



DGK.

Atriale Shunt-Therapie – Pathophysiologie und Konzept der Senkung des Füllungsdrucks

Philipp Lurz

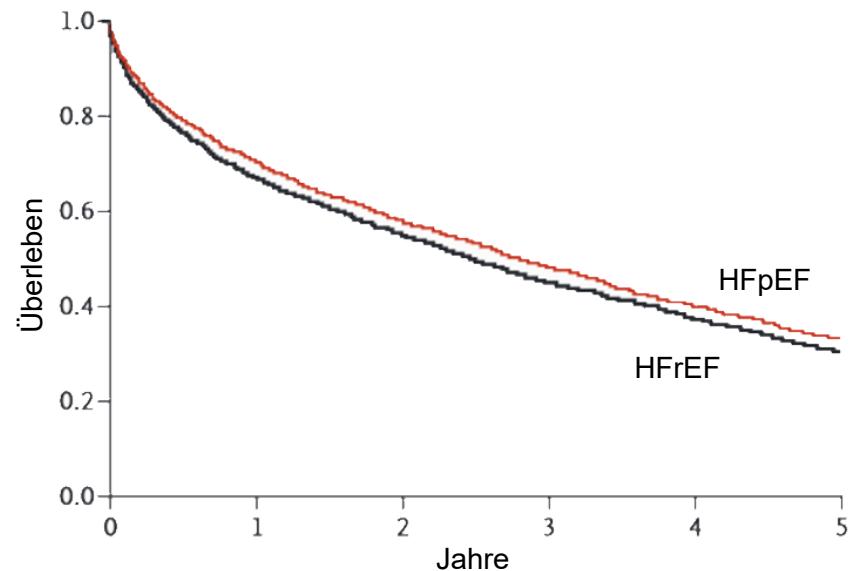
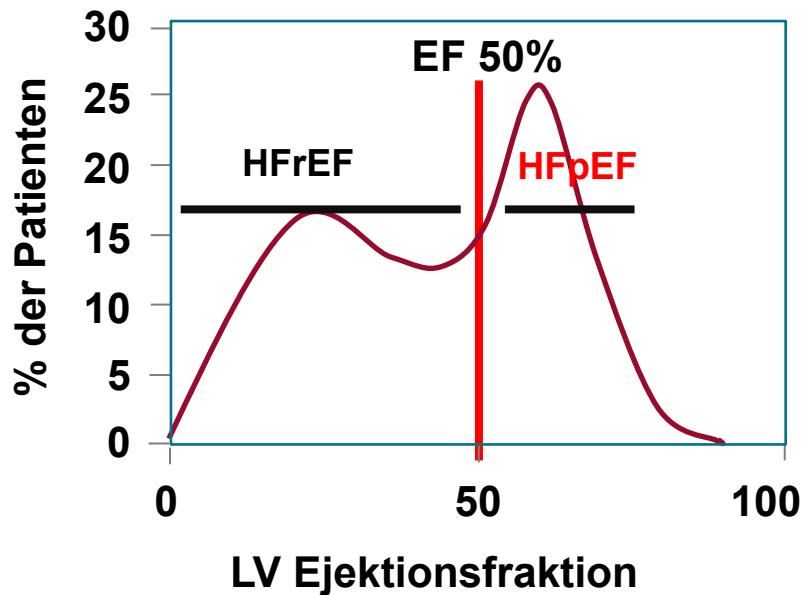


Leipzig
Heart Institute **LHI**





DGK. HFpEF – frequent, trivialized and dangerous



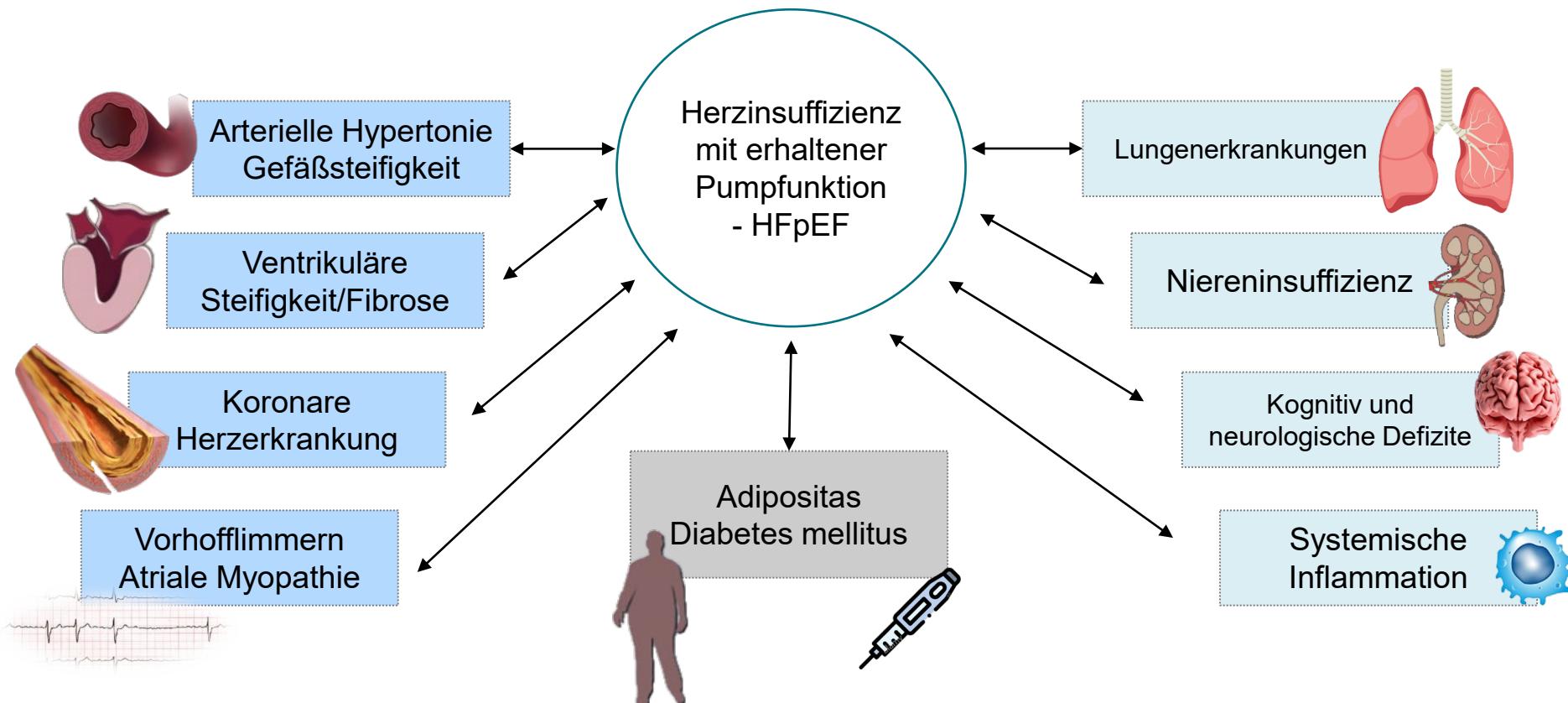
Adaptiert von Borlaug et al., Circulation 2011

