



**ABIOMED™**

**Recovering hearts. Saving lives.™**

**ICI 2008**

**Michael Minogue**

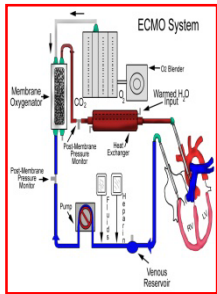
**Abiomed Chairman, President and CEO**

**(NASDAQ: ABMD)**

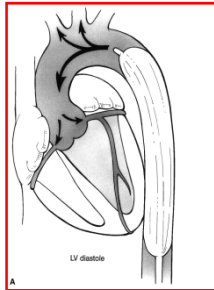


**ABIOMED™**

# Impella: New Era in the Cath Lab



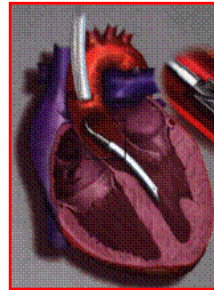
ECMO



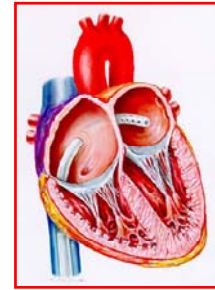
IABP



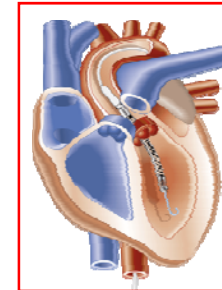
CPS



Hemopump



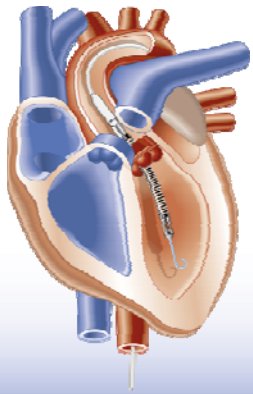
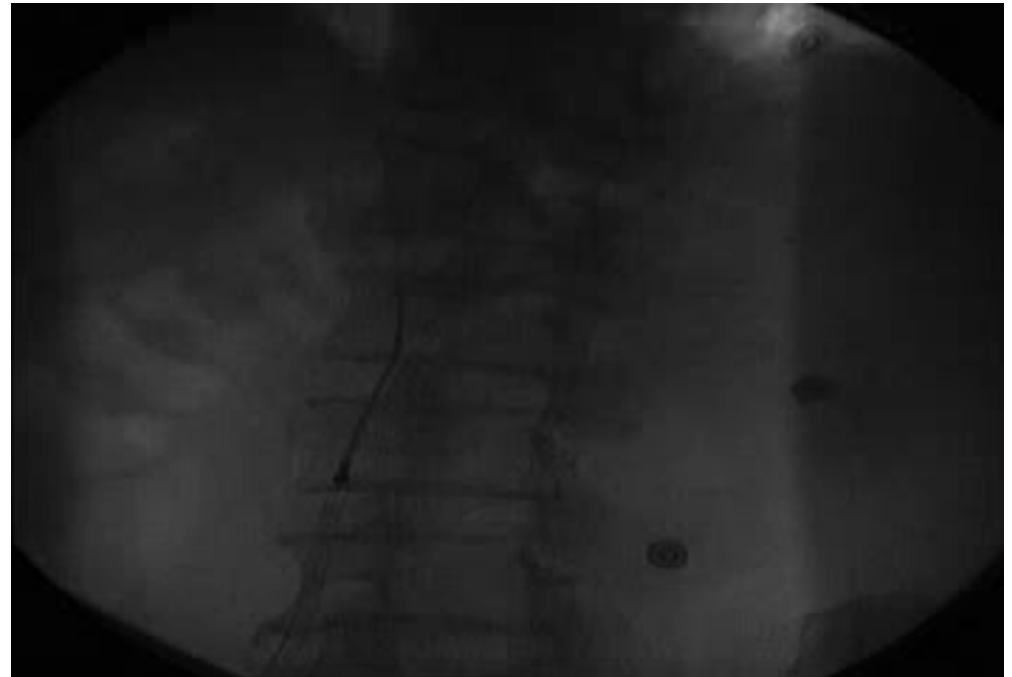
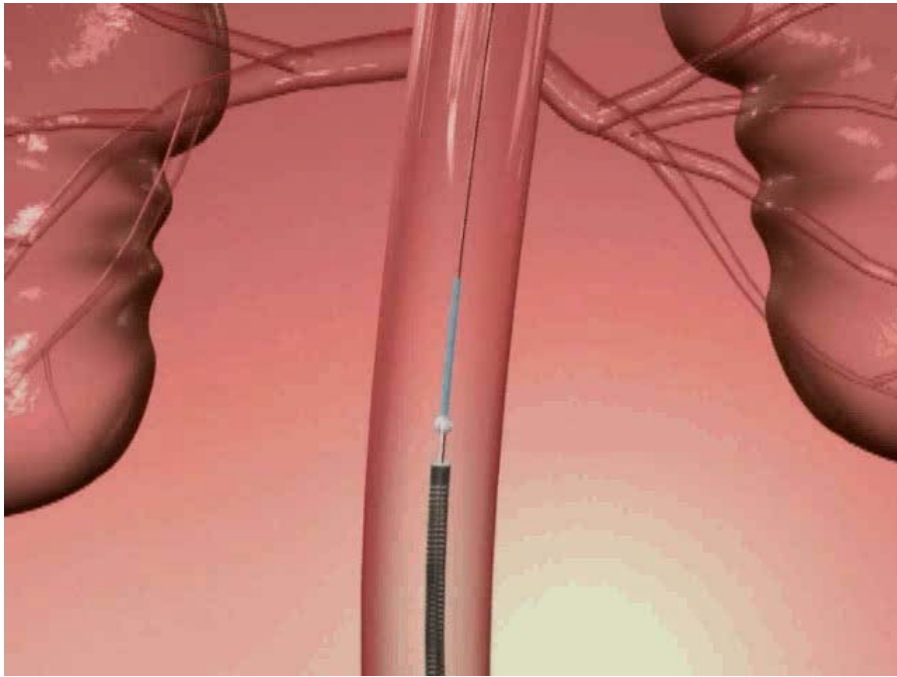
TandemHeart



