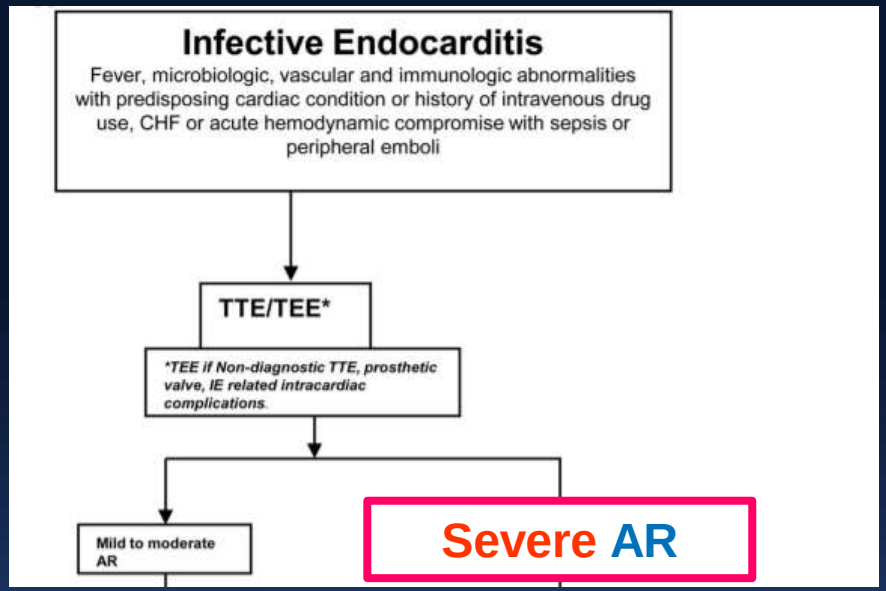
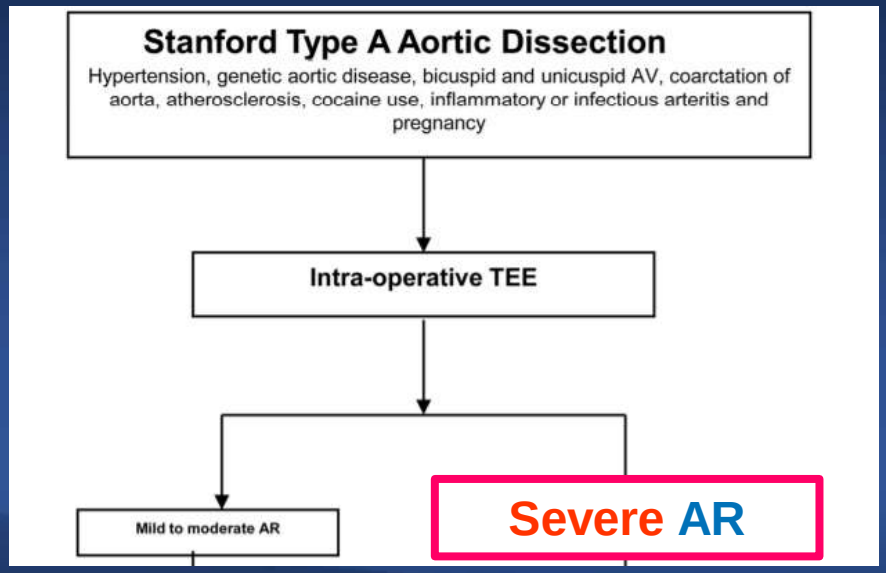
Impact of paravalvular leakage on LV geometry after TAVR

Euihong Ko, MD

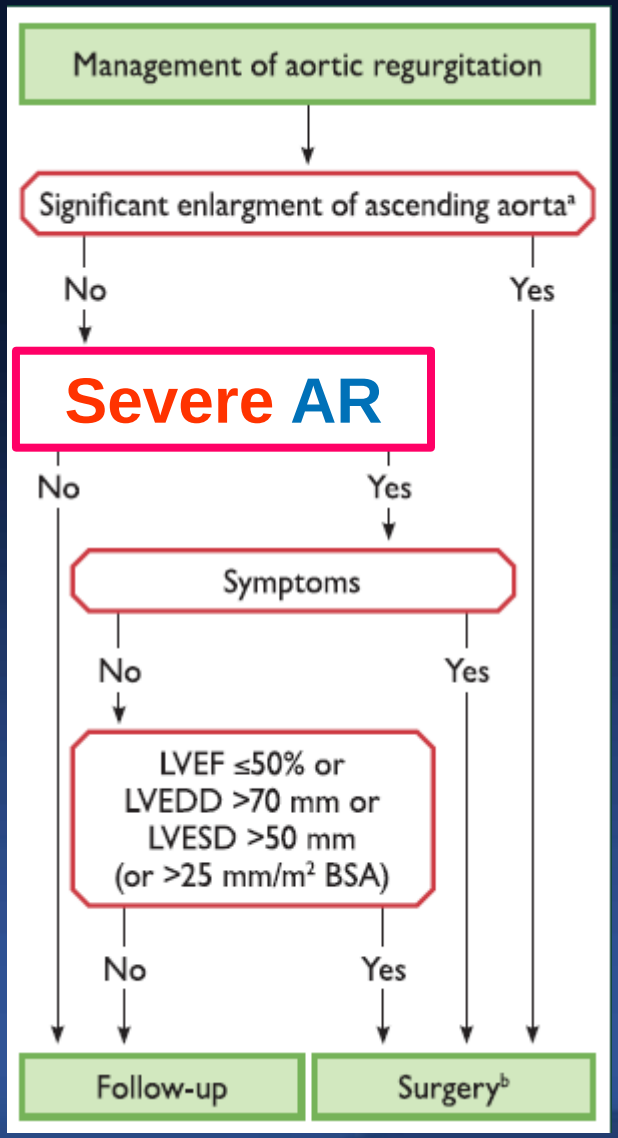
Division of Cardiology, University of Ulsan College of Medicine,
Heart Institute, Asan Medical Center, Seoul, Korea

Acute Native Valve AR



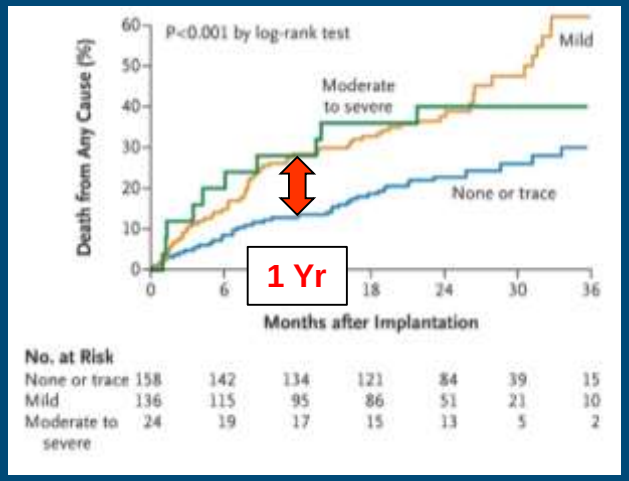


Chronic Native Valve AR



Yasmin S. Hamirani et al. Circulation. 2012;126:1121-1126

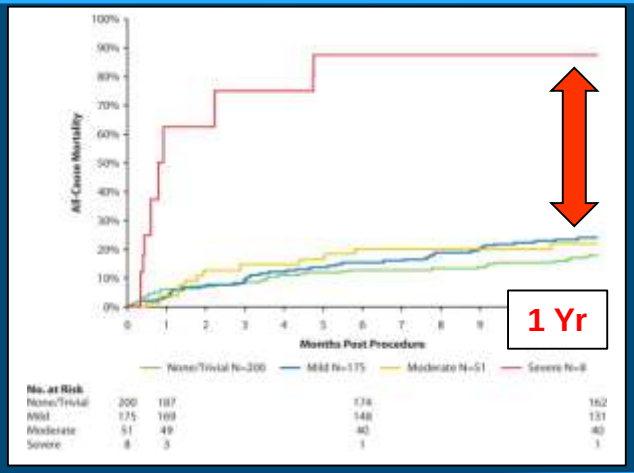
2017 ESC/EACTS Guidelines



PARTNER I Trial

Kodali SK et al. N Engl J Med. 2012;366(18):1686-1695.