Owan et al., N Engl J Med 2006



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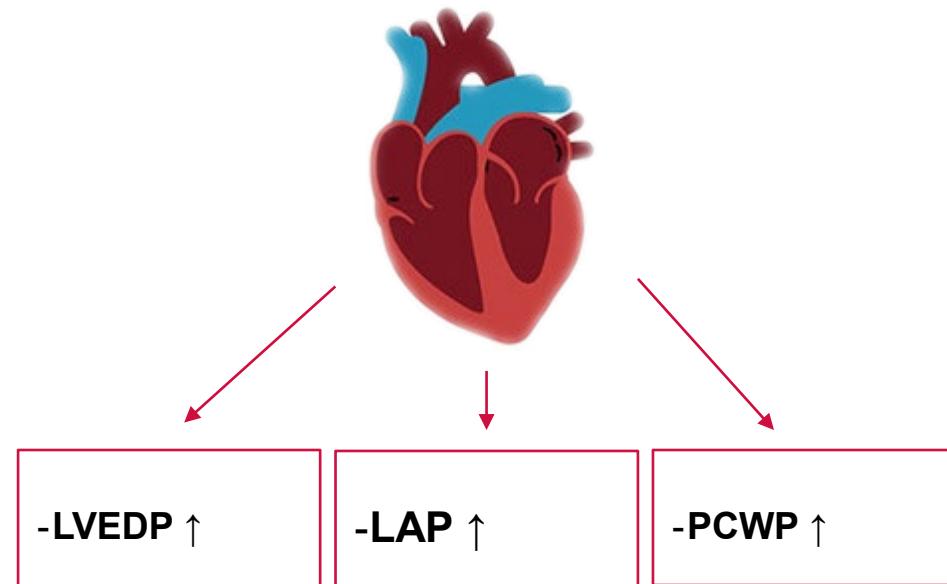
HFpEF – a heterogenous syndrome





DGK. Abnormal left sided pressures - hallmark of HFpEF

- HFpEF and HFmrEF
 - Increase in prevalence
 - High morbidity/mortality
 - No therapies
 - Heterogenous syndrome
 - **INCREASED FILLING PRESSURES**

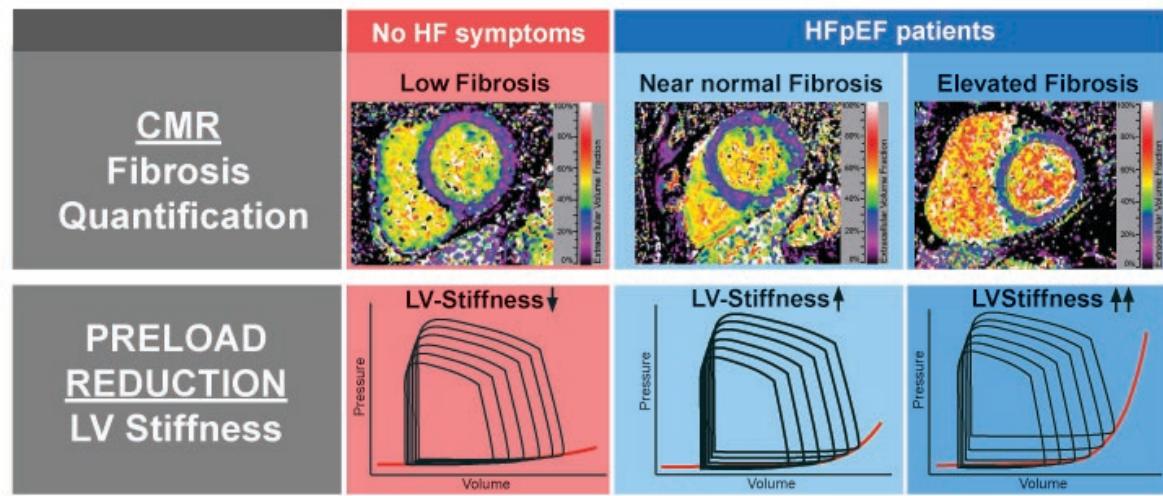
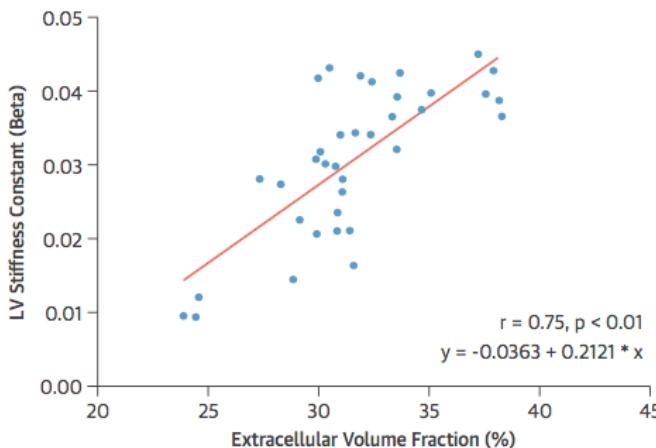




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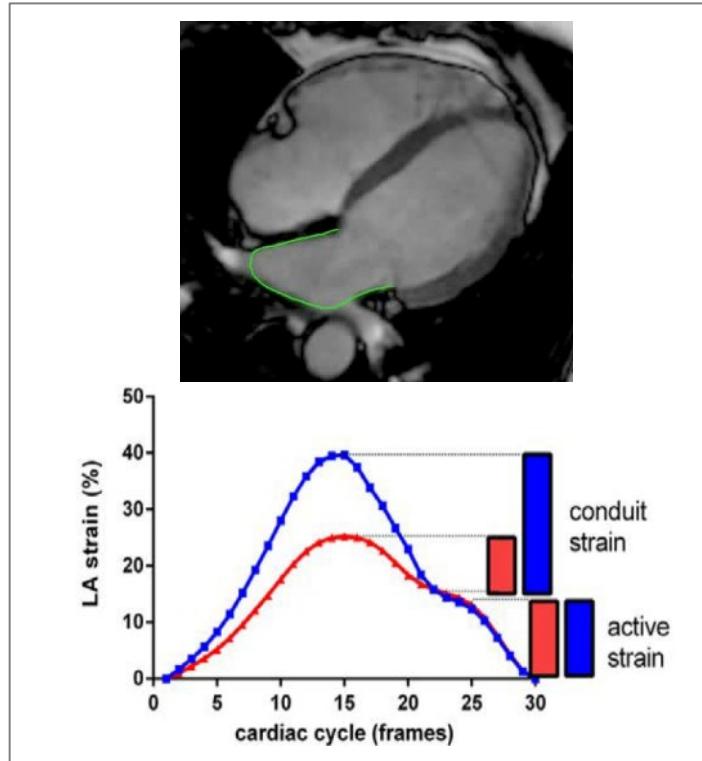
Ventricular stiffness in HFrEF

Comparison of left ventricular stiffness with diffuse fibrosis

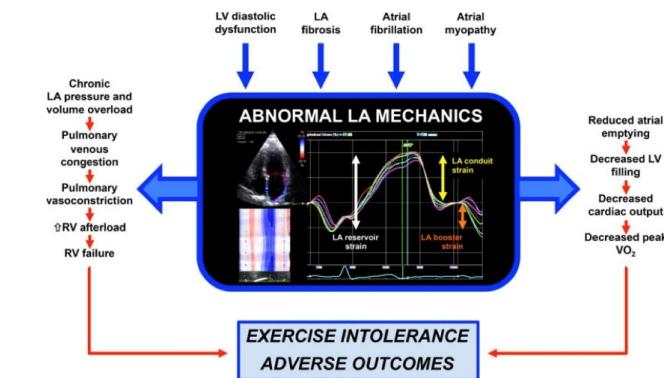
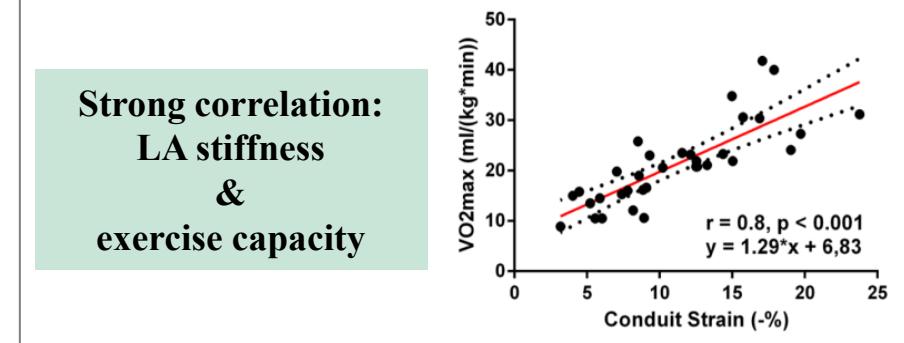


Rommel KP...Lurz P, J Am Coll Cardiol 2016;68(17):1925.

