



10 YEAR ANNIVERSARY **HEART FAILURE** **UPDATE 2023**

Friday May 12 - Saturday May 13
Sheraton Centre Toronto Hotel



Canadian Heart Failure Society
Société canadienne d'insuffisance cardiaque



@CanHFSociety #HFupdate

Implantable Therapies for All Seasons

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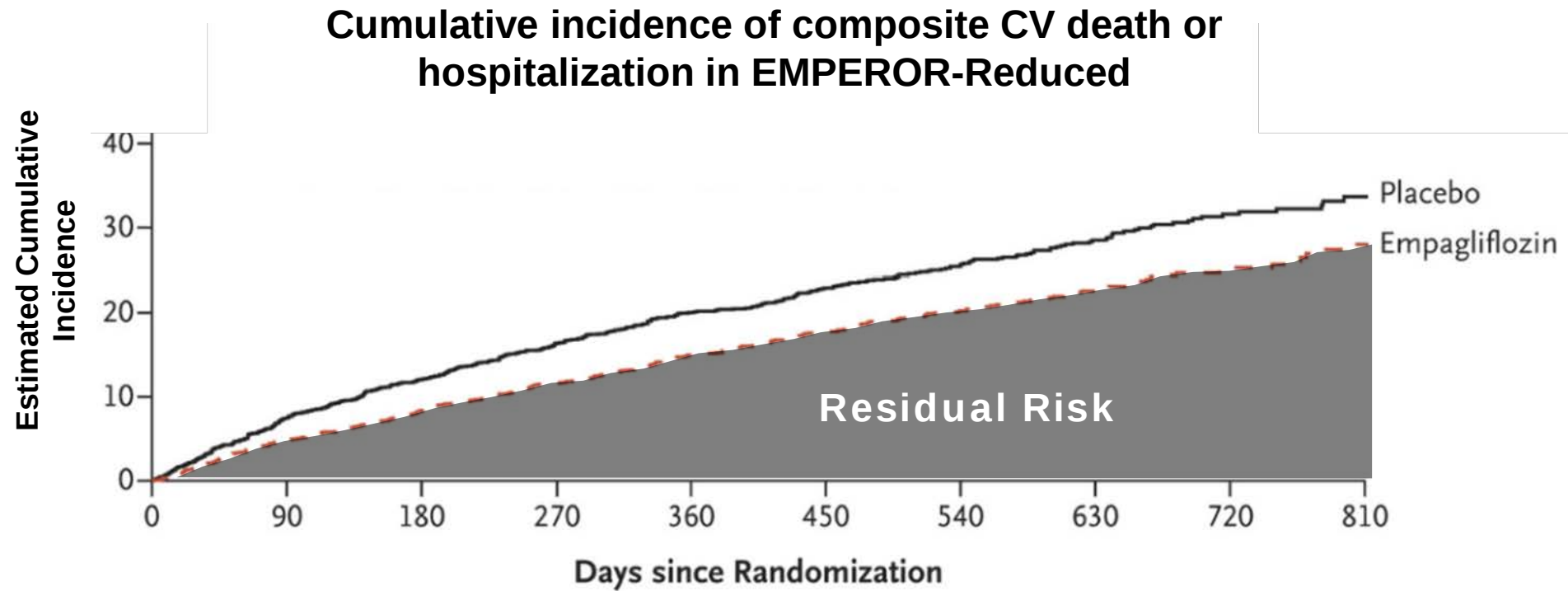


@FudimMarat

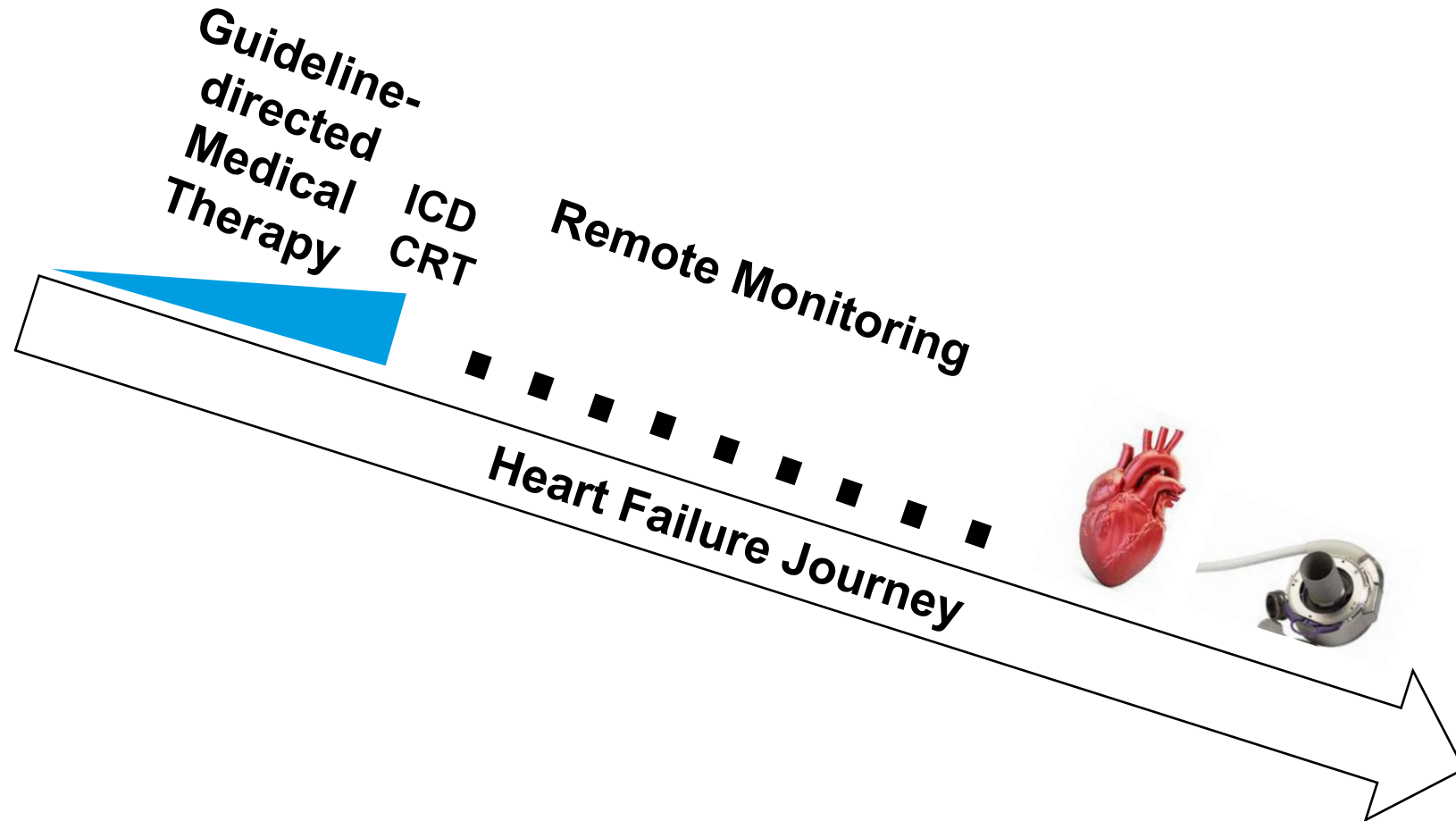
Learning Objectives

- Delineate an approach to HF monitoring using implantable monitoring devices
- Describe the potential treatment role for vagal stimulation and cardiac contractility modulation
- Assess the future of implantable heart failure treatments

Residual risk remains with GDMT



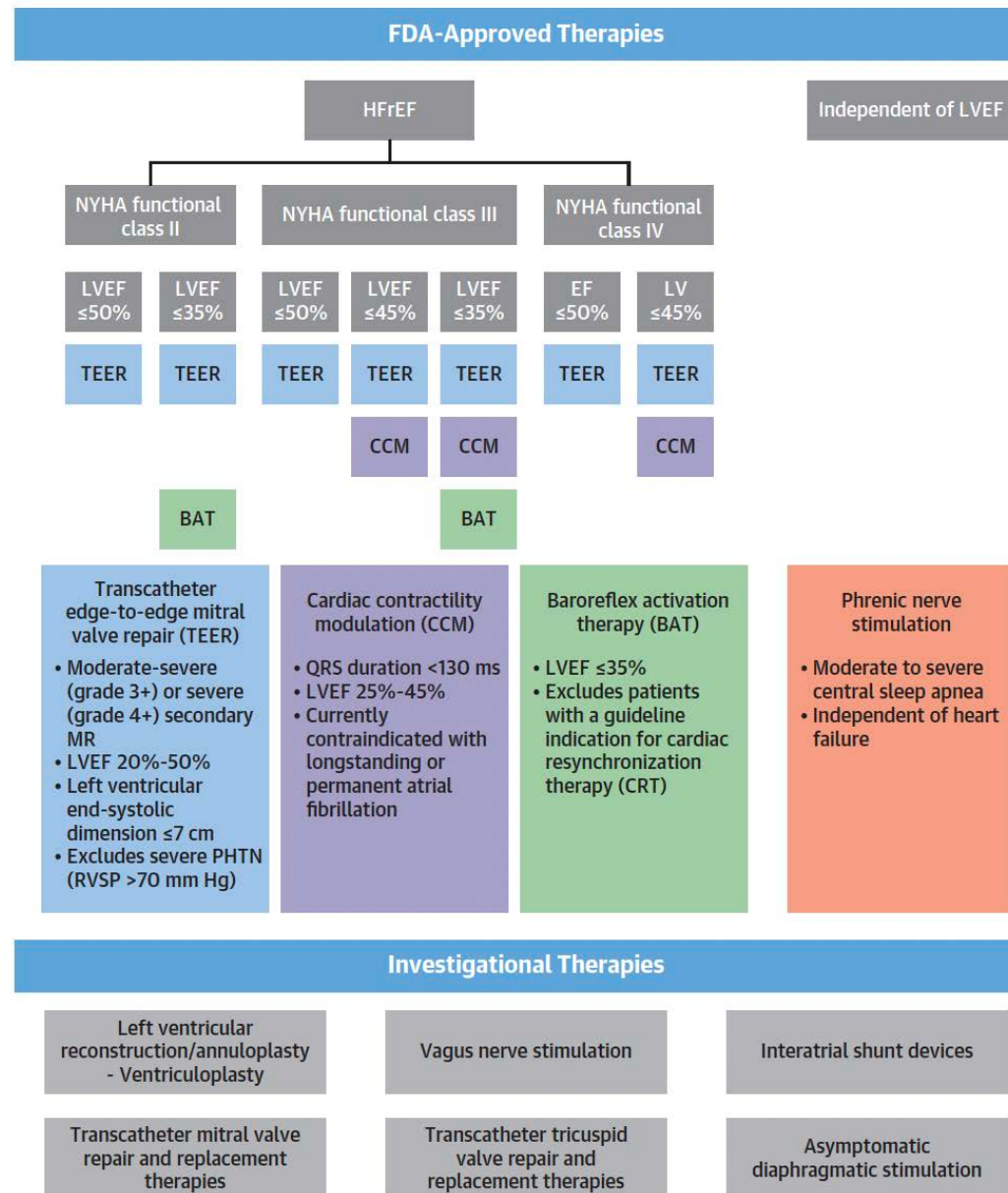
Filling the Gap



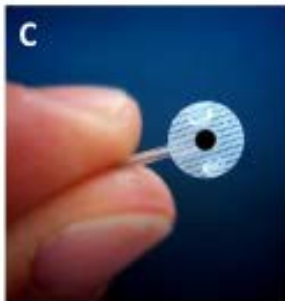
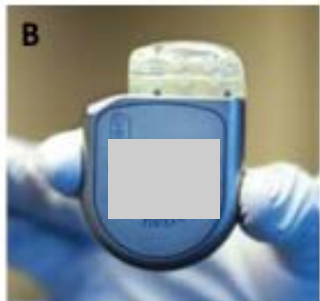
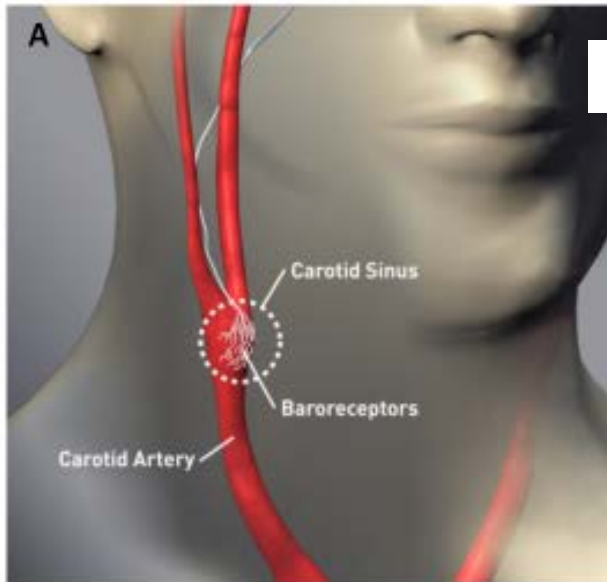
What Could Device Based Therapy Offer in CV Space (beyond GDMT)