Impella



# Hemodynamic Support in Cath lab, in minutes

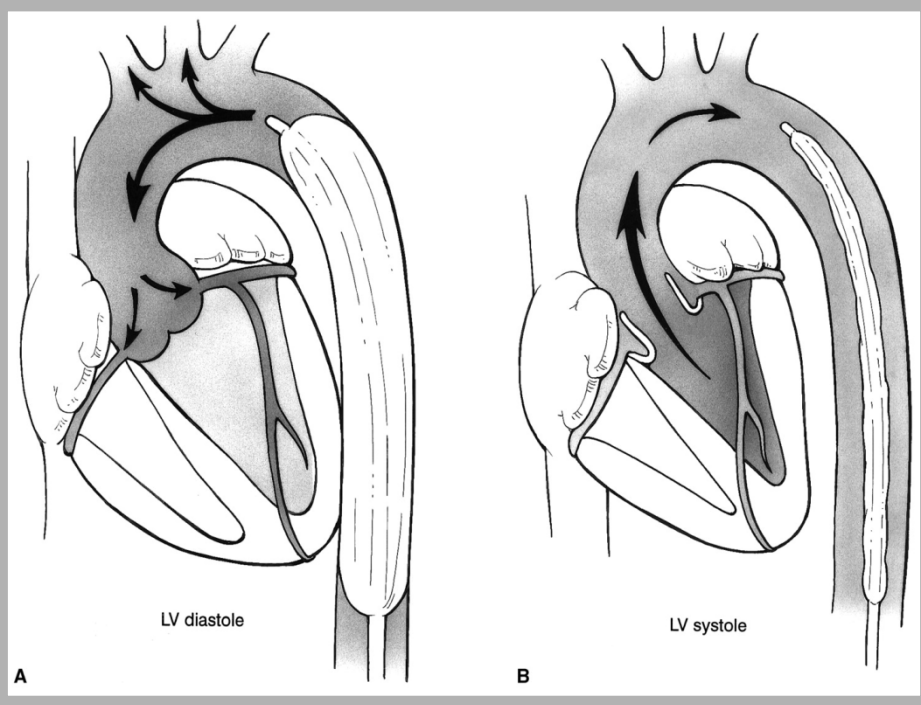


- Impella 2.5 pumps up to 2.5 liters/minute of blood without opening the chest (sternotomy)
  - >50 Papers and >1500 Patients to date
    - Safe and Easy to Use
    - 510(k) cleared 6/2/08



