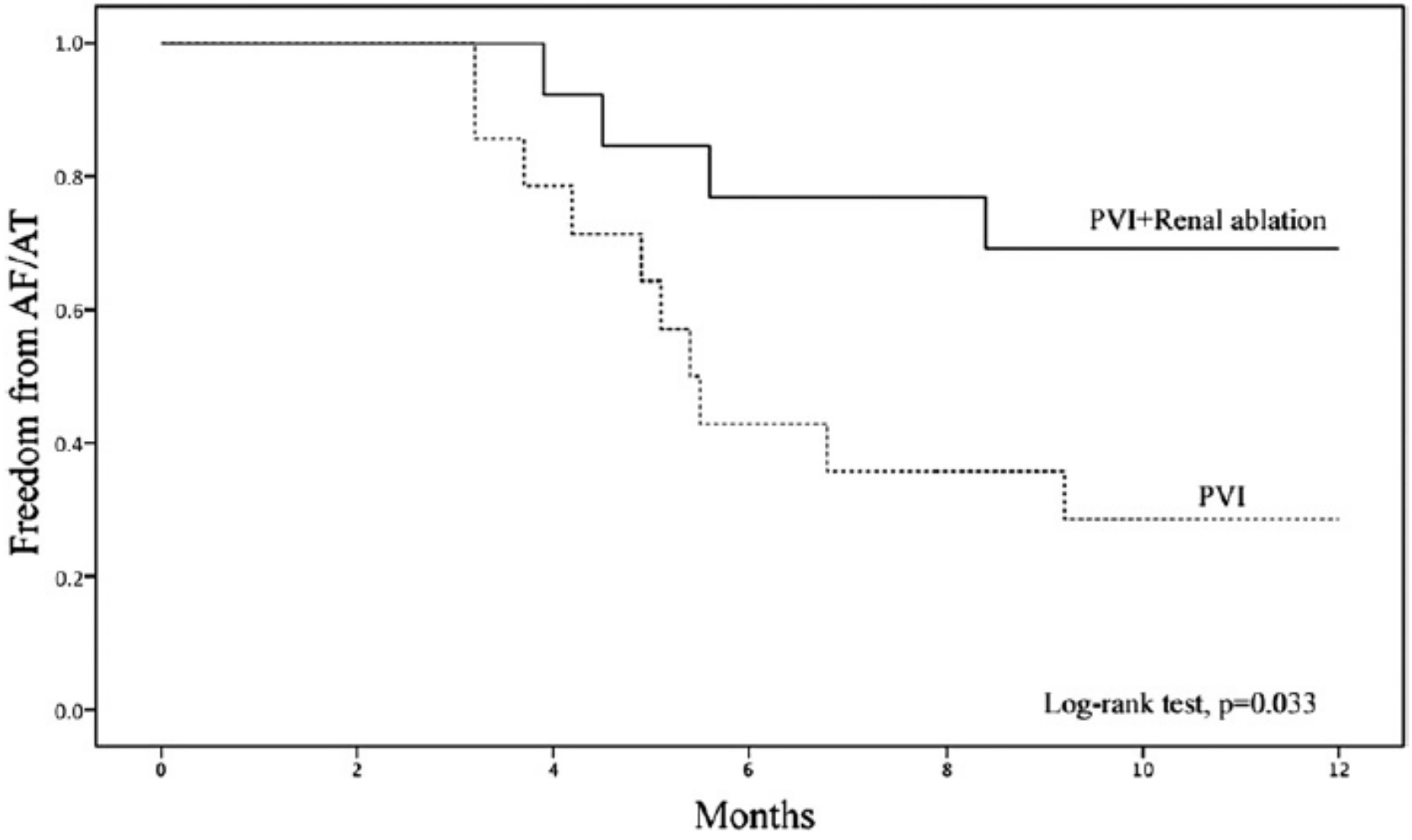
- >80% of RDN patients had ≥10 mmHg reduction in SBP
- 5 patients had ≤ 5mmHG reduction in SBP