- Not all pathophysiological processes are amenable to pharmacological therapy
 - Systemic (side) effect – Lack of regional selectivity
- More detailed physiological phenotyping when considering device-based therapies
- Compliance/Adherence tends not to be an issue with device strategies
- In HFrEF → Device based benefits outstrip the benefits of pharmacologically based HF therapies

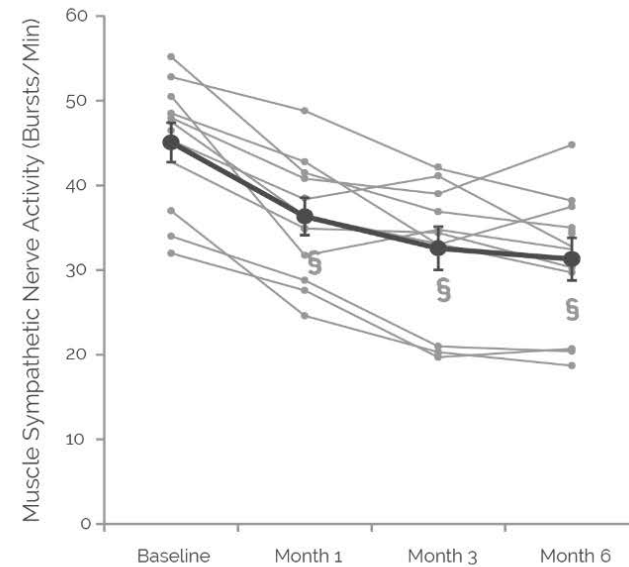
CENTRAL ILLUSTRATION U.S. Food and Drug Administration-Approved and Breakthrough Designated Device Therapies



Effect of Baroreflex Activation on Sympathetic Tone

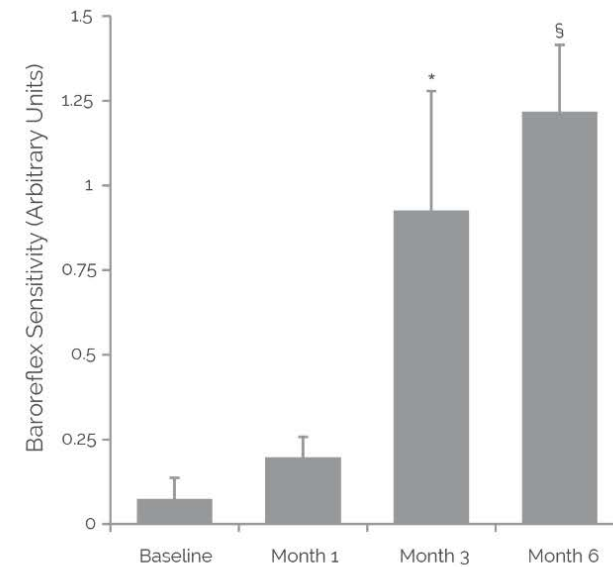


Sympathetic Activity



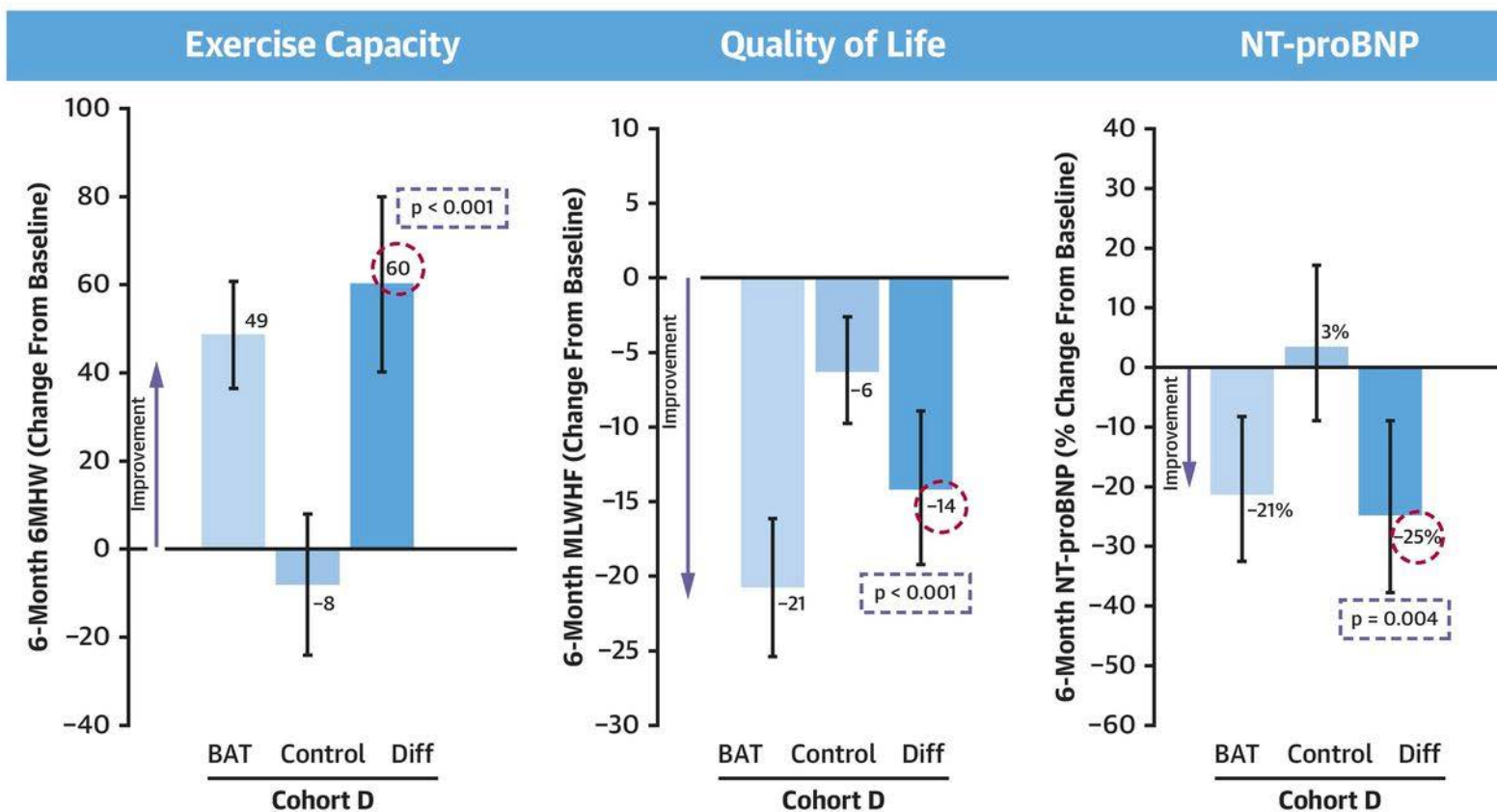
* $p < 0.05$; § $p < 0.001$

Baroreflex Sensitivity



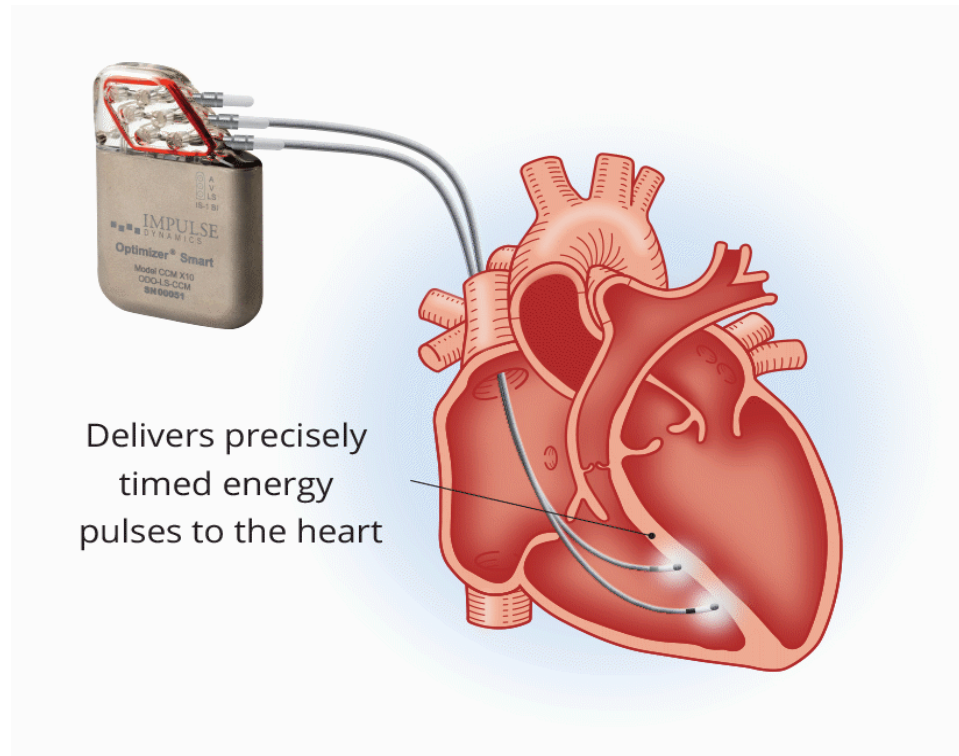
Barostimulation Therapy

CENTRAL ILLUSTRATION: Phase III, Baroreflex Activation Therapy for Heart Failure Trial Top-Line Results

