Renal denervation improves right ventricular function, restores myocardial norepinephrine levels and reverses ventricular specificity of selected markers in hypertensive rats with heart failure induced by volume overload

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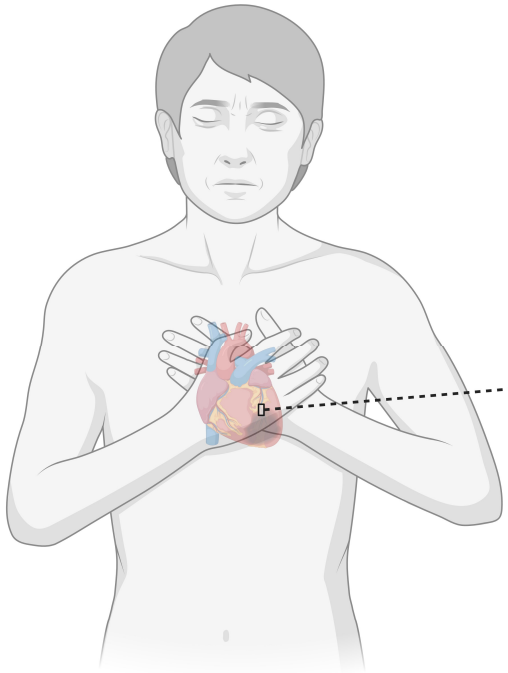
History of renal denervation