Renal Denervation Improves Glucose Metabolism



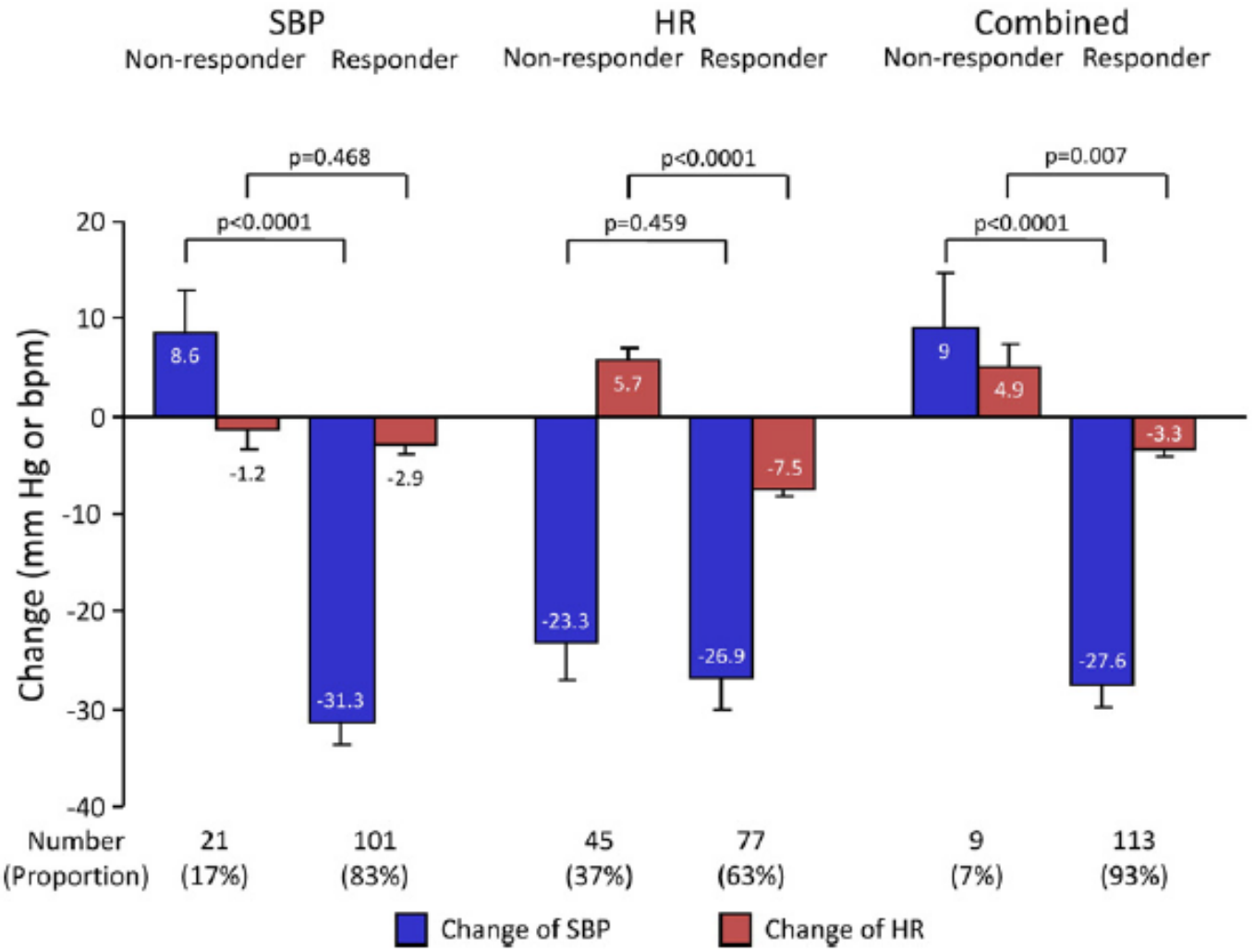
Mahfoud, Circulation 2011

Incidence of AF Recurrences in Patients With and Without Renal Artery Denervation