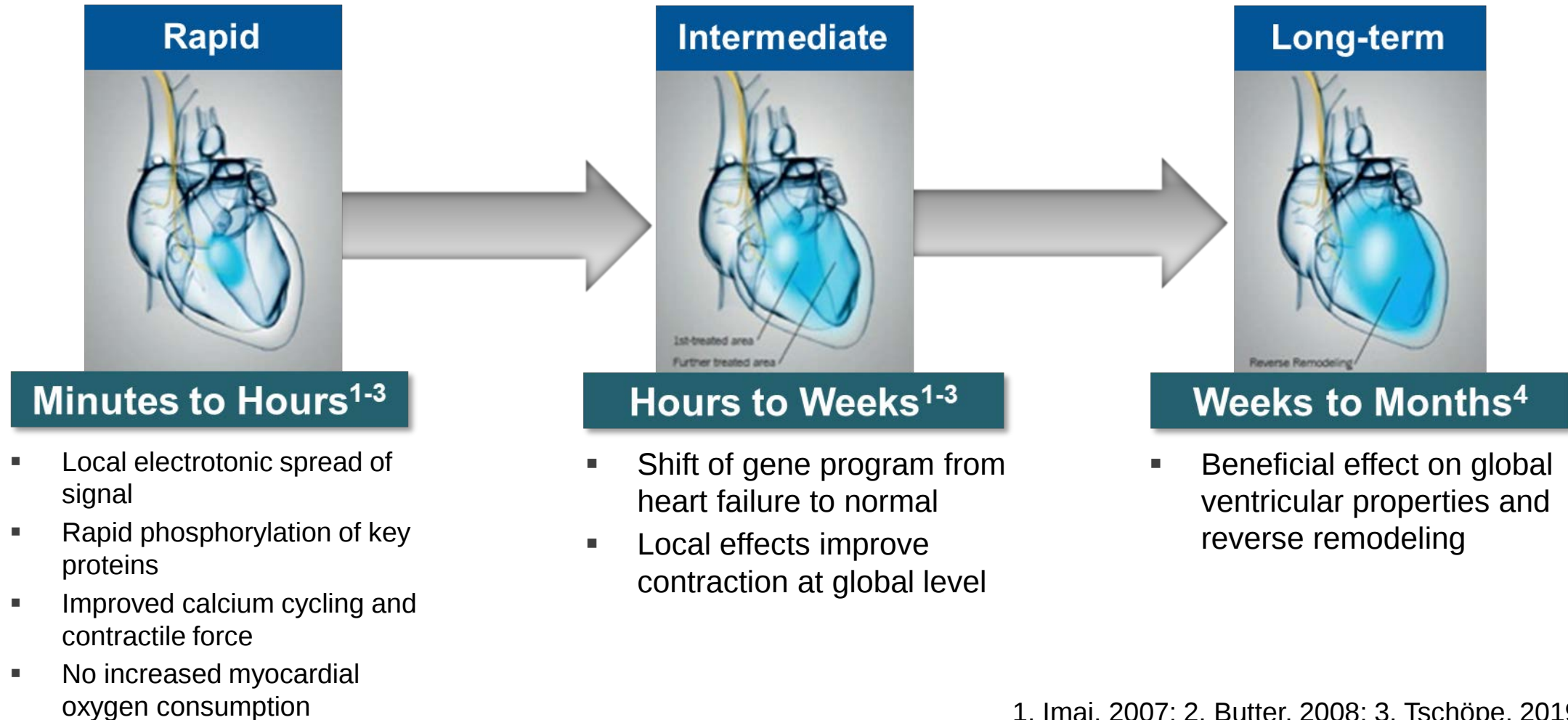


Zile, M.R. et al. J Am Coll Cardiol. 2020;76(1):1-13.

