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Efficacy of renal denervation in the porcine model

Rationale: Recently, the efficacy of renal denervation (RDN) has been questioned. It is discussed whether RDN is able to adequately reach the renal nerves.

Objective: We aimed to investigate how effective RDN was by means of functional hemodynamic measurements and nerve damage on histology.

Methods and results: We performed hemodynamic measurements in both renal arteries of healthy pigs using a Doppler flow and pressure wire. Subsequently unilateral denervation was performed, followed by repeated bilateral hemodynamic measurements. Pigs were terminated directly after RDN or were followed for 3 weeks or 3 months after the procedure. After termination, both treated and control arteries were prepared for histology to evaluate vascular damage and nerve damage. Directly after RDN, resting renal blood flow tended to increase. In contrast, renal resistance reserve increased significantly during follow-up. Vascular histopathology showed that most nerves around the treated arteries were located outside the lesion areas, whereas only 14% of the nerves per pig were observed within a lesion area. Subsequently, a correlation was noted between a more impaired adventitia and a reduction in renal resistance reserve (β : -0.33; $P=0.05$) at three weeks of follow-up

Conclusion: Only a small minority of renal nerves was targeted after RDN. Furthermore, more severe adventitial damage was related to a reduction in renal resistance in the treated arteries at follow-up. These hemodynamic and histological observations may indicate that RDN did not sufficiently target the renal nerves. Potentially, this may explain the significant spread in the response after RDN.

Biography

Pieter Doevendans became a cardiologist in Maastricht. In 1993-1994 he had the opportunity to work with Ken Chien at UCSD San Diego where the work on stem cells started. The work was completed in Maastricht and provided the basis for a thesis on the promoter of the atrialMLC gene. Upon return in the Netherlands he worked with Christine Mummery and Hans Clevers (Hubrecht Laboratory). In the meantime he remained active as an interventional cardiologist initially in Maastricht, but from 2002 on in Utrecht. Here he was appointed full professor in Cardiology in 2004 and head of the department in 2005. The focus is on Cardiac Failure, stem cells and genetics. He was funded by various national and international foundations. Thus far (2016) he published more than 650 peer reviewed papers and 12 books. He is an active member of the European Society of Cardiology where he performed various tasks.

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