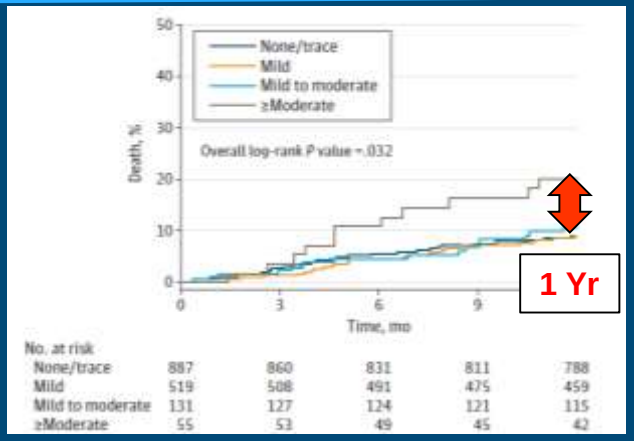
≥ Mild PVL: Mortality ⬆



US CoreValve Pivotal Trial

Pompa JJ et al. J Am Coll Cardiol. 2014;63(19):1972-1981.

Severe PVL: Mortality ⬆



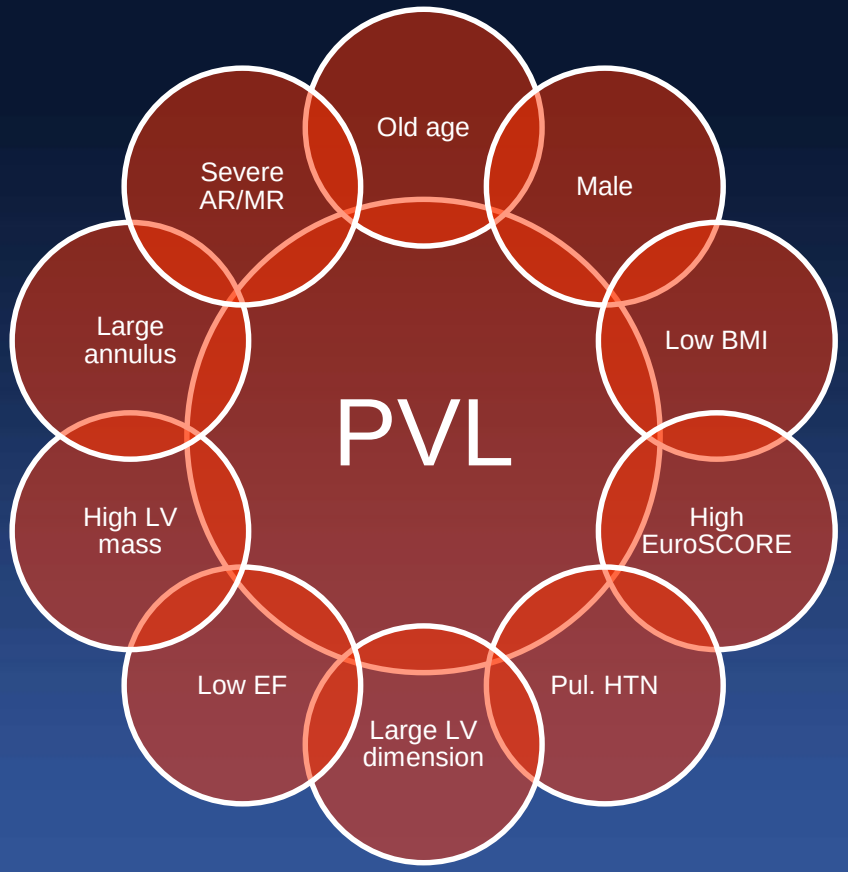
PARTNER II - SAPIEN 3

Pibarot P, et al. JAMA Cardiol 2017;2(11):1208-1216

≥ Moderate PVL: Mortality ⬆

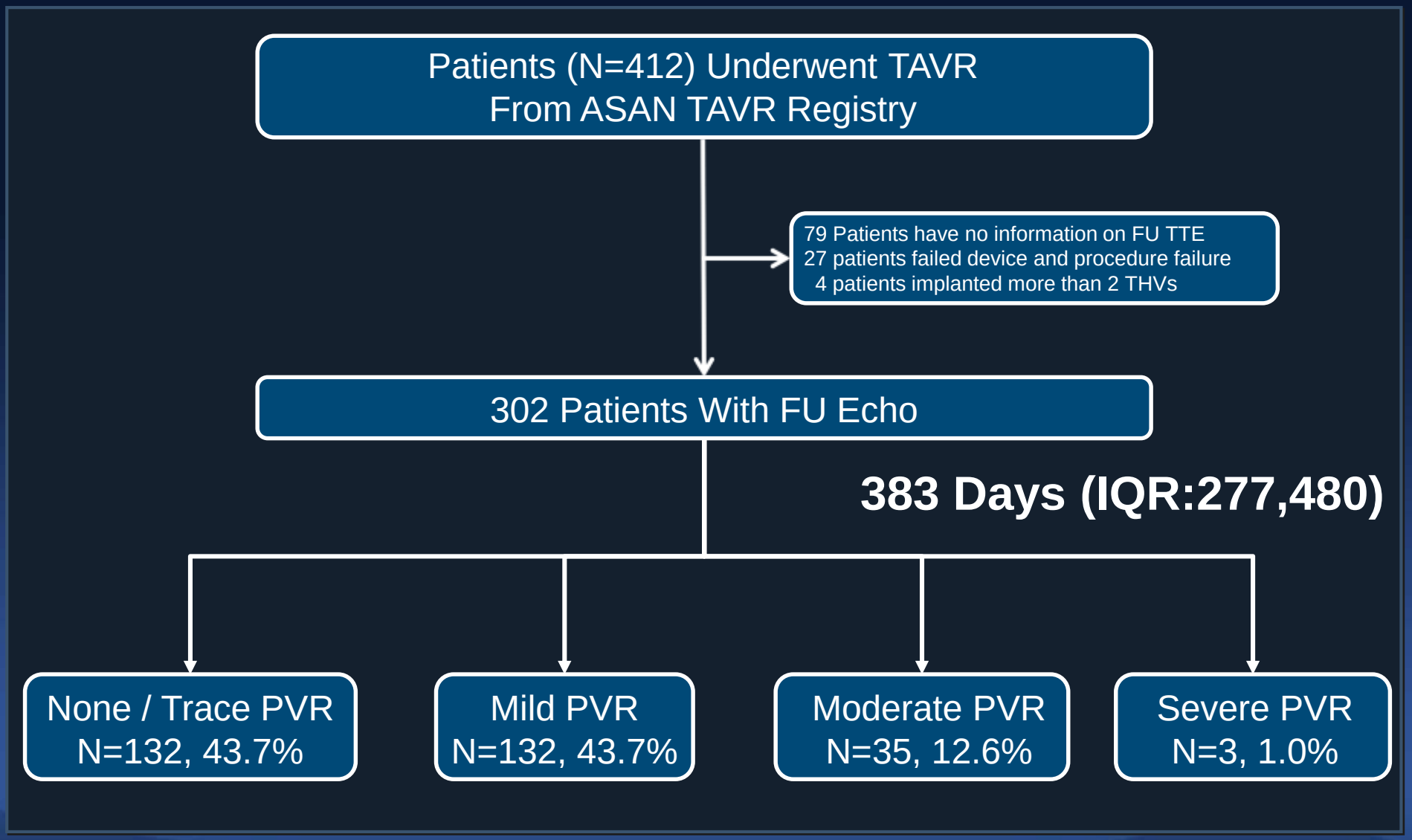
The presence of either **Mild** (HR: 1.37) or **Moderate/Severe** (HR: 2.18) PVR resulted in significantly higher 1-year mortality.

