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MULTIDISCIPLINARY EUROPEAN
ENDOVASCULAR THERAPY

Sustained Durability of the New Generation Stent Graft – the Endurant Case Example

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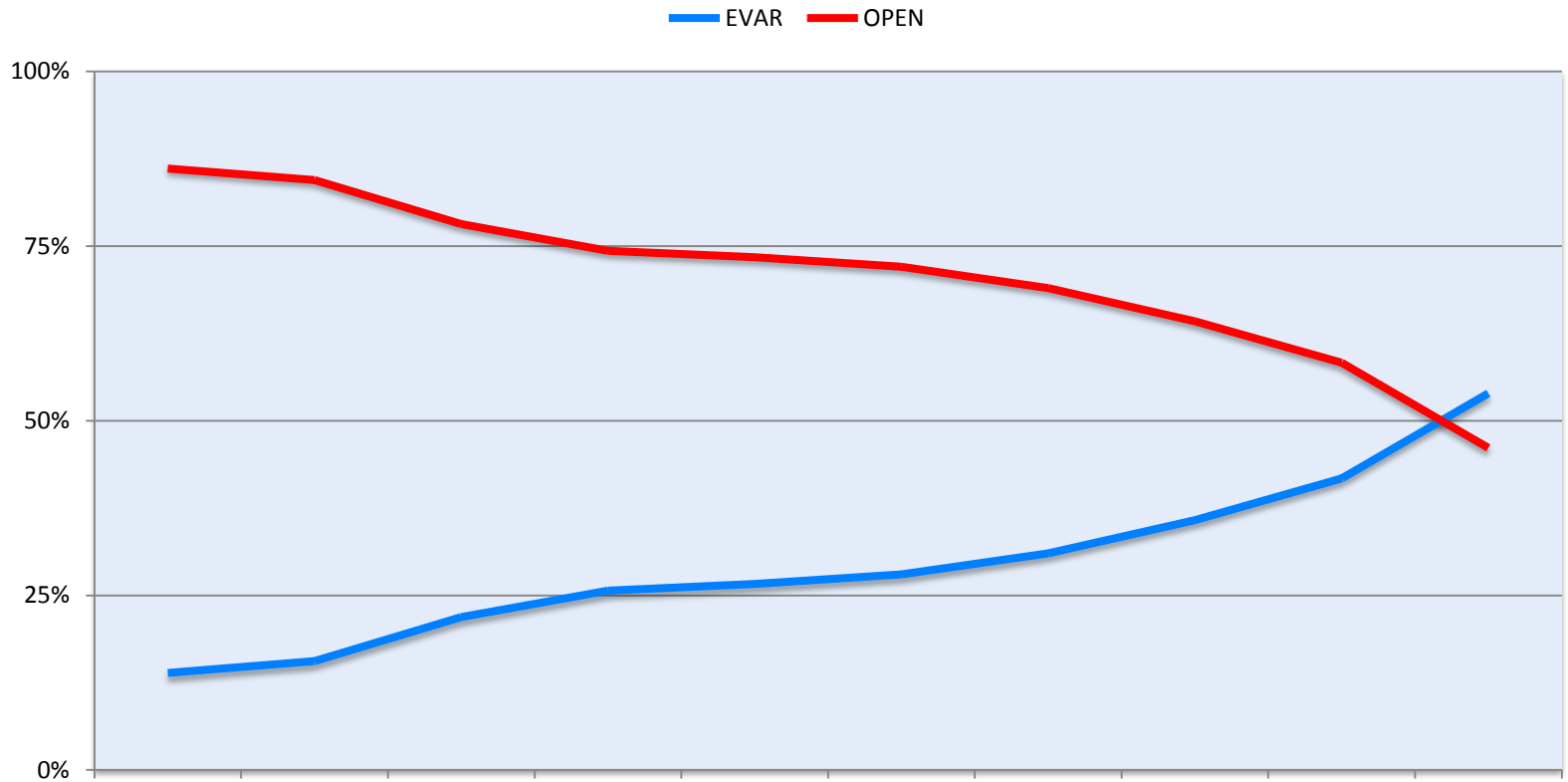
Faculty disclosure

Antoine- SAUGUET

I disclose the following financial relationships:

Consultant for Medtronic Company

AAA repair: 10-year trend



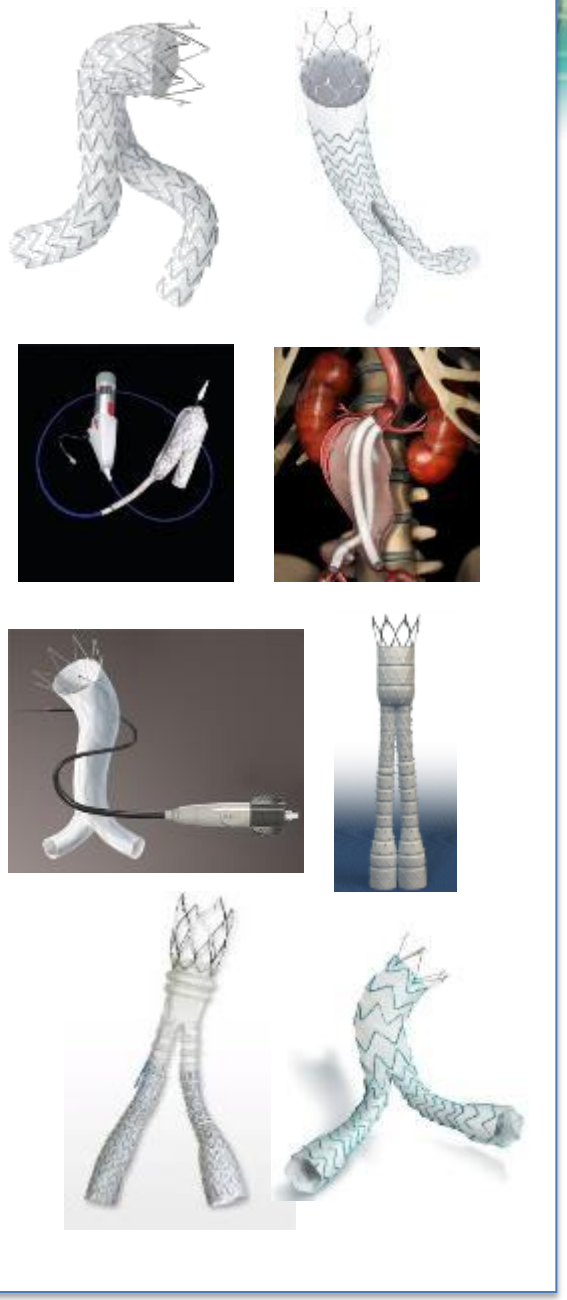
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
EVAR	13.9%	15.6%	21.9%	25.7%	26.6%	28.0%	31.0%	35.8%	41.7%	53.9%
OPEN	86.1%	84.4%	78.1%	74.3%	73.4%	72.0%	69.0%	64.2%	58.3%	46.1%

European Vascular and Endovascular Monitor (EVEM)

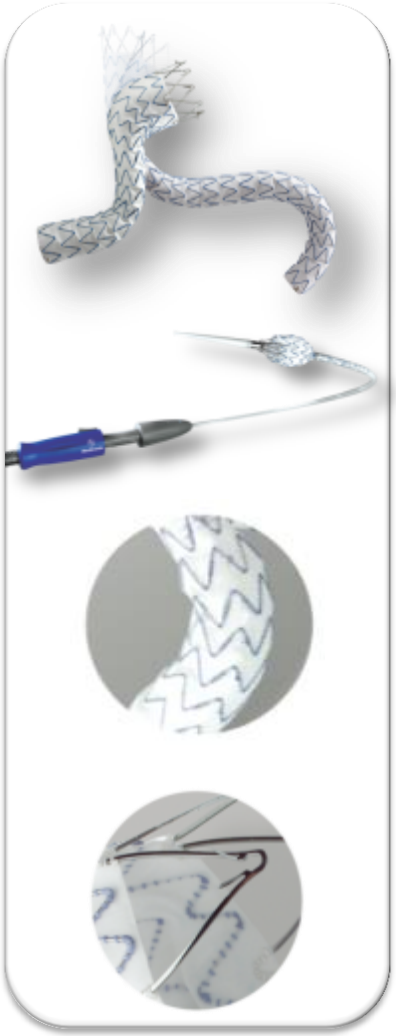
EVAR Today

- Clinical effectiveness of EVAR is well established (EVAR 1, DREAM, EVAR 2, Eurostar, etc.)

