Lady Davis
Carmel Medical Center

Rappaport
Faculty of Medicine

Is TAVI the Solution for Patient-Prosthesis Mismatch?

Avinoam Shiran, Nader Khader, Ronen Jaffe,
David Halon and Salim Adawi

Departments of Cardiovascular Medicine
Lady Davis Carmel Medical Center, Technion IIT

60th International Conference of the IHS, 4/2013, Jerusalem

Disclosures

None

Patient-Prosthesis Mismatch (PPM)

BIG PATIENT

small prosthetic valve

PPM*:

aortic valve area index (AVAI) ≤0.85 cm^2/m^2

Severe PPM*:

AVAI ≤0.65 cm^2/m^2

*Zoghbi et al, JASE 2009

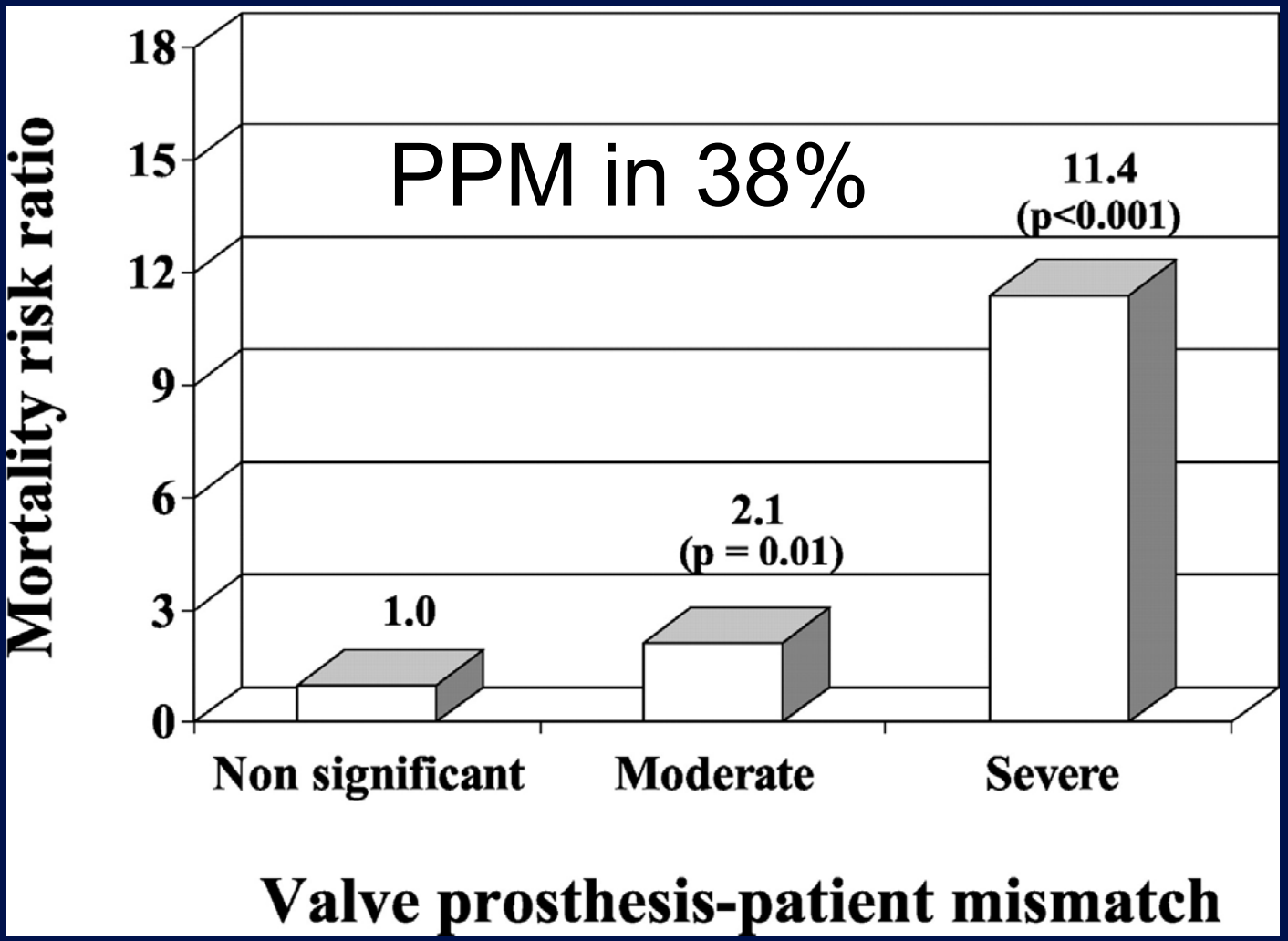
Background

- PPM has been reported in 20% - 70% of patients after aortic valve replacement (AVR), and severe PPM in 2% - 11%