Left atrial stiffness in HFrEF



Strong correlation:
LA stiffness
&
exercise capacity



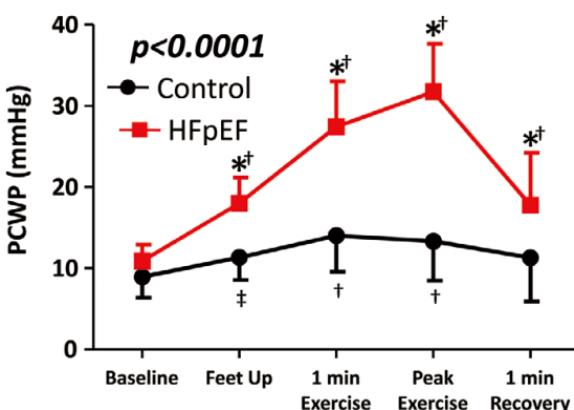
von Roeder M...Lurz P, Circ Cardiovasc Imaging 2017; 10(4).

Freed et al. Circ Cardiovasc Imaging 2017



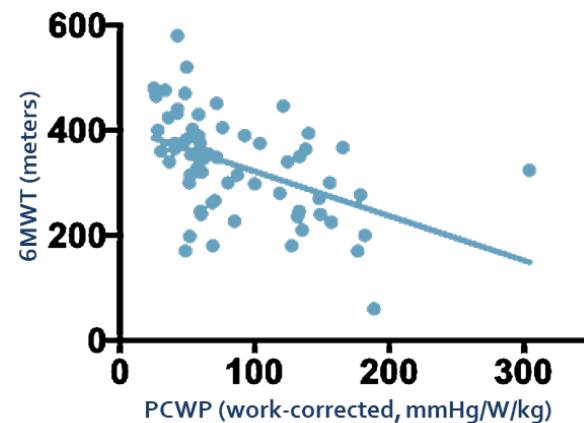
DGK. High LA pressure impacts QoL and survival

PCWP HFpEF vs Control



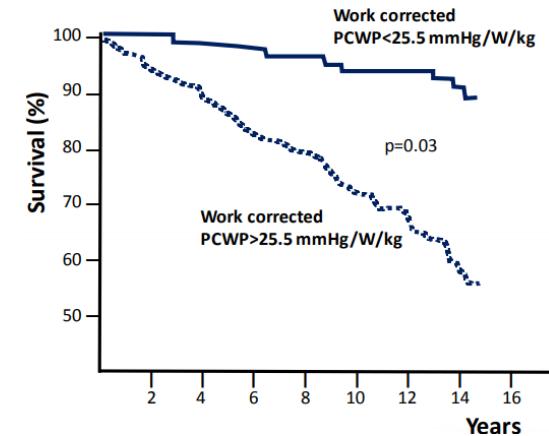
HFpEF patients experience a significant rise in PCWP during exercise