Pokushalov, JACC 2012

Effects of renal sympathetic denervation on SBP and heart rate



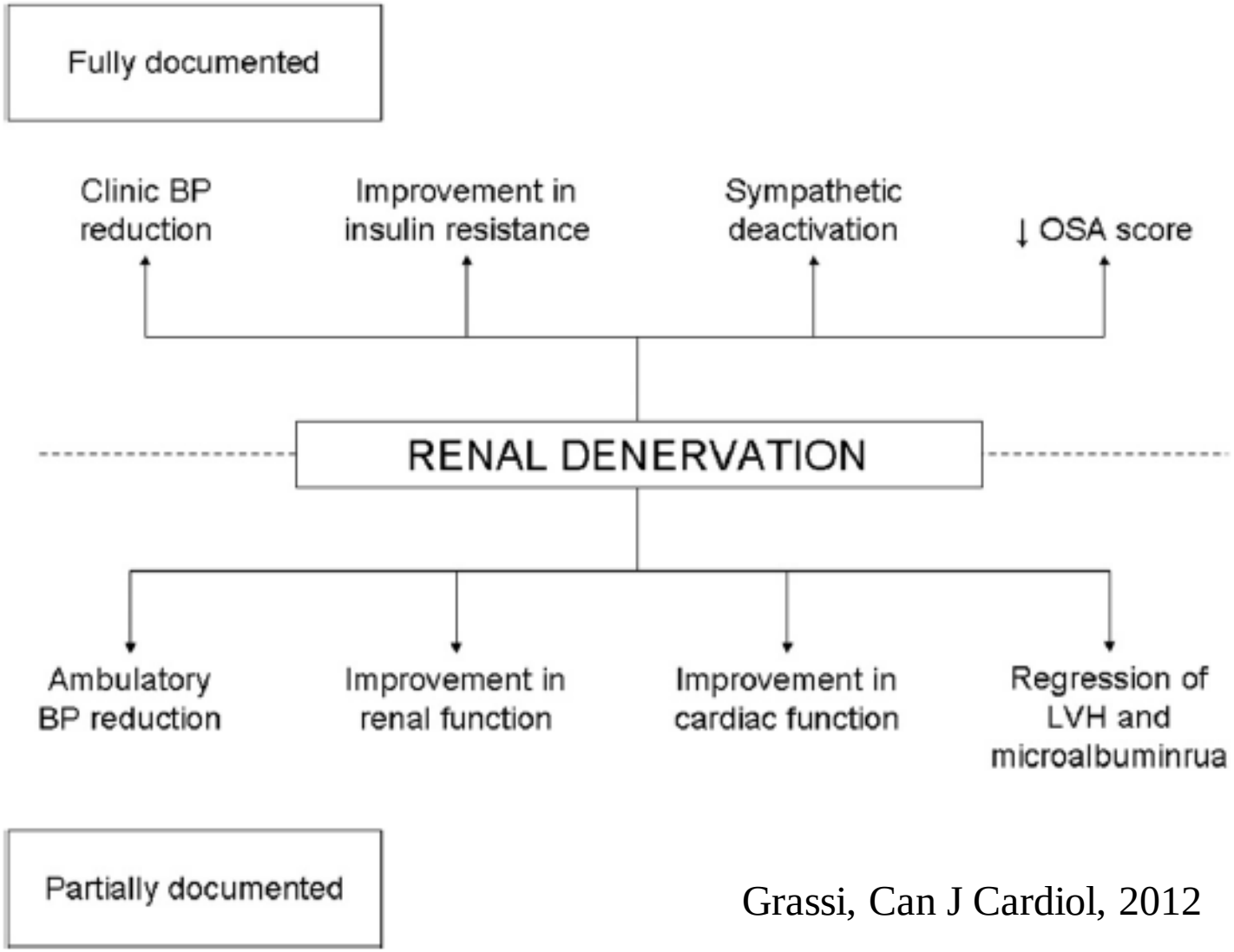
Ukena, International Journal of Cardiology,2012

