Renal Sympathetic Denervation as a Model for Studying the Influence of Hyperoxygenation and Low Salt Intake on Sympathetic Activity and Blood Pressure

Published: 19-06-2013
Last updated: 23-04-2024

To study the effects of renal denervation on the responsiviness of blood pressure to sodium and hyperoxigenation, respectively.

Ethical review	Approved WMO
Status	Will not start
Health condition type	Other condition
Study type	Observational invasive

Summary

ID

NL-OMON38576

Source
ToetsingOnline

Brief title
RHODOS Trial

Condition

- Other condition

Synonym
high blood pressure, Hypertension

Health condition

Hypertensie

Research involving
Human

Sponsors and support

Primary sponsor: Academisch Medisch Centrum
Source(s) of monetary or material Support: Ministerie van OC&W

Intervention

Keyword: Hyperoxygenation, Renal denervation, Salt, Sympathetic nerve activity

Outcome measures

Primary outcome

- Ambulatory blood pressure during day-time (night-time and dipping response)

- Office based blood pressure

Secondary outcome

- Continuous non-invasive hemodynamic recordings supine and standing (as a

read-out for sympathetic nerve activity) (Nexfin device, Bmeye Amsterdam)

- Plasma renin-activity (PRA), aldosteron, ANP, NT proBNP

Study description

Background summary

Renal sympathetic denervation (RSD) has emerged as an attractive minimally invasive treatment option for patients with therapy resistant hypertension. Despite its general effectiveness, the blood pressure (BP) lowering effect of RSD is highly variable and incompletely understood. Radiofrequency ablation of the renal sympathetic nerves in RSD non-selectively targets both efferent and afferent renal sympathetic nerve fibers. Reducing efferent sympathetic outflow to the kidneys may decrease renin release and tubular sodium retention, while increasing renal blood flow. Contra-directionally, interruption of afferent renal nerve traffic through RSD may lower central sympathetic nerve activity (SNA) by attenuation of the renal stimulatory actions on central SNA. Mounting evidence suggests that the driving force behind afferent renal sympathetic nervous activation is renal medullary hypoxia, determined by the balance

between renal oxygen supply and demand. Accordingly, supplementation of 100% oxygen in CKD patients has shown to decrease SNA. Since sodium transport is the primary oxygen consuming activity of the kidneys, renal medullary hypoxia and thus renal afferent sympathetic nerve activity may be affected by dietary sodium intake. Indeed, it has been shown that lowering dietary sodium intake increases medullary oxygenation reduces SNA. Finally, SNA itself may exaggerate renal medullary hypoxia, since increased sympathetic outflow attenuates renal blood flow, but simultaneously increase tubular oxygen demand through increased sodium retention. Altogether this yields a vicious circle of medullar hypoxia leading to sympathetic hyperactivity and vice versa, amplified by increased dietary sodium intake.
We hypothesize that through its efferent effects, with inhibition of renin release and tubular sodium retention, RSD may potentiate the BP lowering effect of a dietary sodium restriction.
Additionally, we hypothesize that supplementation of 100% oxygen has a less profound effect on SNA during dietary sodium restriction and we expect the effect of oxygen supplementation on SNA to be blunted after RSD from reduced renal afferent signaling.

Study objective

To study the effects of renal denervation on the responsiviness of blood pressure to sodium and hyperoxigenation, respectively.

Study design

A prospective clinical cohort study with invasive measurements before and after RSD.

Study burden and risks

The dietary salt restriction of one week as proposed in this study is not associated with any substantial risk. The hemodynamic measurements are all non-invasive and can be carried out safely. Supplementation of 100% oxygen 10L/min during 10 minutes using a non-rebreathing mask does not propose a risk for participating patients. There is no individual but only a group related benefit for participation in this study.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)
Elderly (65 years and older)

Inclusion criteria

- Age *18 years
- Indication for renal sympathetic denervation for therapy resistant hypertension
- Patient is willing to participate and able to give informed consent

Exclusion criteria

- pregnancy or planned pregnancy
- planned surgery during the study period
- drugs- or alcohol abuse
- unable to give informed consent
- actively following a caloric restricted diet for intentional weight loss

Study design

Design

Study type: Observational invasive

Masking:	Open (masking not used)
Control:	Uncontrolled
Primary purpose:	Basic science

Recruitment

NL

Recruitment status:	Will not start
Enrollment:	40
Type:	Anticipated

Ethics review

Approved WMO

Date:	19-06-2013
Application type:	First submission
Review commission:	METC Amsterdam UMC

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL44669.018.13