

Transcatheter Mitral Valve-in-Valve and Valve-in-Ring Implantations

Henrique Ribeiro, MD, PhD

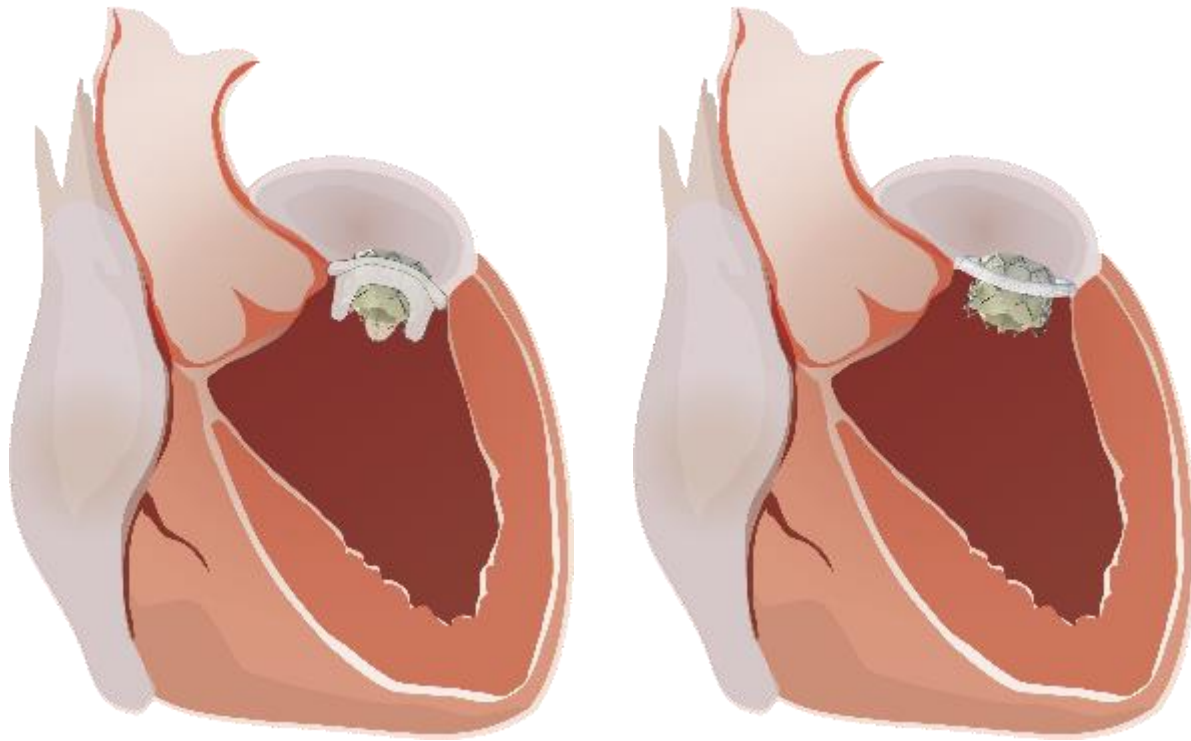
On behalf of VIVID registry investigators

Introduction

- Bioprosthetic valves are increasingly implanted in open-heart surgeries.
- These valves commonly fail, resulting in a need for a high risk repeat cardiac operation.
- Transcatheter *aortic* Valve-in-Valve may obviate the need for reoperation. VIVID registry. *JAMA* 2014;312(2):162-70.

Mitral Valve-in-Valve / Valve-in-Ring

- Transcatheter *Mitral* valve-in-valve / valve-in-ring implantation is a less-invasive approach and possibly an alternative for redo operation.



Objective

- To evaluate the efficacy and safety of ***Mitral*** **Valve-in-Valve** and **Valve-in-Ring** procedures.