# Impella is a Pump placed inside the Heart

IAB



Impella



- IAB (Intra-aortic balloon) does not reduce “heart work or  $O_2$  demand “or mortality in cardiogenic shock<sup>1</sup>
- Standard of Care: 202,000 IAB/year<sup>2</sup> (2006: 124,000 US + 78,000 Europe)
- Impella increases blood flow ( $O_2$  supply) to heart, reduces heart muscle ( $O_2$  demand) workload<sup>3</sup>

1. PAMI-II Stone et al, J Am Coll Cardiol 29:1459, 1997

2. Medtech Insight: Current and Emerging Technologies for the Management of Heart Failure in the U.S., March 2007

3. M.Valgimigli et al., Catheterization & Cardiovascular Interventions 65:263–267 (2005)

# Heart Attacks... a Leading Cause of Death

## Espicom Ltd, Data Report 2002

Country	Total Mortality STEMI
UK	54,781
Germany	71,025
Canada	19,944
Italy	36,658
USA	179,514
Spain	24,486
France	25,366
Japan	45,675
<b>Total</b>	<b>457,499</b>

## American Heart Association 2007 Heart Disease Update Report

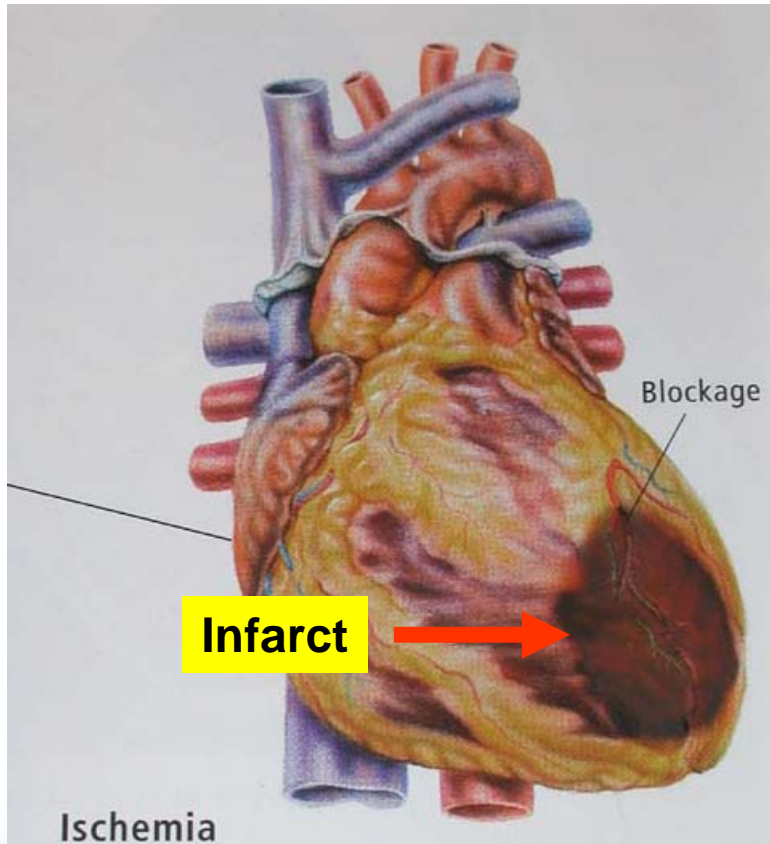
- In 2002, Heart Attacks @ hospital = 865,000
- For Heart Attack survivors, estimated average # of years of life lost = 15 years

## WomenHeart.org

- 267,000 women die each year from heart attacks, which kill six times as many women as breast cancer