JAMA
The Journal of the American Medical Association

Smithwick and Thomson ← 1953

THE LANCET

THE LANCET



European Heart Journal

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Journal of Hypertension

Circulation

THE LANCET

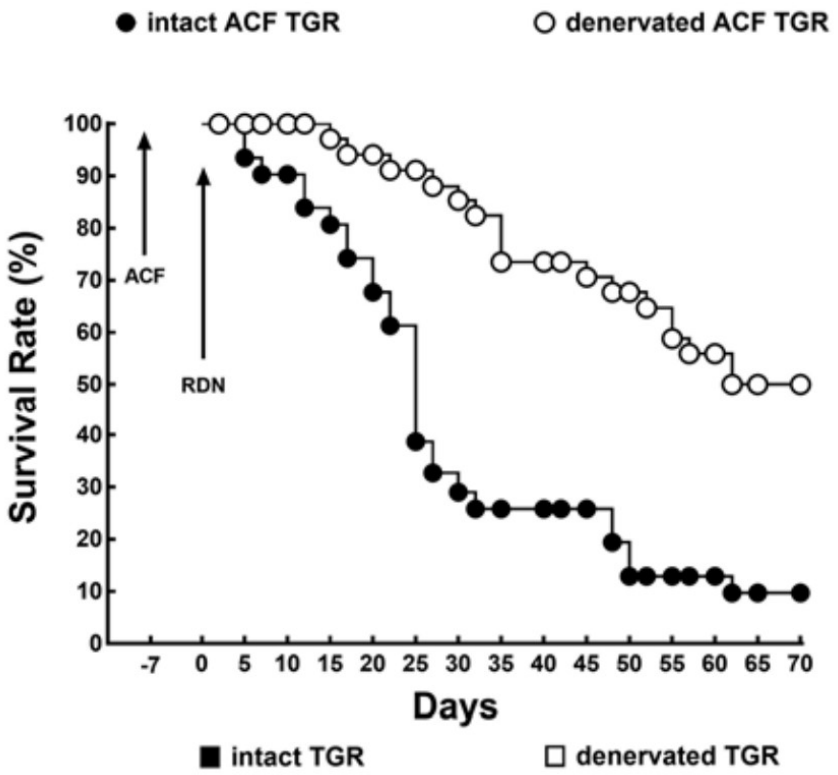
2022 → Manfoud et al.
SPYRAL HTN-ON MED

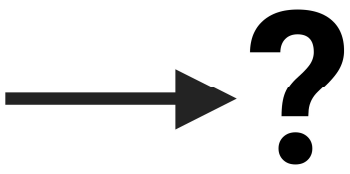
THE LANCET

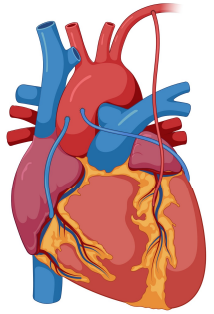
Circulation

Kandzari et al.
Alcohol-mediated RDN

← 2024



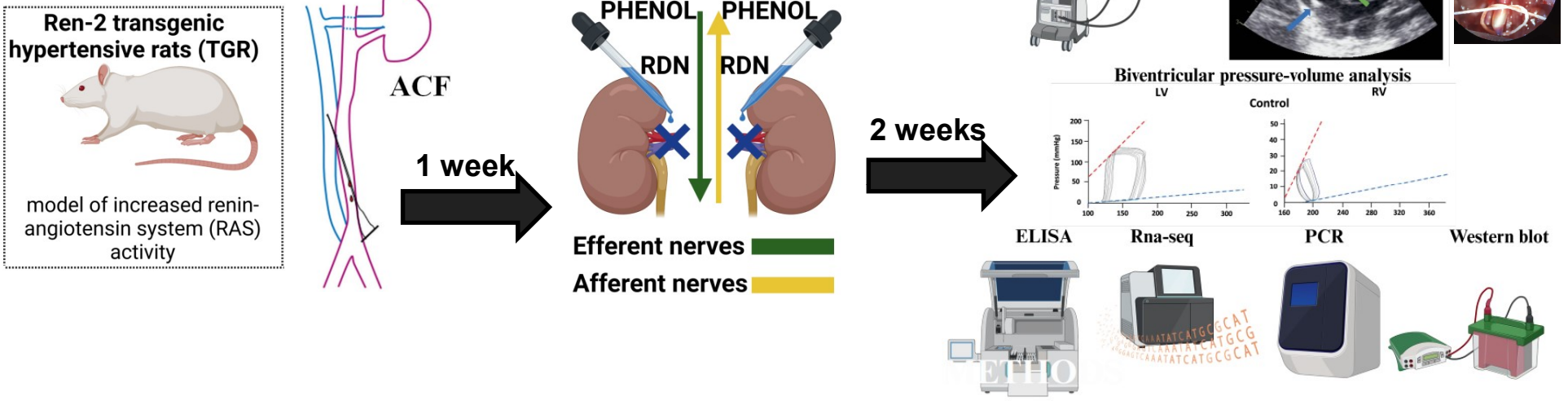




Zuzana Honetschlägerová

Honetschlagerová Z, et al. : Renal Sympathetic Denervation Attenuates Congestive Heart Failure in Angiotensin II-Dependent Hypertension: Studies with Ren-2 Transgenic Hypertensive Rats with Aortocaval Fistula. Kidney Blood Press Res 2021;46:95-113. doi: 10.1159/000513071

Methods



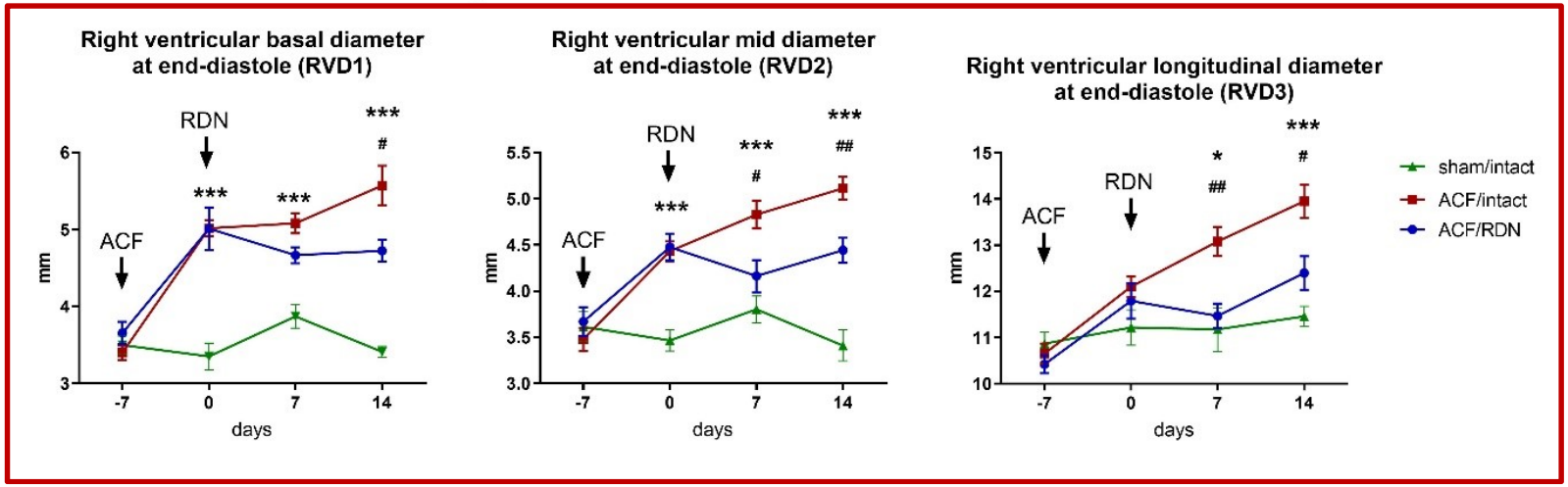
Miklovic M, Kala P, and Melenovsky V (2023) Simultaneous biventricular pressure-volume analysis in rats. *J Physiol Pharmacol Off J Pol Physiol Soc* **74**, Poland.