Cardiac Contractility Modulation

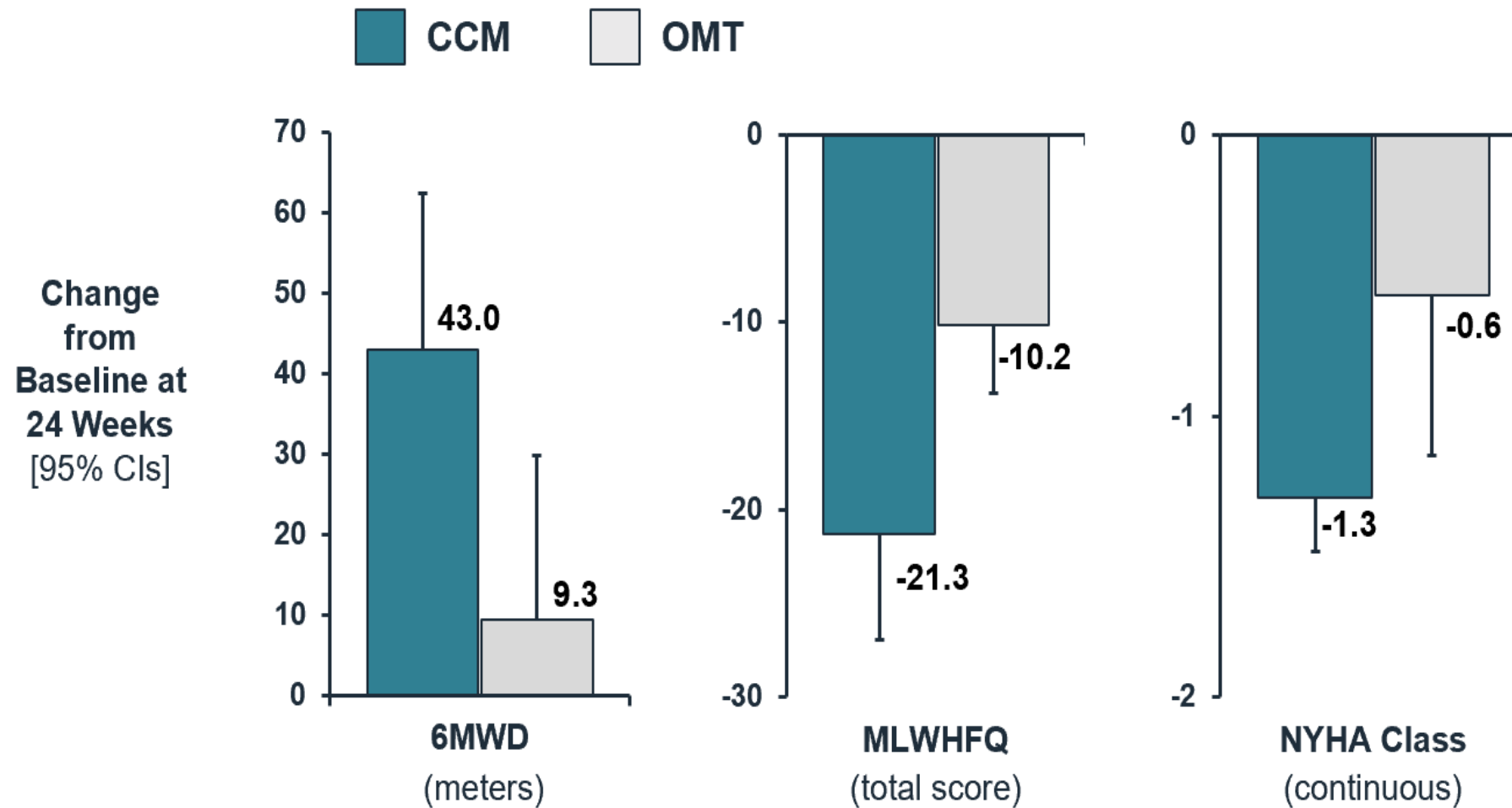


CCM Mechanism of Action is Multifactorial and Time-Dependent

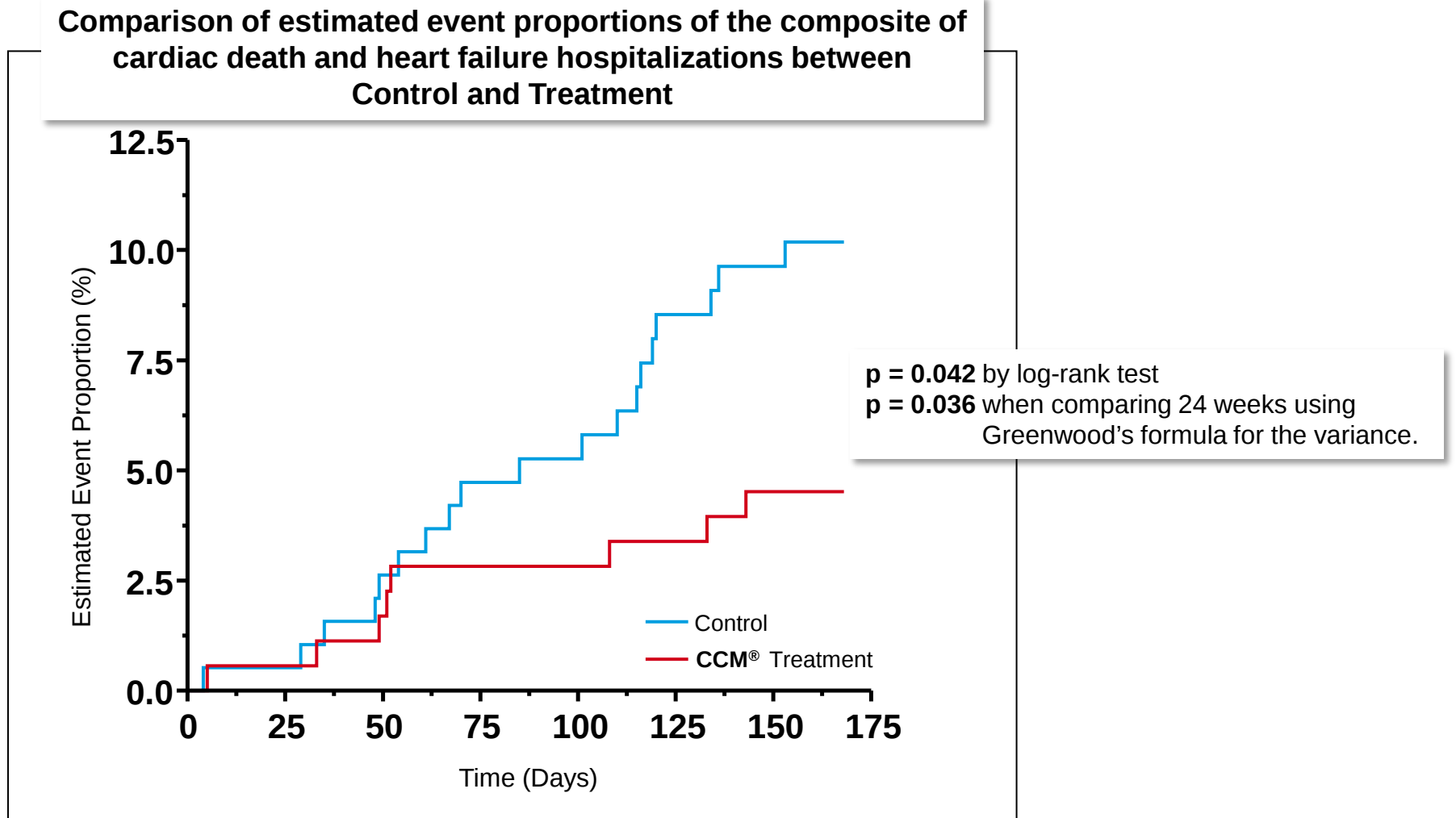


FIX-HF-5C Confirmatory Study

Secondary and Additional Endpoints



FIX-HF-5 & FIX-HF-5C: Cardiovascular Death & HF Hospitalizations



Optimization of Diuresis



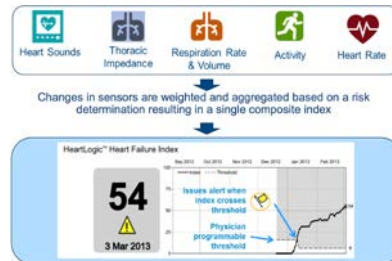
Wearable devices



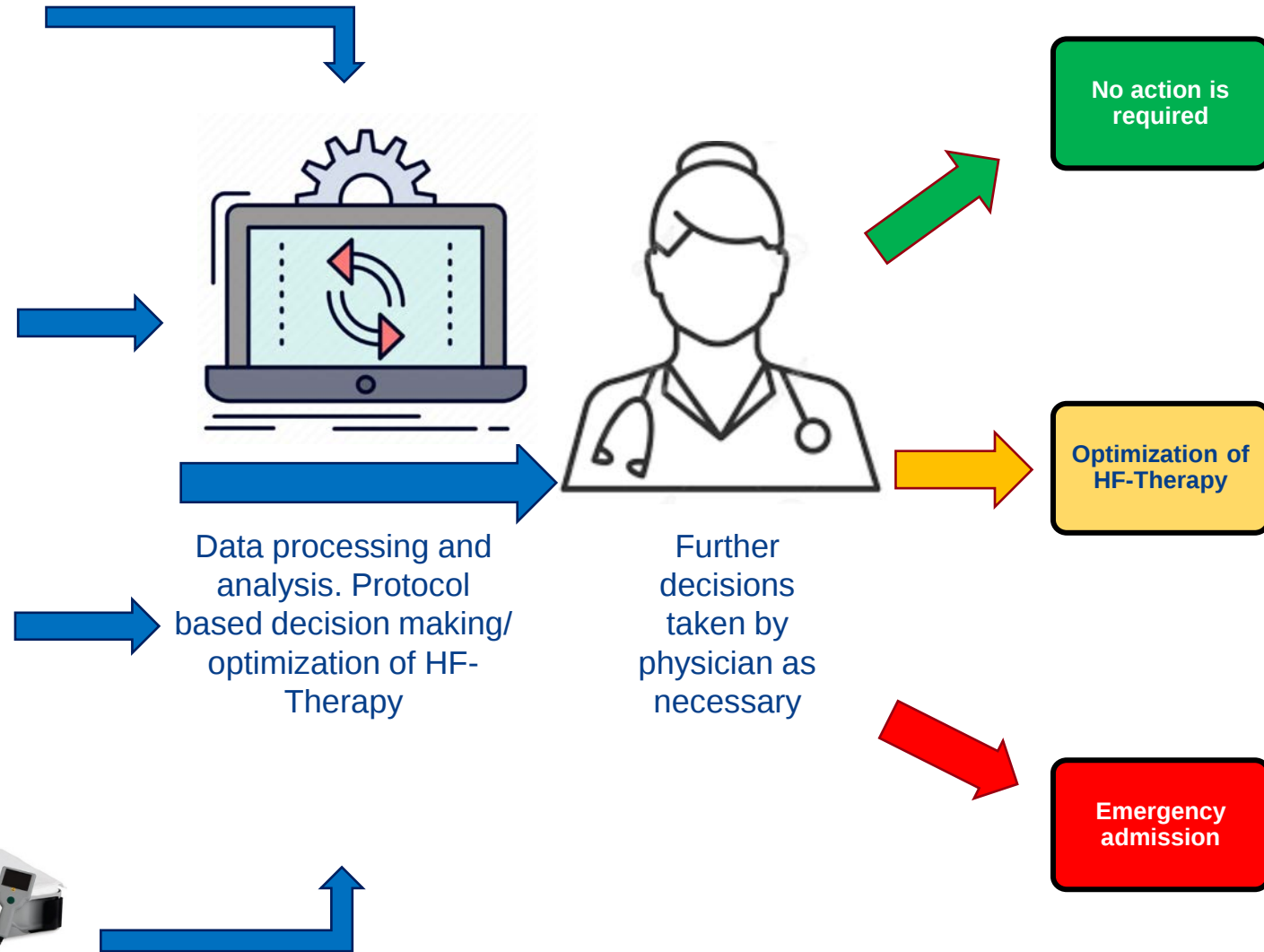
Non-invasive monitoring, e.g. ReDS, Zoll



Integrated algorithms in implanted devices, e.g. HeartLogic™

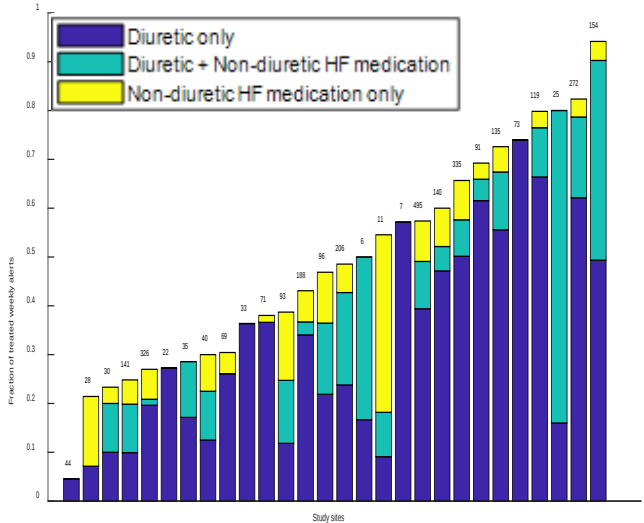


Invasive monitoring, e.g. CardioMEMS™, Cordella™

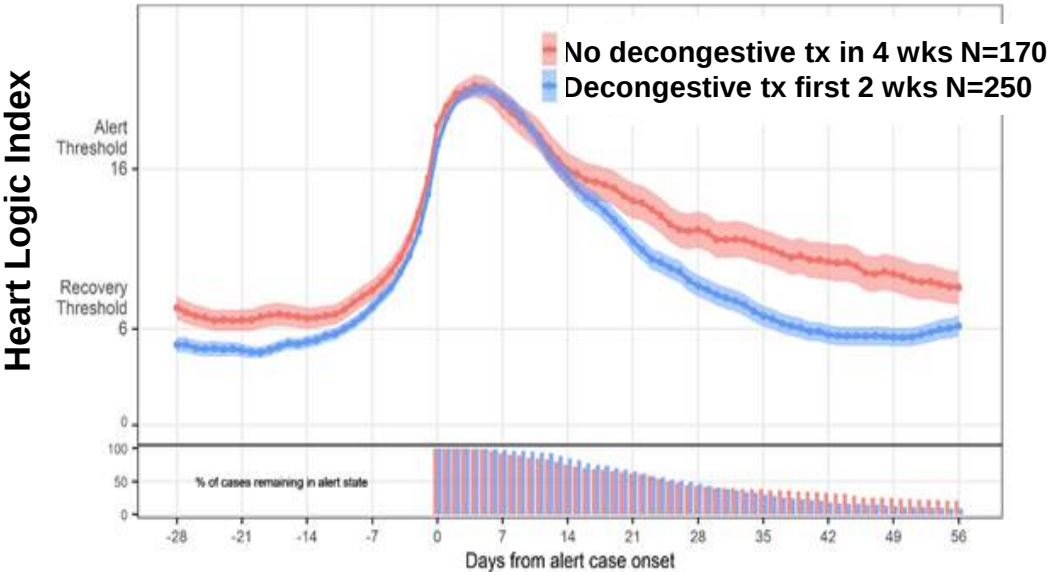


Response to HeartLogic Alerts & Other Findings

Large variability in HF TX utilization across sites (diuretic most common)

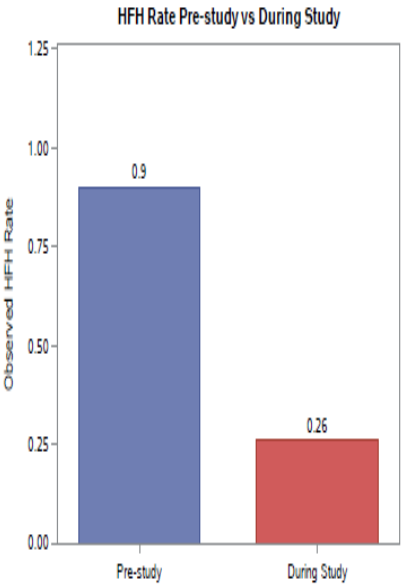


HeartLogic index recovered faster with early decongestive treatments (in blue)



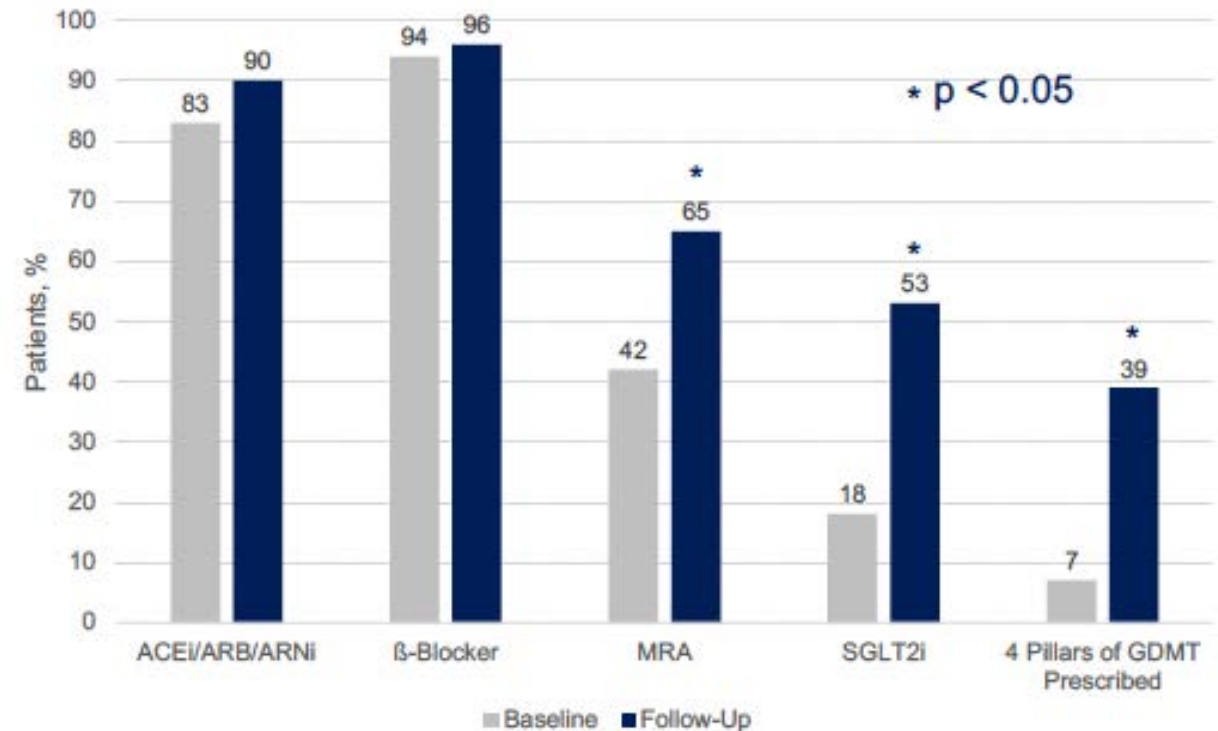
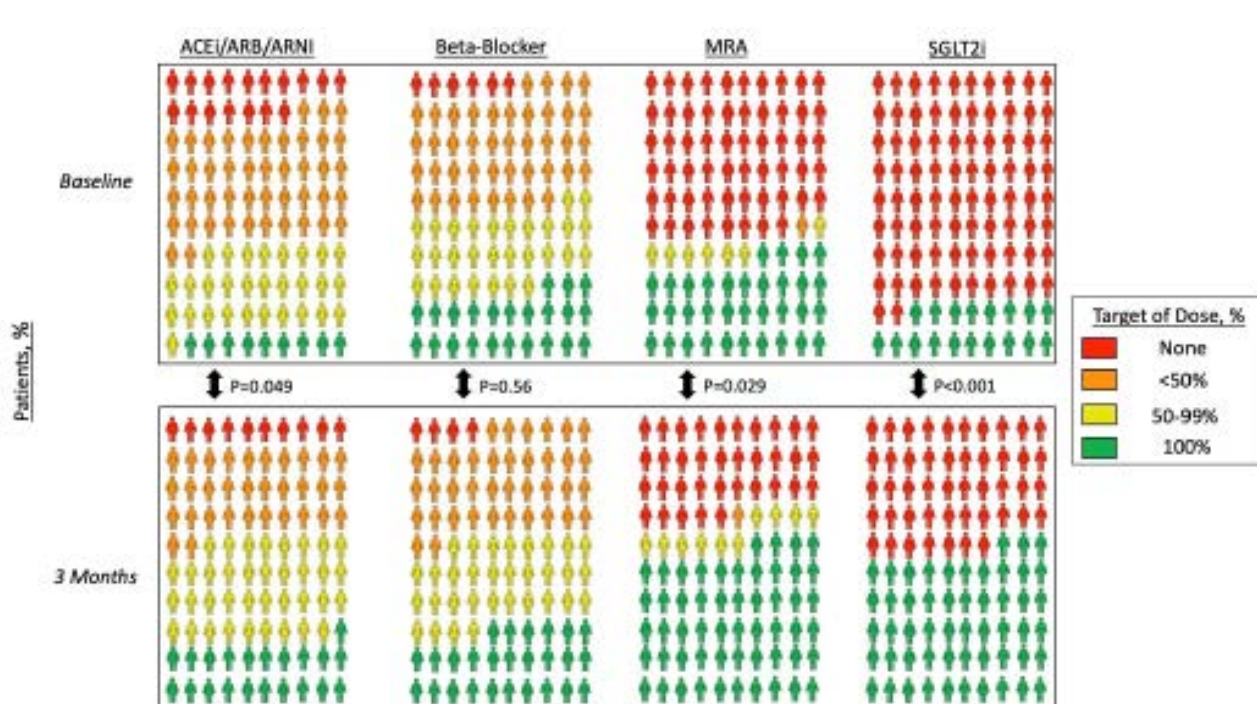
In-study HFH rate was 29% of the pre-study HFH rate