Tuzcu et al, JACC 2011

Early Mortality After AVR by PPM

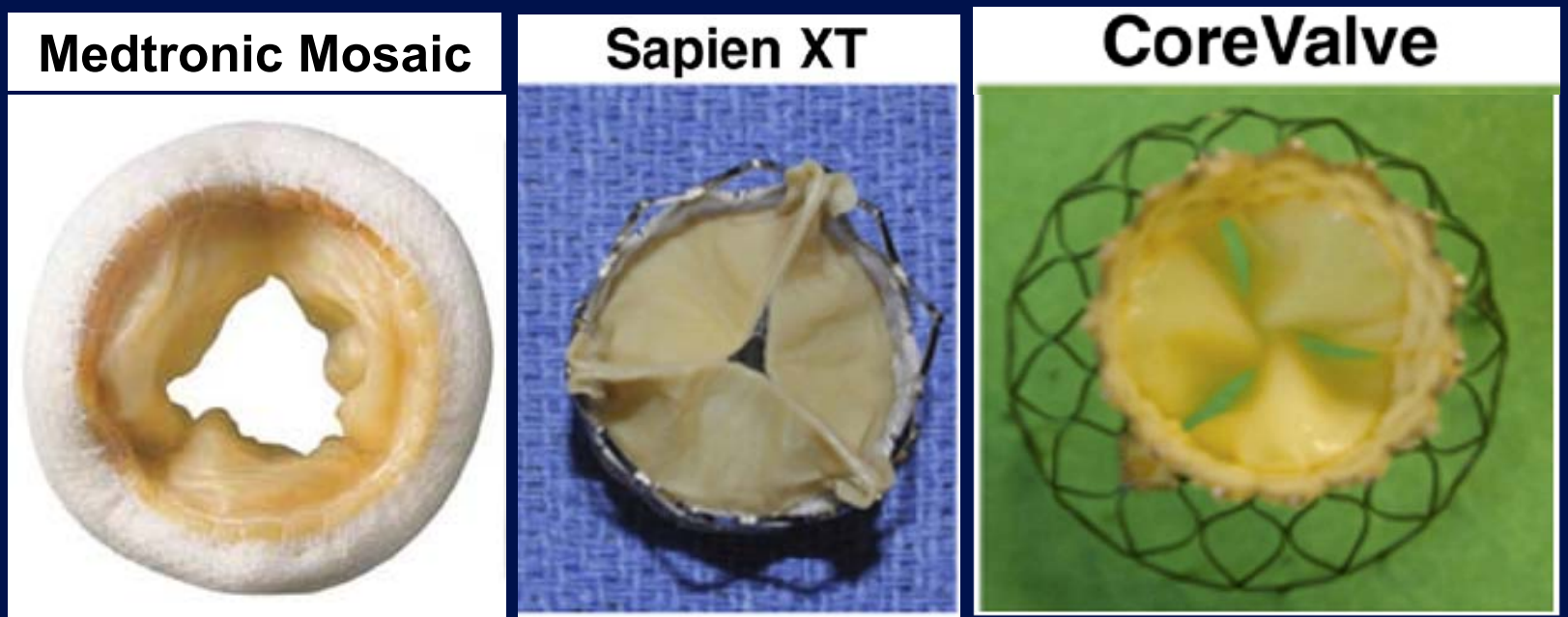
n=1266



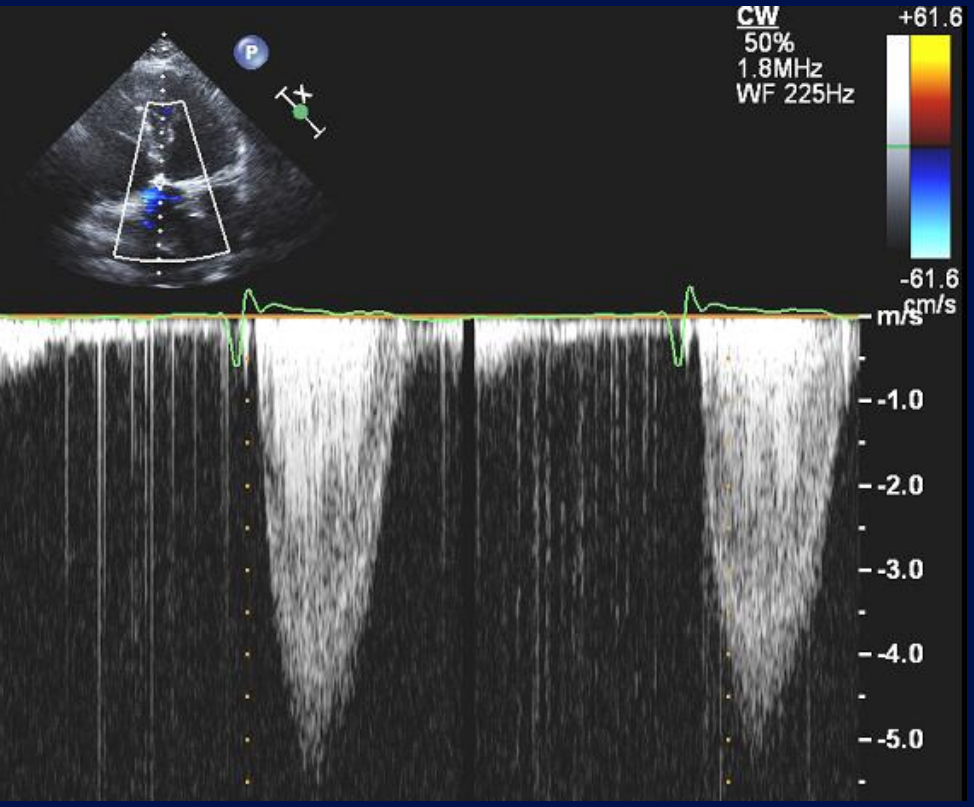
Blais et al, Circ 2003

Background