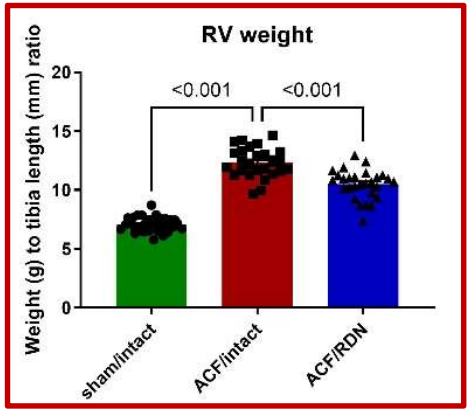
- Sham-operated Ren2 hypertensive rats (TGR) + intact
- ACF TGR + intact
- ACF TGR + RDN

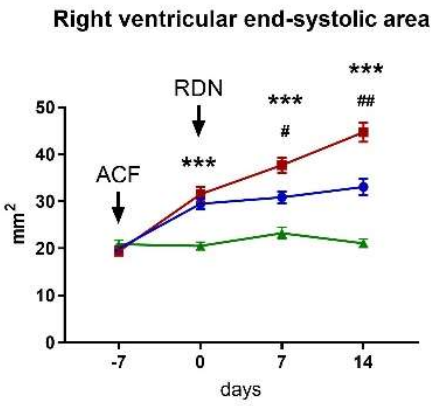
ACF = aorto-caval fistula

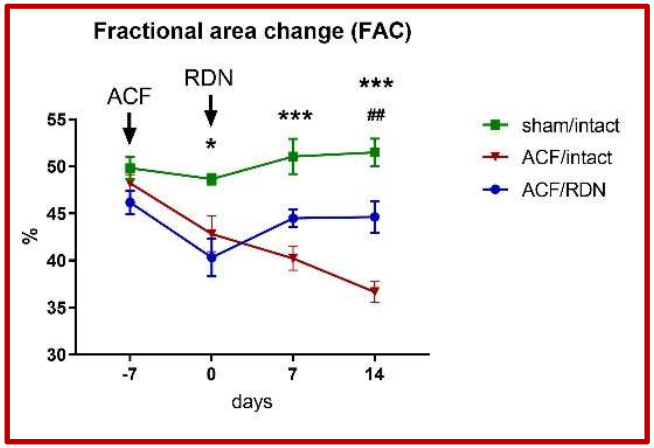
RDN = renal denervation

Abassi et al., 2011 Chang, S.-N. et al. J Am Coll Cardiol Basic Trans Science. 2017;2(2):184-93.









RDN in ACF decreased hypertrophy and improved systolic function in RV.