Exercise capacity



As PCWP rises, patient exercise capacity falls

Outcomes

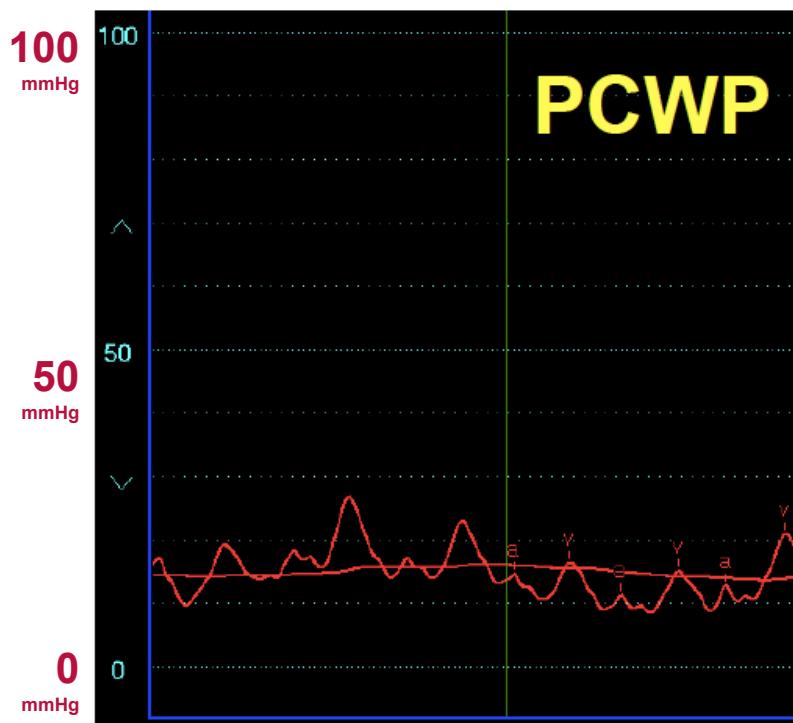


Higher PCWP is correlated with worse outcomes

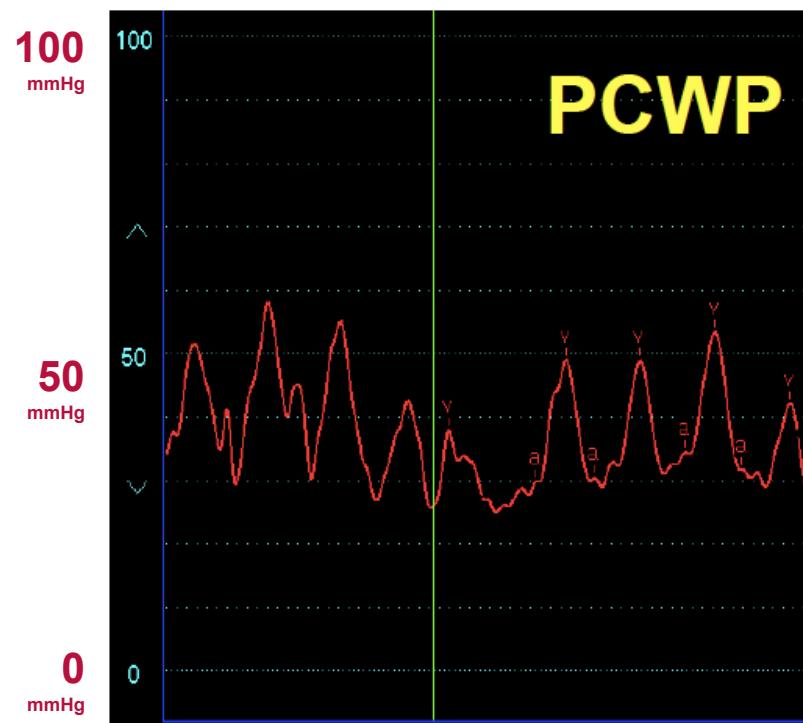


DGK. Out of proportion increase in PCWP in HFpEF

Rest

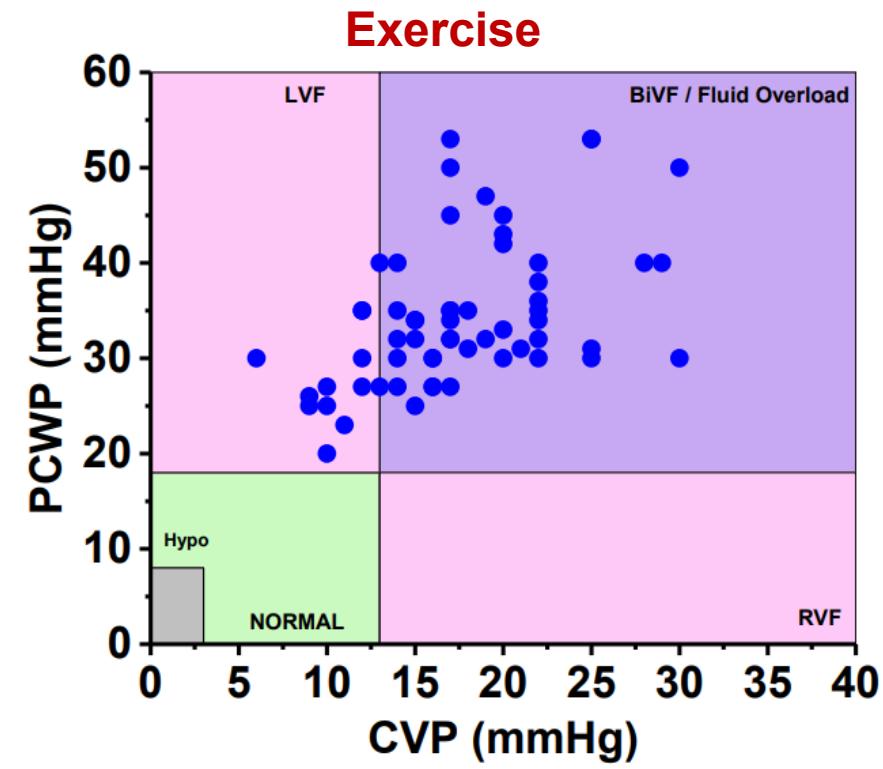
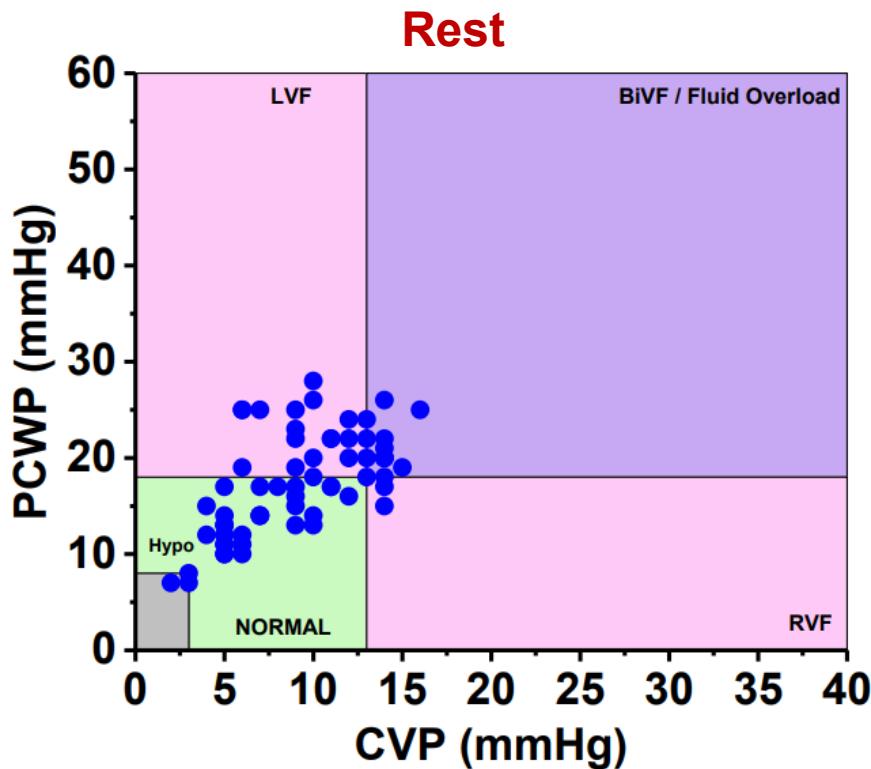


Exercise





DGK. CVP and PCWP increase in HFpEF with exercise

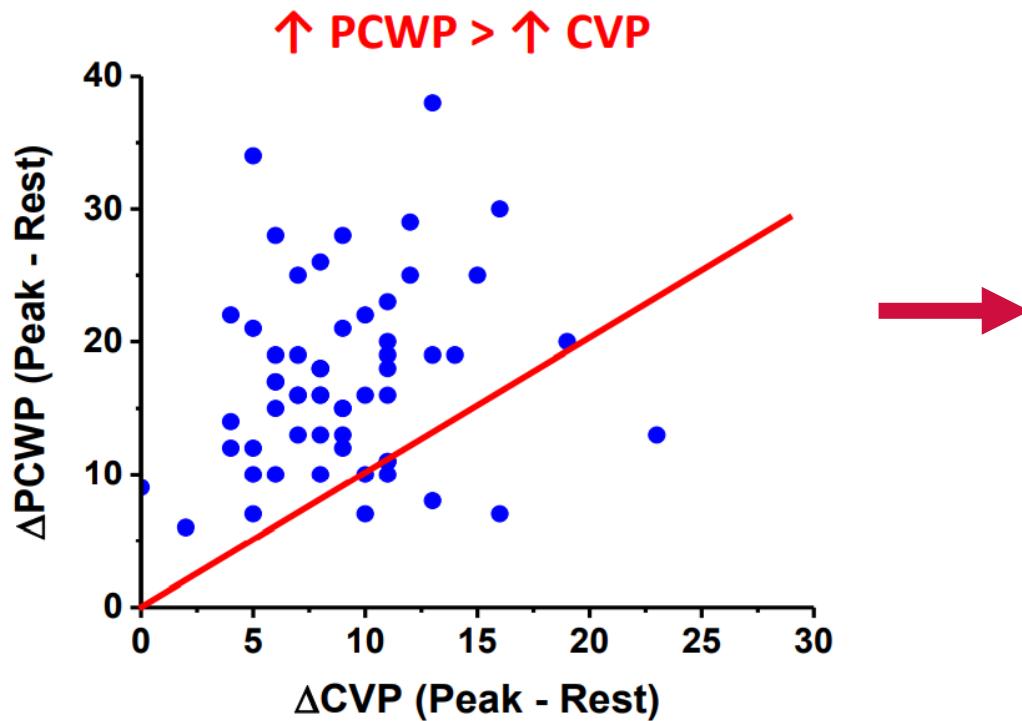


Wessler J. et al., *Circ Heart Fail.* 2018



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Exercise induced PCWP increase is larger than CVP increase



The LA-RA gradient is the driving pressure for atrial decompression

Wessler J. et al., *Circ Heart Fail*. 2018



DGK. Iatrogenic ASD, who came up with the idea?

