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RENAL HAEMODYNAMICS DURING CHRONIC THERAPY WITH ELECTRICAL STIMULATION OF THE CAROTID SINUS IN HUMANS

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Objective: To evaluate renal haemodynamics in drug-resistant hypertensive patients who underwent implantation of the Rheos[®] System (CVRx, Inc., Minneapolis, MN, USA). The Rheos System electrically stimulates carotid sinus baroreceptors to activate the baroreflex and subsequently reduces sympathetic tone, resulting in a reduction in blood pressure.

Design and Methods: Of the 16 patients who underwent implantation of the device at the University Hospital Maastricht, a cohort of 12 patients (5f/ 7m, age: 50±11 year, BMI: 32±7 kg/m²) has completed 1 year of chronic therapy. In this cohort, blood pressure (BP) and heart rate (HR) were measured non-invasively at supine rest. Effective renal plasma flow (ERPF) was measured as the clearance of para-immunohippuric acid (PAH) and glomerular filtration rate (GFR) was measured as the clearance of inulin, using the continuous infusion method. Filtration fraction (FF) was calculated as GFR/ERPF. Measurements were performed at pre-implant and repeated at 1 year post-implant during baroreflex activation therapy. At post-implant, infusion was extended for 1 hour with the therapy turned off. At the end of this hour BP and HR were measured and a second series of blood samples were drawn.

Results: Resting systolic and diastolic BP were significantly decreased at post-implant compared to pre-implant (-25±14 and -19±11 mmHg, respectively, p=.001) and HR was unchanged. ERPF showed a decreasing trend (-33±55 ml/min*1.73m², p=.057), while GFR was unchanged. FF was significantly increased (2±3 %, p=.029). Turning off therapy for 1 hour, significantly increased BP (13±10 and 10±11 mmHg, respectively, p=.001 and p=.010, respectively) and showed an increasing trend in ERPF (10±16 ml/min*1.73m², p=.062) and an unchanged GFR.

Conclusion: As expected, 1 year of chronic therapy with the Rheos System significantly decreased BP, showed a trend toward decreasing ERPF, and maintained GRF. These results indicate that, chronic carotid baroreceptor activation does not impair overall renal function.