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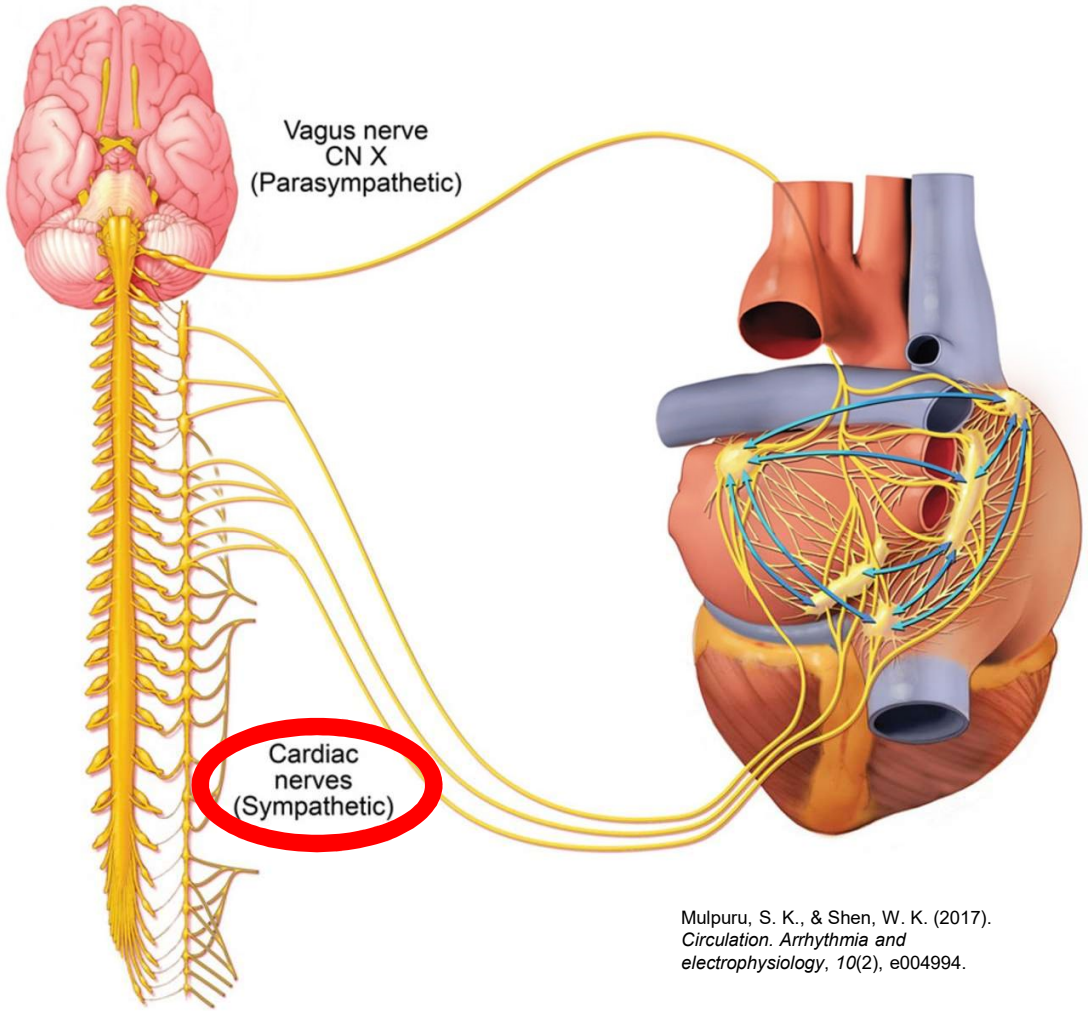
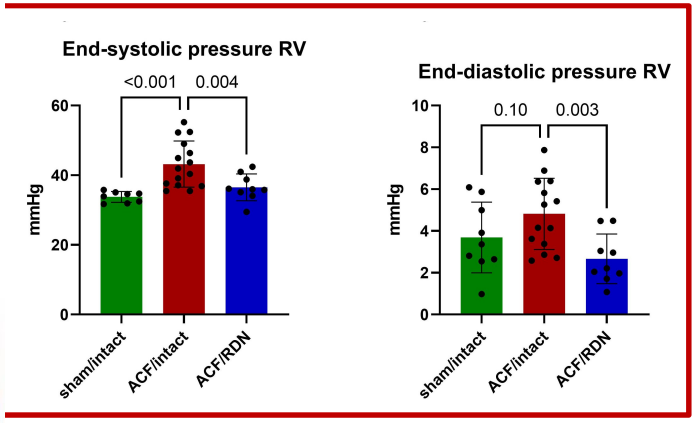
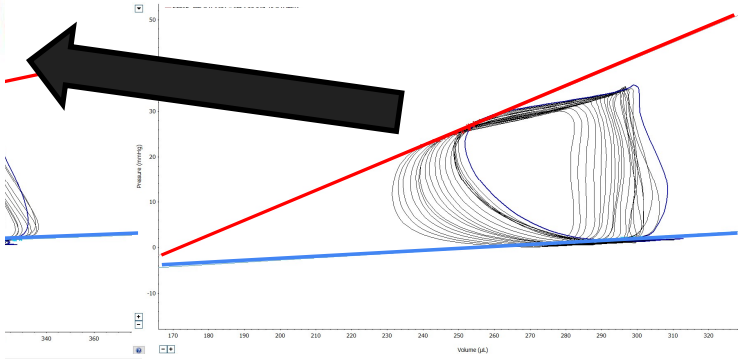


Mulpuru, S. K., & Shen, W. K. (2017). *Circulation. Arrhythmia and electrophysiology*, *10*(2), e004994.