,Lutembacher' Syndrome



Case-series of 66 cases and description of the syndrome by Lutembacher



,Severe Mitral Stenosis and large ASD died 61 yrs of age survived 7 pregnancies'

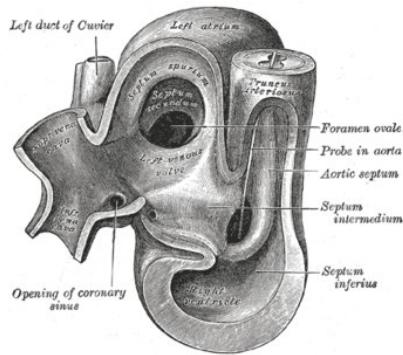
- J *Corvisart des Morts*, 1818



DGK. Evolution of iASD as a therapy

1916

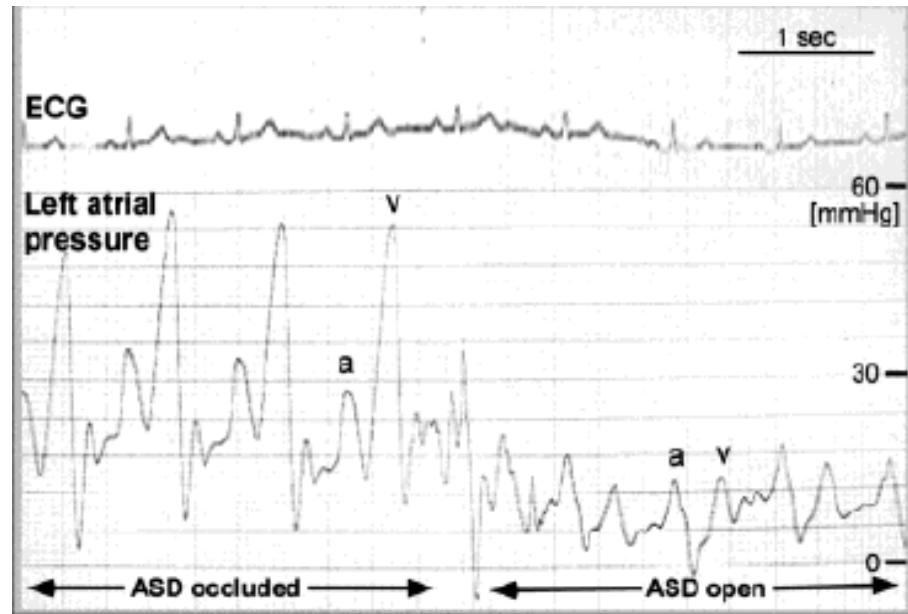
Lutembacher observed that patients with mitral stenosis and an ASD had fewer symptoms and better outcomes than those without an ASD.



Lutembacher R. Arch Mal Coeur 1916

2001

Ewert et al. showed that re-opening a closed ASD would decompress LA.

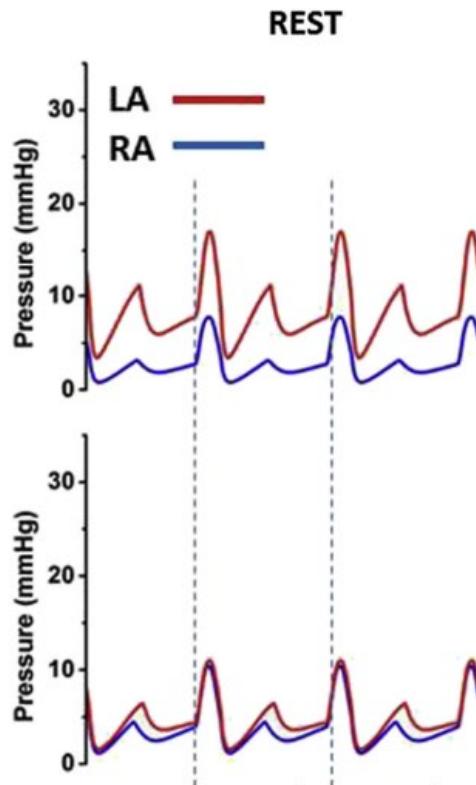


Ewert P. et al., Z Kardiol. 2001

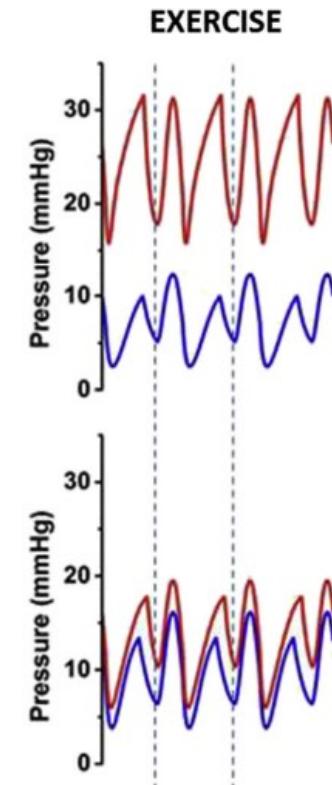


DGK. Simulation using exercise hemodynamic data

No shunt



Shunt

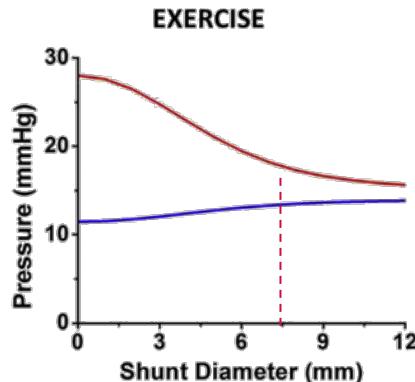
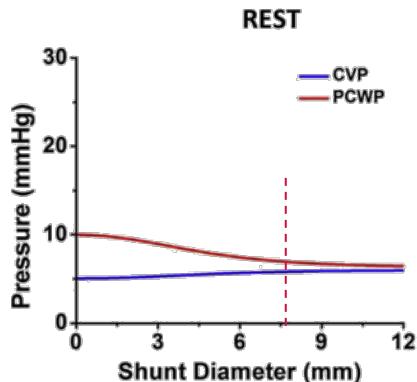


Kaye D. et al., J Card Fail. 2014



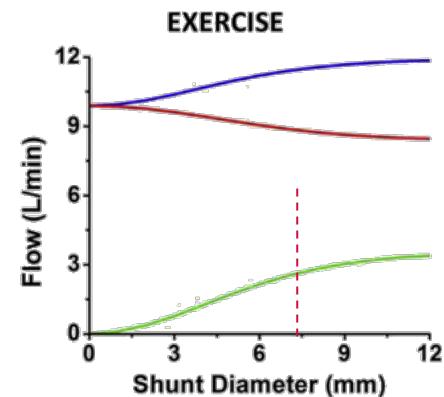
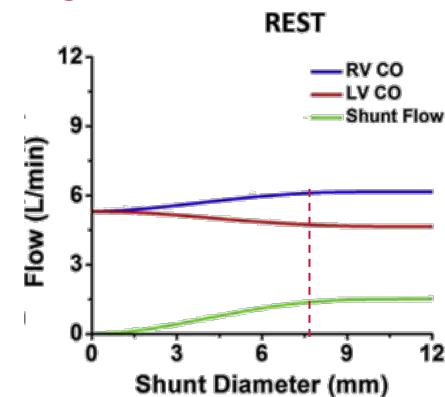
DGK. Pros and cons of shunting/iASD

Pressure



Adding a shunt immediately reduces the high PCWP characteristic of HFpEF patients.