- Significant differences in the baseline clinical and echo characteristics of patients with none/trace, mild, or moderate/severe PVR



Susheel Kodali et al. European Heart Journal (2015) 36, 449-456

Study Flow


Patients (N=412) Underwent TAVR
From ASAN TAVR Registry
79 Patients have no information on FU TTE
27 patients failed device and procedure failure
4 patients implanted more than 2 THVs
302 Patients With FU Echo
383 Days (IQR:277,480)
None / Trace PVR
N=132, 43.7%
Mild PVR
N=132, 43.7%
Moderate PVR
N=35, 12.6%
Severe PVR
N=3, 1.0%

Baseline Characteristics

	None/Trace N=132	Mild PVR N=132	More then Mild PVR N=38	P value
Age	78.6±5.5	78.7±4.7	78.5±4.9	0.94
Gender (Male)	60 (45.5%)	63 (47.7%)	19 (50.0%)	0.86
BMI	24.5±3.5	24.0±3.5	23.4±2.9	0.23
BSA	1.6±0.2	1.6±0.2	1.6±0.1	0.30
STS score	4.3±3.7	3.8±2.4	3.8±2.7	0.63
EuroSCORE	15.3±11.5	15.1±10.8	18.8±11.4	0.09
NYHA III or IV	73 (55.3%)	55 (41.7%)	17 (44.7%)	0.08
A.Fib	19 (14.4%)	19 (14.4%)	1 (2.6%)	0.13
Smoker	14 (10.6%)	20 (15.2%)	5 (13.2%)	0.55
Hypertension	114 (86.4%)	116 (87.9%)	31 (81.6%)	0.61
Diabetes	48 (36.4%)	40 (30.3%)	7 (18.4%)	0.10
Hyperlipidemia	89 (67.4%)	88 (66.7%)	23 (60.5%)	0.72
Coronary artery disease	59 (44.7%)	53 (40.2%)	12 (31.6%)	0.34
Renal insufficiency	40 (30.3%)	30 (22.7%)	9 (23.7%)	0.35
Balloon expandable THV	90 (68.2%)	82 (62.1%)	16 (42.1%)	0.014

Severe PVR N=3

Baseline CT Measurement

	None/Trace N=132	Mild PVR N=132	More then Mild PVR N=38	P value
Annulus				
Maximal diameter	25.4±4.4	26.4±3.5	27.3±2.3	0.01
Minimal diameter	20.4±3.3	20.6±2.7	21.8±2.8	0.09
Area (mm^2)	412.8±97.7	427.5±84.3	457.4±82.9	0.047
Perimeter (mm)	73.9±7.4	75.0±6.7	77.1±6.9	0.06
Sinus area (mm^2)	669.3±240.5	683.2±239.4	570.2±316.9	0.32
Sinotubular junction area (mm^2)	615.6±146.3	614.6±170.6	577.7±254.1	0.86
LVOT area (mm^2)	377.2±132.2	395.7±279.5	438.5±104.0	0.02
Calcification (850 HU)				
Total	260.1±233.3	368.2±279.5	562.9±454.1	<0.0001
Left coronary cusp	74.4±79.0	93.7±101.3	149.2±154.4	0.05
Right coronary cusp	84.9±98.6	108.4±101.6	180.5 ± 192.6	0.001
Non coronary cusp	126.4±105.9	170.5±161.4	245.6 ± 218.7	0.003