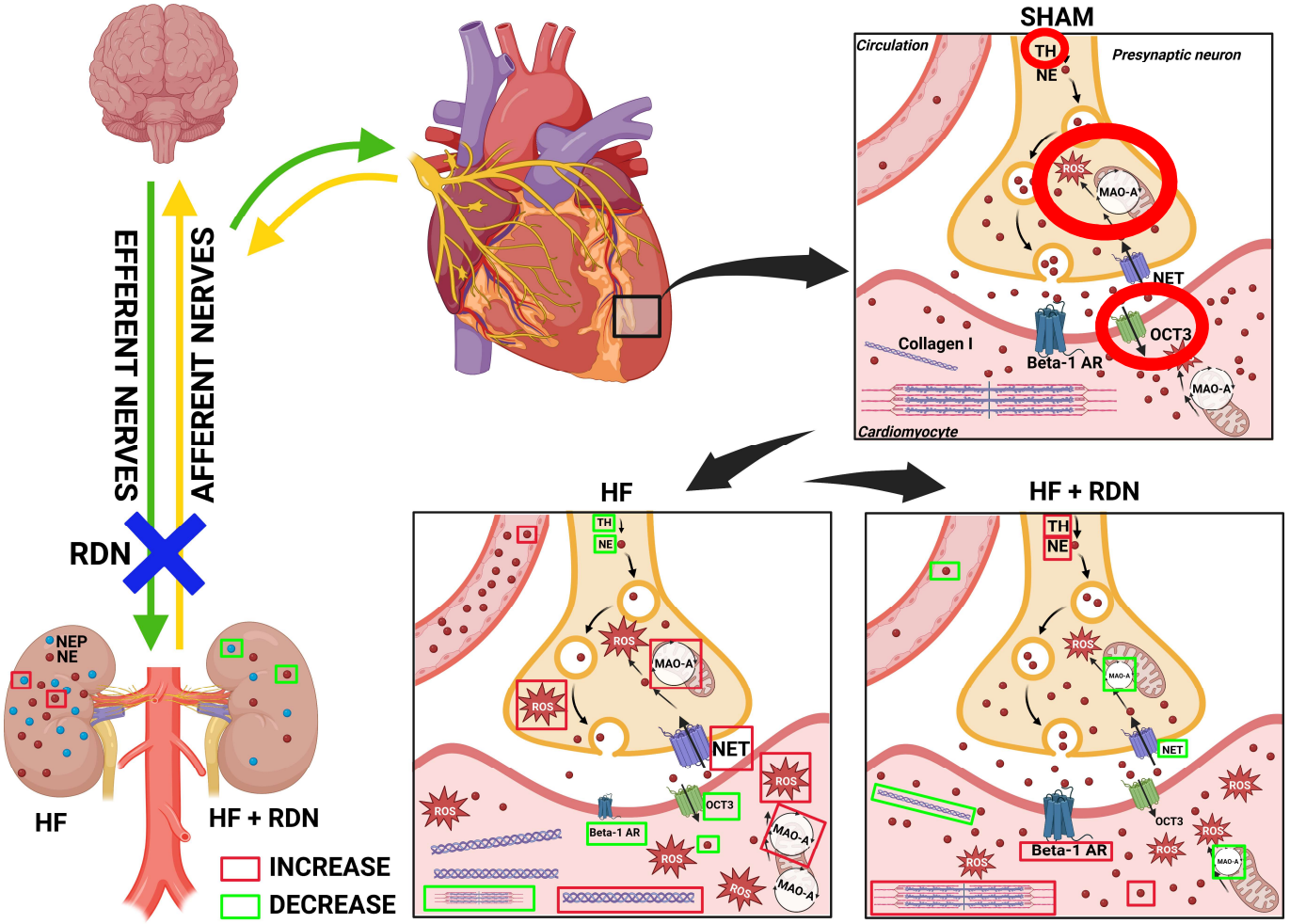




ACF/RDN

RDN in ACF improved systolic function and decreased end-systolic and end-diastolic pressure in RV.