- Will new technology perform as well or better than older technology? Primary concerns:
  - Long-term durability
  - Performance outside of controlled trials when anatomic limits pushed

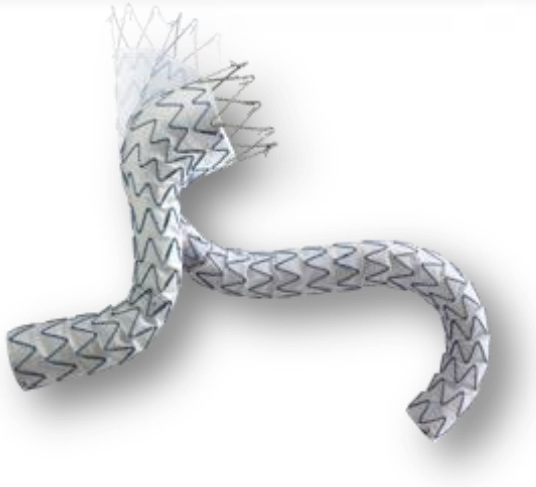


Endurant Stent Graft Device Characteristics



- Flexible and conformable stent graft design
- Low profile (Hidrophilic coating)
- Accurate, controlled deployment
- Fracture resistant (Nitinol stents)
- High density polyester graft material
- Active suprarenal fixation for migration resistance

Testing New Generation Devices



Endurant Trial:

- US IDE – controlled clinical setting

Endurant Registry:

- ENGAGE – multi-center, real world setting

Endurant Registry:

- PANDORA – two-center prospective study

So far >145,000 pts treated with Endurant worldwide

US IDE Trial

Primary Endpoint (composite)

- **Safety:** Safety – the proportion of subjects who have no MAE reported within 1 month (Day 0 – Day 30) from the index procedure

- **Efficacy:** Successful aneurysm treatment within 12 months of procedure

150 patients

3 year follow-up

Mid-term Results

US IDE Trial

Durable Clinical Performance Out to 3 Years

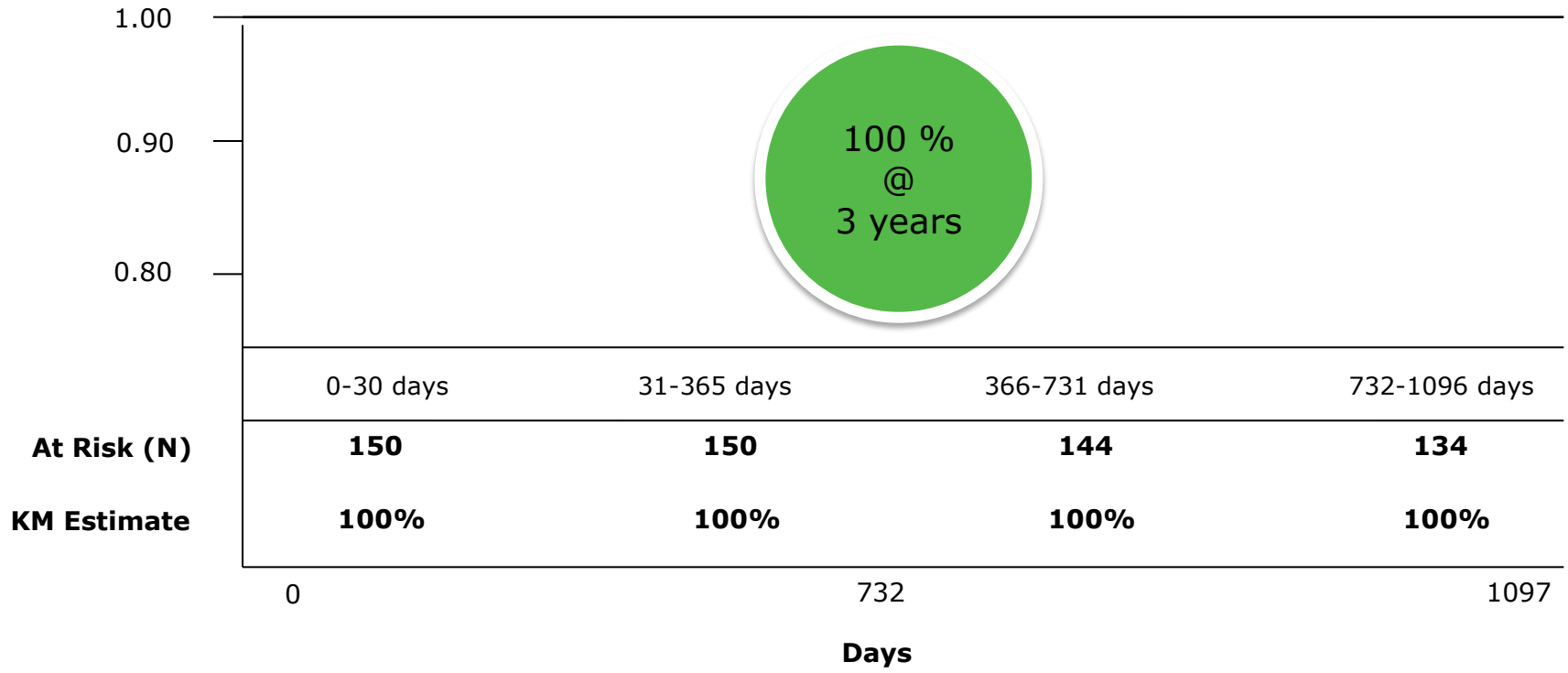
Treatment outcomes			
	1 Year	**2 Year**	**3 Year**
Post-Implant Rupture	0%	0%	0%
Conversion to Open Repair	0%	0%	0%

Source: Endurant IDE Dec 2012_APR
* One subject experienced a new Type I endoleak at the 3 year time frame which led to an aneurysm expansion. The subject refused intervention and voluntarily entered hospice, and expired on day 1212 due to an aneurysm rupture

Freedom from ARM

US IDE Trial

Durable Clinical Performance Out to 3 Years



Source: SVS_05022013.rtf

Mid-term Results

US IDE Trial

Durable Clinical Performance Out to 3 Years

Durability Markers			
	1 Year	**2 Year**	**3 Year**
Type I Endoleak	0%	0%	0.9%*
Migration	0%	0%	0%
Stent Graft Wire Form Fracture	0%	0%	0%
Stent-graft occlusion	0%	0.8%	0%