RENAL DENERVATION TRIALS in progress

The RHAS (Renal Hypertension Ablation System) OneShot

EnligHTN three months study

Perspectives of renal denervation

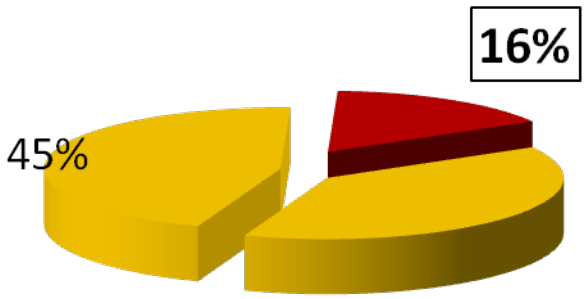


Grassi, Can J Cardiol, 2012

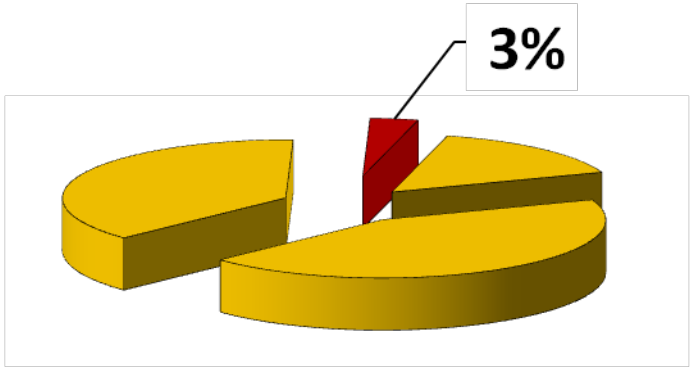
IPERTENSIONE RESISTENTE
Centro Ipertensione Torino

Pz totali = 9874

RESISTENTI (n=1520)

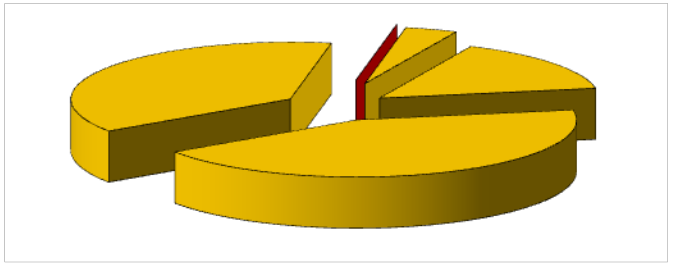


VERI RESISTENTI (n=357)