VIVID Registry

Patients undergoing procedures in 160 sites in Europe, North-America, Australia, New Zealand, South Africa, South America and the Middle-East
(n = 3,751)

Aortic Valve in Valve
(n = 2,505)

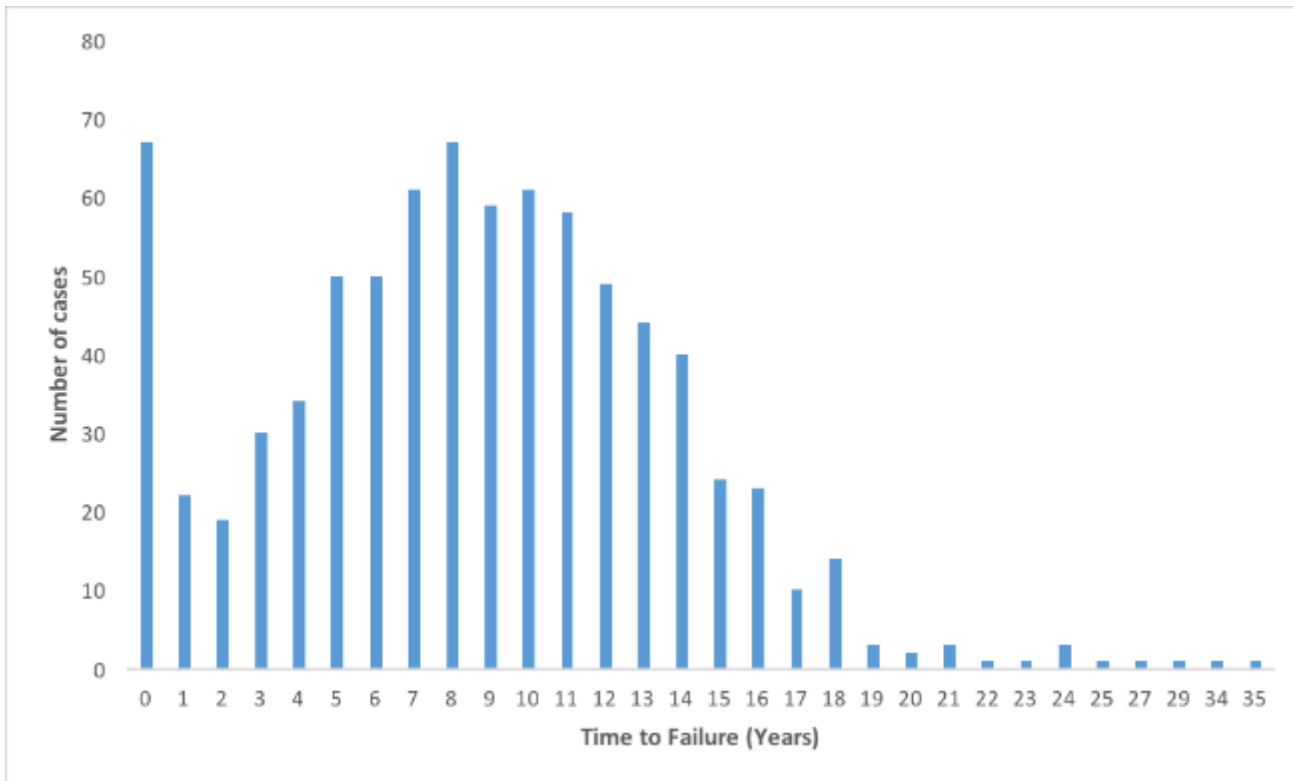
Tricuspid Valve in Valve /
Valve in Ring (n = 430)

**Transcatheter Mitral implants in
failed valves post surgery**
(n = 816)

Mitral Valve in Valve
(n = 660)

Mitral Valve in Ring
(n = 156)

Index cardiac surgery



- Median 8.5 years since last cardiac surgery (IQR 5-12).