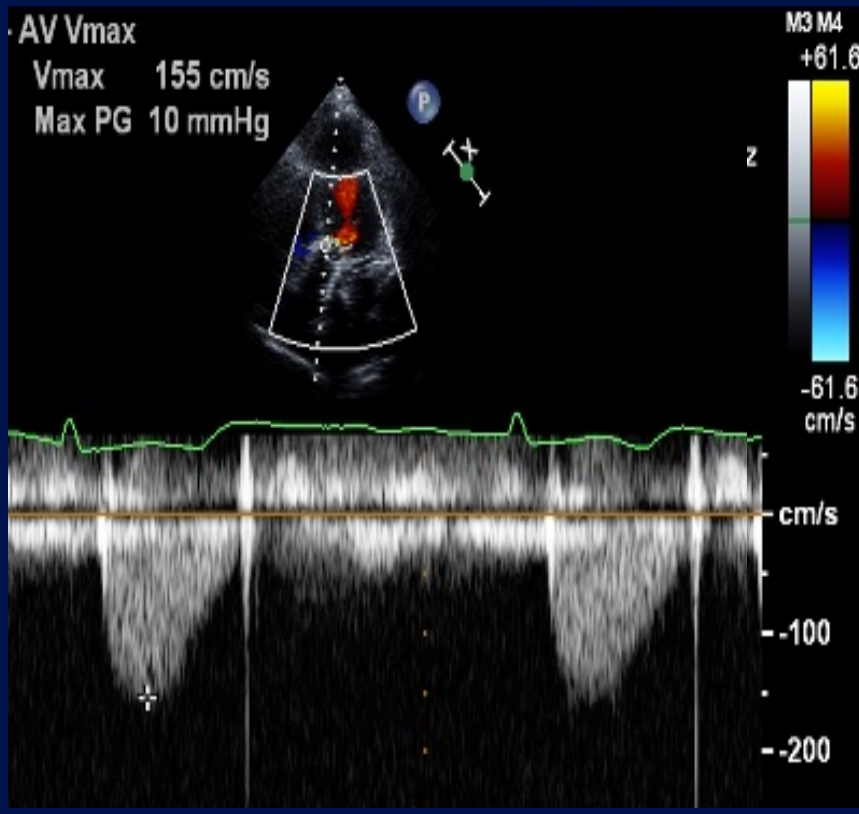
- Stent valves used for transcatheter aortic valve implantation (TAVI) do not require a sewing ring and therefore have a larger effective aortic valve area