# Preserving Muscle- Reducing the Infarct

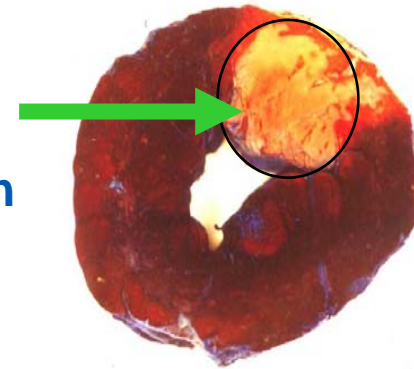
## Cardiogenic Shock



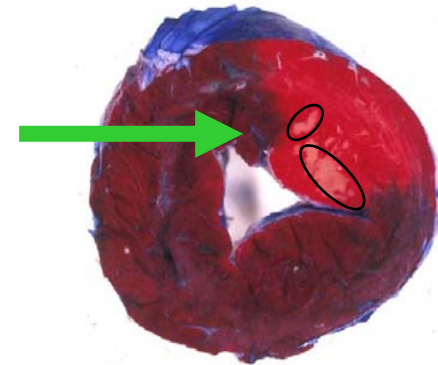
Page DL, et al. *N Engl J Med* 1971  
Alonso DR, et al. *Circulation* 1973  
*N Engl J Med* 2003;348: 2007

## “D2B” Time with Animal

INFARCT  
WITH  
Revascularization  
only



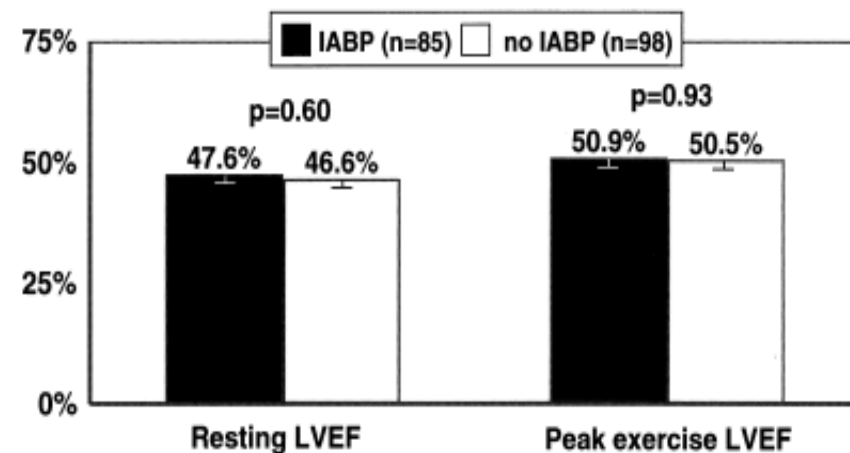
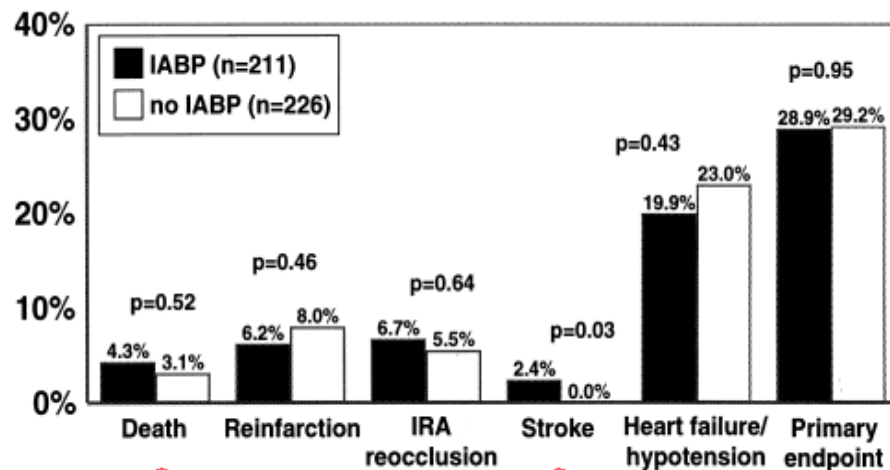
INFARCT  
WITH  
Revascularization  
AND  
“Unloading”  
from Impella