Surgical Mitral Bioprosthesis (n = 660)

Type	n	%	Size	n	%
Edwards Pericardial / Porcine	307	46.5	23 mm	5	0.8
Medtronic Hancock	103	15.6	25 mm	74	11.2
Medtronic Mosaic	92	13.9	27 mm	210	31.8
St Jude Epic	55	8.3	29 mm	177	26.8
Labcor	8	1.2	31 mm	109	16.5
Sorin	8	1.2	33 mm	13	2
Other / Unknown	87	13.2	Other / unknown	72	10.9

Surgical Mitral Ring (n = 156)

Type	n	%	Size	n	%
Edwards Physio I / II	95	60.9	26 mm	17	10.9
Medtronic Duran	8	5.1	28 mm	45	28.8
Edwards Classic	8	5.1	30 mm	17	10.9
St. Jude Seguin	7	4.5	32 mm	16	10.3
Medtronic CG Future	5	3.2	34 mm	6	3.8
Cosgrove	4	2.6	36 mm	2	1.3
Other / Unknown	29	18.6	Other / unknown	53	33.9

Access during Mitral VinV / VinR procedures

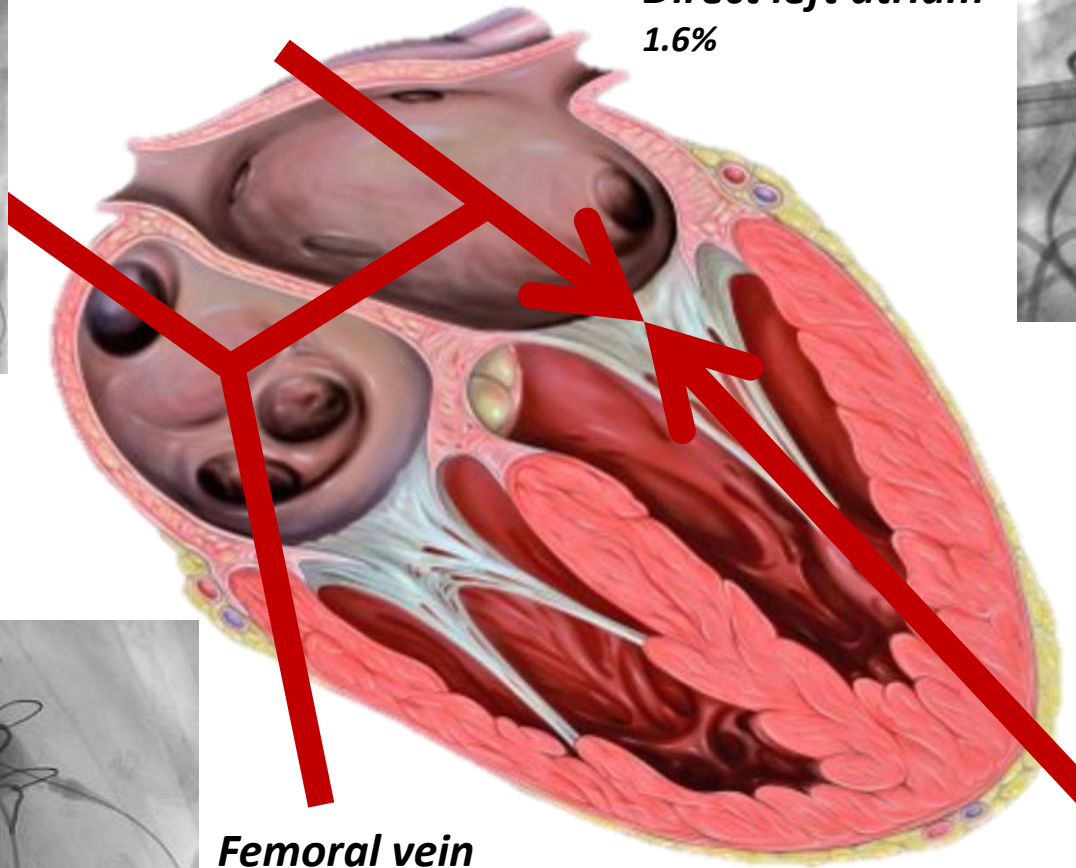
Jugular Vein



Direct left atrium
1.6%

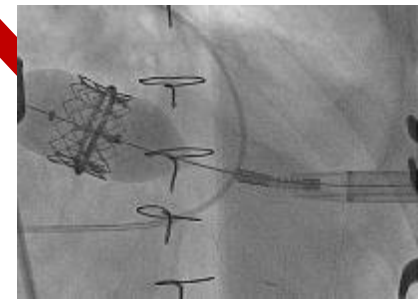


Total trans-septal
21.3%



Femoral vein

Transapical
75.9%



Baseline characteristics

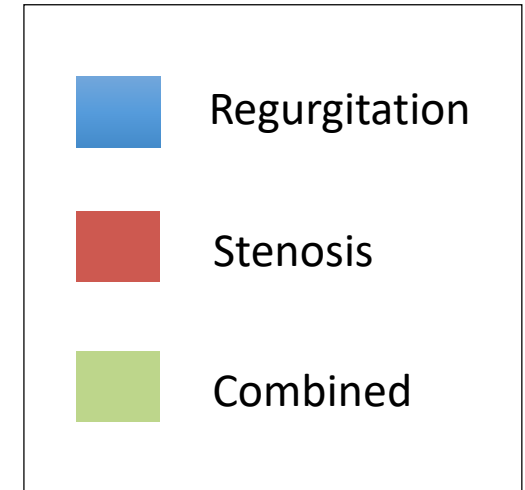
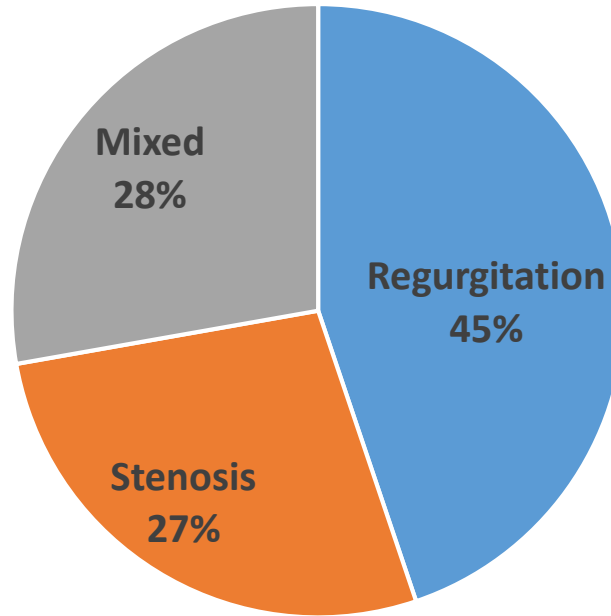
	Total N = 816	Mitral Valve-in-Valve N=660	Mitral Valve-in-Ring n=156	P Value