Flow



Increasing shunt diameter increases shunt flow but too much can negatively impact LV cardiac output during exercise

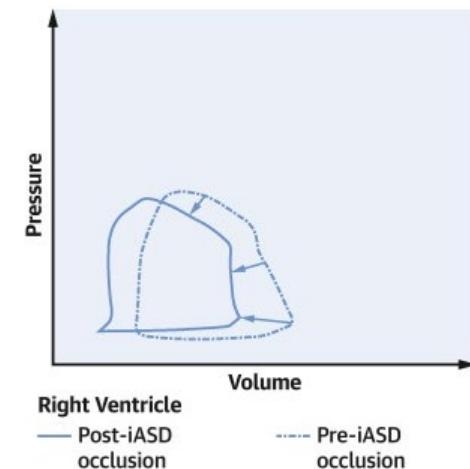
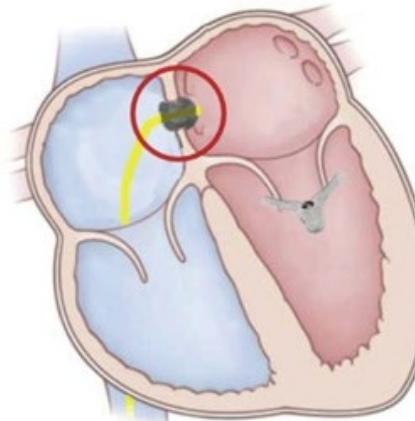
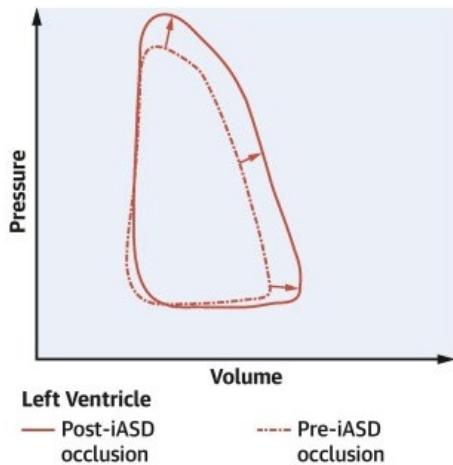
8 mm shunt diameter strikes the optimal balance between effectively reducing LA pressures without meaningfully decreasing forward cardiac output.

Kaye D. et al., J Card Fail. 2014



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Too large iASD might be unfavourable – lessons learned from TMVR



iASD open

- RV volume overload, LV underfilling
- LV-CO ↓, RV-CO ↑↑
- Unfavorable ventricular interaction

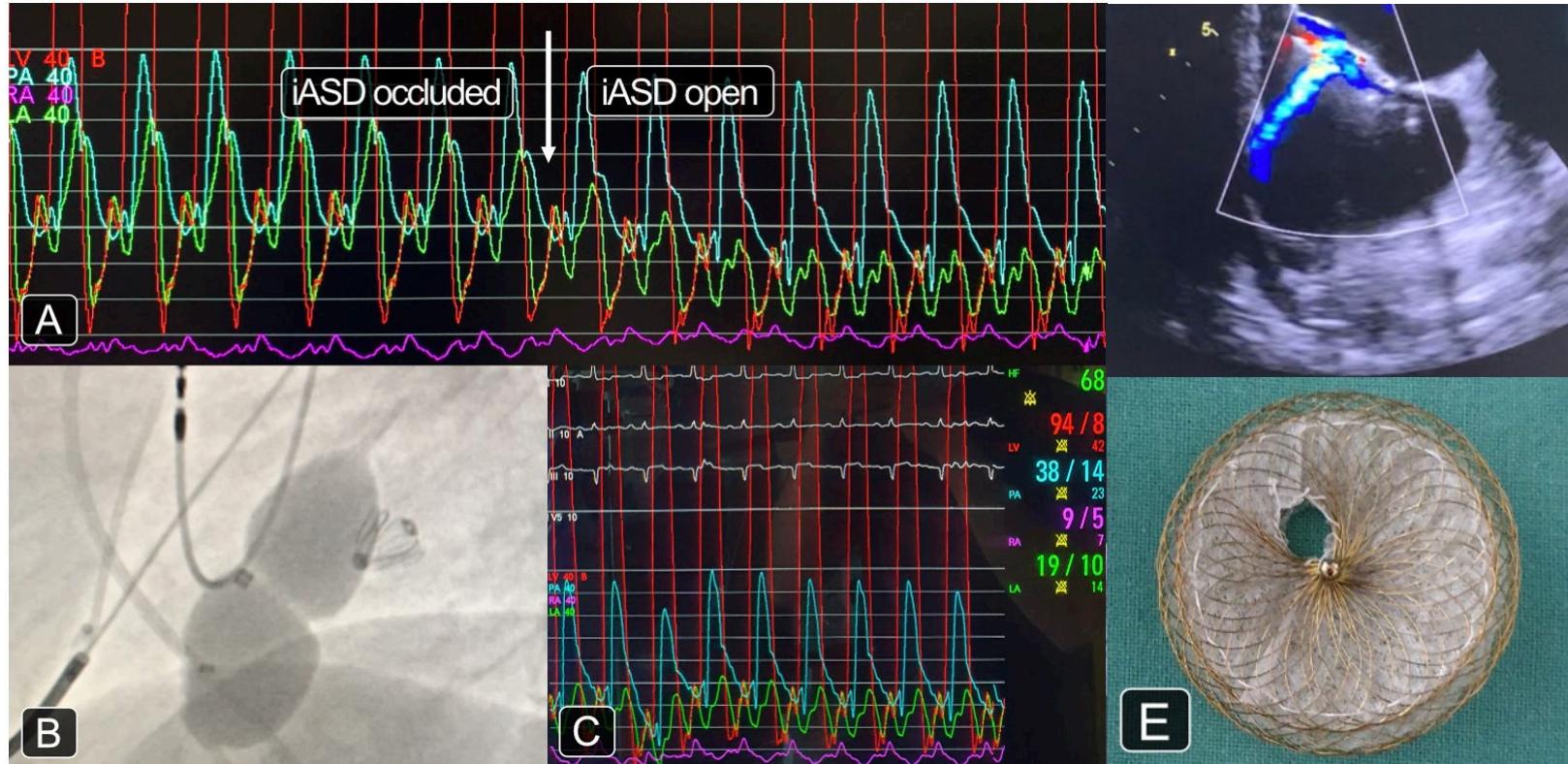
iASD closed

- Volume shift from RV to LV
- LV-CO ↑, RV-CO ↓
- Favorable ventricular interaction