Flameng et al 2000: Published *JACC* 2001

# PAMI-II, No benefit in Mortality for IABP

- High risk AMI patients (age > 70, EF < 45%, etc)
- Randomized to 26-48 hrs IABP (n=211) or conventional Rx after PCI (n=226)
- No benefit in mortality or LV function, at discharge or 6 weeks



# Why we believe Impella is Superior to IABP

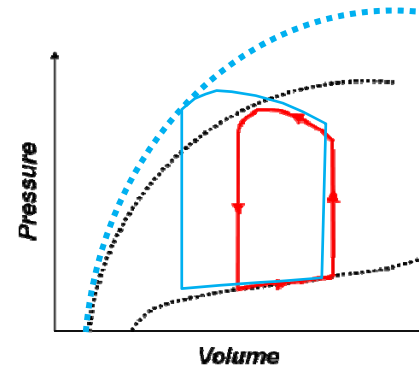
	<u>IABP</u>	<u>Impella</u>
<ul style="list-style-type: none"> <li>■ <b>Direct Unloading...</b><i>reducing O<sub>2</sub> demand on heart</i></li> </ul>		✓
<ul style="list-style-type: none"> <li>■ <b>Supporting Coronary Flow...</b><i>increasing O<sub>2</sub> supply to heart</i></li> </ul>	✓	✓
<ul style="list-style-type: none"> <li>■ <b>Increasing Cardiac Power...</b><i>increasing O<sub>2</sub> supply to all organs, decreasing mortality</i></li> </ul>		✓



# “Unloading” ... Reducing Work ( $O_2$ demand) of the Myocardium

## Inotropic Drugs

- Increase peak systolic pressure
- Stroke volume increase



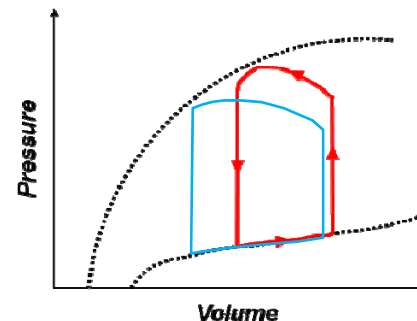
## Work Reduction

*Reduced Area of PV Loop?*

**No: Increases PV loop area**

## Balloon Pump

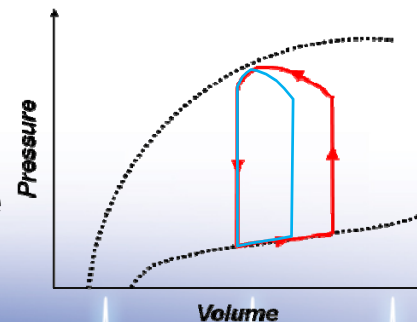
- Reducing systolic aortic pressure
- Stroke volume increase



**No: Stroke Volume increase offsets pressure reduction**

## Impella

- Unloads from ventricle
- Reduces diastolic volume



**Yes: Volume reduction reduces PV loop area**

# ***Benefits of Managing Supply-Demand***

## **It's About Time ...**

- More time to revascularize
- More time to deploy stents during complex procedures
- Longer angioplasty inflation times
- Increased Ischemic Threshold

## **It's About Safety ...**

- Cath lab “safety net” in the event of coronary dissection

## **It's About Preserving Muscle for AMI Patients**

- Reducing infarct size and improving quality of life



# Impella Papers Demonstrate Safety

Study	Device	n	LOS	Imaging Modality	Aortic Regurgitation	Echo findings Trauma / valve
Burzotta et al. 2008	2.5	10	N.A	Serial TTE	No	No
O'Neill et al. 2007	2.5	20	Up to 2.5 hrs	Serial TTE	No	No
Henriques and al. 2006	2.5	19	Up to 2 hrs	Serial TTE	No	No
Valgimigli and al. 2005	2.5	1	~ 2.5 hrs	Angio	No	No
Vlasselaers and al. 2005	2.5	1	6 days	Serial TTE	No	No
Meyns and al. 2003	5.0	16	2-8 days	Serial TEE	No	No
Siengenthaler and al. 2005	5.0	24	1-10 days	Serial TEE	No	No
Cantena and al. 2005	5.0	1	N.A	3D TTE / 2D TEE	No	No
Catena and al. 2004	5.0	8	2-19 days	Serial TEE	No	No
Colombo and al. 2003	5.0	1	18 days	Serial TEE	No	No
Strecker and al. 2004	5.0	1	6 days	Serial TEE	No	No
Jurmann and al. 2004	5.0	6	1-7 days	Serial TEE	No	No