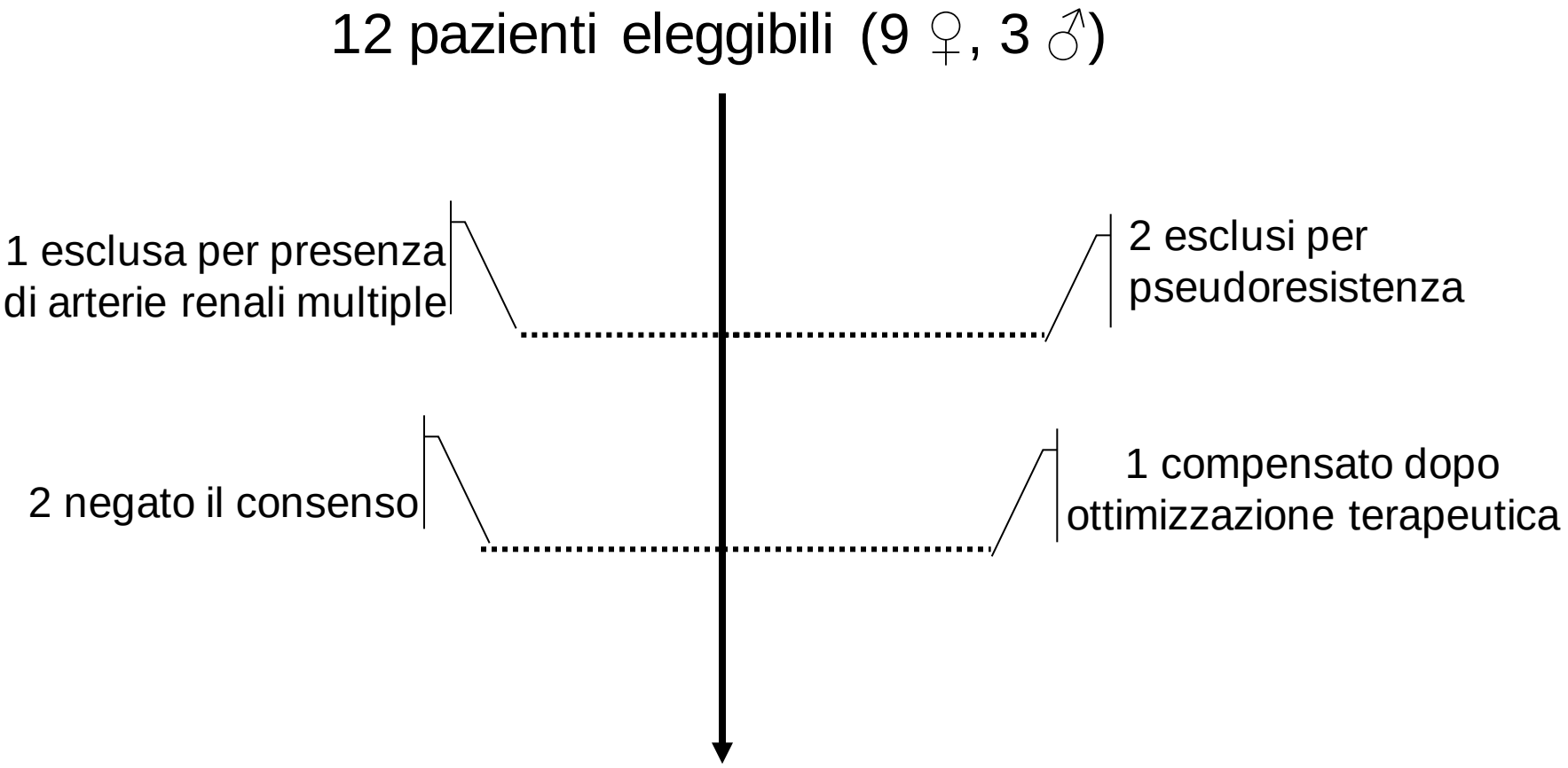


12 CASI ELEGGIBILI

0.06%

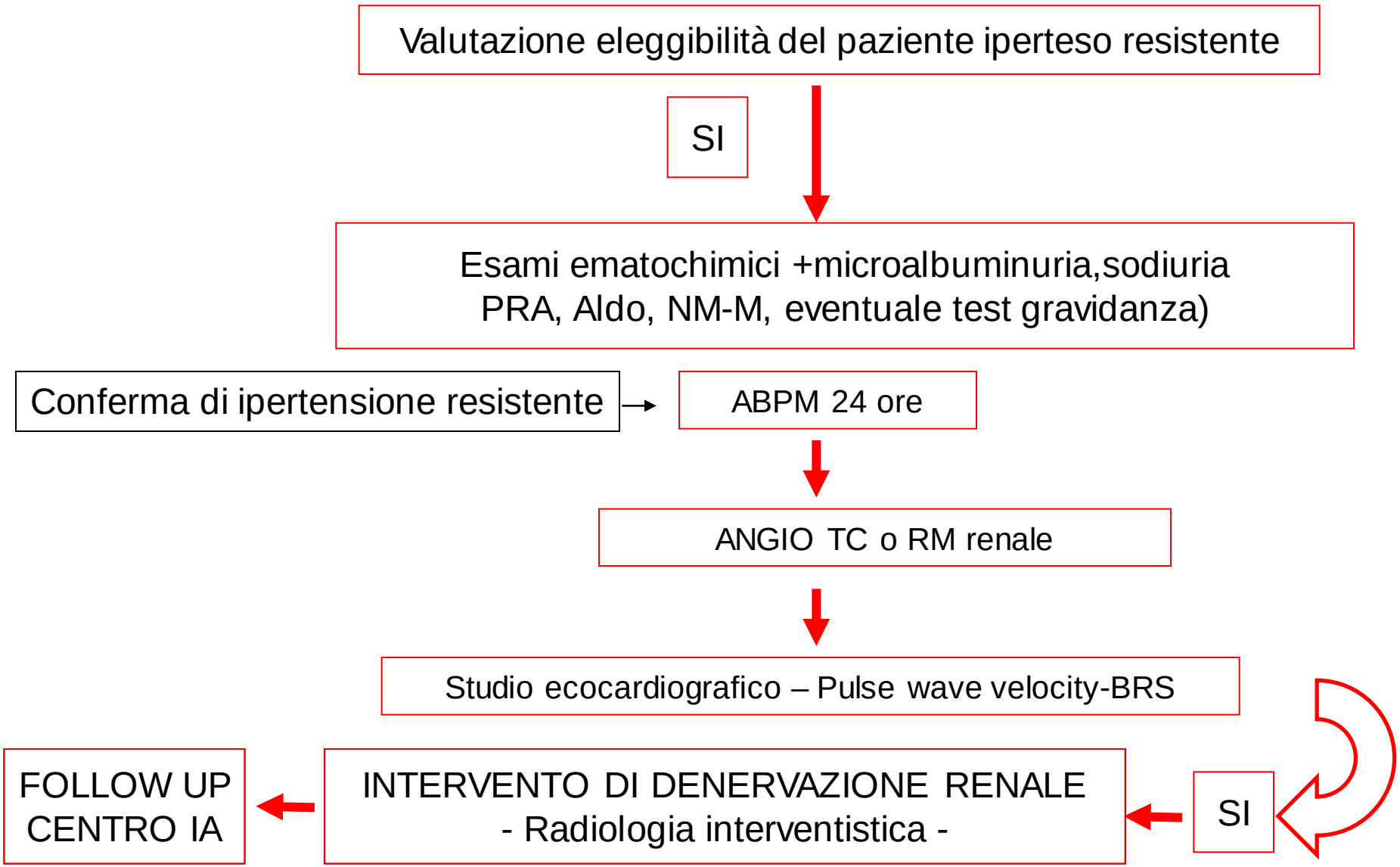


CASISTICA 2011/12 CENTRO IPERTENSIONE TORINO



5 pazienti sottoposti a denervazione nel 2011-2012 (5 ♀)
1 paziente candidata a denervazione ottobre 2012

PROTOCOLLO OPERATIVO - TORINO