Age (yrs)	73.9 ± 12	74.5 ± 12	71.3 ± 11.8	0.03
Female	486 (59.9%)	408 (62.2%)	78 (50%)	0.005
LogEuroSCORE	31.2 ± 18.4	31 ± 18.4	32 ± 18.4	0.58
EuroSCORE II	15.7 ± 10.9	15.3 ± 10.8	17.5 ± 11.5	0.048
STS score (%)	12.2 ± 10.7	12.5 ± 11.2	11.1 ± 8.5	0.13
Height (cm)	165.2 ± 9.4	164.6 ± 9.4	167.9 ± 8.8	< 0.001
Weight (kg)	68.5 ± 15.2	67.5 ± 14.8	72.6 ± 16.2	< 0.001

Baseline characteristics

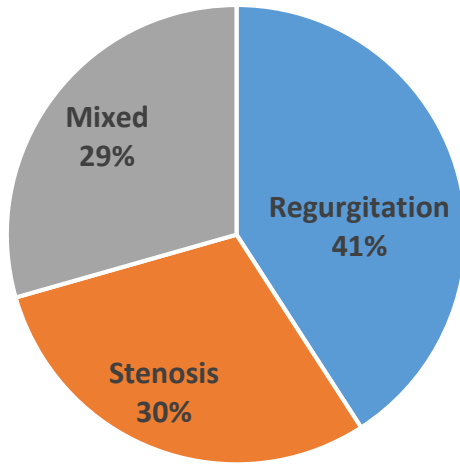
	Total N = 816	Mitral Valve-in-Valve N=660	Mitral Valve-in-Ring n=156	P Value
Diabetes Mellitus	183 (23.1%)	139 (21.6%)	44 (29.3%)	0.04
Peripheral Vascular Disease	109 (14%)	86 (13.5%)	23 (16%)	0.45
Chronic Renal Failure	412 (55.3%)	314 (52.2%)	98 (68.1%)	0.001
Atrial fibrillation / flutter	176 (29.8%)	155 (32.2%)	21 (19.3%)	0.02
Previous stroke	111 (21.7%)	92 (22.6%)	19 (18.1%)	0.32
NYHA III/IV	723 (91.5%)	584 (91%)	139 (93.9%)	0.6
Permanent Pacemaker	190 (24.7%)	133 (21.3%)	57 (39%)	< 0.001
Chronic lung disease	194 (24.5%)	155 (24.1%)	39 (26.2%)	0.6