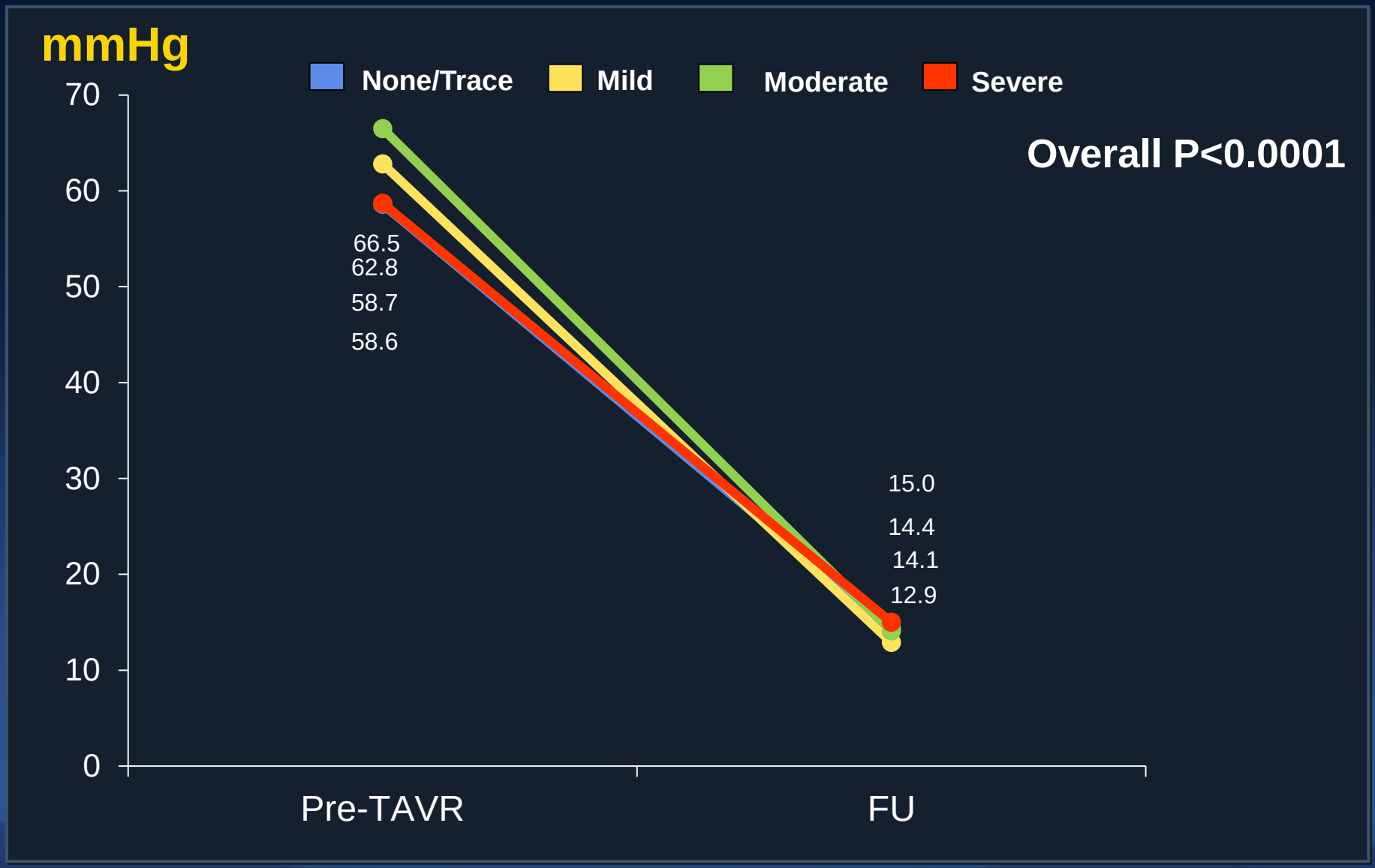
Severe PVR N=3

Baseline Echo Parameters

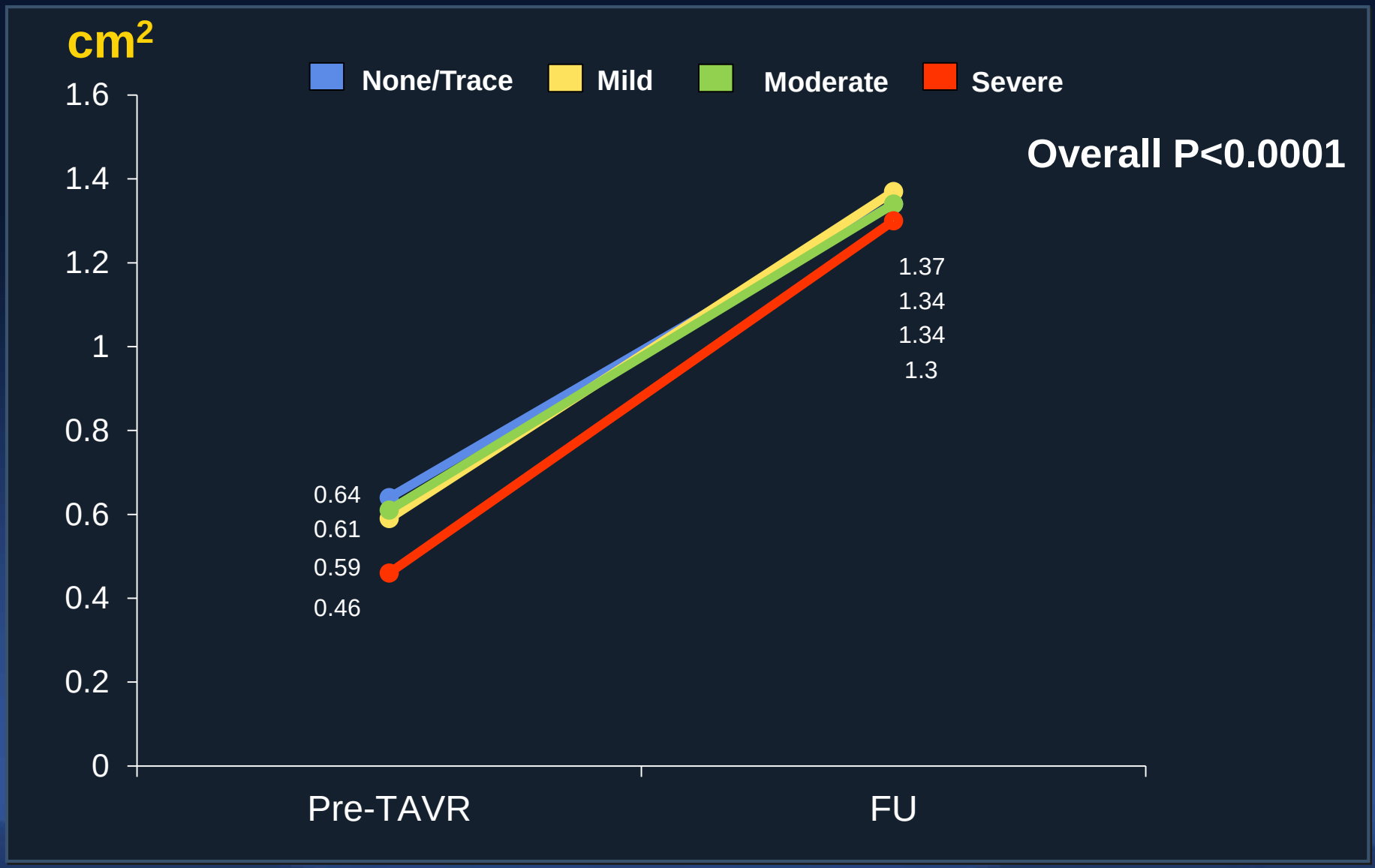
	None/Trace N=132	Mild PVR N=132	More then Mild PVR N=38	P value
Peak velocity	4.8±1.0	5.1±0.9	5.1 ± 0.9	0.11
Peak PG	97.9±33.7	103.3±32.2	108.9 ± 33.7	0.14
Mean PG	58.6±21.1	62.8±23.2	65.9 ± 23.5	0.20
LVEF	60.4±8.2	58.5±10.9	57.7 ± 12.9	0.89
EDV	96.6±38.0	103.1±34.6	115.2 ± 45.2	0.02
Indexed EDV	59.8±22.1	65.4±22.3	74.1±33.4	0.009
ESV	39.8±23.8	45.1±27.9	52.7 ± 36.7	0.10
Indexed ESV	24.6±14.3	28.7±18.2	34.4±27.5	0.056
LVIDd	47.2±6.3	48.9±6.6	49.0 ± 6.1	0.11
LVIDs	29.8±7.2	32.0±8.0	32.8 ± 7.6	0.022
LVmass	203.8±62.1	216.0±58.8	226.2 ± 51.0	0.016
Indexed LVmass	127.2±38.2	136.9±38.0	145.3 ± 42.3	0.008
Mitral E/E`	23.8±12.7	20.8±8.1	23.4±11.5	0.28
EOA at Post TAVR	1.4±0.5	1.4±0.3	1.6±1.5	0.69
Severe PPM At Post TAVR	12 (9.4%)	11 (8.3%)	4 (10.8)	0.89