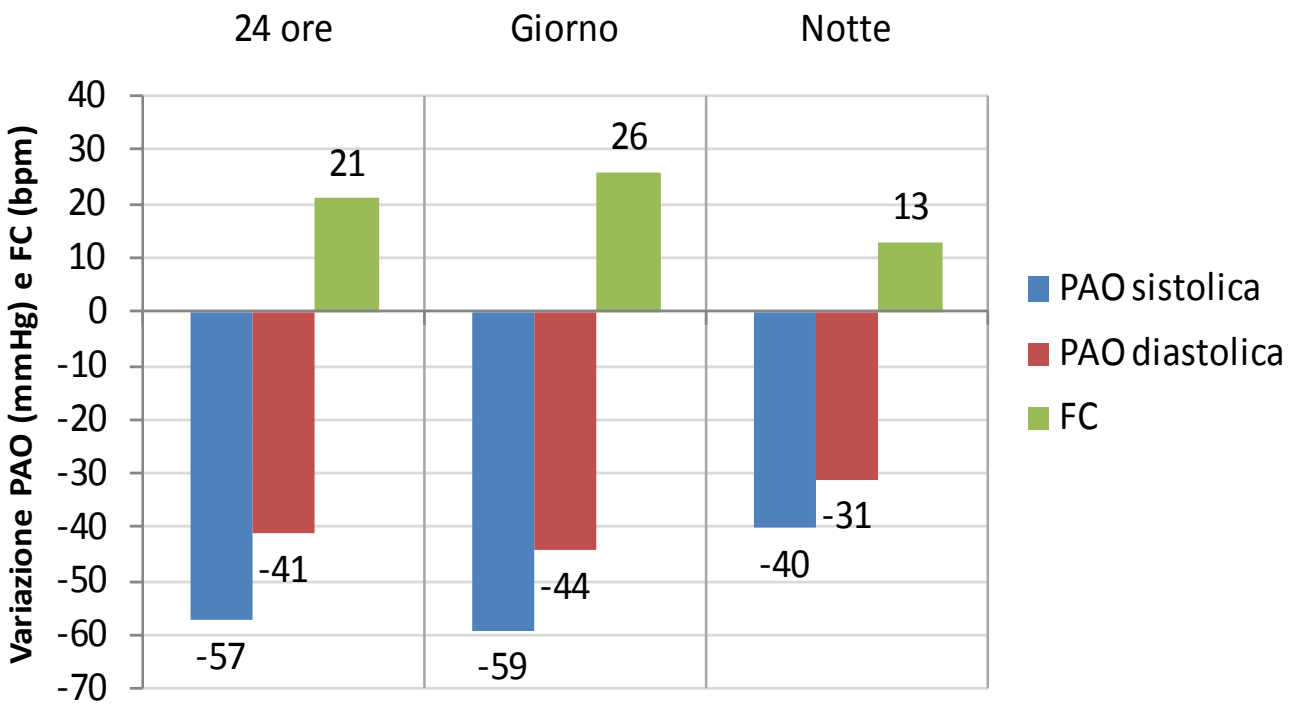
CARATTERISTICHE CLINICHE PAZIENTI

	Paziente 1	Paziente 2	Paziente 3	Paziente 4	Paziente 5
Età e sesso	44 ♀	40 ♀	49 ♀	52 ♀	50 ♀
PAO office (mmHg)	205/130	225/135	250/160	210/115	220/140
N. farmaci	10	11	12	7	13
BMI (Kg/m2)	32,7	31,2	29	21	22,4
DM	no	sì	no	no	no
Ictus	sì	sì	no	no	no