Surgical AVR vs. TAVI Hemodynamics



CE Bioprosthesis #19



CoreValve 26mm

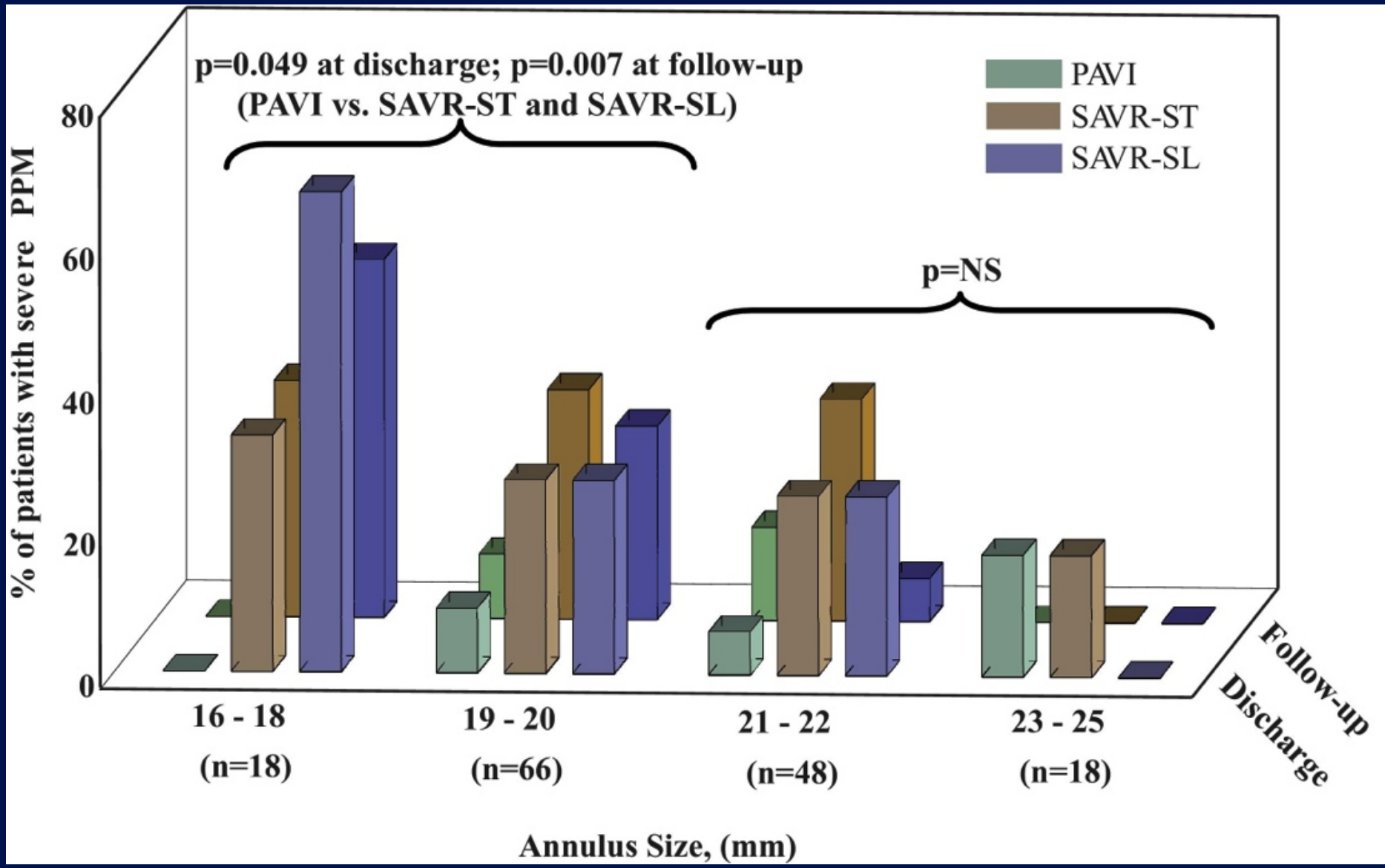
PARTNER Trial Hemodynamic Results

Table 12. Echocardiography Findings (AT)

	TAVR				AVR			
Parameter	**Baseline**	**30 days**	**6 Month**	**1 Year**	**Baseline**	**30 days**	**6 Month**	**1 Year**
No. patients	319	279	235	219	297	228	165	155
AVA (cm^2)	0.7 ± 0.2	1.7 ± 0.5	1.7 ± 0.5	1.6 ± 0.5	0.6 ± 0.2	1.5 ± 0.4	1.5 ± 0.5	1.4 ± 0.5
*p-value**	*0.32*	*.001*	*0.01*	*.002*				
No. patients	327	287	246	227	301	231	170	159
Mean Gradient (mm Hg)	42.7 ± 14.5	9.9 ± 4.8	10.2 ± 4.3	10.2 ± 4.3	43.5 ± 14.3	10.8 ± 5.0	10.8 ± 4.8	11.5 ± 5.4
*p-value**	*0.51*	*0.04*	*0.16*	*.008*				

Smith et al, NEJM 2011

PPM in TAVI Vs. Surgical AVR



Clavel et al, JACC 2009

Purpose

The aim of this study was to to determine the incidence and hemodynamic significance of PPM after TAVI

Methods

- From 3/2010 to 11/2012 104 patients underwent TAVI in Carmel Medical Center for native valve aortic stenosis (AS)
- We studied 98 patients who had a transthoracic echocardiogram (TTE) in our echo lab before (56±65d) and after TAVI (11±32d)