Severe PVR N=3

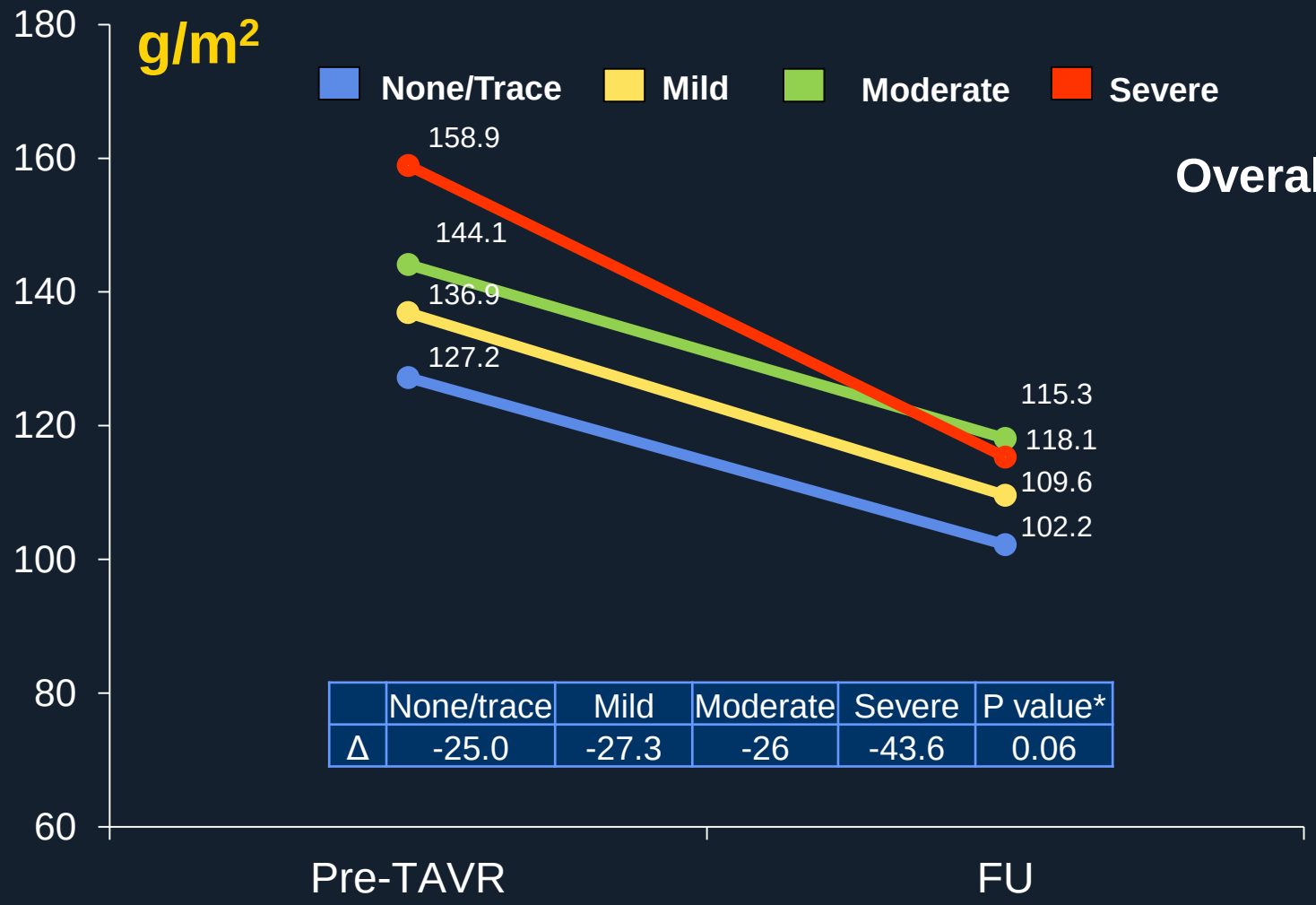
Change in Mean Pressure Gradient



Change in Effective Orifice Area



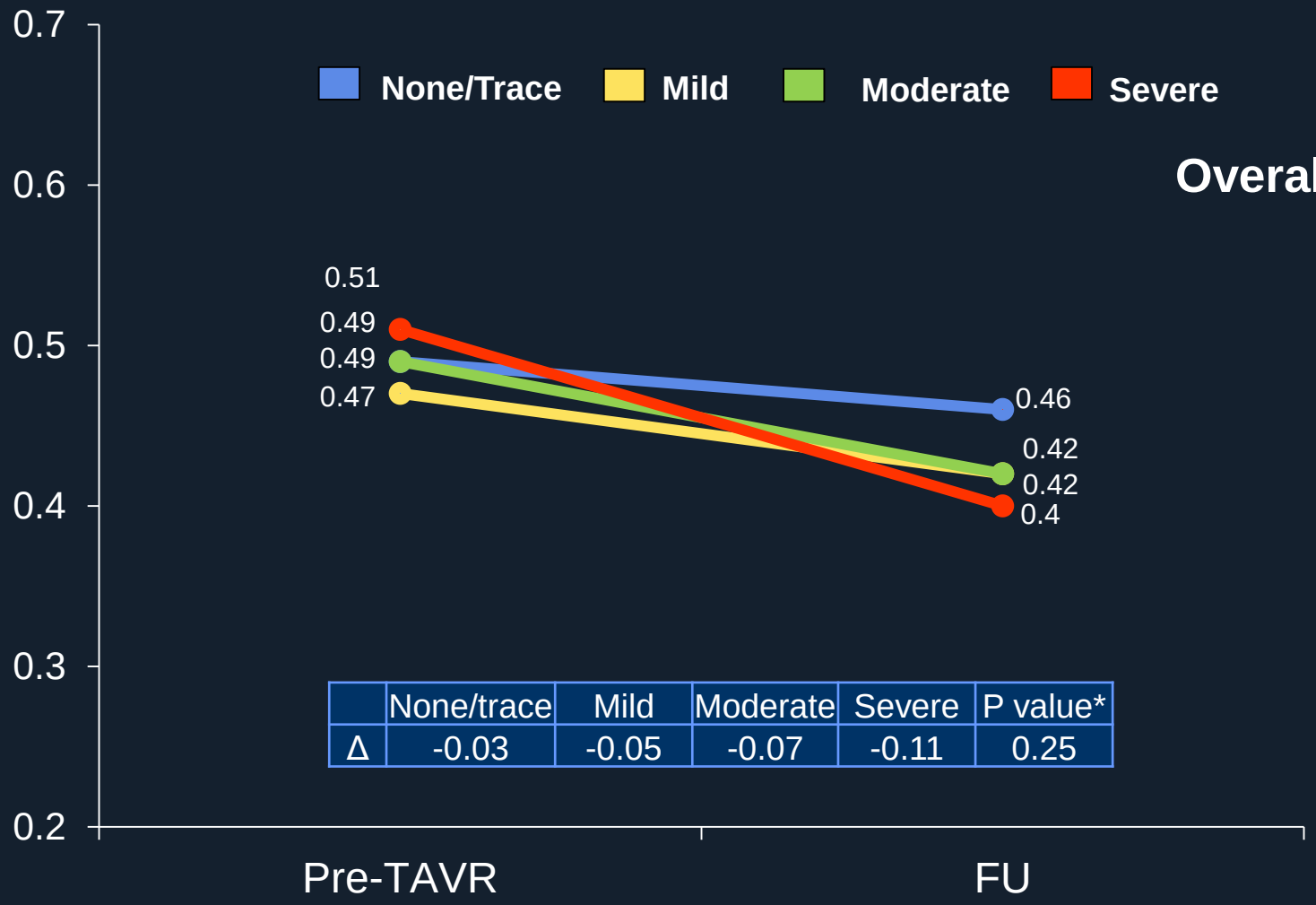
Change in Indexed LV Mass



	None/trace	Mild	Moderate	Severe	P value*
Δ	-25.0	-27.3	-26	-43.6	0.06

* Linear regression model includes the severity of PVL, age, sex, BMI, STS score, EuroSCORE, Valve type, Annulus are, calcium, pressure gradient, baseline EDV and iLVmass