The most treated had the fewest HF events



TX=treatment, HF=heart failure, HFH= heart failure hospitalization

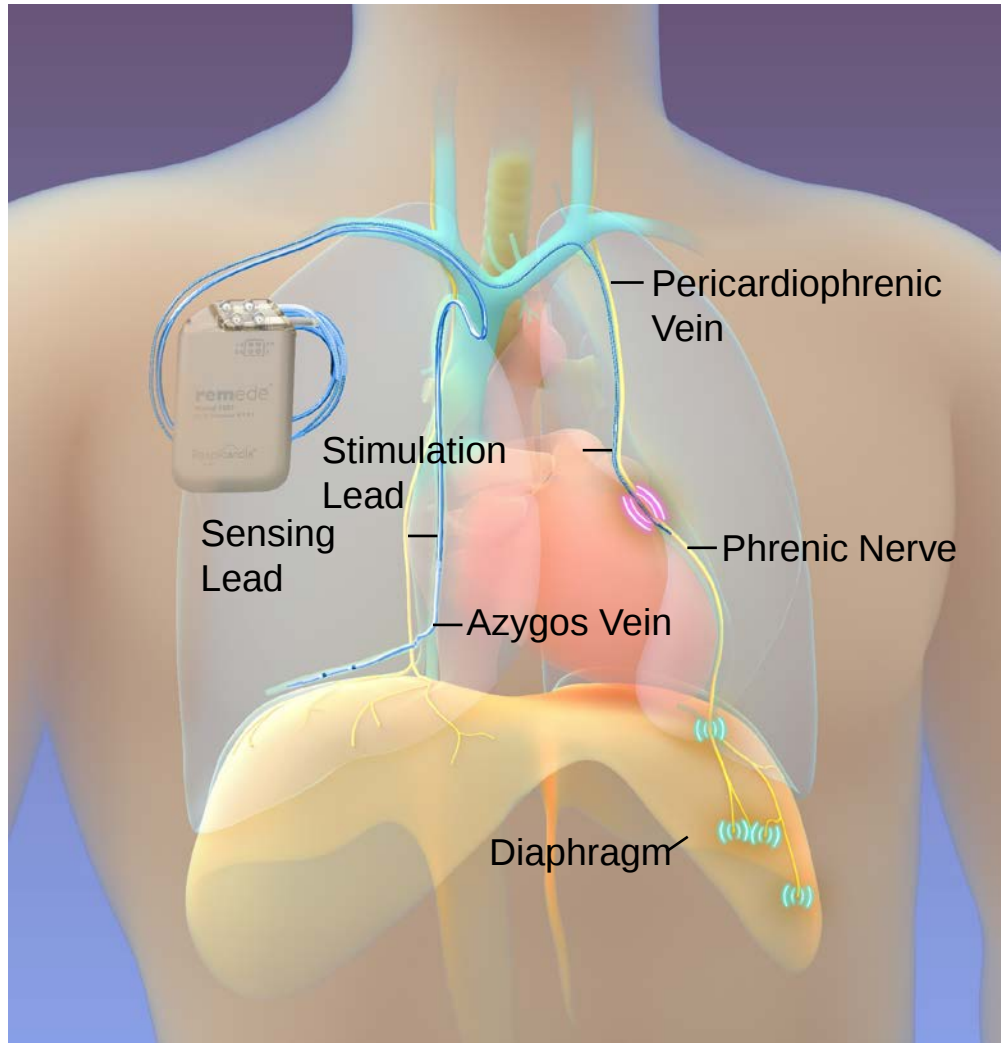
Remote Monitoring Combined with Centralized Care



Don't Forget the Comorbidities

- Sleep Apnea
- Hypertension
- Diabetes
- Chronic Kidney Disease

Transvenous phrenic nerve stimulation



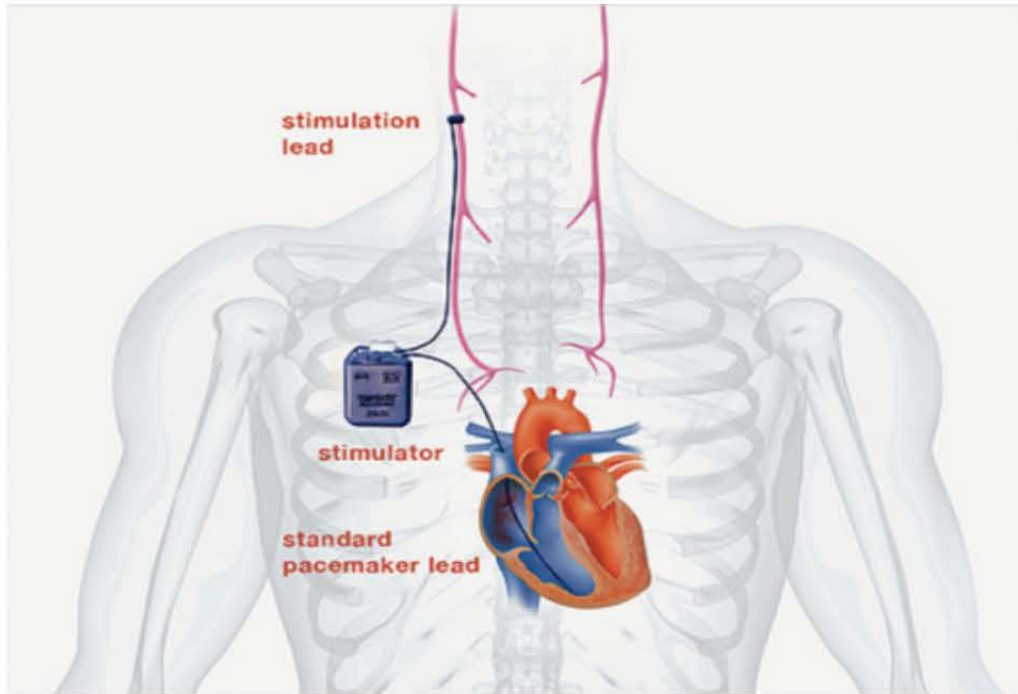
- **Fully implantable system**, designed to treat moderate to severe central sleep apnea
- **Drives inspiration** by activating the diaphragm to generate negative pressure in the chest (similar to natural breathing)
- **Turns on automatically at night**, ensuring nightly compliance and adherence over time
- Implanted by cardiac electrophysiologists (EPs)
 - **Pulse generator** implanted below clavicle
 - **Stimulation lead** placed either in left pericardiophrenic or right brachiocephalic vein
 - **Sensing lead** helps optimize therapy

1. FDA-Approved Summary of Safety and Effectiveness Data (SSED) for the remedē® System and The remedē System Implant and Clinician Use Manual (P160039) Oct. 6, 2017.

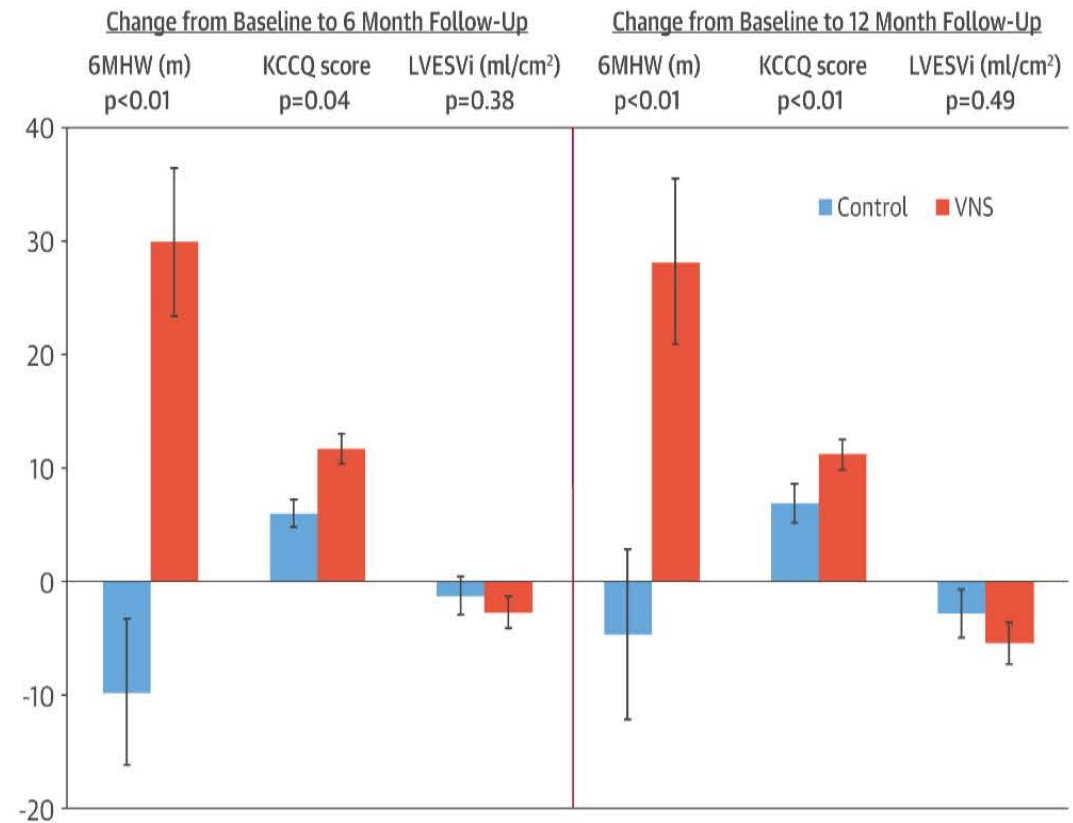
What's in the Pipeline?