Effects of renal denervation in heart failure due to volume overload

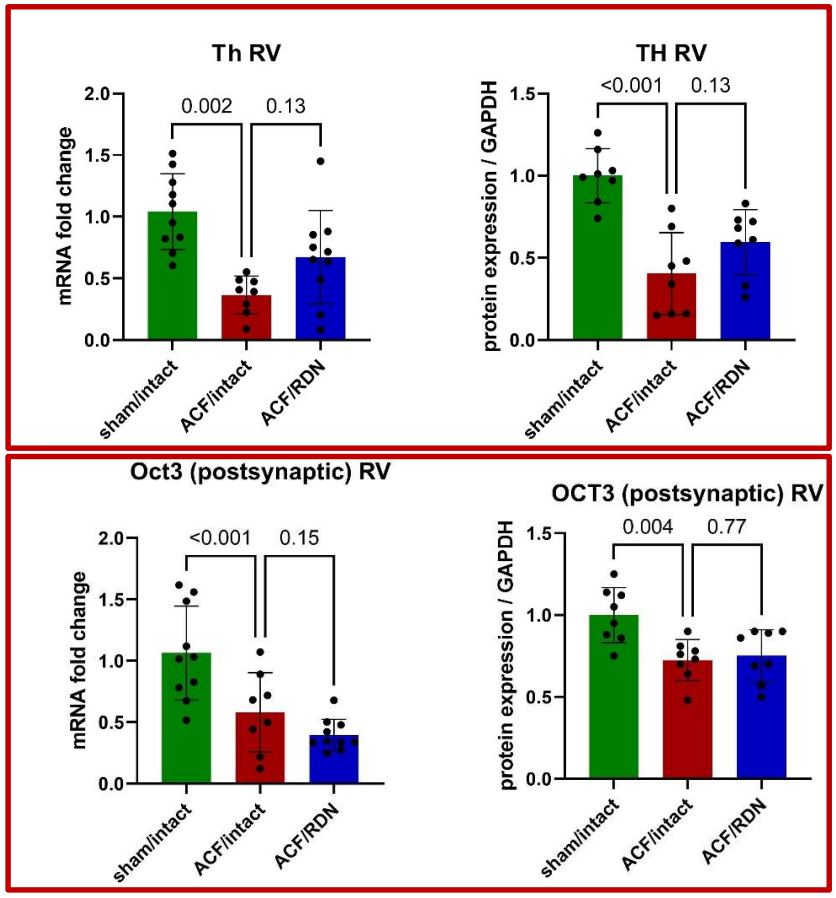


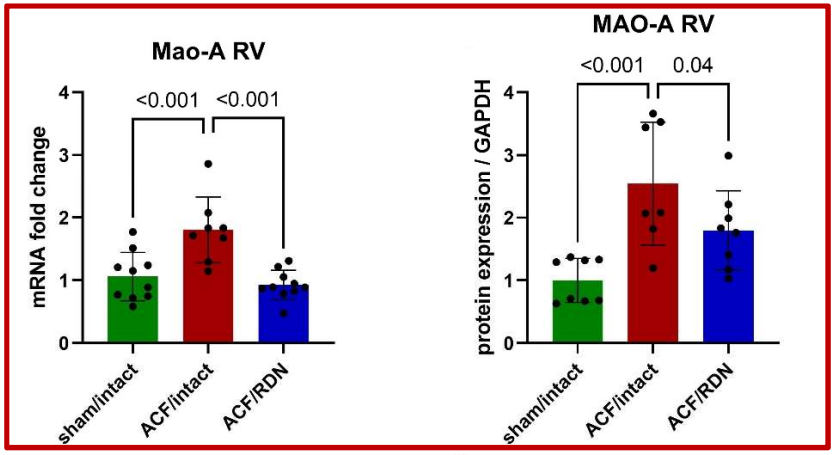
1. Tyrosine hydroxylase (TH)
Density of sympathetic nerves, biosynthesis of norepinephrine