# Impella 2.5 Improves Ejection Fraction in AMI

## Impella 2.5 LP vs. Standard of Care

Controlled Single Center: AMC

Non-Randomized Study:

10 Impella 2.5 Patients

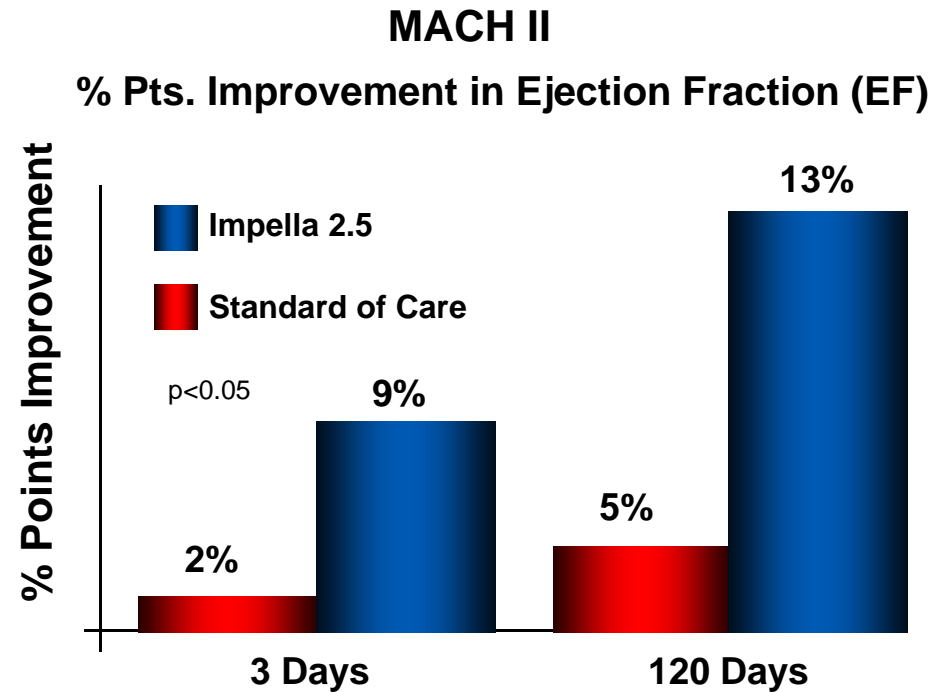
10 Standard of Care Patients

## MACH II Feasibility Results<sup>1</sup>

- Significantly Higher % Improvement in EF of the Impella Group vs. Standard of Care at 3 days and 120 days
- No Femoral Vessel Complications
- Statistically Significant Results  $p < 0.05$