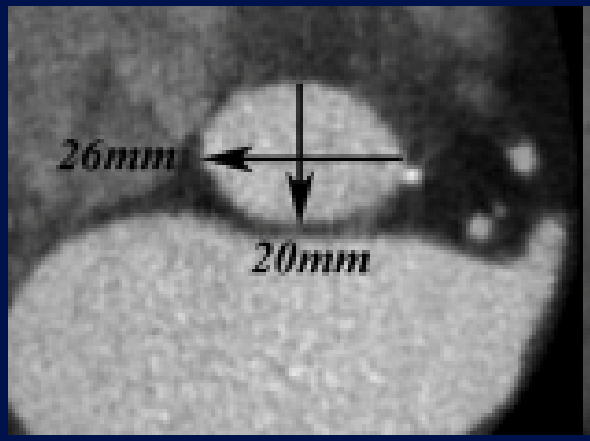
Methods

- AVA was determined by the continuity equation:
  - Left ventricular outflow tract (LVOT) velocity was measured proximal to the stent-valve
  - LVOT area was calculated from LVOT diameter measured from the pre-procedural parasternal long-axis view, assuming a circular LVOT
- PPM: AVAI ≤0.85 cm^2/m^2
- Severe PPM: AVAI ≤0.65 cm^2/m^2

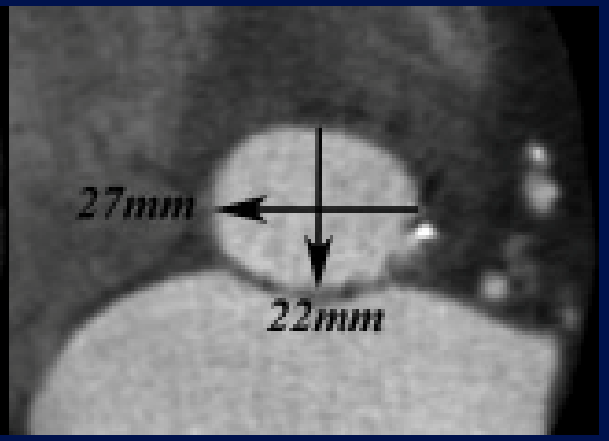
Methods

- We have previously shown that 2D TTE using the continuity equation assuming a circular LVOT underestimates AVA by 17%*
- LVOT area increases by 5% after TAVI**

Pre TAVI



Post TAVI



*Gaspar et al, JASE 2012

**Ng Circ Card Imag 2010

Results – Baseline Characteristics

n	98
Age (y)	82±6
Gender (M)	40 (41%)
CoreValve	76 (78%) [26: 34, 29: 35, 31: 7]
Sapien XT	22 (22%) [23: 7, 26: 15]
Hight (cm)	162±9
Weight (Kg)	73±14
BSA (m^2)	1.8±0.2
BMI (Kg/m^2)	28±5