I. Vagus Nerve Stimulation

C

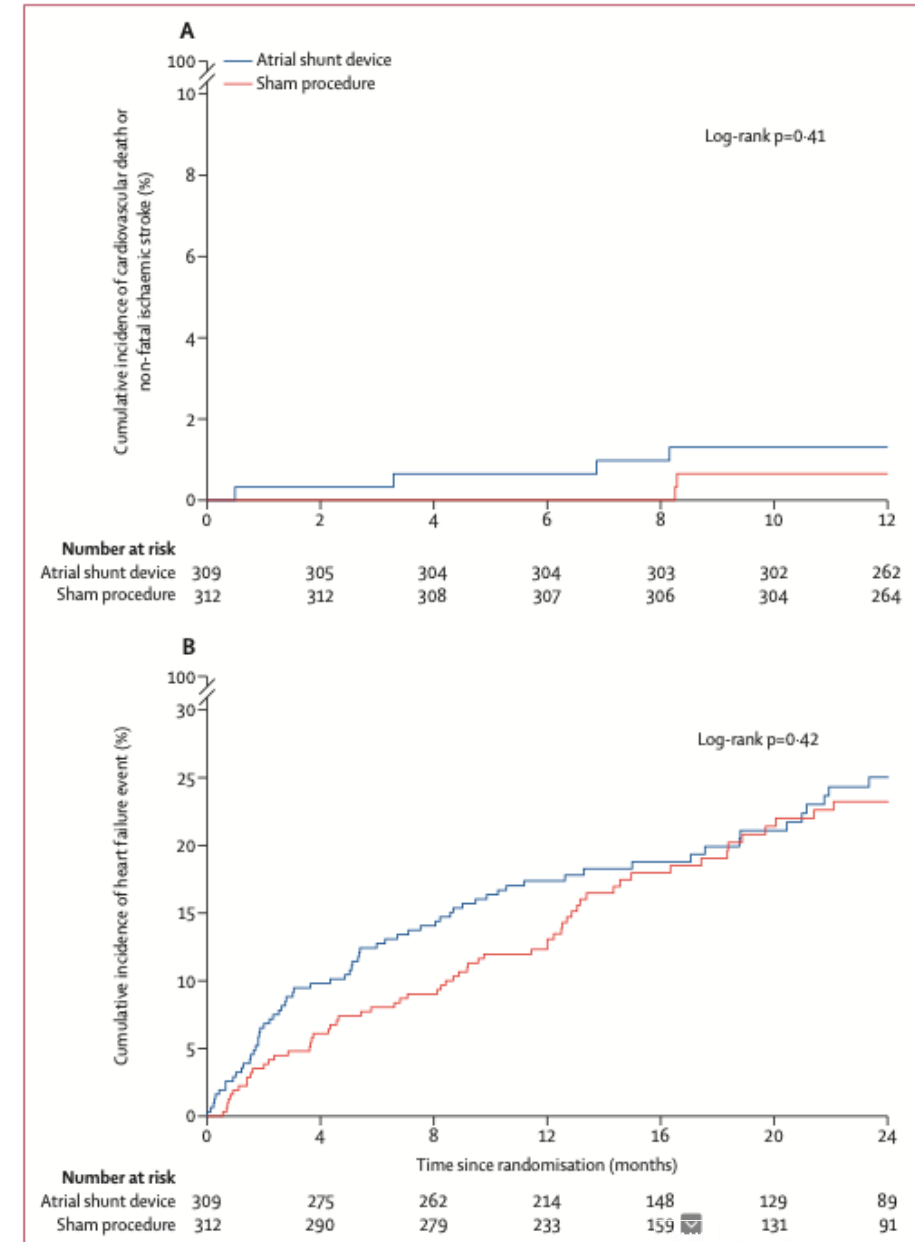
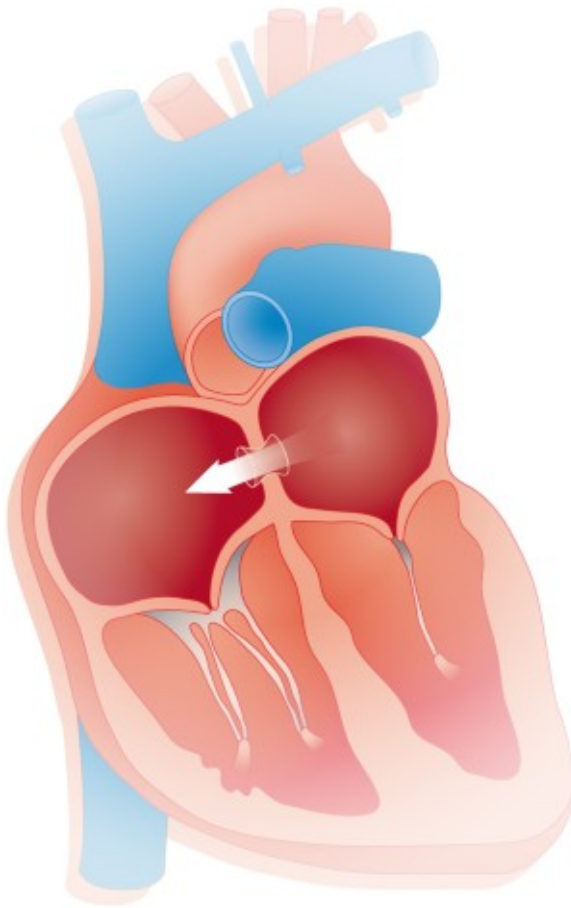


D



ANTHEM HFrEF has been stopped

II. Shunting



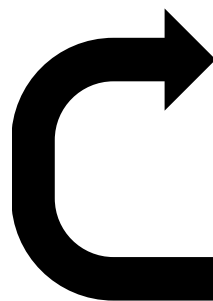
III. Volume Redistribution Concept

Heart Failure

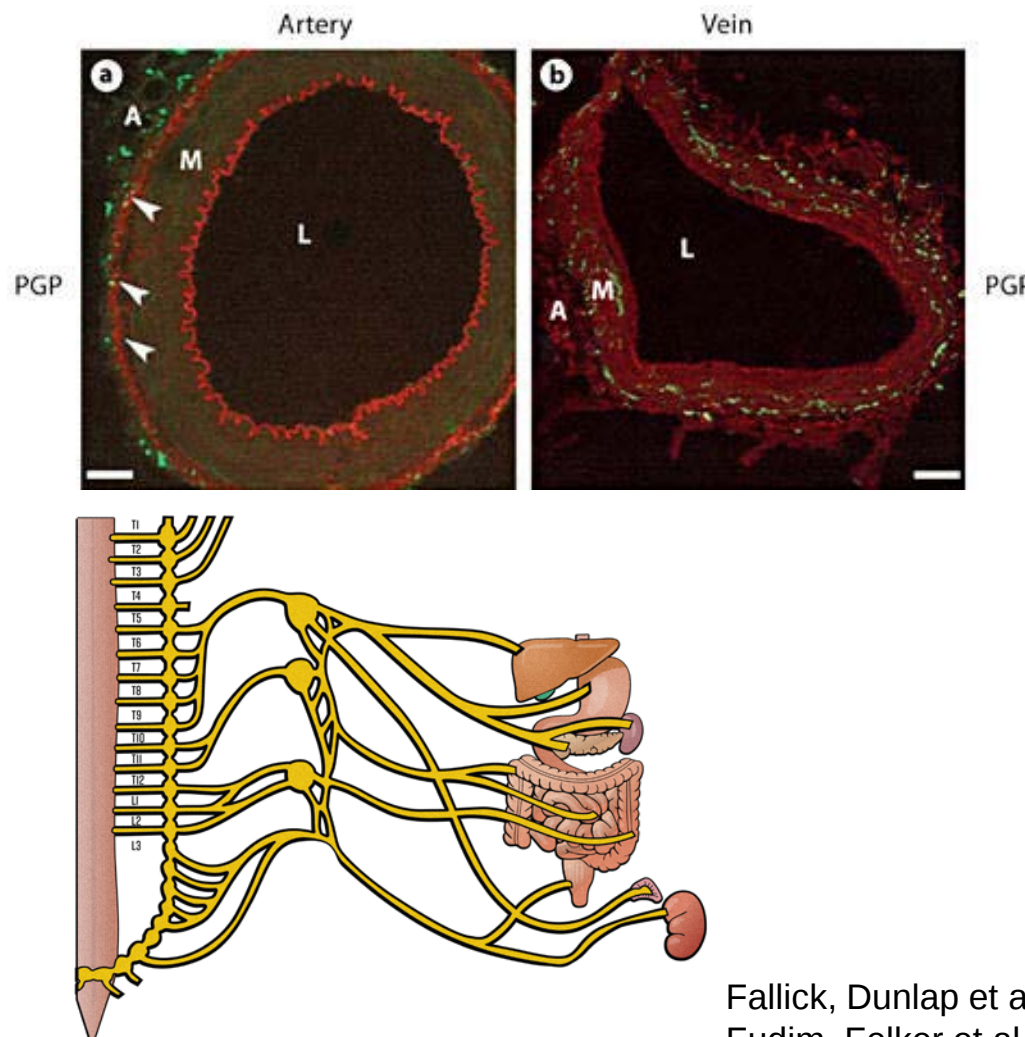
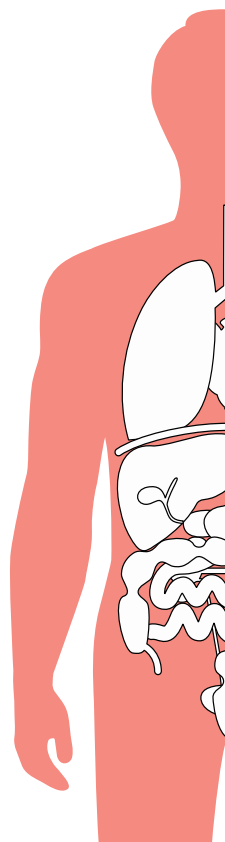
Congestion