Blazek S... Lurz., JACC Cardiovasc Interv. 2021



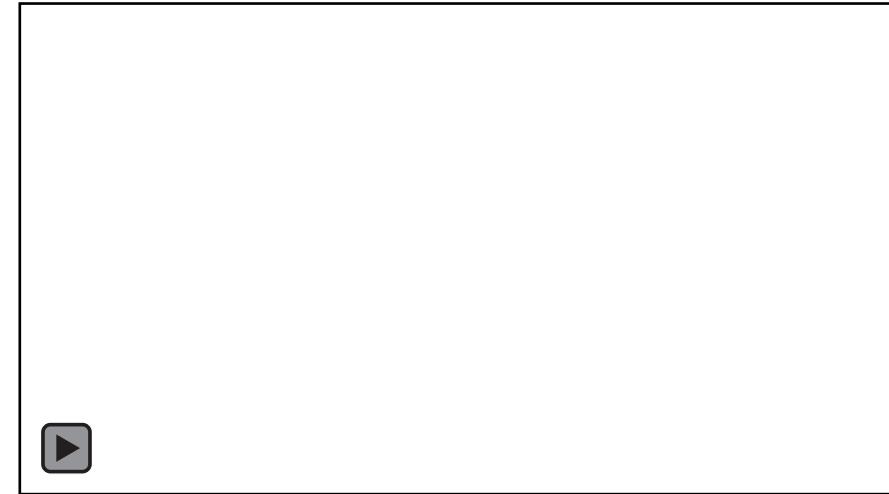
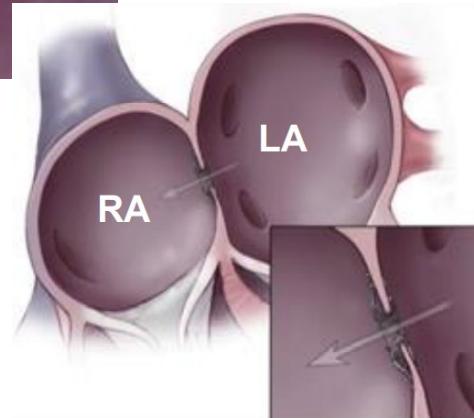
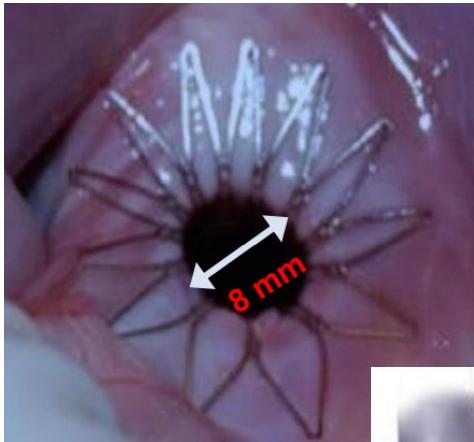
DGK. Closure vs. Partial closure of ASD





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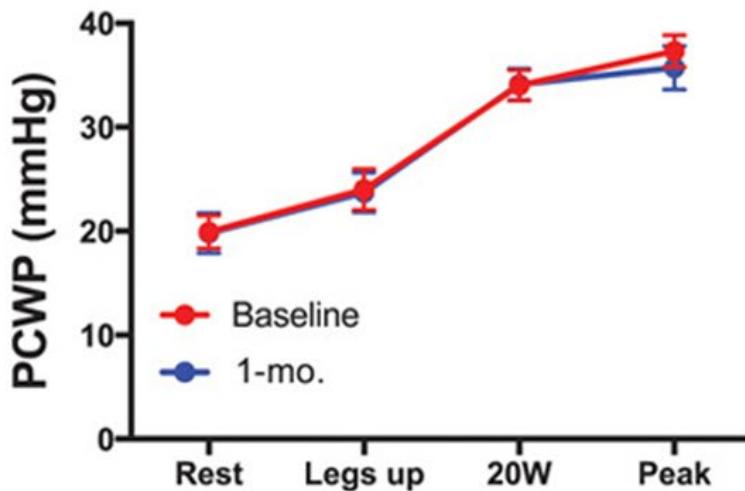
Interatrial shunt for passive LA decompression



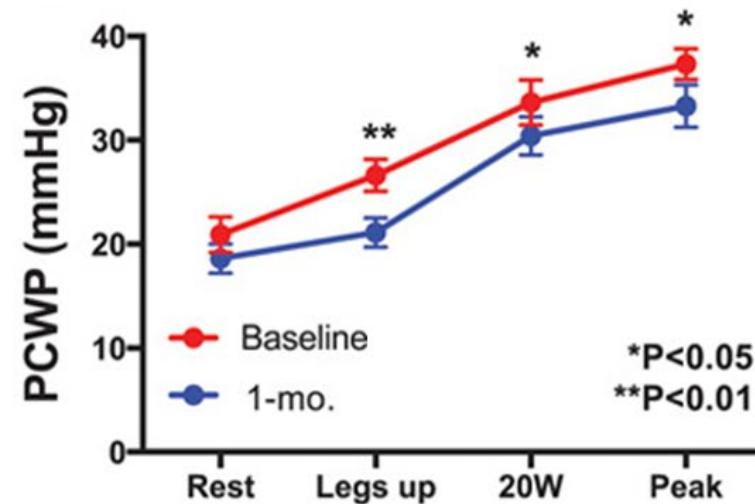


DGK. Results of REDUCE LAP-HF I

Control-group



iASD group

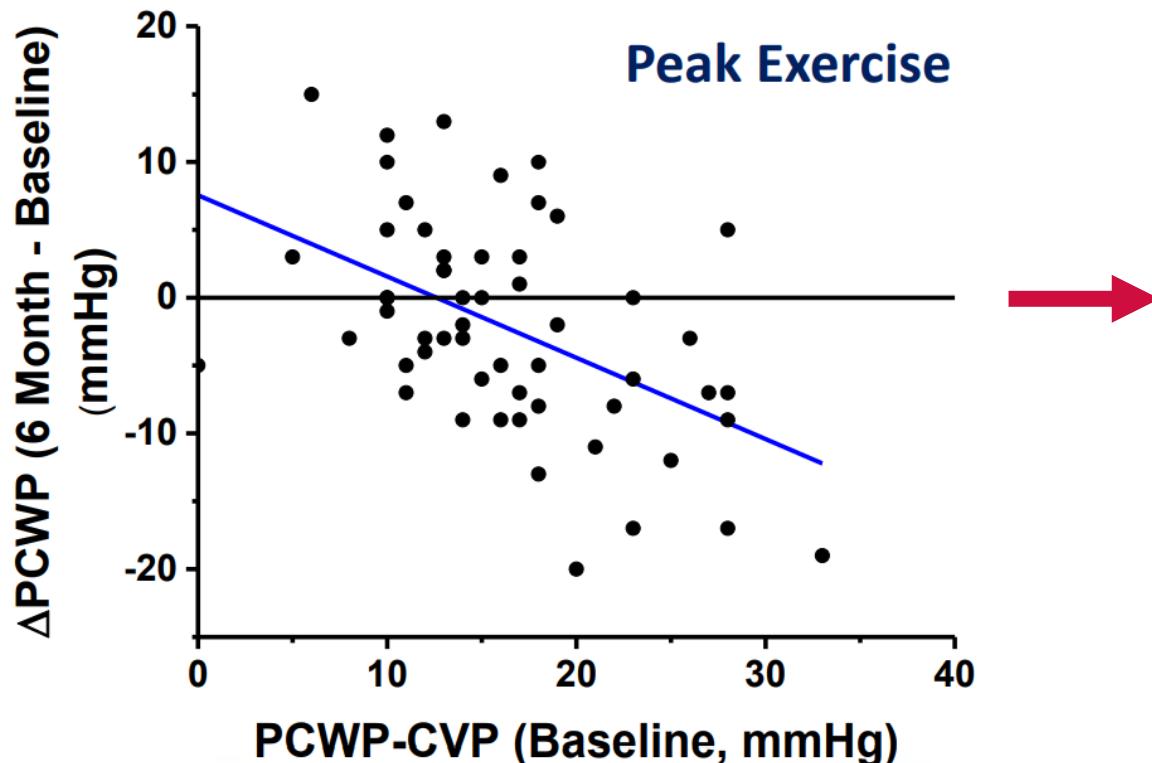


Feldman T. et al., *Circulation*. 2018



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High LV distending pressure associated with favourable results