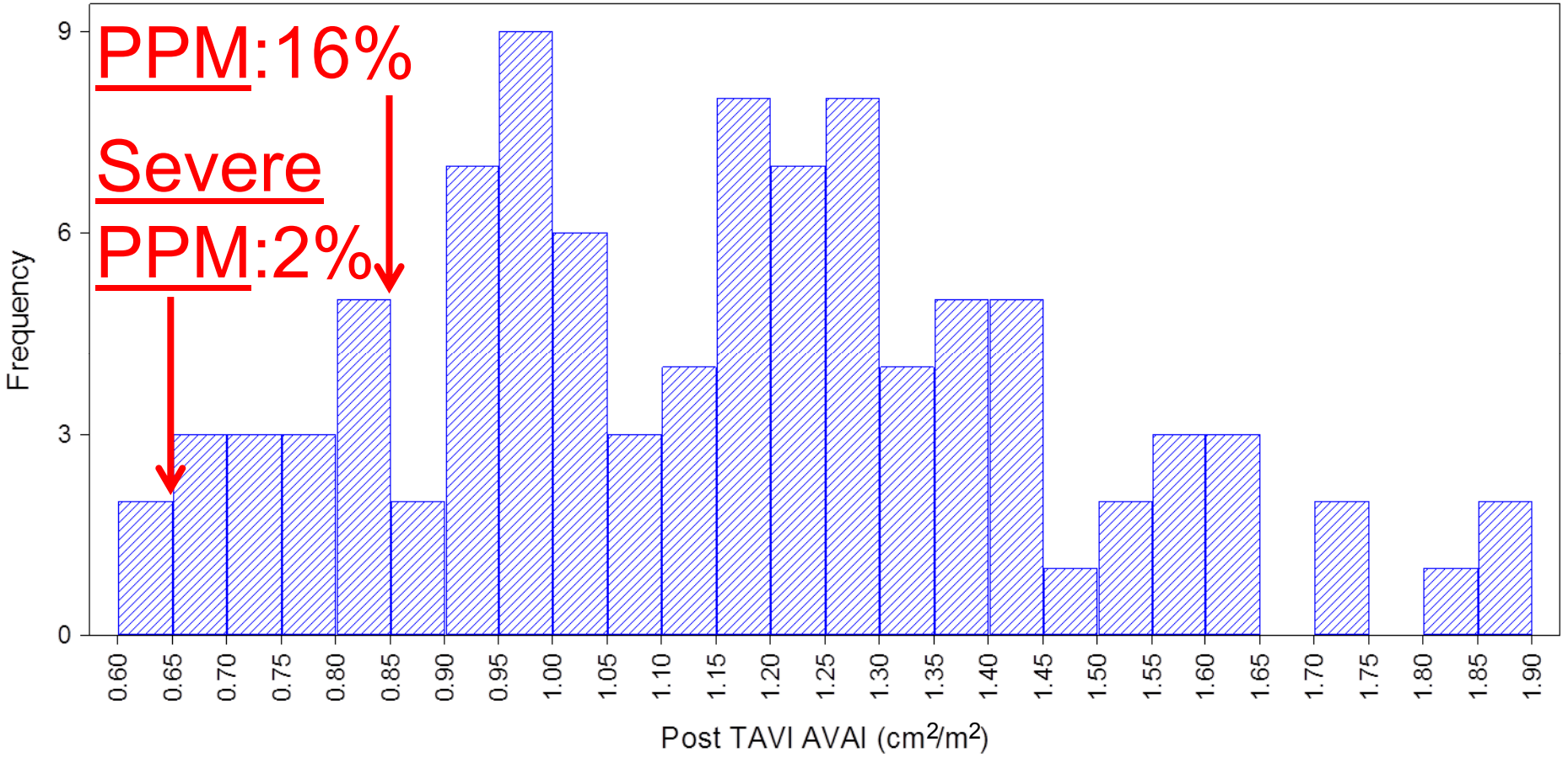
Baseline Echo Characteristics

AVA (cm^2)	0.76±0.14
AVAI (cm^2/m^2)	0.43±0.08
AoG max (mmHg)	80±22
AoG mean (mmHg)	51±15
LVOTd (cm)	2.14±0.15

Post-TAVI Echo Results

AVA (cm^2)	2.1±0.46
AVAI (cm^2/m^2)	1.2±0.29
AoV max (m/sec)	194±41
AoG max (mmHg)	16±6
LVEF (%)	58±10

Post-TAVI PPM



Peak Aortic Gradients PPM / no-PPM

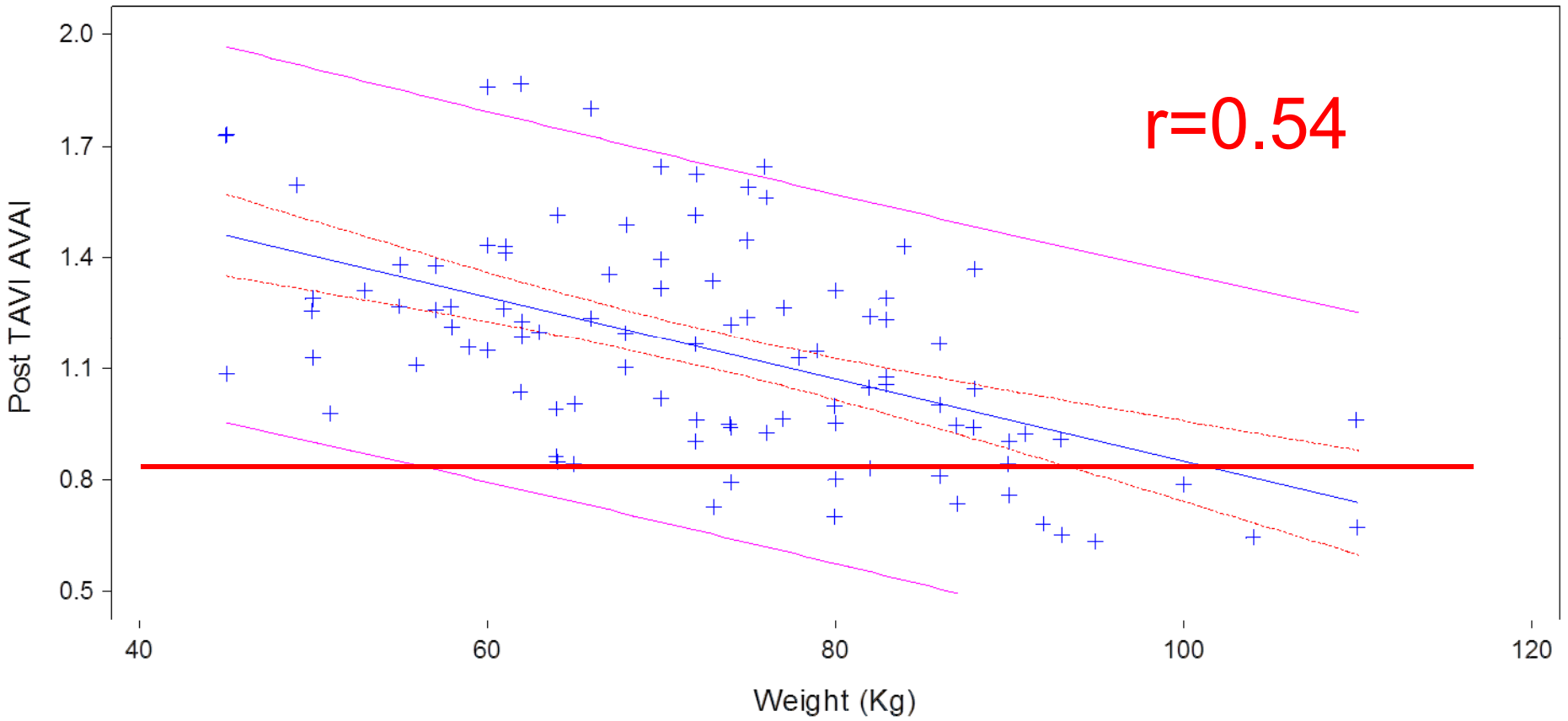
PPM	**No PPM**
20±6mmHg 12 – 32 mmHg	15±6 5 – 31 mmHg
p=0.0006	