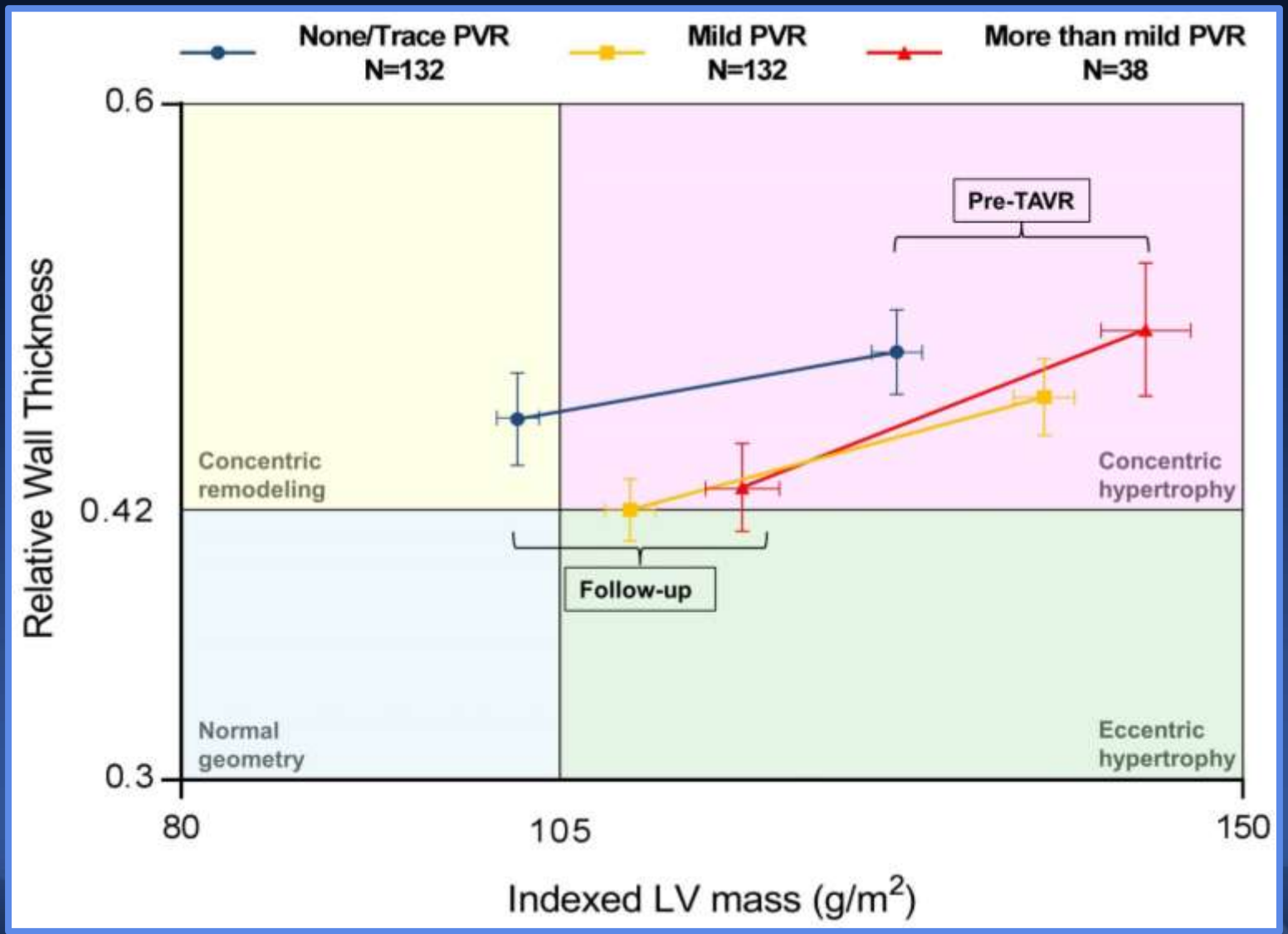
Change in Relative Wall Thickness



	None/trace	Mild	Moderate	Severe	P value*
Δ	-0.03	-0.05	-0.07	-0.11	0.25

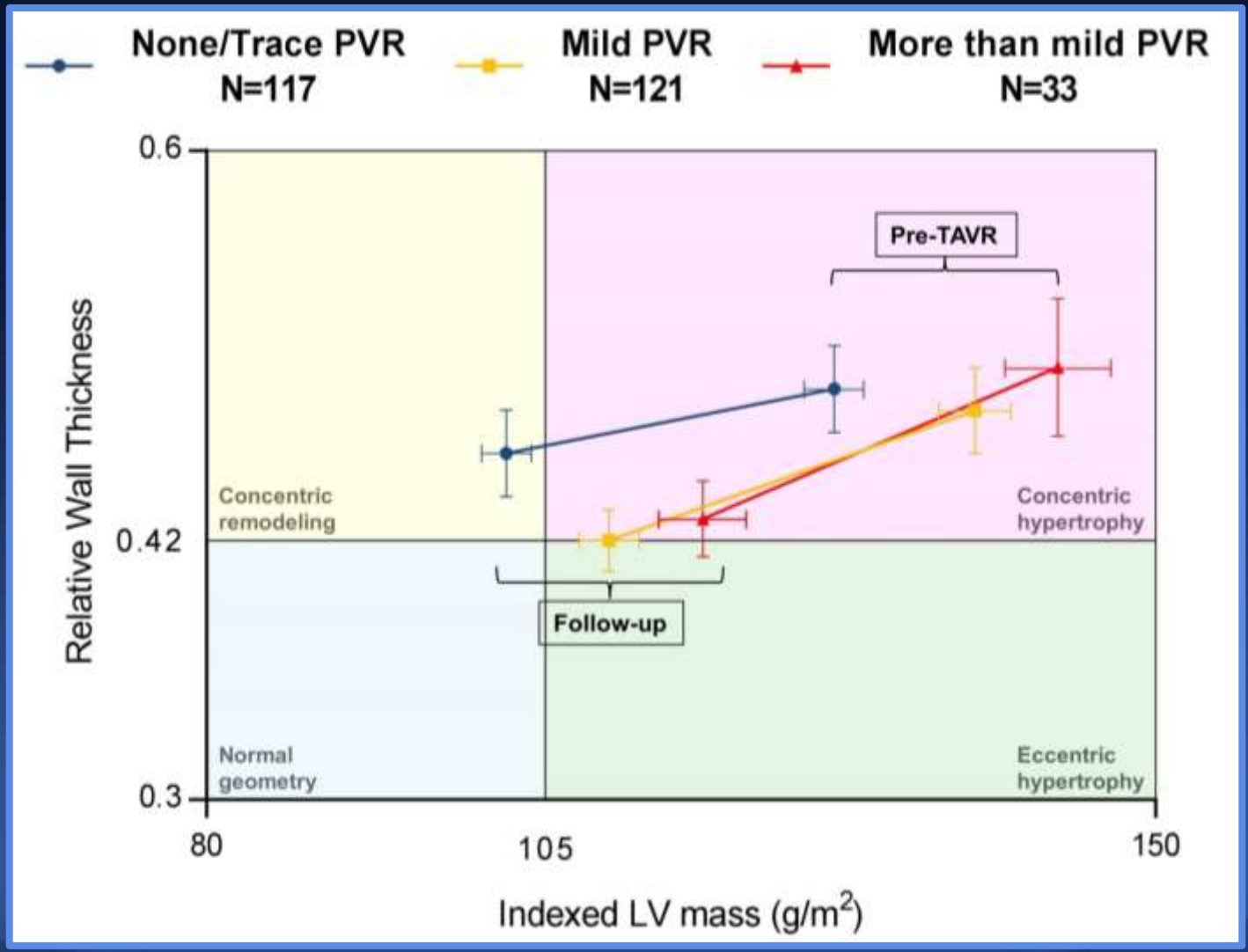
* Linear regression model includes the severity of PVL, age, sex, BMI, STS score, EuroSCORE, Valve type, Annulus are, calcium, pressure gradient, baseline EDV and iLVmass