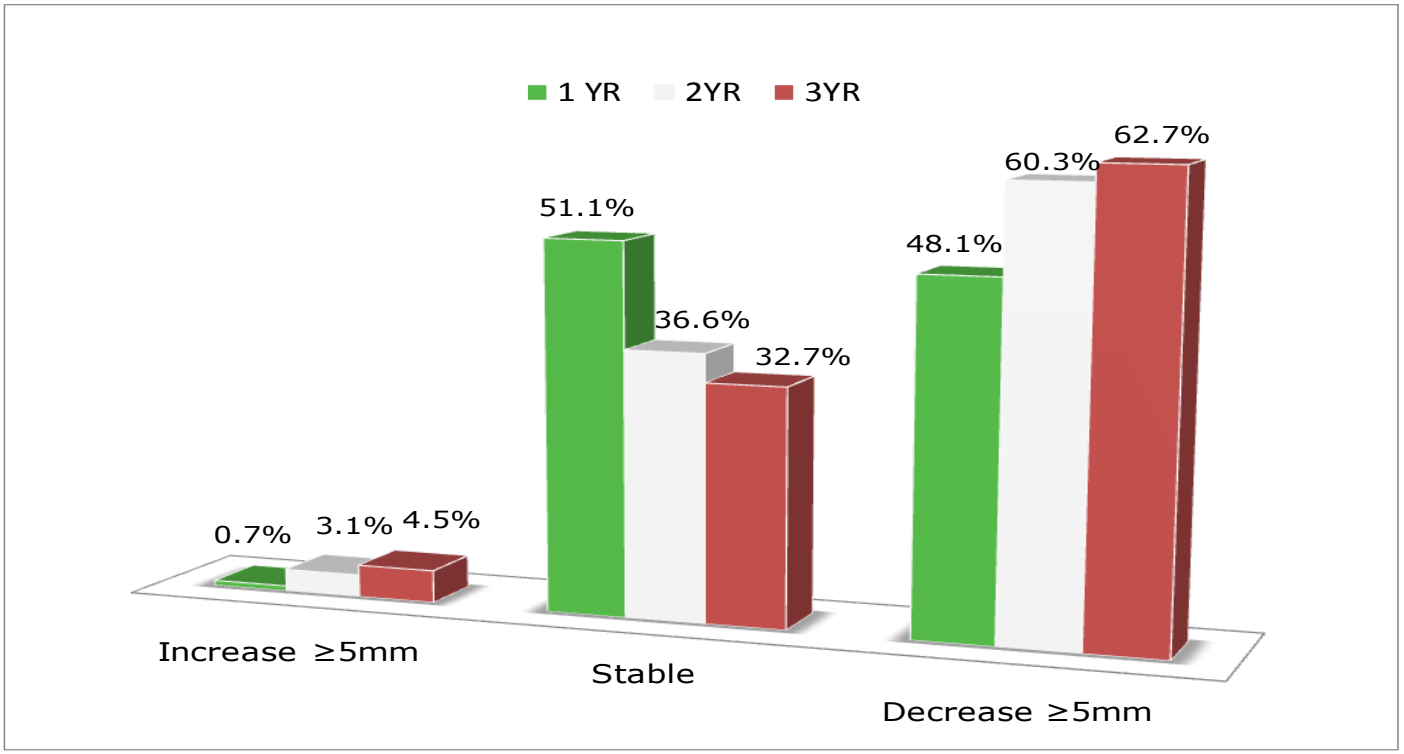
Source: Endurant IDE Dec 2012_APR

* One subject experienced a new Type I endoleak at the 3 year time frame which led to an aneurysm expansion. The subject refused intervention and voluntarily entered hospice, and expired on day 1212 due to an aneurysm rupture

AAA Diameter Change

US IDE Trial

95.4% of Sacs Decreasing/Stable at 3Y: Excellent Durability



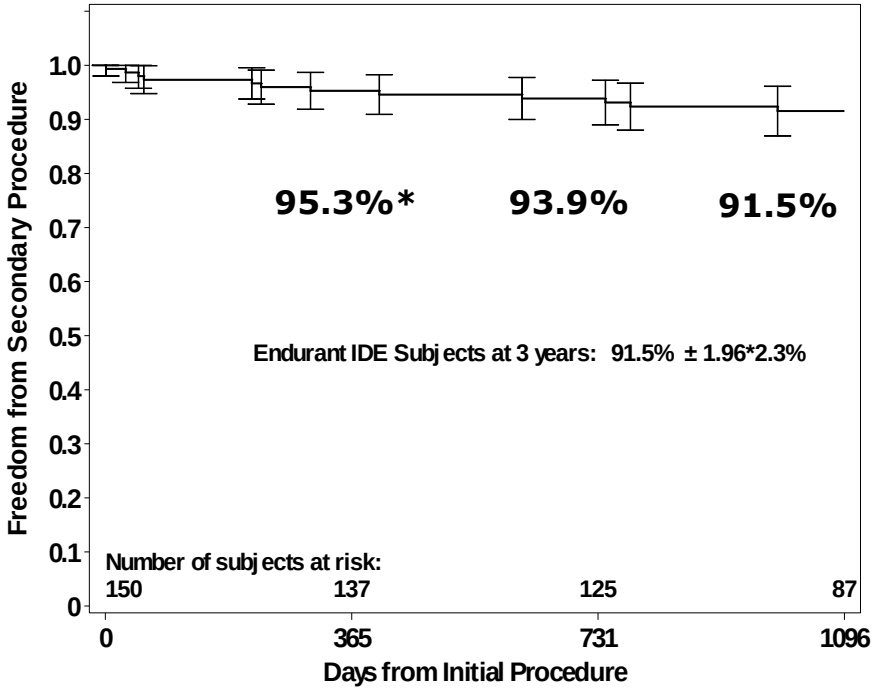
Source: Endurant IDE Dec 2012_APR

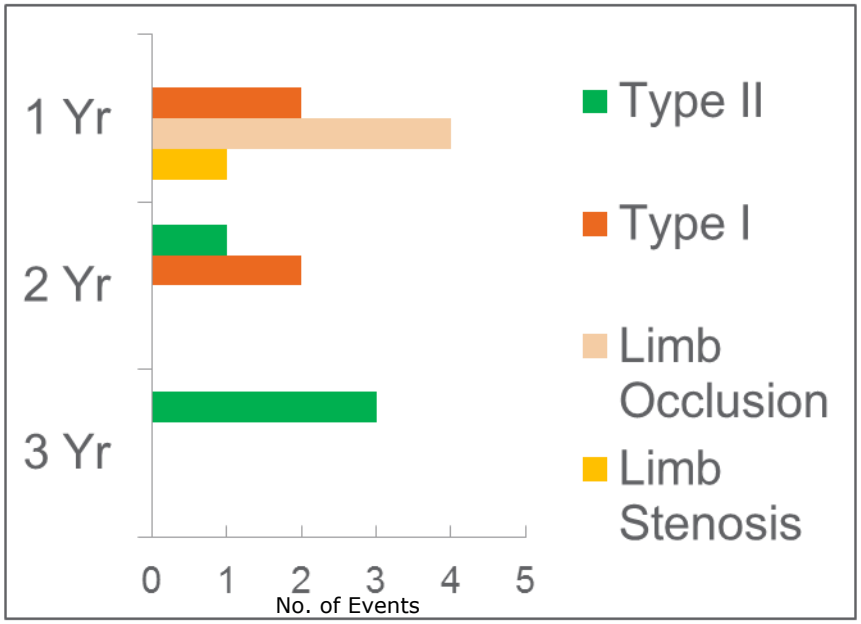
Freedom from Secondary Procedures

US IDE Trial

Durability Markers

Freedom from secondary procedures





* Value is calculated from 31-365 days
Source: SVS_05022013.rtf

Source: Endurant IDE Dec 2012_APR

Summary

US IDE Trial

- The Endurant stent graft delivers sustained clinical performance across key endpoints at 3 years
- Robust outcomes from the US IDE Trial confirm the sustained durability of the Endurant stent graft

Source: Endurant IDE Dec 2012_APR

Real World

Real world experience in EVAR:

Endurant Stent Graft Natural Selection Global Postmarket Registry

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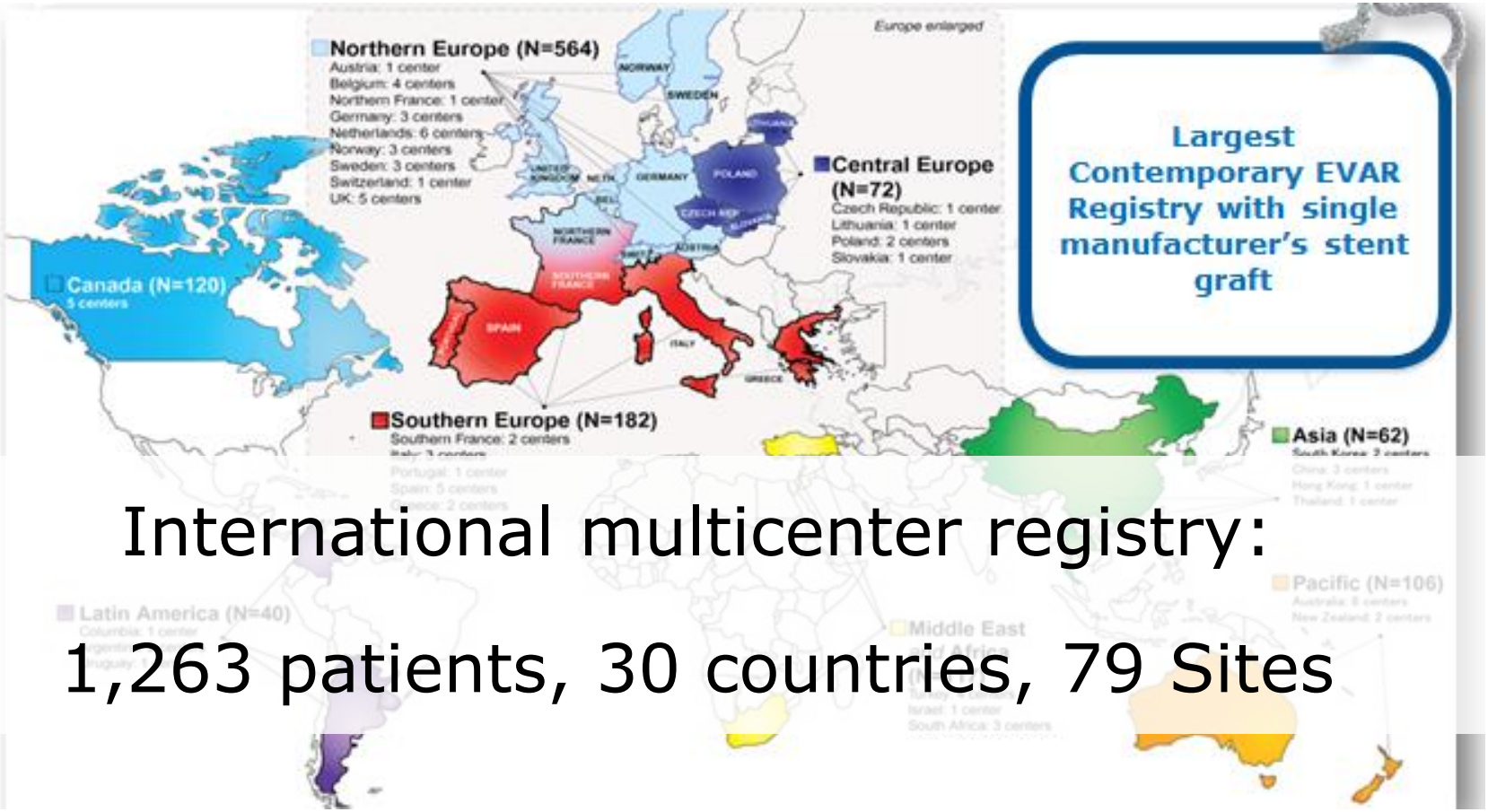
ENGAGE

ENGAGE Global Registry



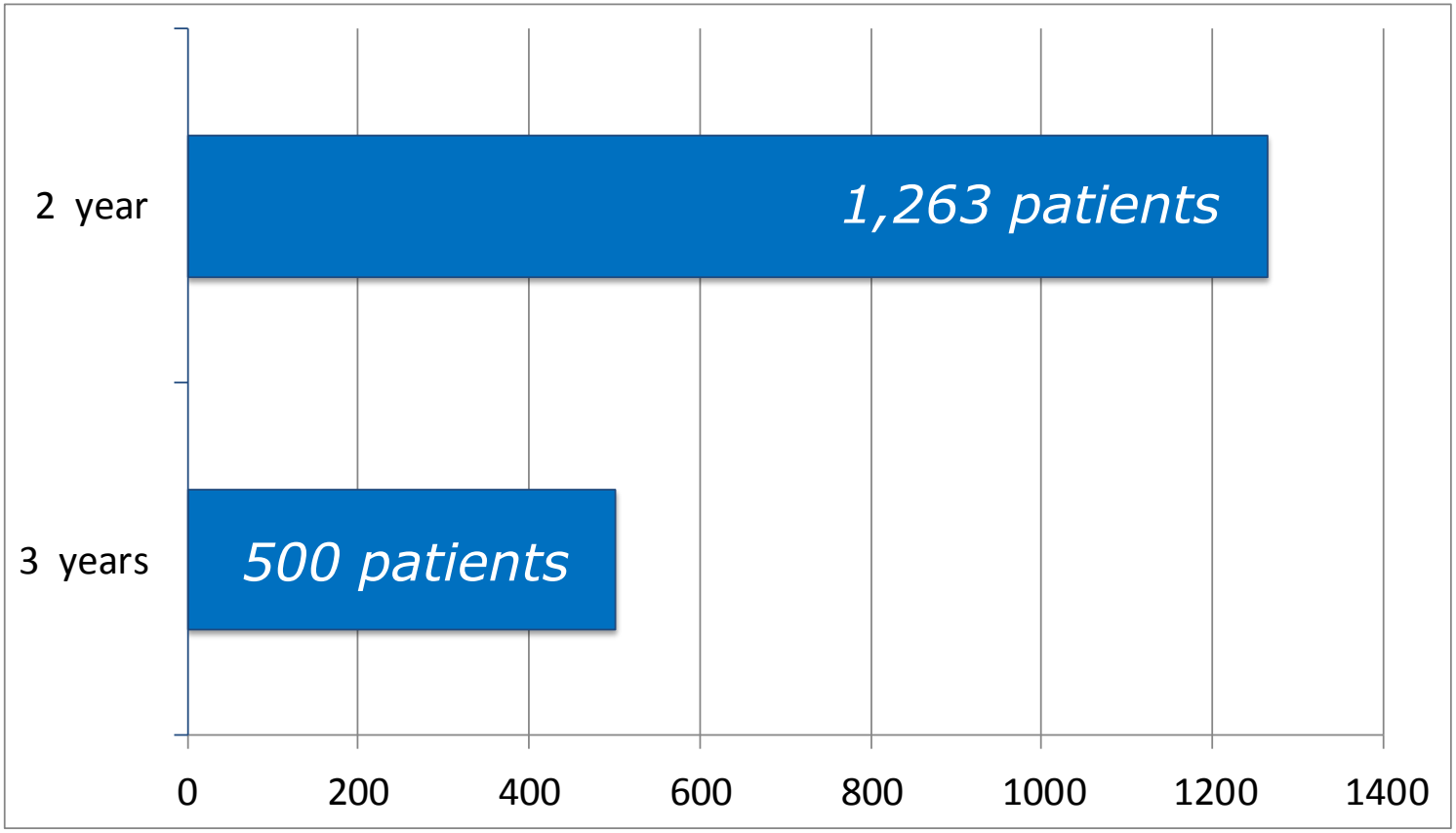
International multicenter registry:

1,263 patients, 30 countries, 79 Sites

ENGAGE Study Design

- Patients consecutively enrolled (2009-2011)
- Follow-up: 30-day, annual visits through 5 yrs
- Extensive monitoring on-going
  - 100% data management review
  - Independent data monitoring (100% endpoints)
  - Independent Clinical Event Committee