Volume redistribution
into thoracic
compartment

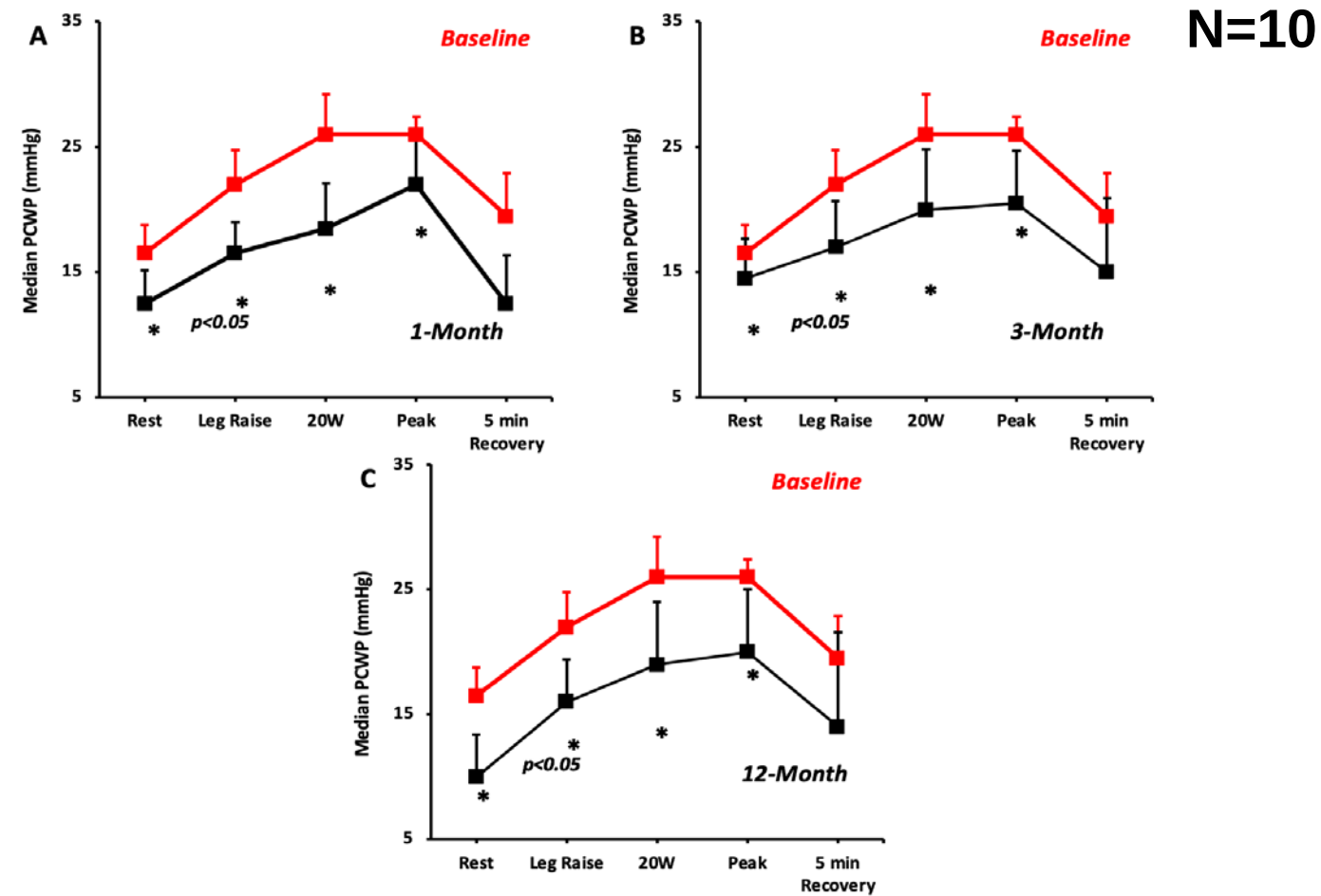
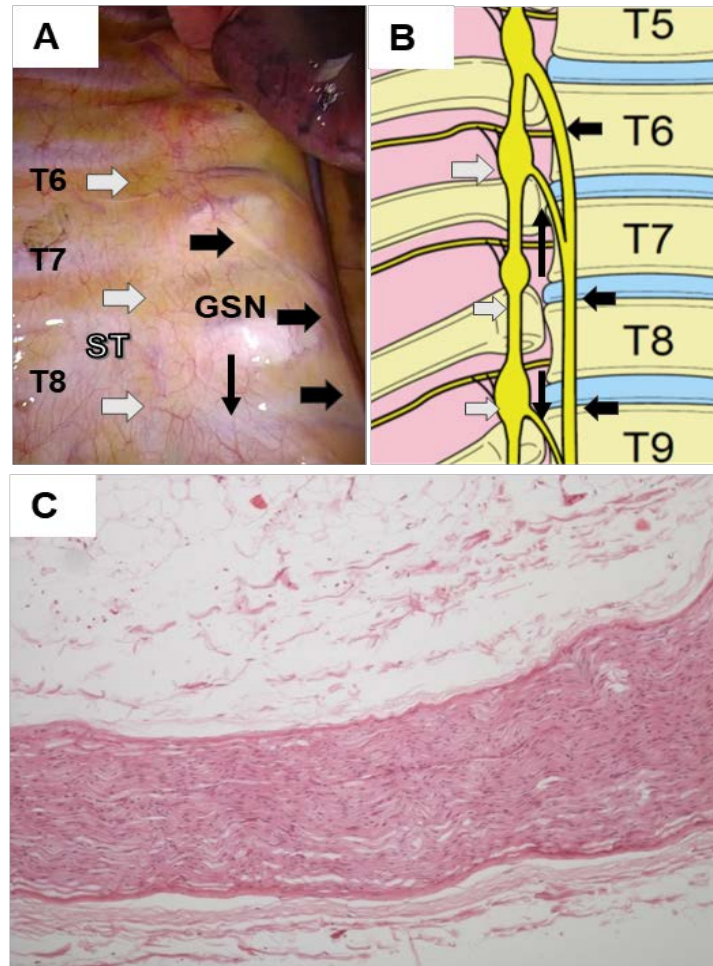


- ↑ Sympathetic tone
- ↑ Splanchnic vascular tone
- ↓ Vascular compliance

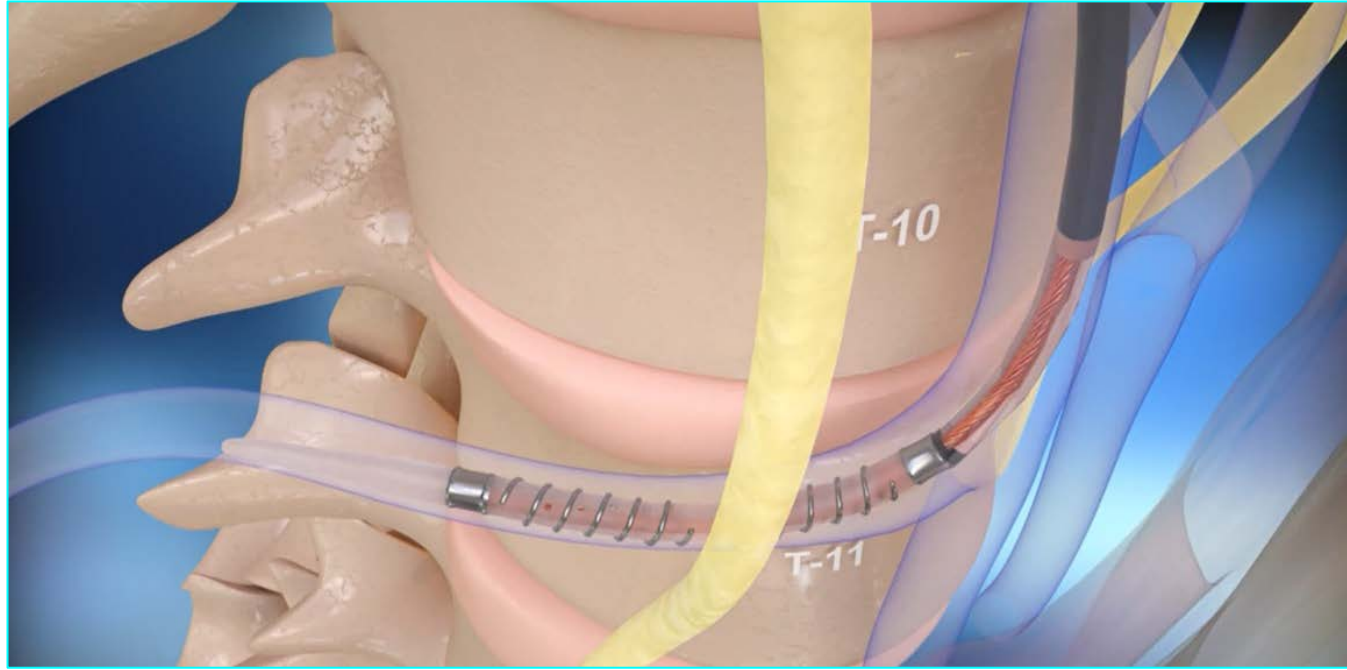


Fallick, Dunlap et al. Circ HF 2011
Fudim, Felker et al. JAHA 2017
Fudim, Patel et al. Circulation 2018
Birch, Birnstock et al. J Vasc Res 2008

Long-term Splanchnic Nerve Blockade in HFpEF



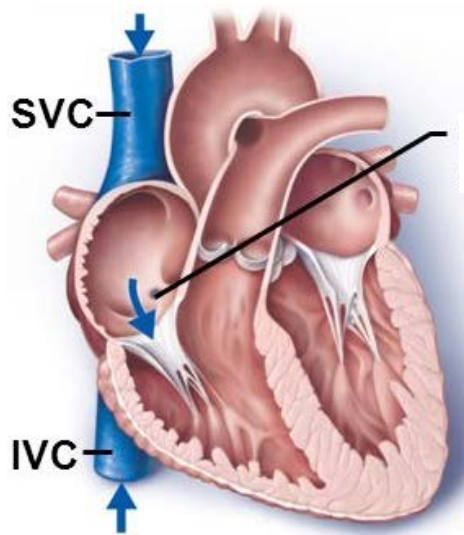
Catheter Based Approach



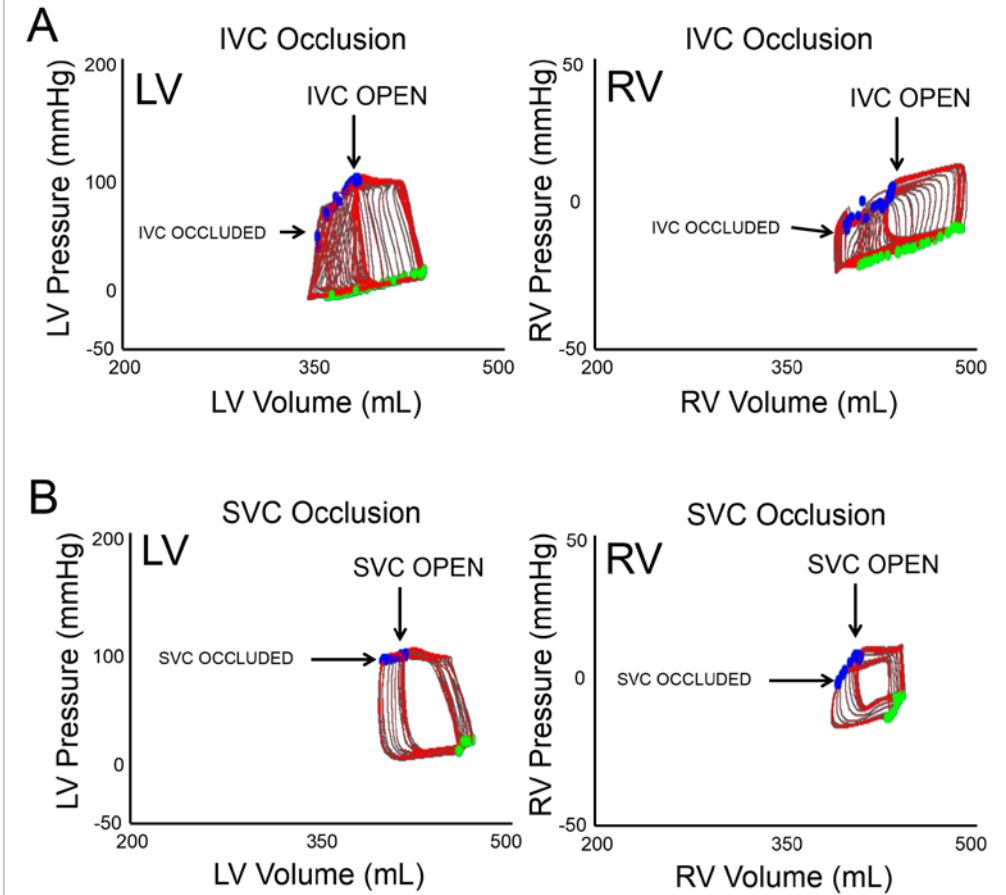
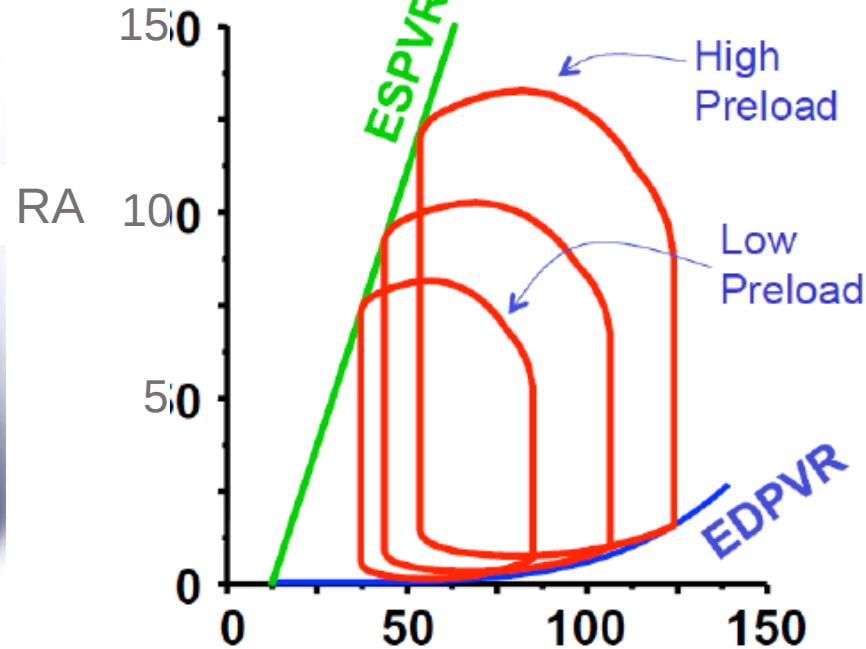
- Successful ablation achieved in all patients
- No device-related serious adverse events