Change in Category of LV geometry



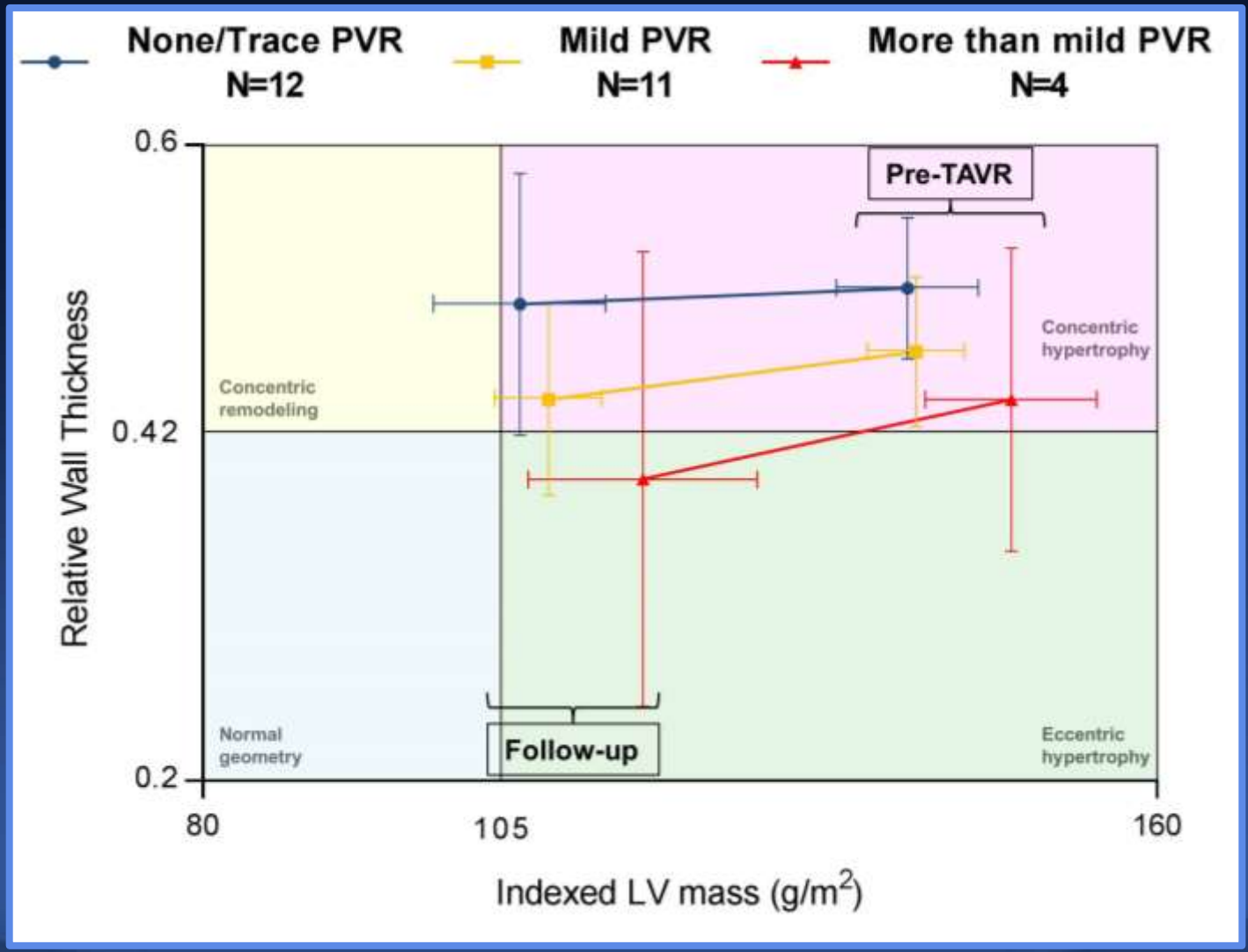
Change in Category of LV geometry

Prosthesis-Patient Mismatch: -

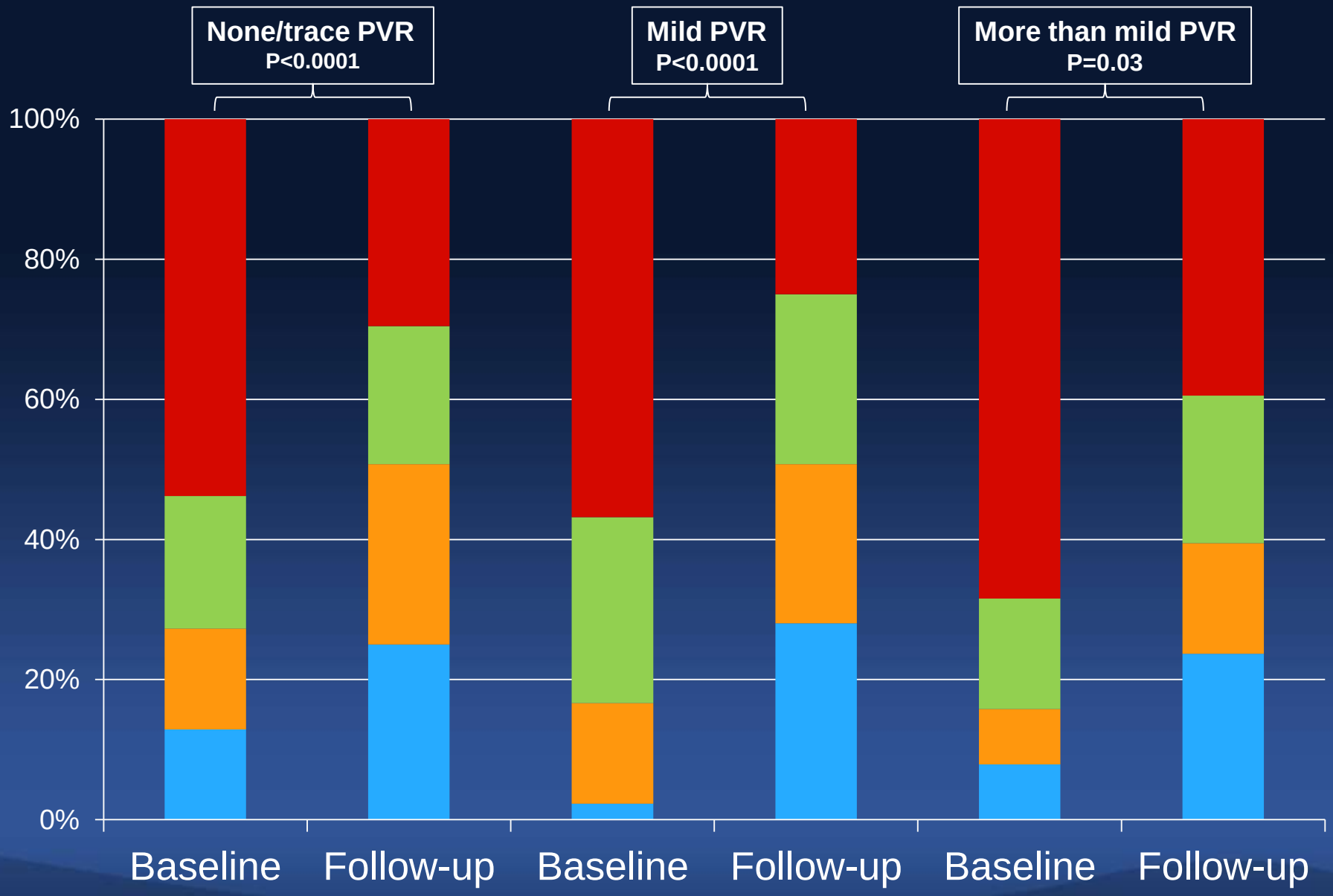


Change in Category of LV geometry

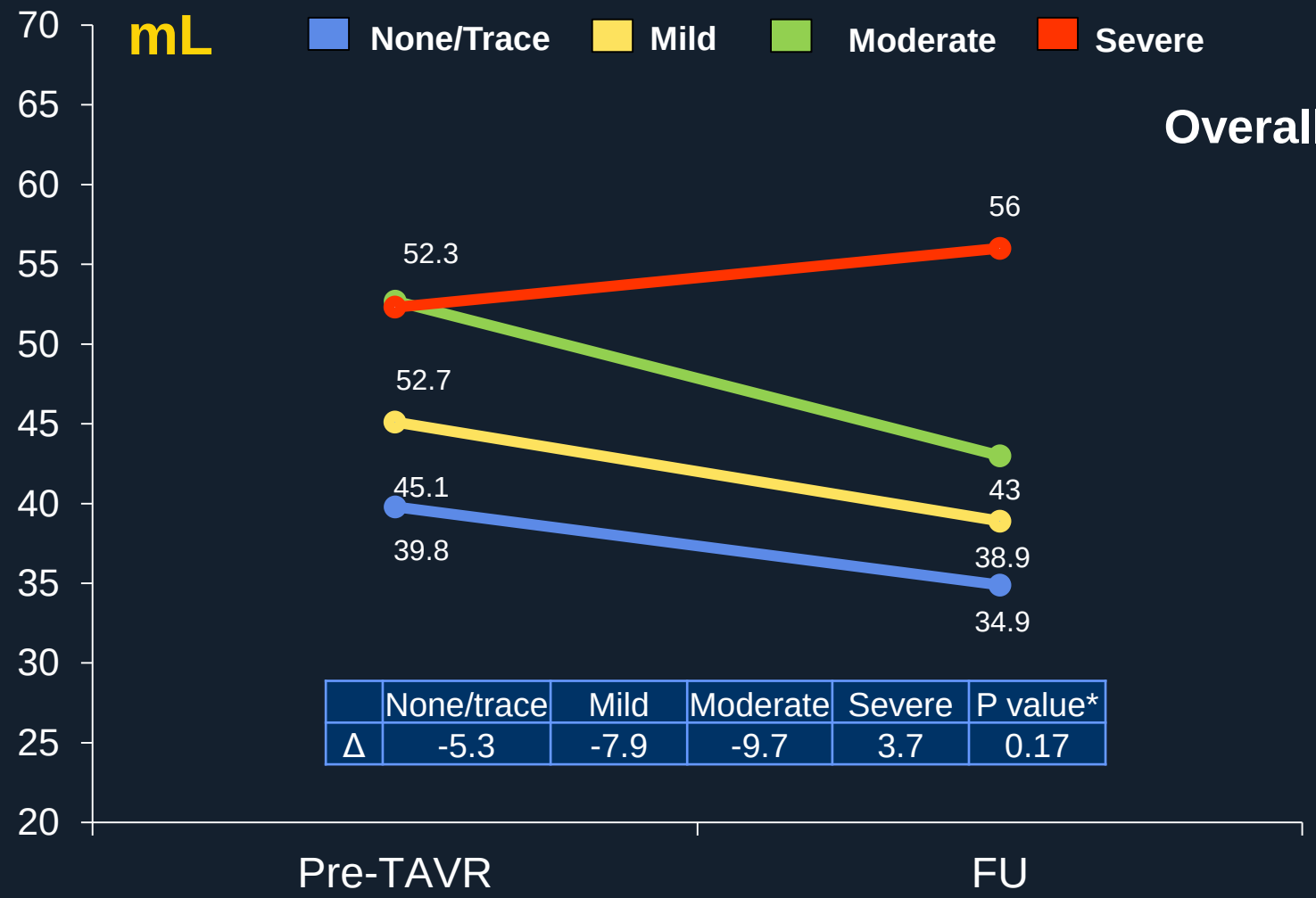
Prosthesis-Patient Mismatch: +



Distribution of different LV geometry by PVR severity



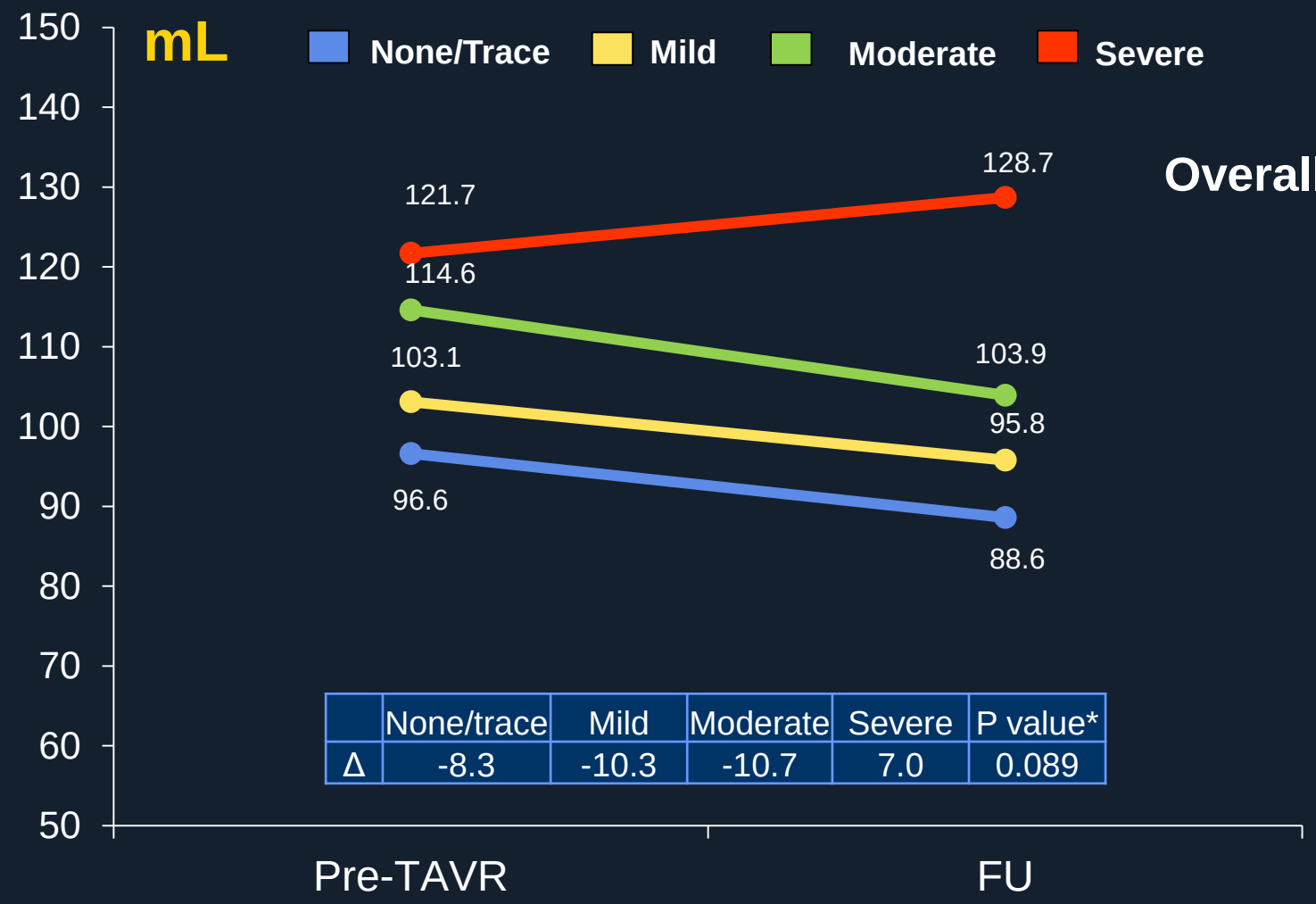
Change in End Systolic Volume



	None/trace	Mild	Moderate	Severe	P value*
Δ	-5.3	-7.9	-9.7	3.7	0.17

* Linear regression model includes the severity of PVL, age, sex, BMI, STS score, EuroSCORE, Valve type, Annulus are, calcium, pressure gradient, baseline EDV and iLVmass

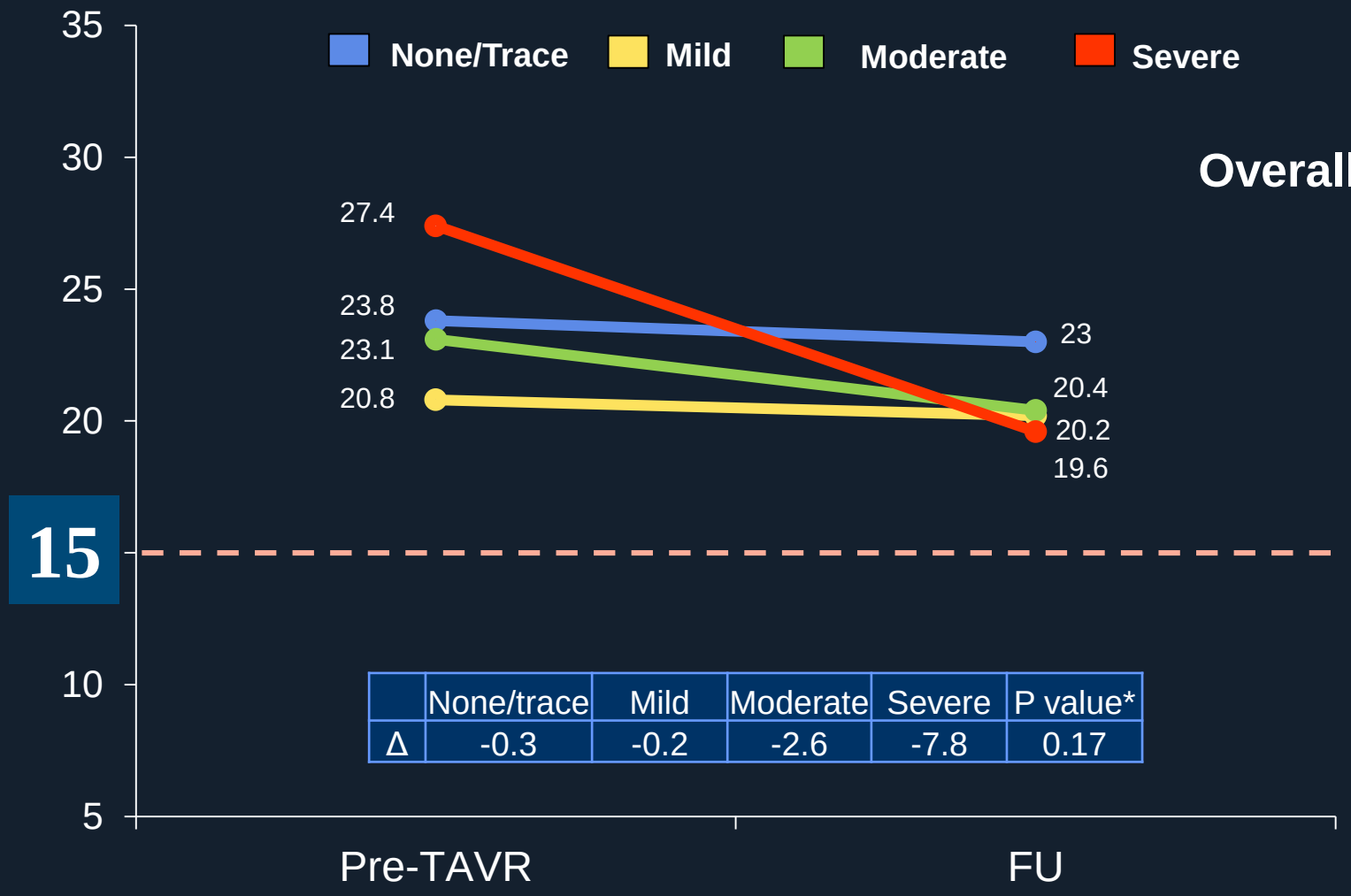
Change in End Diastolic Volume



	None/trace	Mild	Moderate	Severe	P value*
Δ	-8.3	-10.3	-10.7	7.0	0.089

* Linear regression model includes the severity of PVL, age, sex, BMI, STS score, EuroSCORE, Valve type, Annulus are, calcium, pressure gradient, baseline EDV and iLVmass

Change in Mitral E/E`



	None/trace	Mild	Moderate	Severe	P value*
Δ	-0.3	-0.2	-2.6	-7.8	0.17

* Linear regression model includes the severity of PVL, age, sex, BMI, STS score, EuroSCORE, Valve type, Annulus are, calcium, pressure gradient, baseline EDV and iLVmass

LV geometry after TAVR

	Degree of PVL			
	None/Trace	Mild	Moderate	Severe
Mass Regression	Yes	Yes	Yes	Yes
Wall Thickness	Yes	Yes	Yes	Yes
Volume Reduction	Yes	Yes	Yes	No
Diastolic Dysfunction	→			

Summary

- TAVR has a favorable impact on indexed LV mass and relative wall thickness regardless of the PVL severity.
- LV volume appears to increase in patients with severe PVL.
- Given diastolic dysfunction even after TAVR, strict management for hypertension, volume, heart rate should be considered.
- Longer-term follow-up and larger study is needed