PPM by LVOT Size

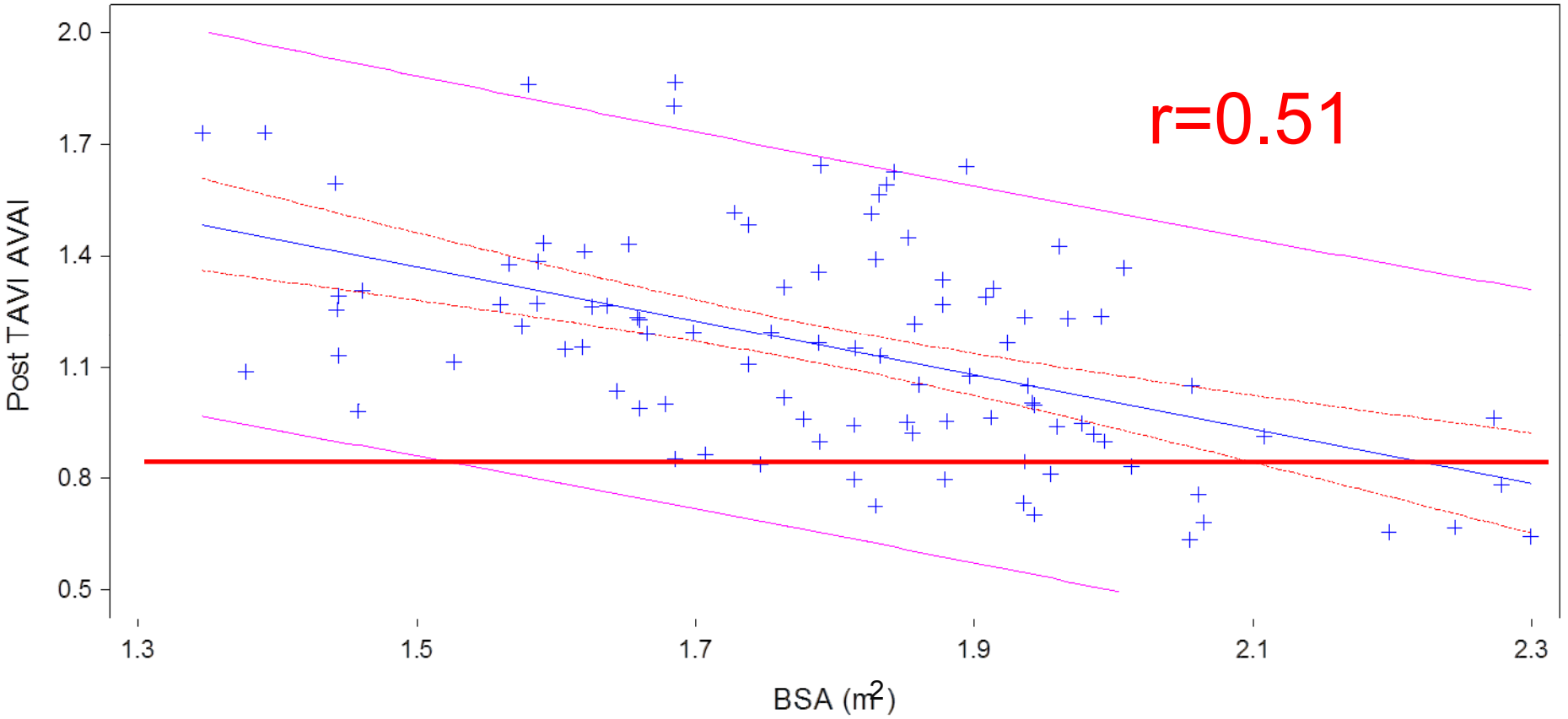
	LVOT ≤2 cm	**LVOT >2cm**
PPM	2/21 (10%)	14/77 (18%)
AoG max (mmHg)	16±7mmHg	15±6mmHg
	p=0.5-0.7	