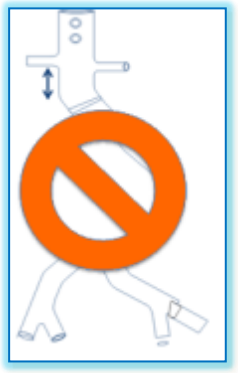
ENGAGE Follow-up Status



September 2013

ENGAGE Baseline Aneurysm Characteristics

AAA size	60.3 ± 11.6 mm	
prox neck diameter	23.7 ± 3.5 mm	
	range 15-37 mm	
	> 32 mm	**5%**
neck length	27.0 ± 12.4 mm	
	range 0-80 mm	
	<15 mm	**12.0%**
AAA diameter	> 5 cm	89%
infrarenal neck angle	30.3 ± 23.8° range 0-130°	
	>60°	**10.2%**
iliac fixation	2 - 30 mm	



remarkable at baseline

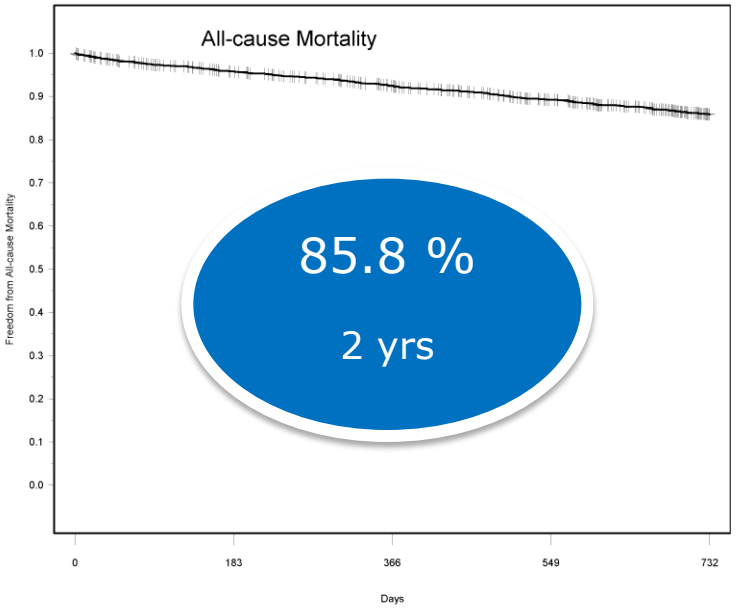
- 18% beyond IFU
- 15.9% sAAA
- 10.6% ASA IV
- 10.5% female

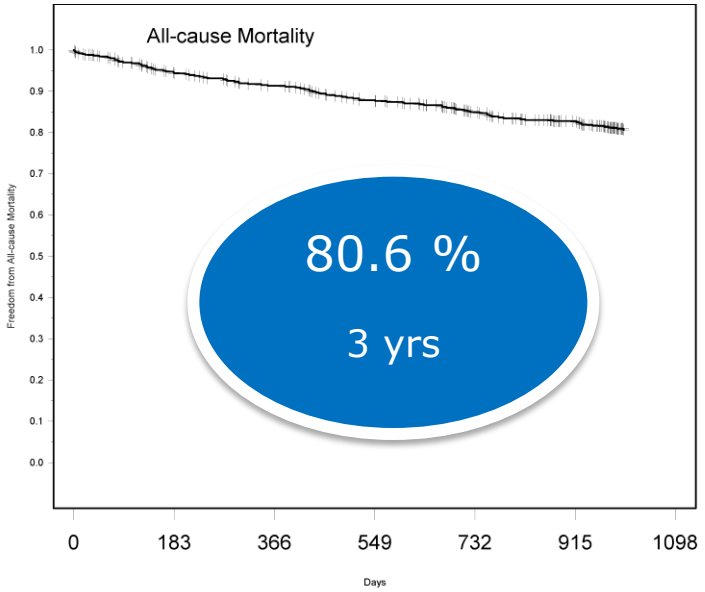
ENGAGE: Endurant is Technically and Clinically Successful

Technical Success	99.0% (1251/1263)
Intra-operative Clinical Success	**97.6% (1233/1263)**
• Technical Success	99.0% (1251/1263)
• Freedom from intra-operative death	100.0% (1263/1263)
• Freedom from type I/III Endoleak	98.6% (1239/1257)

Freedom from All-Cause Mortality

ENGAGE Registry



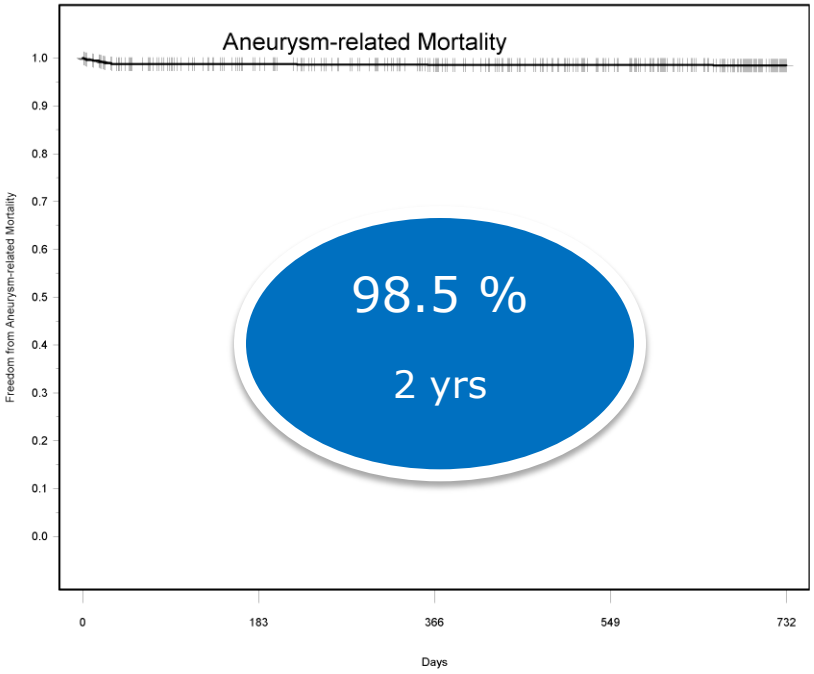


	0-30 days	31-365 days	366-731 days
No. at Risk[1]	1263	1243	1146
No. of Events	16	78	80
No. Censored[2]	4	19	123
Kaplan-Meier Estimate[3]	0.987	0.925	0.858
Peto Standard Error	0.003	0.007	0.011

	0-30 days	31-365 days	366-731 days	732-1096 days
No. at Risk[1]	500	491	452	417
No. of Events	6	35	25	27
No. Censored[2]	3	4	10	93
Kaplan-Meier Estimate[3]	0.988	0.917	0.866	0.806
Peto Standard Error	0.005	0.012	0.015	0.020

Freedom from AAA-Related Mortality

ENGAGE Registry



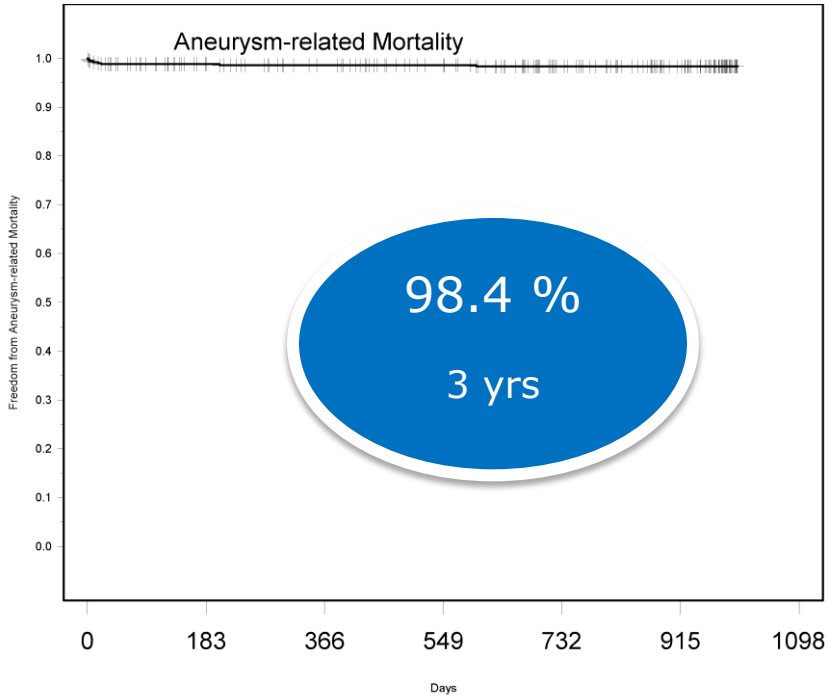


Table 18: Kaplan-Meier Estimates for Aneurysm-related Mortality

	0-30 days	31-365 days	366-731 days
No. at Risk[1]	1263	1243	1146
No. of Events	16	2	1
No. Censored[2]	4	95	202
Kaplan-Meier Estimate[3]	0.987	0.986	0.985
Peto Standard Error	0.003	0.003	0.004