OUTCOME A BREVE

	Paziente 1	Paziente 2	Paziente 3	Paziente 4	Paziente 5
DENERVAZIONE	**SI BILAT**	**SI BILAT**	**NO**	**SI BILAT**	**SI BILAT**
Complicanze operatorie/ Post/ Operatorie	No/no	No/no	Dissecazione a. renale/no	No/no	Pseudoaneurisma a.fem/no
Ipotensione post intervento	*No*	*Si marcata*	*Si moderata*	*No*	*No*
Dolore	8/10	9/10	10/10	3/10	8/10
Terapia dolore	Morfina+ paracetamolo	Morfina+ paracetamolo	Morfina+ paracetamolo	paracetamolo	Morfina+ paracetamolo
Degenza (giorni)	3	4	7	3	3

Denervazione renale: follow-up 6 mesi



MSVAlt basale 76 g/m^{2,7} → MSVAlt a sei mesi 55 g/m^{2,7}

Riepilogo dati ricovero

Stato Cartella: Sola lettura	**S.C.:** 2666-Medicina Interna 4	
Cartella N°: 2011046122	**Tipo di episodio:** Ricovero Ordinario	
Assistito: [redacted]	**Data di Nascita:** 30/06/1959	**Sesso:** Femmina
Data di accettazione: 15/11/2011	**Data di dimissione:** 18/11/2011	**GG Degenza:** 3
Condizione di dimissione: 2-Ordinaria	**DRG:** 120 - Altri int. su app. circolatorio	**MDC:** 05: 05-Mal. e dist. sis.cardiocircol
Categoria DRG: C: C - peso > 2.0	**Peso DRG:** 3,1099	**N.ro di calcoli:** 8
Tipo DRG: Chirurgico	**Primo calcolo:** 24/11/2011	**Ultimo calcolo:** 14/12/2011

Diagnosi

Progr.	Data	Codice	Descrizione
1	24/11/2011	4010	IPERTENSIONE ESSENZIALE MALIGNA
2	24/11/2011	40490	CARDIONEFROPATIA IPERTENSIVA NON SPECIFICATA SENZA INSUFFICIENZA CARDIACA E CON PATOLOGIA RENALE CRONICA DALLO STADIO I ALLO STADIO IV, O NON SPECIFICATA
3	24/11/2011	3004	DISTURBO DISTIMICO
	15/11/2011	Accettazione	ipertensione resistente