Predictors of PPM - Weight

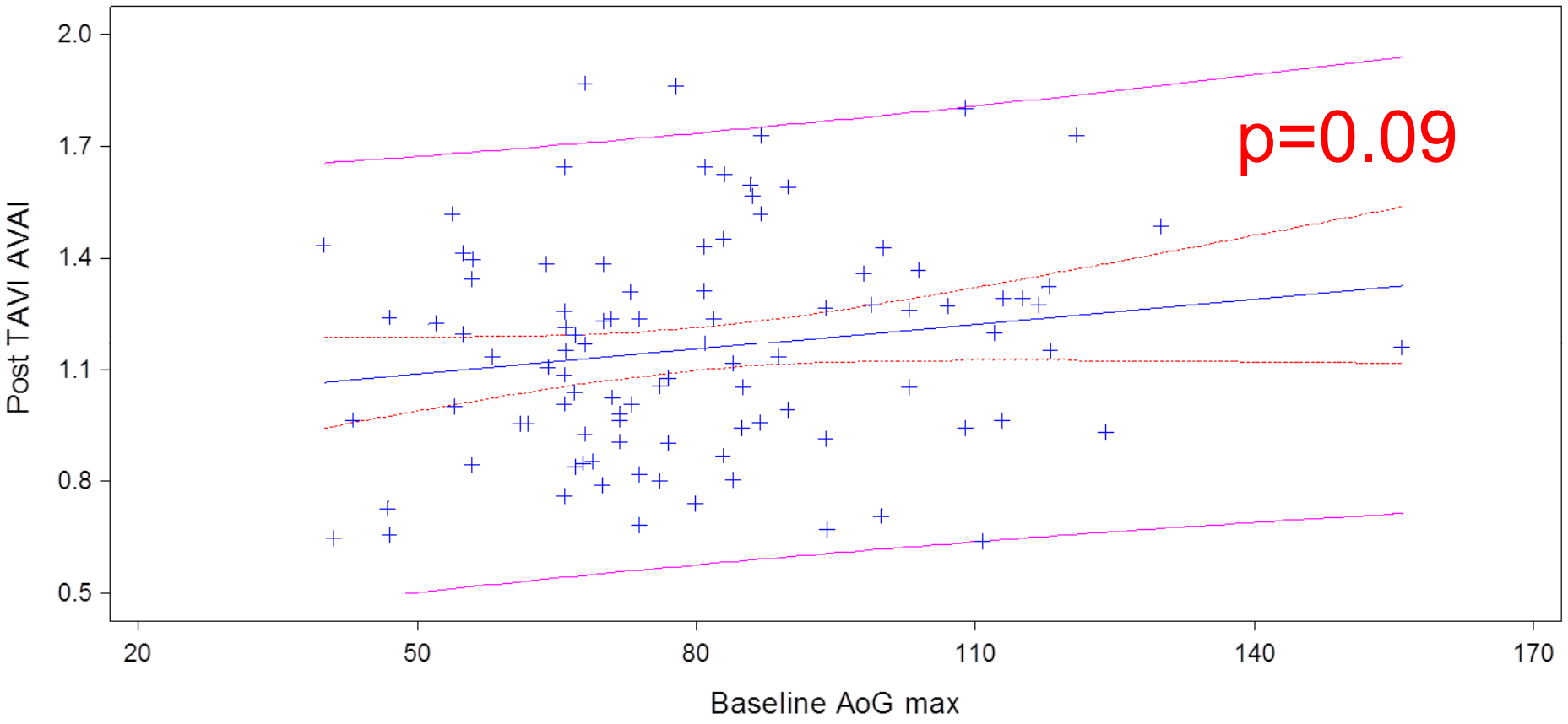
PPM was not related to valve type or size, age or gender



Predictors of PPM - BSA



Predictors of PPM – Baseline AoG max



Conclusions

PPM after TAVI, unlike post AVR, is:

1) Uncommon and usually non-severe, even in patients with a small LVOT
2) Associated with low trans-aortic gradients