## In-Process: IMPRESS<sup>2</sup> Study in Europe

Multi-center, Randomized Study vs. IABP

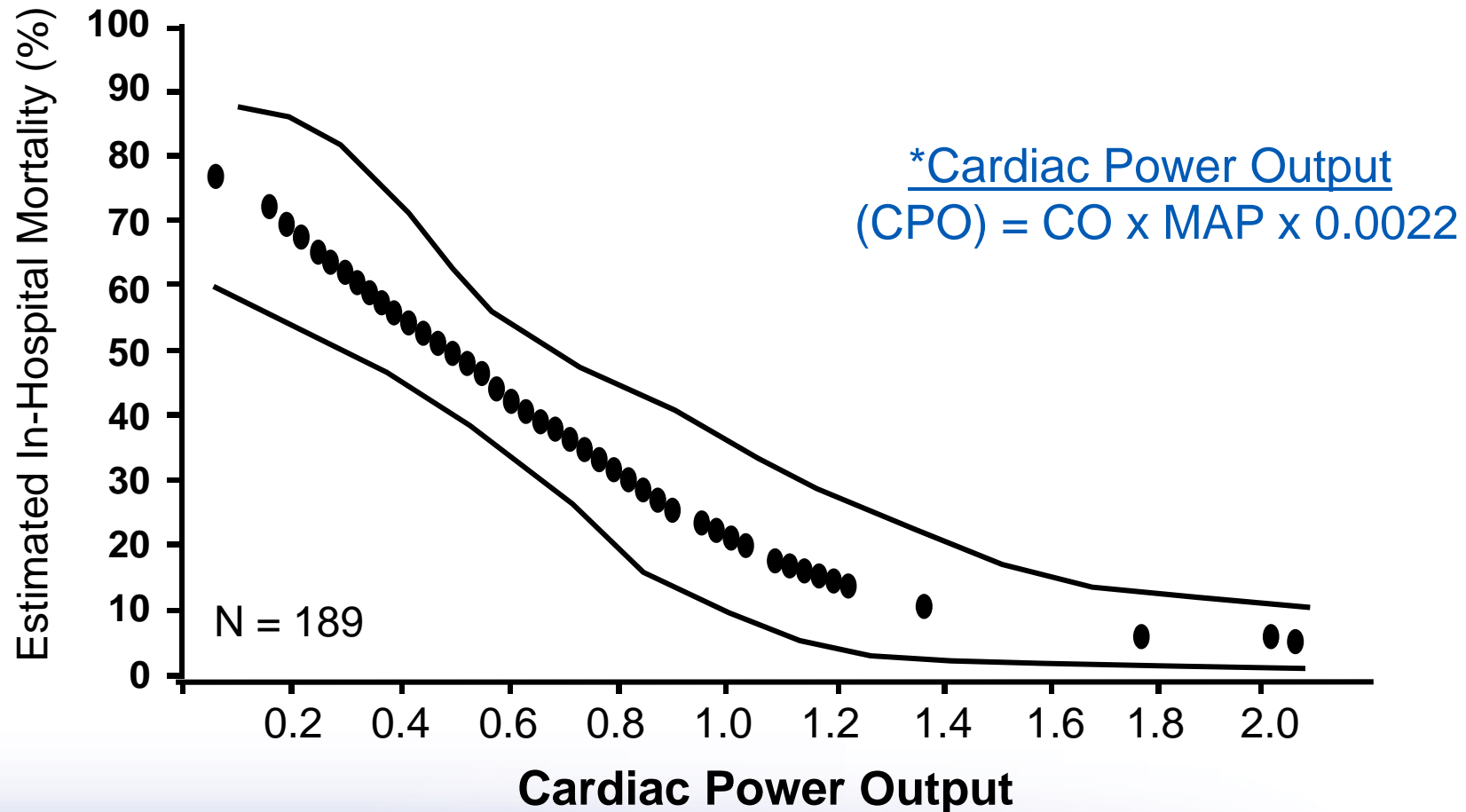


*“Impella 2.5 improves cardiac function at three days and four months (120 Days) after AMI vs. Standard of Care.”*