Table 18: Kaplan-Meier Estimates for Aneurysm-related Mortality

	0-30 days	31-365 days	366-731 days	732-1096 days
No. at Risk[1]	500	491	452	417
No. of Events	6	1	1	0
No. Censored[2]	3	38	34	120
Kaplan-Meier Estimate[3]	0.988	0.986	0.984	0.984
Peto Standard Error	0.005	0.005	0.006	0.006

ENGAGE: Durability Markers

Endurant seals well and prevents type I or III endoleak even in challenging anatomies

	At 1 month n = 1162	At 1 year n = 1079	At 2 Year n = 900	At 3 Year n = 333
Endoleak (Total)	13.1% (152)	9.8% (106)	10% (90)	10.2% (34)
Type I	1.3% (15)	0.4% (4)	0.9% (8)	1.2% (4)
Type III	0.3 (3)	0.2% (2)	0.6% (6)	0.3 (1)
Type I and/or III	1.5% (17)	0.6% (6)	1.6% (14)	1.5% (5)

ENGAGE: Durability Markers

Proven durability:

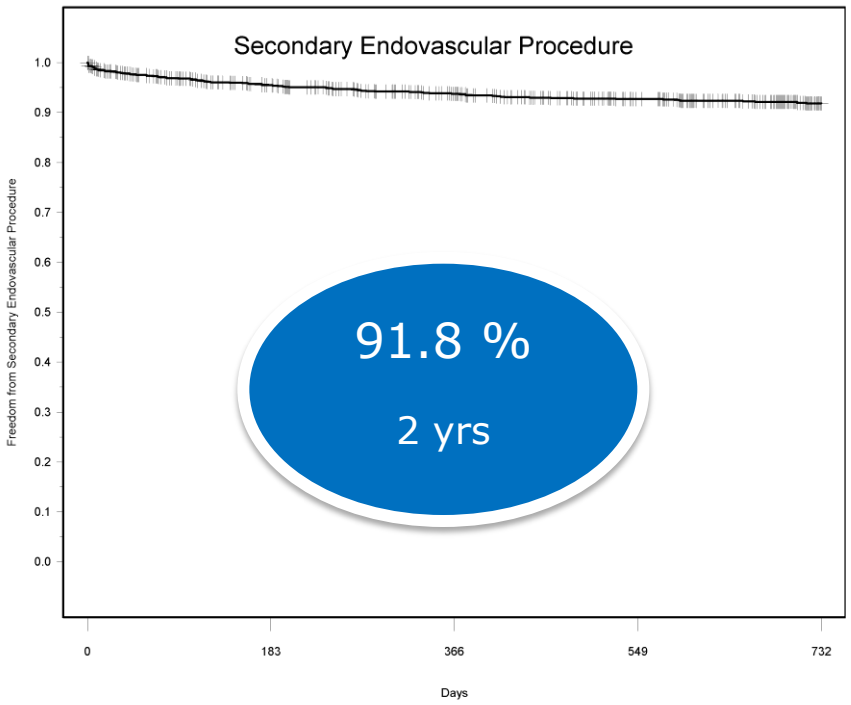
- 0% migration & stent fracture
- low incidence of occlusion & kinking

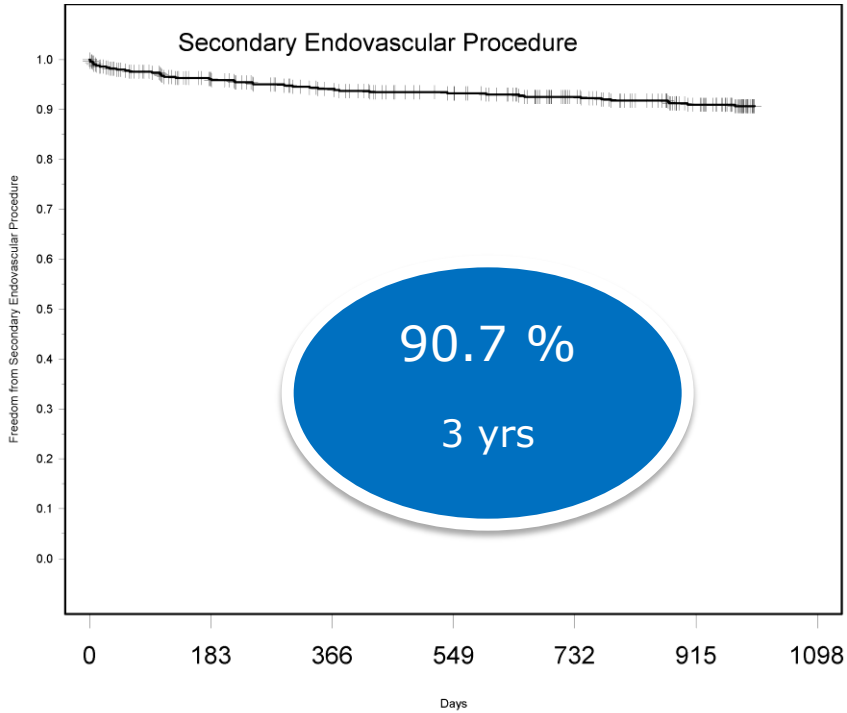
	through 1 Year n = 1242	through 2 Year n = 1243	through 3 Year n = 490
Proximal migration *	0%	0%	0%
Stent graft occlusion	3.5% (44)	3.8% (47)	2.9% (14)
Stent graft kinking	2.2% (27)	2.3% (29)	2.7 (13)
Stent fracture	0%	0%	0%