Mechanism of failure

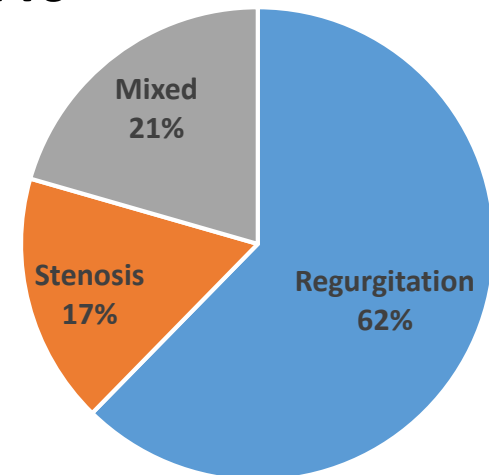
Total
n= 816



Valve in Valve
n= 646



Valve in Ring
n= 146



$p < 0.001$

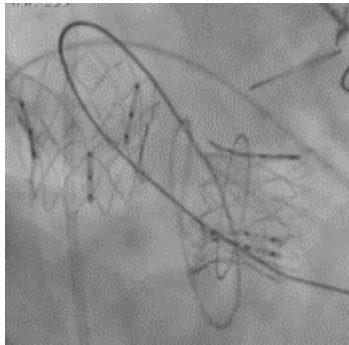
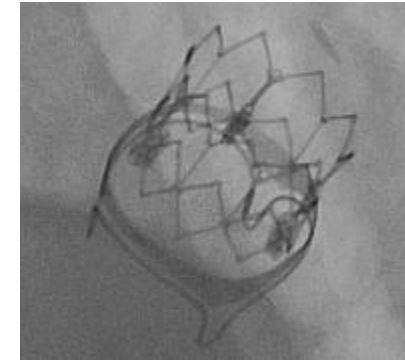
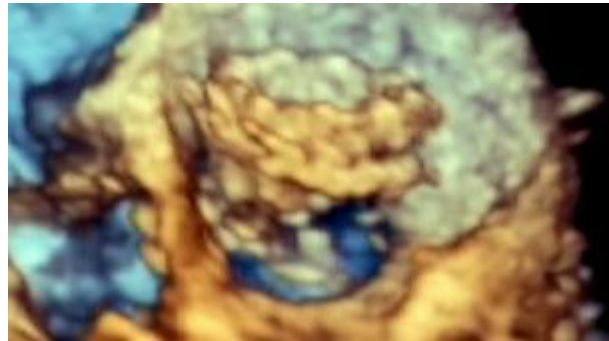
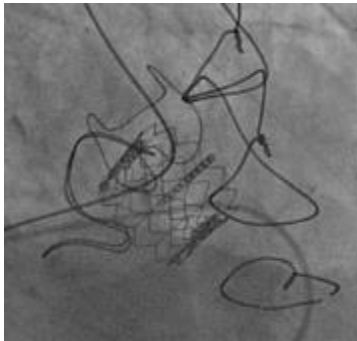
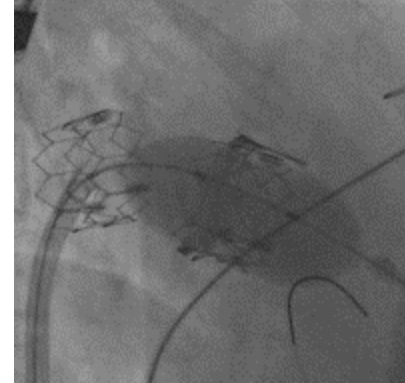
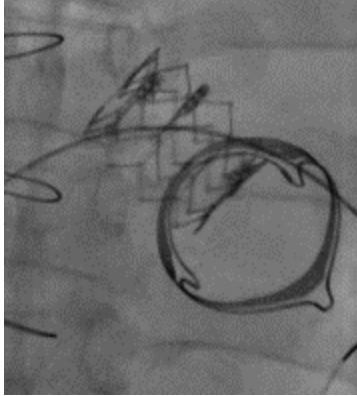
Baseline Echocardiographic parameters