IV. Restricting Cardiac Preload

30% of Blood Flow

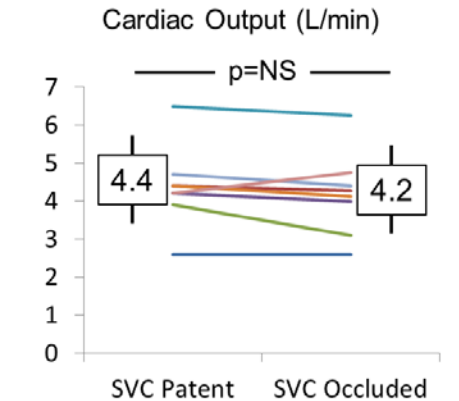
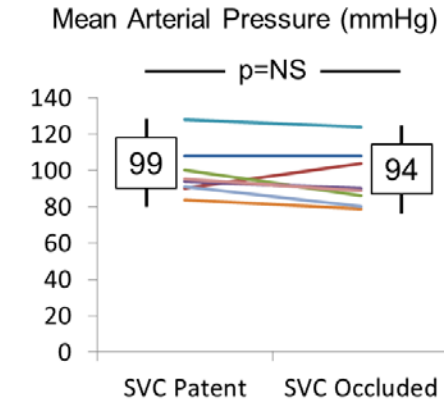
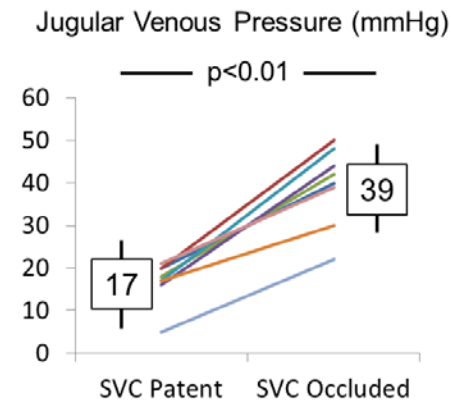
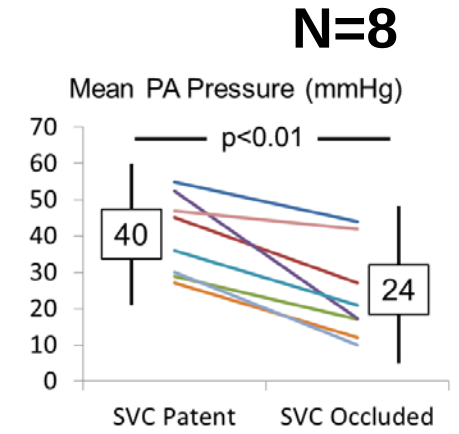
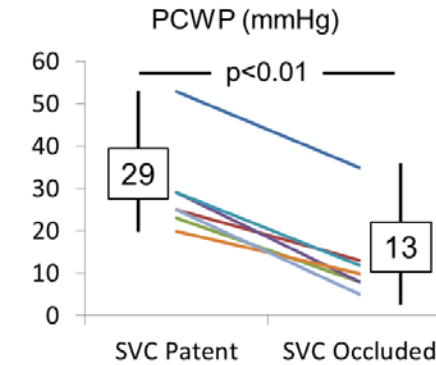
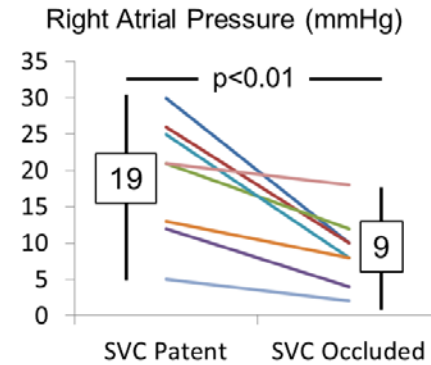
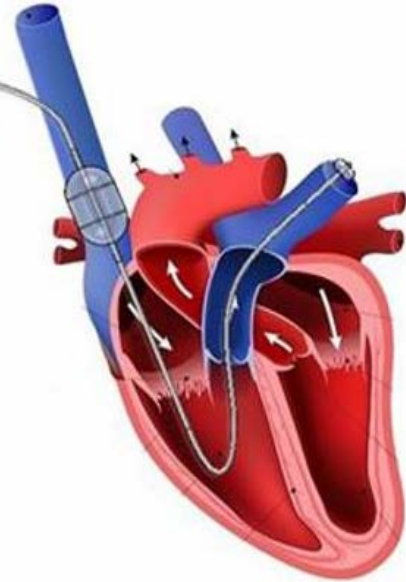
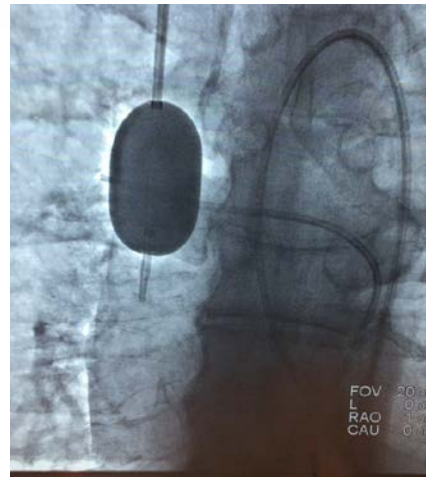


70% of Blood Flow



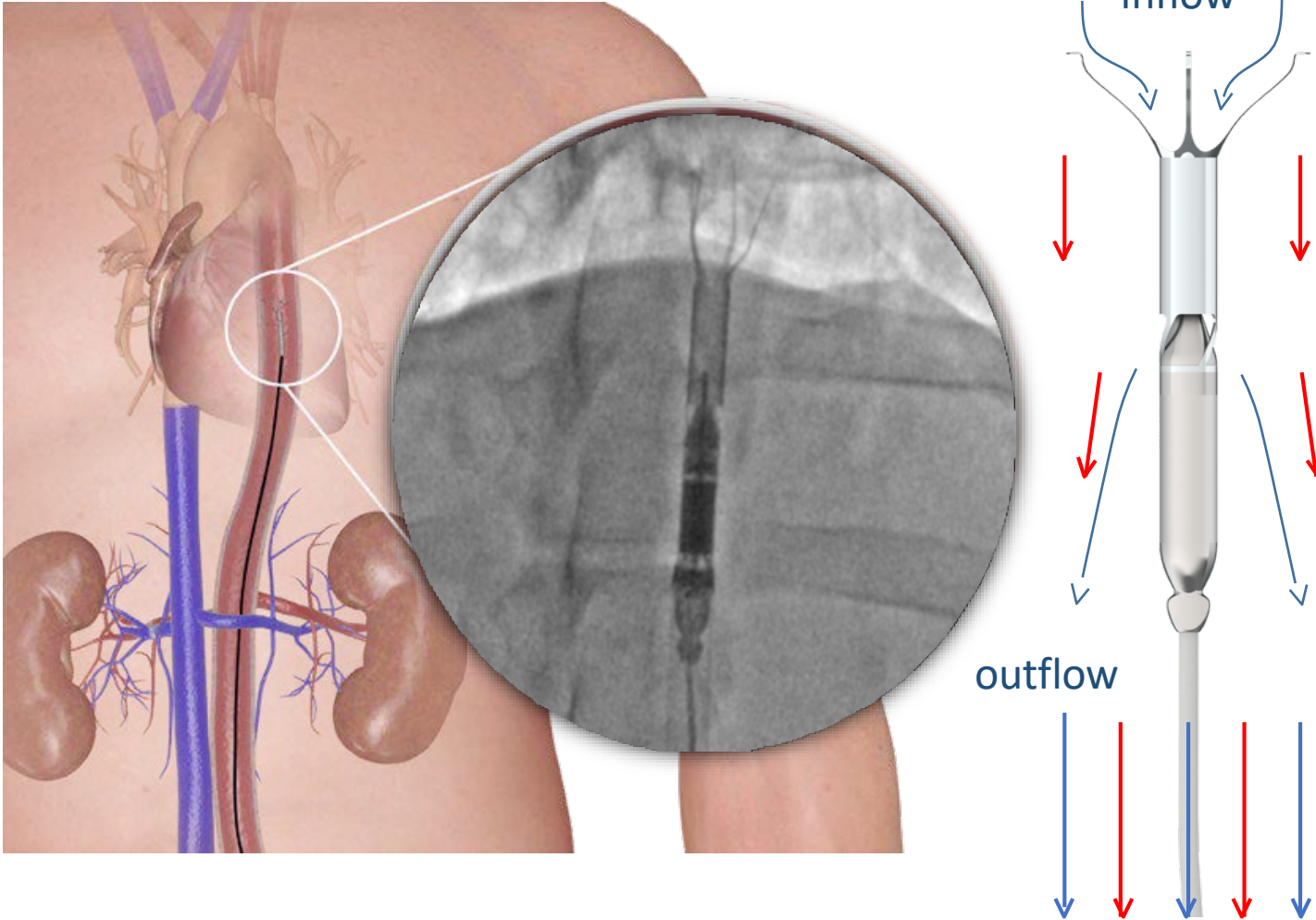
Restricting Cardiac Preload

Catheter-Mounted
SVC Balloon
Therapy System



Kapur NK et al. CCI 2019

V. Mechanical Unloading of Heart



- Mean flow rate through the device: 3.5 L/min
- Improved EF and Stroke Volume by echo
- Mean rate of urine output increased 10-fold (range 2.5–25.0x)

Conclusions

- Devices have the opportunity to fill gap in the management of HF
- A number of device-based strategies are already approved for the management of HF
- Exciting therapies in the pipeline → Device-based era