2. Organic cation transporter 3 (Oct3)
Norepinephrine transport to cardiomyocytes

3. Monoamino-oxidase A
Degradation of norepinephrine, large producer of ROS

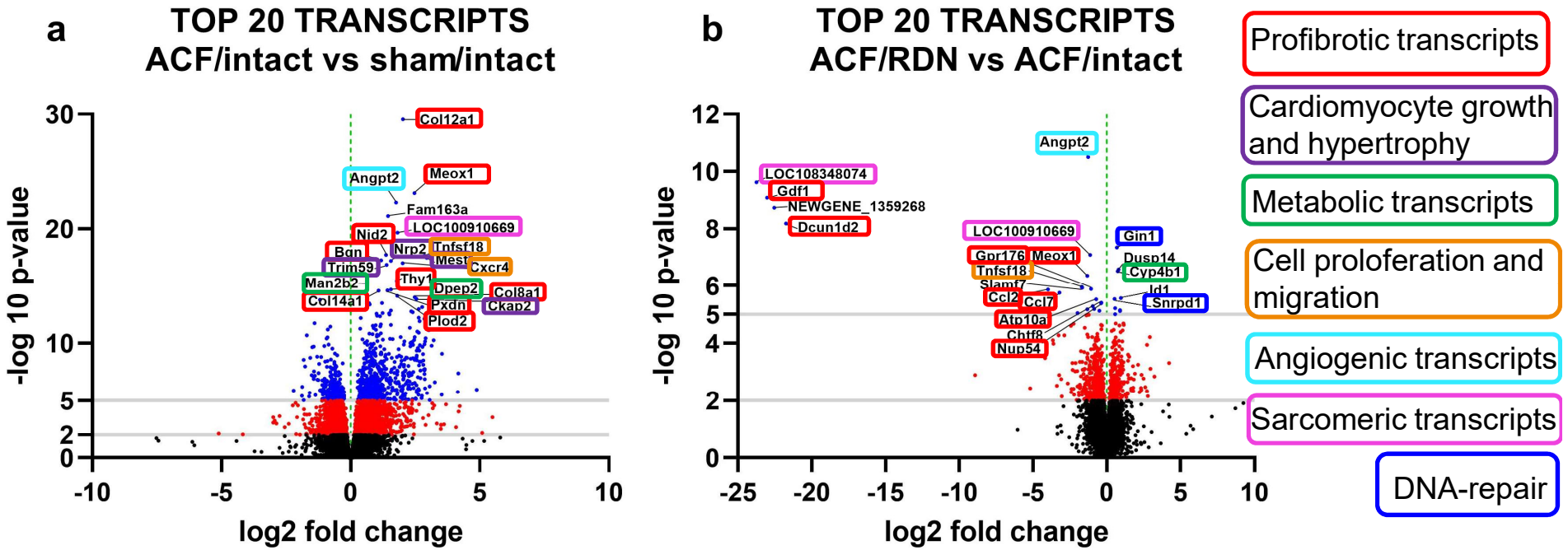
Miklovic et al., Hypertens Res, 2024





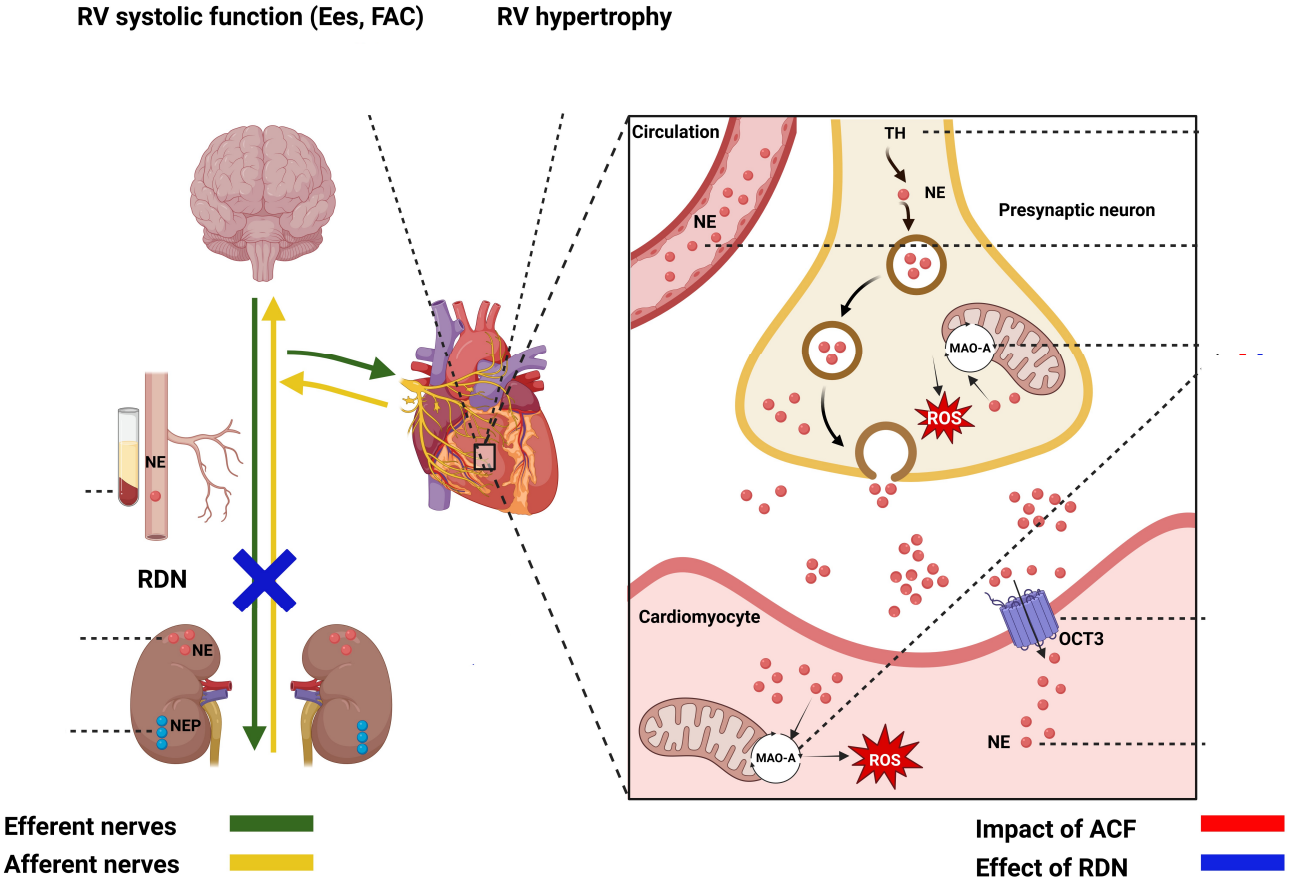
RDN in ACF did not decreased gene and protein expression of TH and OCT3, but decreased MAO-A.

Results – RNA-Seq of right ventricular tissue



RDN in ACF down-regulated most of profibrotic transcripts.