* 0,3% (4) limb separation/limb migration reported within 2 years

Excellent Freedom from Re-intervention

ENGAGE Registry



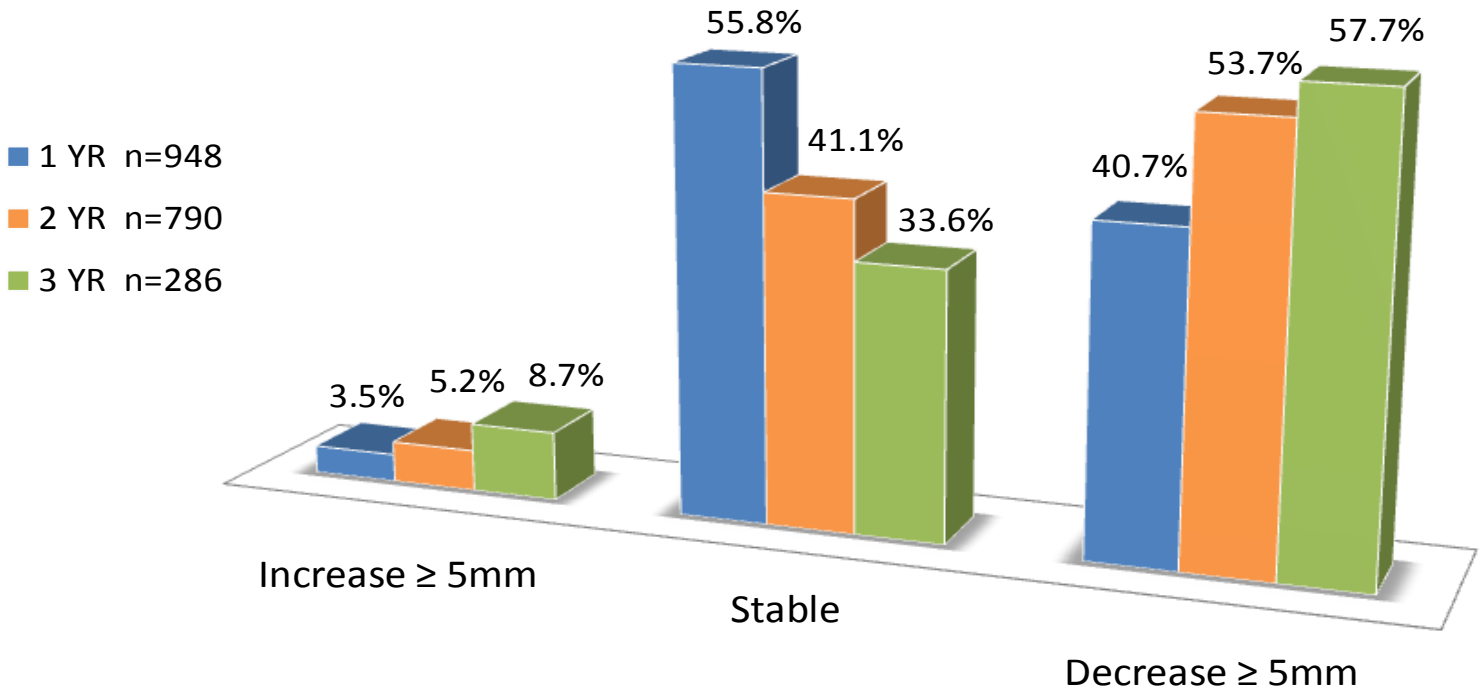


	0-30 days	31-365 days	366-731 days
No. at Risk[1]	1263	1219	1078
No. of Events	25	51	21
No. Censored[2]	19	90	183
Kaplan-Meier Estimate[3]	0.98	0.938	0.918
Peto Standard Error	0.004	0.007	0.009

	0-30 days	31-365 days	366-731 days	732-1096 days
No. at Risk[1]	500	483	427	388
No. of Events	8	19	8	7
No. Censored[2]	9	37	31	111
Kaplan-Meier Estimate[3]	0.984	0.944	0.925	0.907
Peto Standard Error	0.006	0.011	0.013	0.016

ENGAGE: AAA Diameter Change

Majority of AAA show decrease/stable diameter: proven durability in real world patients



US IDE vs. ENGAGE

Durable Clinical Performance Out to 3 Years

Endurant performs equally well in standard EVAR anatomy and real-world patient population

US IDE Trial	1 Year (150)	2 Year (150)	3 Year (150)
Post-Implant Rupture	0%	0%	0%
Conversion to Open Repair	0%	0%	0%

ENGAGE	1 Year (1263)	2 Year (1263)	3 Year (500)
Post-Implant Rupture	0.2%	0.3%	0.2%
Conversion to Open Repair	0.6%	0.8%	0.8%

US IDE vs. ENGAGE

Durable Clinical Performance Out to 3 Years

US IDE Trial	At 1 Year (150)	At 2 Year (150)	At 3 Year (150)
Type I Endoleak	0%	0%	0.9%*
Migration	0%	0%	0%
Stent graft occlusion	0%	0.8%	0%
Stent Graft Wire Form Fracture	0%	0%	0%

ENGAGE	At 1 Year (1263)	At 2 Year (1263)	At 3 Year (500)
Type I Endoleak	0.4%	0.9%	1.2%
Migration	0%	0%	0%
Stent graft occlusion	3.5%	3.8%	2.9%
Stent Graft Wire Form Fracture	0%	0%	0%

Source: Endurant IDE Dec 2012_APR ENGAGE Registry - Data on File at Medtronic.
* One subject experienced a new Type I endoleak at the 3 year time frame which led to an aneurysm expansion. The subject refused intervention and voluntarily entered hospice, and expired on day 1212 due to an aneurysm rupture

US IDE vs. ENGAGE: Durability

Durable; consistent performance in straight-forward and challenging anatomies

US IDE at 3 Yrs

- **No** ASA IV patients
- **100%** freedom from aneurysm-related mortality
- **91.5%** freedom from secondary procedure
- Low **0.9%** Type I/III endoleak rate (n=1 Type I)

ENGAGE Registry at 3 Yrs

- **Yes** ASA IV patients
- **98.4%** freedom from aneurysm-related mortality
- **90.7%** freedom from secondary procedure
- Low **1.5%** Type I/III endoleak rate

3Y ENGAGE OUS Data on file at Medtronic
3Y US IDE Data on file at Medtronic.

Prospective Evaluation of the Endurant Endoprosthesis for the Treatment of Abdominal Aortic Aneurysms

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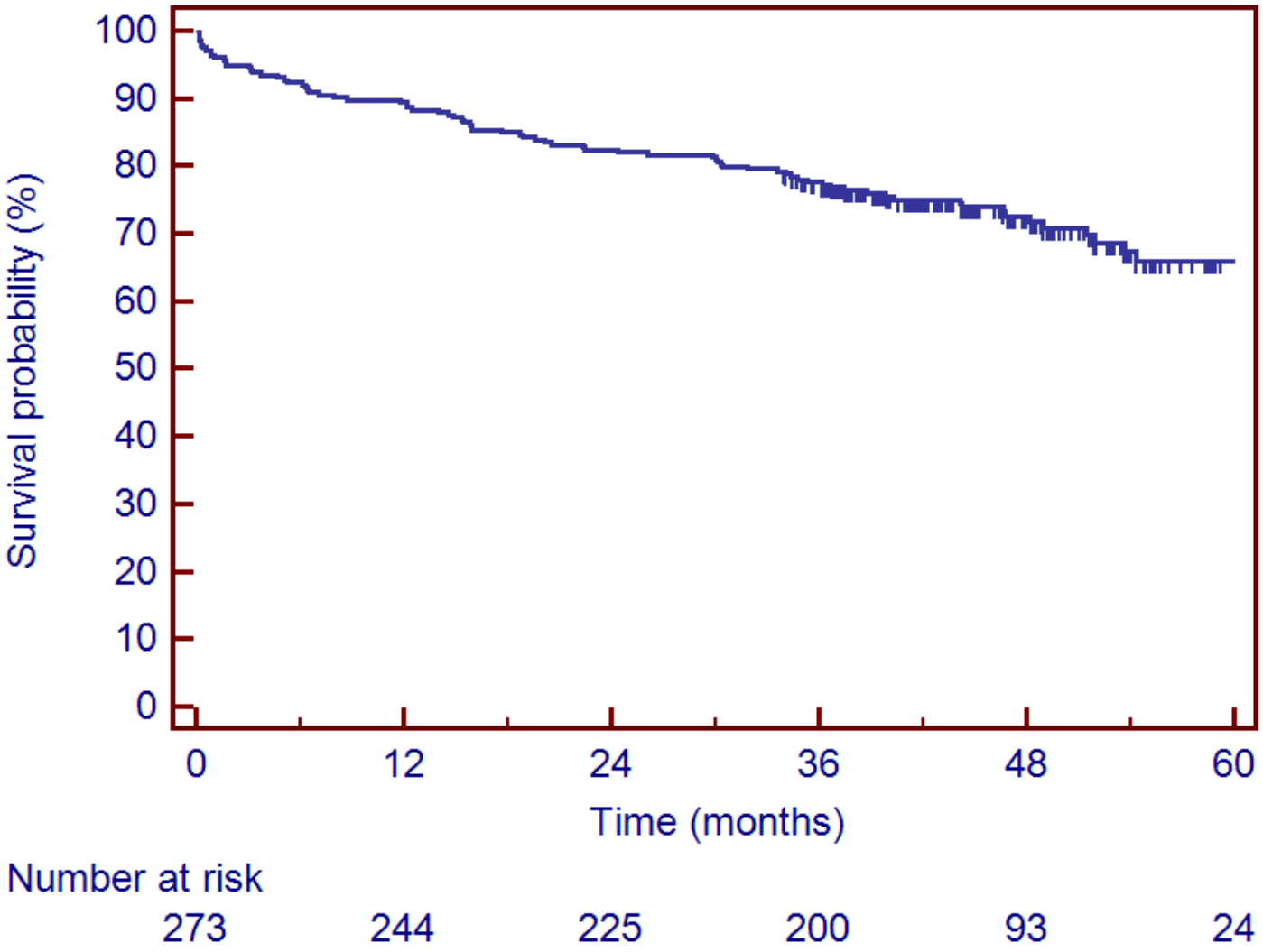
PANDORA