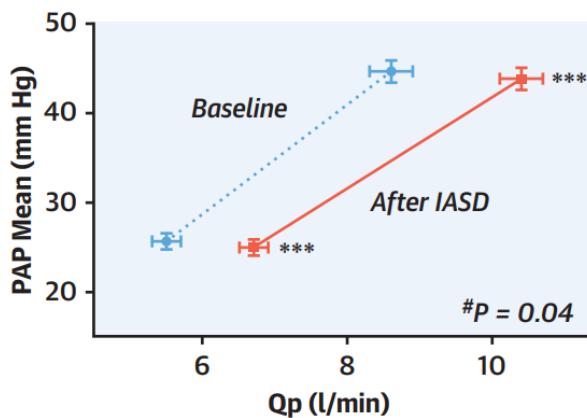
A high LV-distending pressure (PCWP-CVP) predicted stronger response to iASD in HFP EF and HFmrEF patients at 6-months

Kaye D. et al., *Circ Heart Fail.* 2016



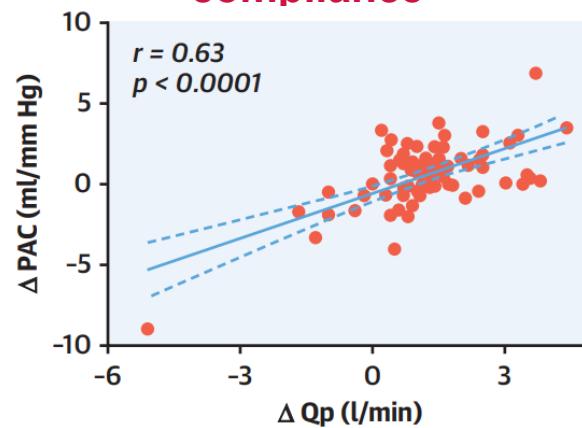
DGK. Pulmonary vascular effects of iASD

Pulmonary flow/pressure



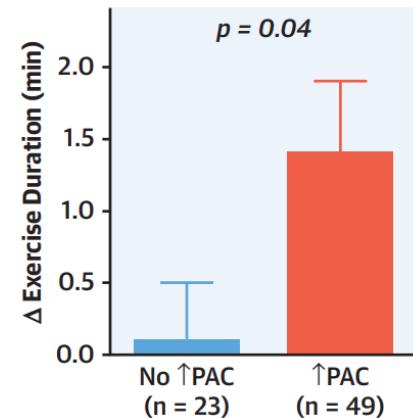
iASD leads to increased pulmonary flow at comparable PA pressure

Pulmonary artery compliance



Increases in pulmonary flow are mediated by an increase in pulmonary artery compliance

Exercise capacity

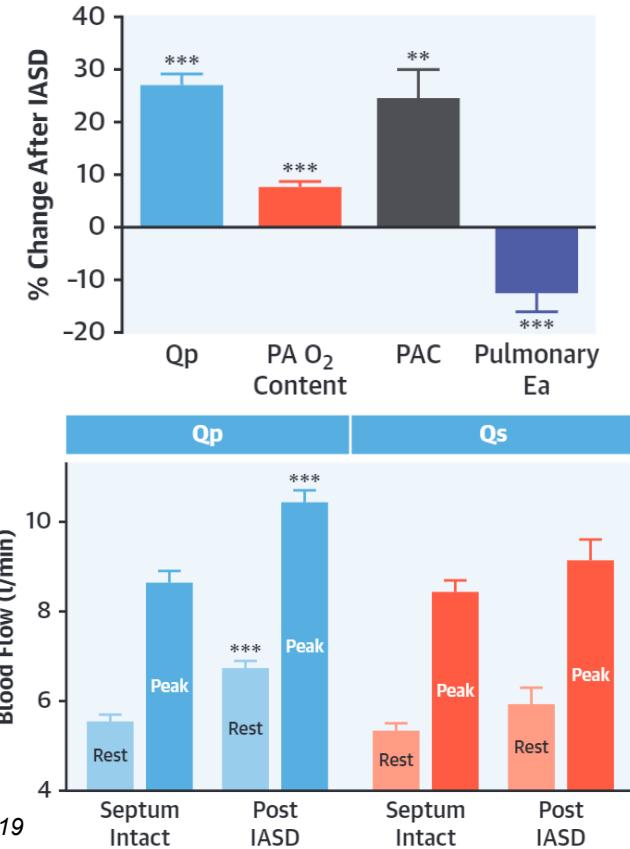
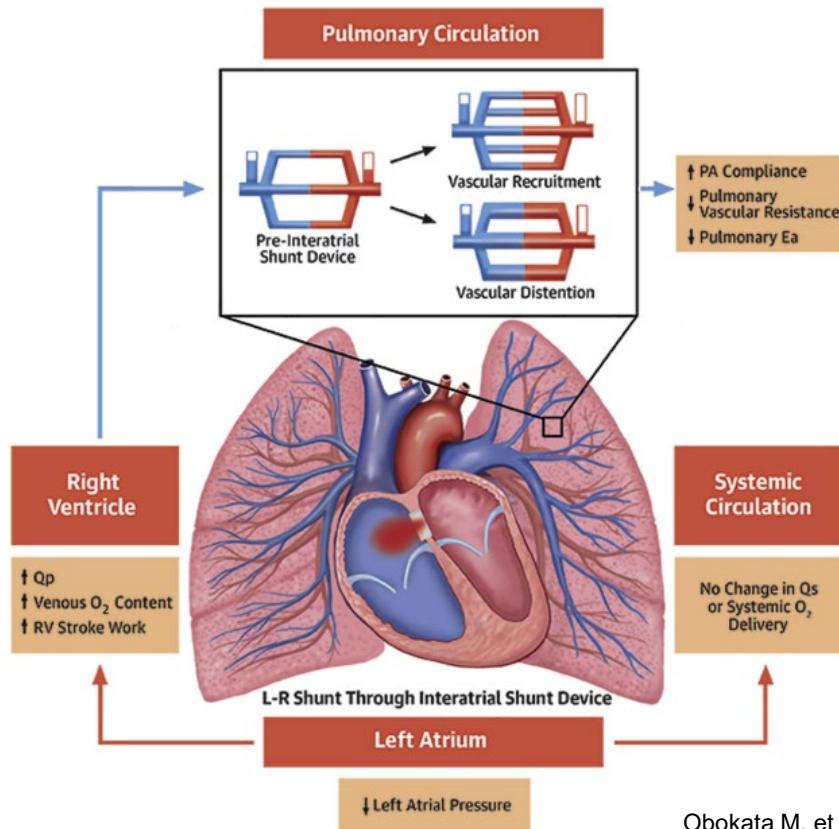


Improved PAC translates into increased exercise capacity

Obokata M. et al., J Am Coll Cardiol. 2019



DGK. Pulmonary vascular effects of iASD

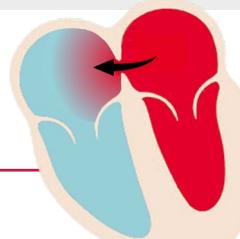
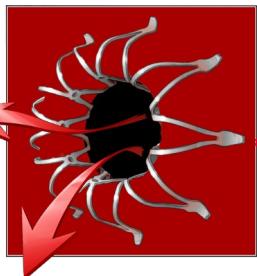




DGK. Summary - Current mechanistic understanding



Interatrial Shunt

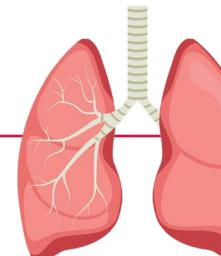


Cardiac effects

- Qp:Qs depends on PCWP-CVP gradient
- Pulmonary blood flow ↑
- PCWP at rest and exercise ↓

Clinical implications

?



Pulmonary effects

- PA O₂ saturation ↑
- Pulmonary artery compliance ↑
- Endarterial elastance ↓



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