Conclusions



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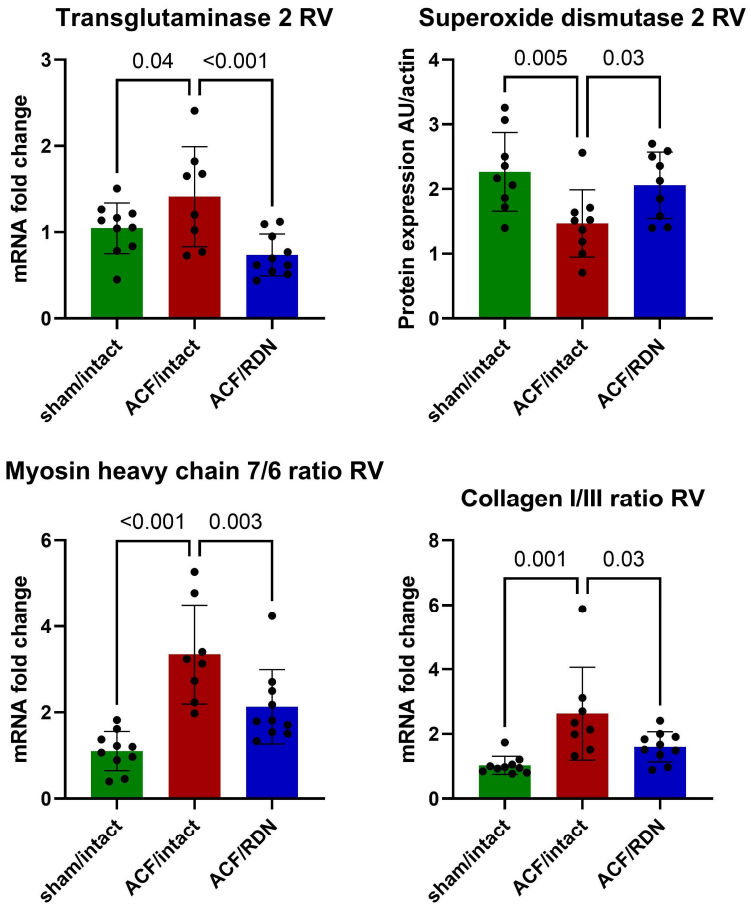
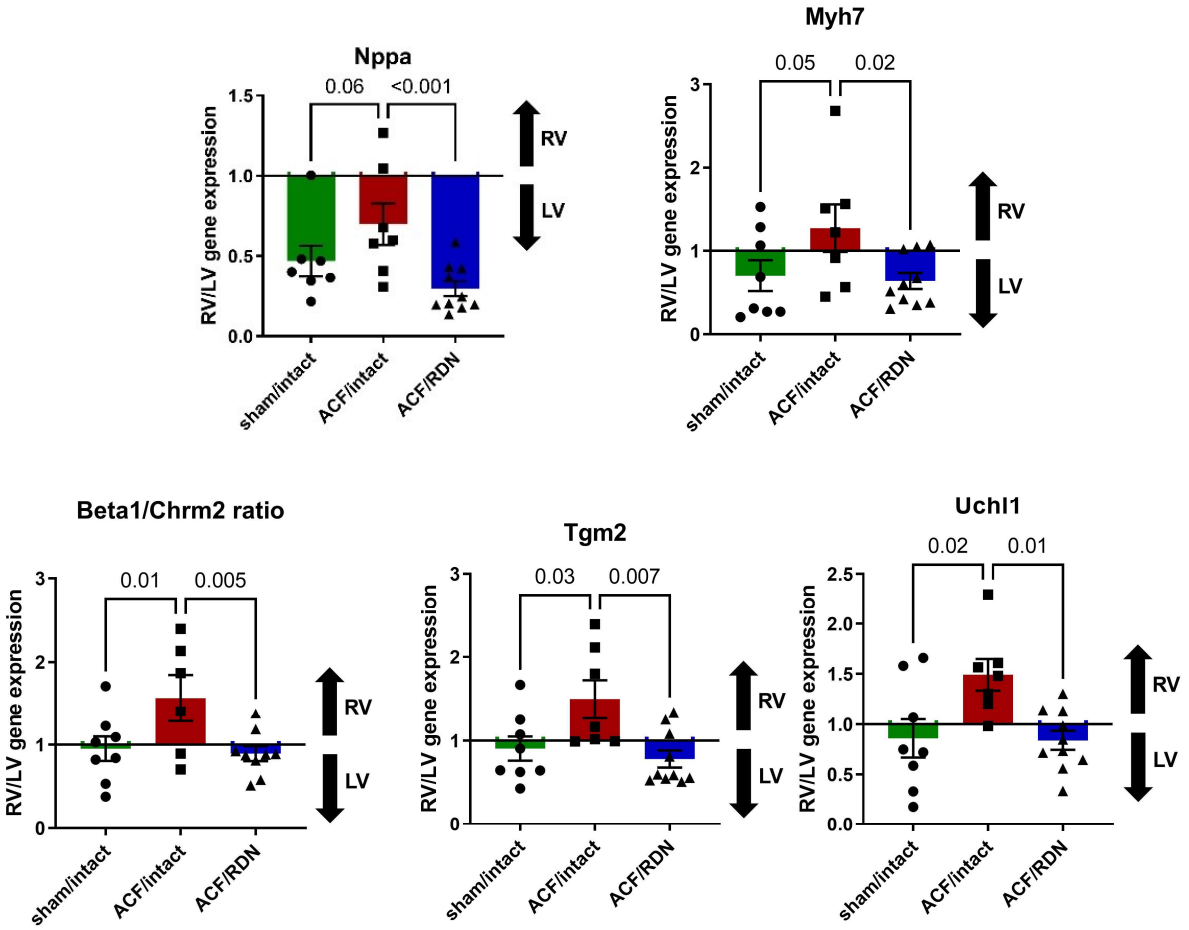


RDN in ACF decreased gene expression of Tgm2, Myh7, Collagen I/III ratio and increased Sod2.



RDN in ACF reversed ventricular dominance from RV to LV specificity in some genes of HF markers.