Procedure

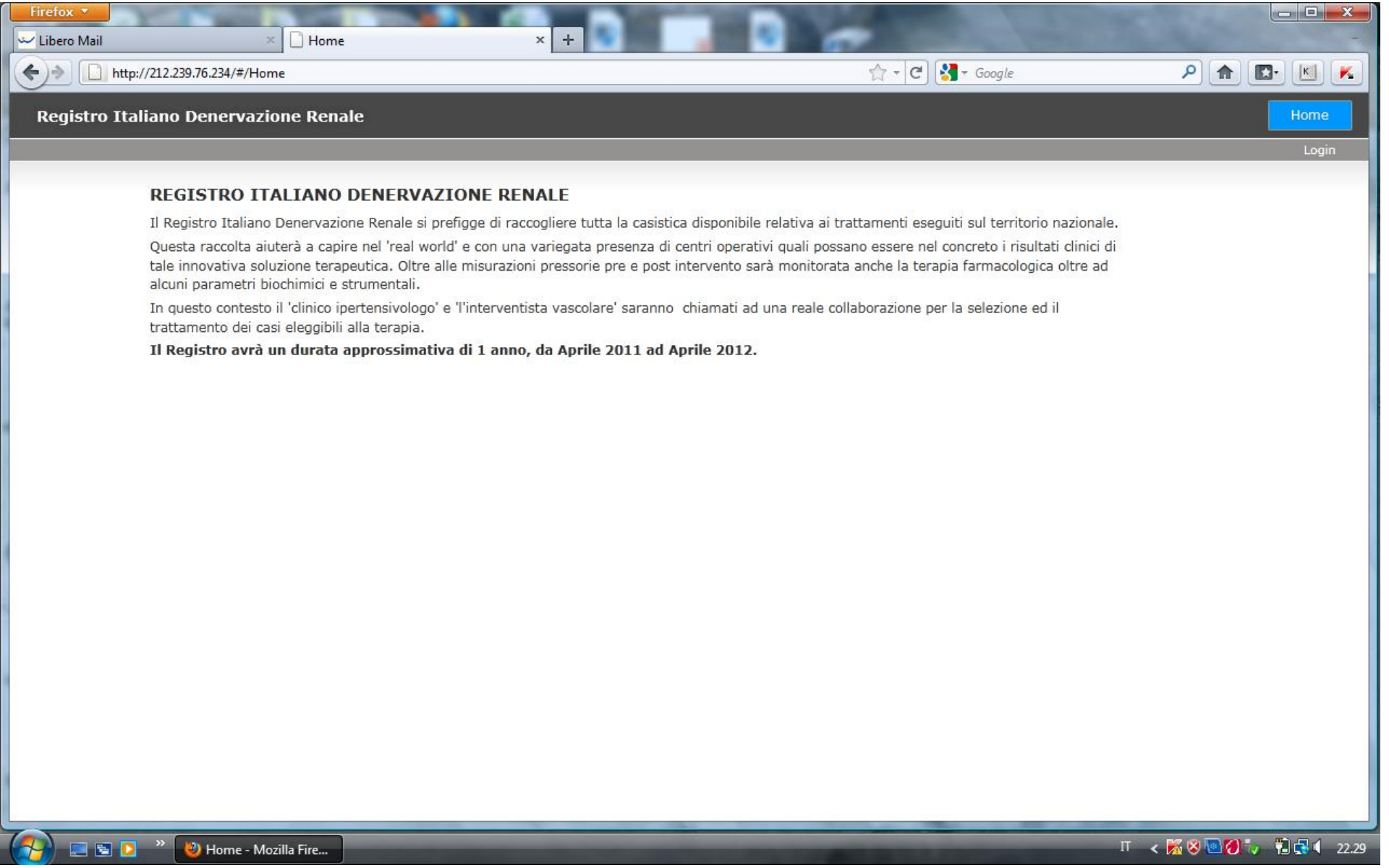
Progr.	Data	Codice	Descrizione
1	16/11/2011	0525	SIMPATECTOMIA PERIARTERIOSA
2	16/11/2011	8845	ARTERIOGRAFIA DELLE ARTERIE RENALI
3	16/11/2011	9926	INIEZIONE DI TRANQUILLANTI
4	16/11/2011	9918	INIEZIONE O INFUSIONE DI ELETTROLITI
5	15/11/2011	8744	RADIOGRAFIA DEL TORACE DI ROUTINE, SAI
6	15/11/2011	8952	ELETTROCARDIOGRAMMA

DRG 120 peso 3,1 concordato con Direz. Sanitaria

Centri Attivi RDN

31 Centri Attivi

138 Casi effettuati


Firefox
Libero Mail
Home
http://212.239.76.234/#/Home
Google
Registro Italiano Denervazione Renale
Home
Login
REGISTRO ITALIANO DENERVAZIONE RENALE
Il Registro Italiano Denervazione Renale si prefigge di raccogliere tutta la casistica disponibile relativa ai trattamenti eseguiti sul territorio nazionale.
Questa raccolta aiuterà a capire nel 'real world' e con una variegata presenza di centri operativi quali possano essere nel concreto i risultati clinici di tale innovativa soluzione terapeutica. Oltre alle misurazioni pressorie pre e post intervento sarà monitorata anche la terapia farmacologica oltre ad alcuni parametri biochimici e strumentali.
In questo contesto il 'clinico ipertensivologo' e 'l'interventista vascolare' saranno chiamati ad una reale collaborazione per la selezione ed il trattamento dei casi eleggibili alla terapia.
Il Registro avrà un durata approssimativa di 1 anno, da Aprile 2011 ad Aprile 2012.
Home - Mozilla Fire...
IT
22.29


Grazie