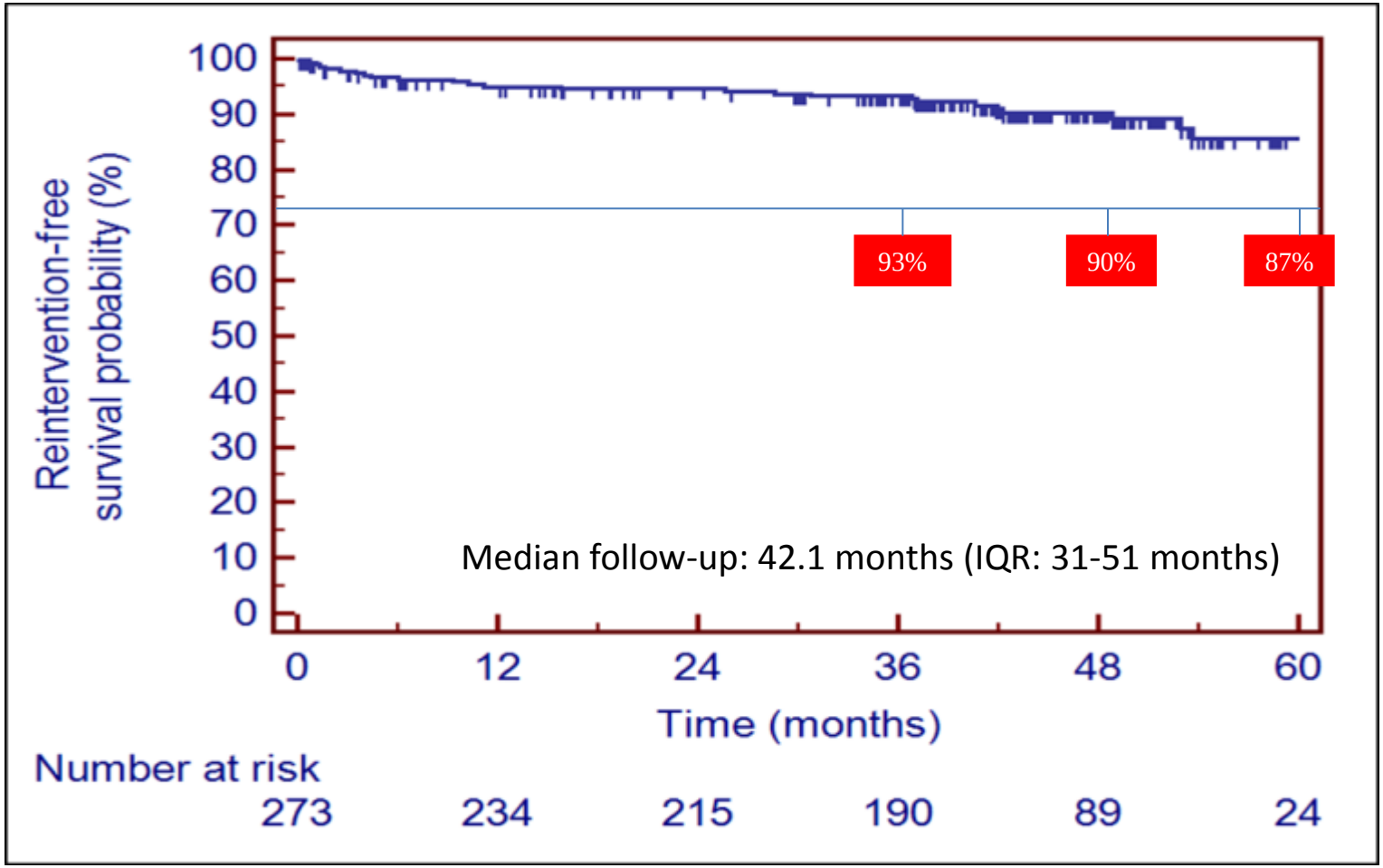
PANDORA Study Design

- Two-centre
- Prospective data collection
- ≥3 yr FU
- All-comers
- 273 pts

PANDORA Survival Probability



PANDORA Freedom from Re-intervention



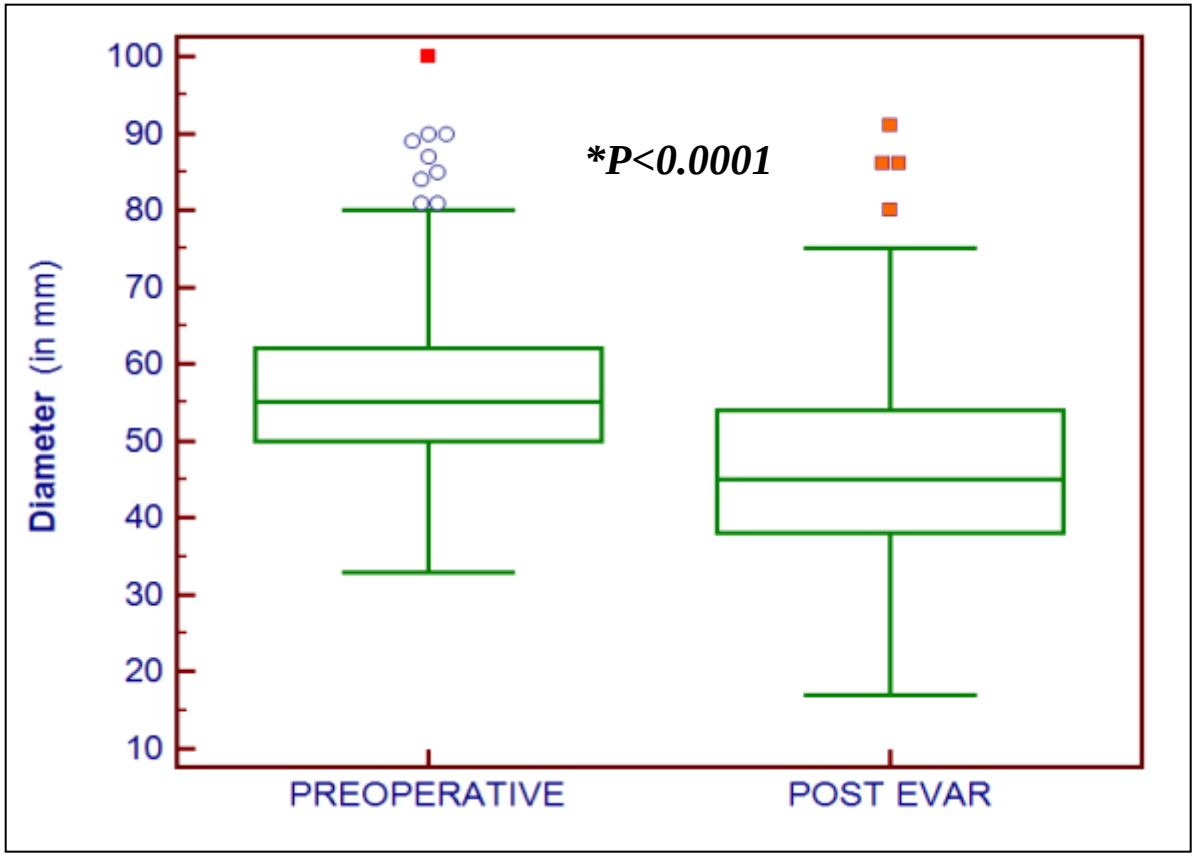
Excellent Results given Patients Complexity

PANDORA Durability Markers through 5 yrs

TYPES OF ENDOLEAK	N(%)
Type Ia	3 (1%)
Type Ib	2 (0.7%)
Type III	1 (0.3%)
Main body migration	0%

Low Type I/III endoleaks, given anatomical complexity

PANDORA Aneurysm Shrinkage through 5 yrs



Impressive AAA shrinkage (> 5mm) in 58% of patients

Conclusion

- Consistent results between US IDE and ENGAGE at 3 yrs: very good mid-term durability of the Endurant stent graft
- Real world EVAR practice with Endurant shows excellent results in a wide range of anatomy
- PANDORA demonstrates consistency with controlled US IDE and ENGAGE studies and shows continued long-term durability of Endurant through 5 yrs