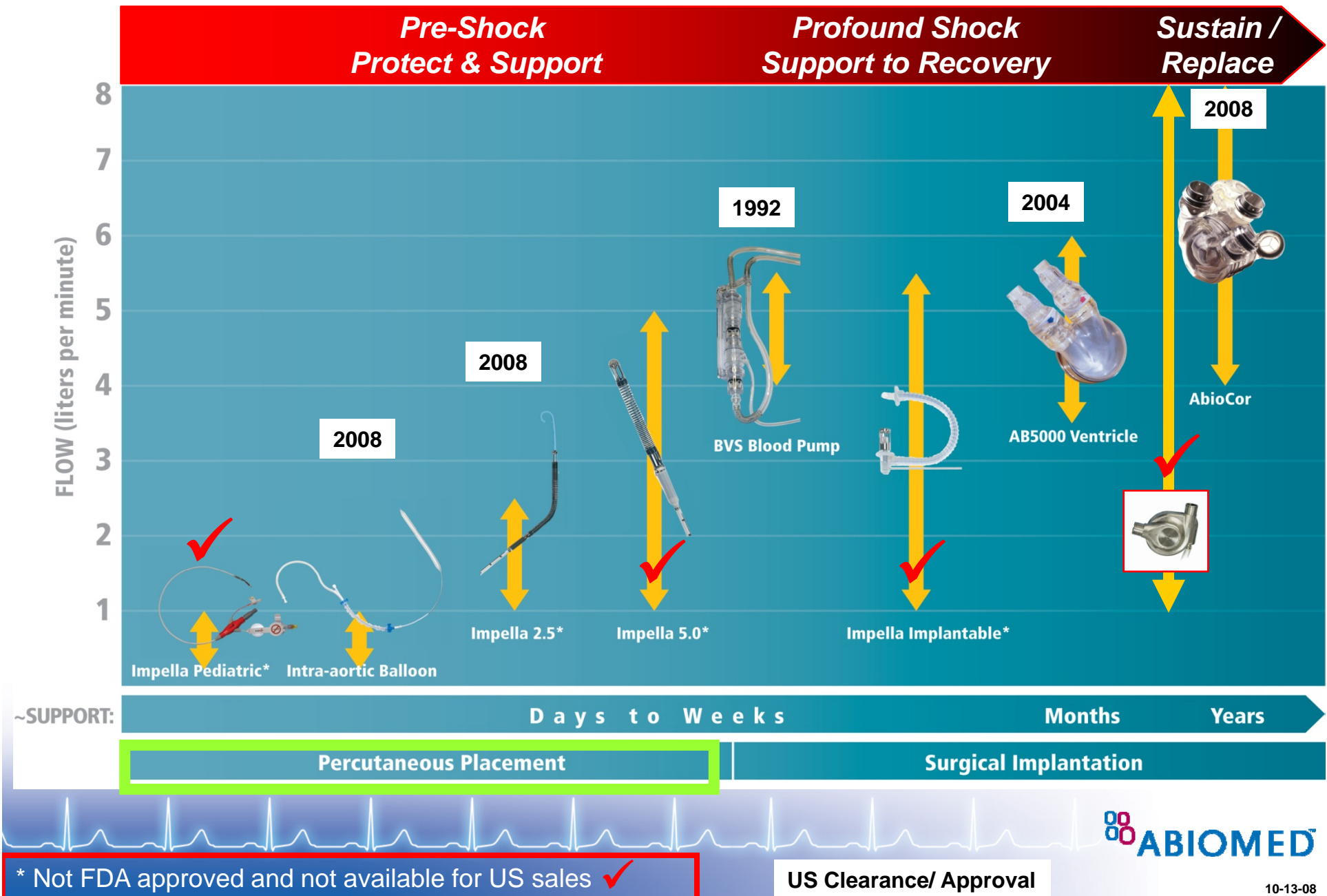
1. MACH II Trial - ACC 2007 (José Henriques, MD, PhD). Academic Medical Center, Netherlands, Mechanical Assistance for Acute Congestive Heart failure

2. IMPRESS- Impella vs. IABP reduces infarct size in STEMI patients treated with primary PCI

# Cardiac Power Output: The Strongest Hemodynamic Correlate of Mortality in Cardiogenic Shock



# The Abiomed Spectrum of Care



\* Not FDA approved and not available for US sales ✓

US Clearance/ Approval



# ABIOMED

- ✓ Mission: to promote heart recovery and eliminate in-hospital death from Heart Attacks and high risk PCI
- ✓ Manufacturing exclusive heart recovery pump technologies with exclusive regulatory approvals
- ✓ 110+ patents or patents pending derived from \$200M in R&D
- ✓ 100+ publications validating science of “heart pumps” for heart recovery and organ perfusion
- ✓ ~\$80M Revenues, ~\$67M Cash, No debt, ~\$620M Mkt Cap



## Summary:



- Impella is a patented breakthrough technology for multiple applications
- Impella enhances coronary flow like an IABP (O<sub>2</sub> supply) and rests the heart muscle like a VAD (O<sub>2</sub> demand) with prophylactic safety profile
- Abiomed's core competency for 26 years has been about pumping blood and recovering hearts
- Interested in expanding into Israel