	Total N = 816	Mitral Valve-in-Valve N=660	Mitral Valve-in-Ring n=156	P Value
LVEF (%)	52.8 ± 12.9	54.9 ± 11,3	44 ± 15.5	< 0.001
MV max gradient (mmHg)	17 ± 13.3	17.9 ± 13.1	12.7 ± 13.6	< 0.001
MV mean gradient (mmHg)	10.6 ± 5.8	11.2 ± 5.7	7.8 ± 5.4	< 0.001
MV area (cm²)	1.13 ± 1.03	1.06 ± 0.97	1.42 ± 1.23	0.005
PA systolic pressure (mmHg)	59.4 ± 17.1	59.8 ± 17.3	57.7 ± 16.4	0.24

Procedural characteristics

	Total N = 816	Mitral Valve-in-Valve N=660	Mitral Valve-in-Ring n=156	P Value
Transesophageal echocardiogram	757 (97.6%)	610 (97.4%)	147 (98%)	0.69
General anesthesia	763 (98.1%)	617 (98.2%)	146 (97.3%)	0.46
Pre-inflation	127 (17%)	91 (14.9%)	36 (26.5%)	0.001

Malpositioning



26 malpositioning events (3.4%).



Procedural characteristics

	Total N = 816	Mitral Valve-in-Valve N=660	Mitral Valve-in-Ring n=156	P Value
Post-inflation	66 (8.5%)	31 (4.9%)	35 (24.6%)	< 0.001
Regurgitation (≥ moderate)	42 (5.9%)	15 (2.6%)	27 (19.9%)	< 0.001
Mean gradient (mmHg)	5.8 ± 2.7	5.7 ± 2.6	6 ± 2.8	0.29
Valve area (cm ²)	1.29 ± 1.07	1.26 ± 1.06	1.38 ± 1.13	0.29

Procedural characteristics

	Total N = 816	Mitral Valve-in-Valve N=660	Mitral Valve-in-Ring n=156	P Value
Major stroke	9 (1.2%)	9 (1.5%)	0 (0%)	0.15
Acute kidney injury (VARC II/III)	77 (10.2%)	58 (9.5%)	19 (13.5%)	0.16
Major vascular complications	19 (2.5%)	16 (2.5%)	3 (2.1%)	0.65
Bleeding complications	70 (9%)	60 (9.5%)	10 (6.8%)	0.3

Summary / Conclusions

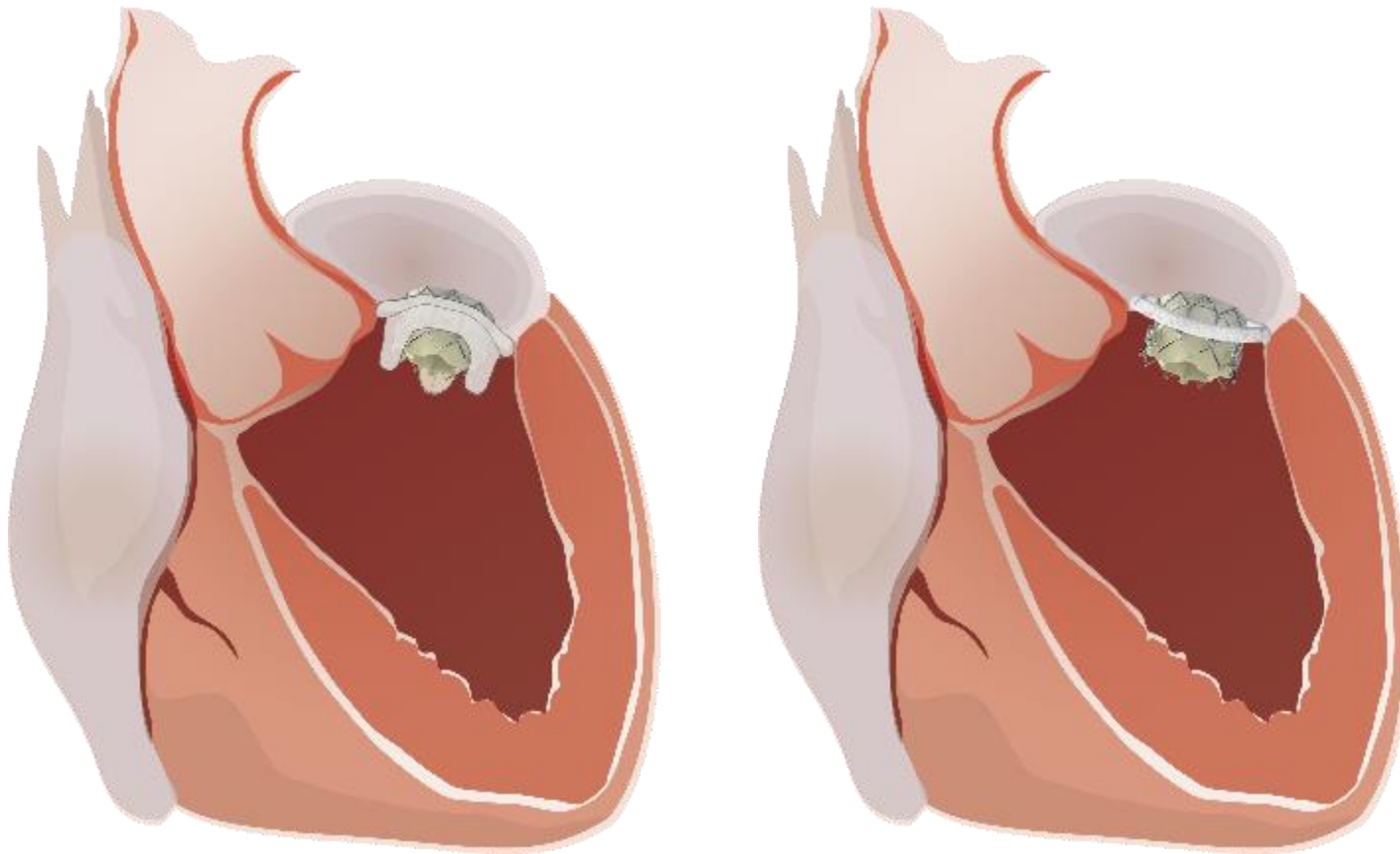
- VIVID registry displays the first large comprehensive analysis of transcatheter *mitral* valve implantation, including **Valve-in-Valve** and **Valve-in-Ring**.
- **Mitral Valve-in-Ring** was associated with **worse clinical results** in comparison with Valve-in-Valve, including more post procedural mitral regurgitation and LVOT obstruction. Almost one third of patients undergoing Valve-in-Ring experienced the composite adverse event end point at 30-days.
- Study results have numerous implications for the interventional community, for surgeons, who deploy bioprostheses / rings, and for the cardiovascular industry, that designs transcatheter strategies for mitral valve and ring implantations.

Thank you

registry@valveinvalve.com



*Valve-in-Valve
International Data*
VIVID



Sub-studies

- ViV vs. Vin-Ring
- Antithrombotic management
- Angiographic CoreLab analysis / CT analysis
 - Perfect hemodynamic, height
- LVOT obstruction
- Post-dilatation (25% in Vin-Ring)
- Transeptal procedures
 - Double wire, malpositioning, bailout procedures
- Pulmonary hypertension
 - Incidence and clinical impact
- Complications
 - AKI
 - Malpositioning
 - PPM (mismatch)
 - Thrombocytopenia



*Valve-in-Valve
International Data*
VIVID