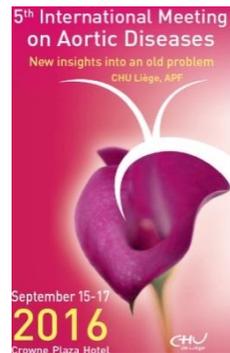




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# Aortic size index could improve surveillance of women and men with AAA

A population-based retrospective cohort study



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# Disclosure

I do not have any potential conflict of interest



# Background



- Women have a higher risk of rupture and possibly older patients
- 20-30% of ruptured AAA patients are previously diagnosed; but inadequate surveillance strategies hinder elective repair
- Surveillance programs are based on aortic diameter
  - without consideration of gender, age, medication or body surface area
- Aortic Size Index (ASI) might be a complimentary tool in surveillance for AAA

To investigate the possible correlation between aneurysm diameter, body surface area and aortic size index in women and men with AAA, in order to develop future improved surveillance



# Material and Methods

- Retrospective, population based cohort study
- AAA patients followed at the Karolinska University Hospital in Stockholm Sweden, Jan 2012 – Dec 2014
- Two radiological examinations
- Review of medical records
- Means were compared
  
- 120 women and 120 men were included

# Results

## Women versus men:

- Women had a higher mean age (79 vs 76 years)
- No difference in comorbidities

# Results

Variables	Total	Men	Women	p-value
	n = 240	n = 120	n = 120	
Weight (kg)	75 (85)	85 (65)	65.5 (75)	< 0.05
Height (m)	172 (58)	178 (37)	164 (34)	< 0.05
Aortic diameter (mm)	42.0 (37)	43 (37)	41.5 (30)	0.21
EMI (kg/m <sup>2</sup> )	26 (25)	27 (20)	24 (25)	< 0.05
BSA (m <sup>2</sup> )	1.9 (3.7)	2.0 (3.3)	1.7 (3.7)	< 0.05
ASI (cm/m <sup>2</sup> )	2.2 (3.7)	2.1 (3.7)	2.4 (3.5)	< 0.05

# Results

## BSA and ASI different between age groups

Variables	Age 51 - 77	Age 78 - 96	p-value
	n = 118	n = 122	
Aortic diameter (mm)	41.5 (30)	43.5 (37)	0.09
BMI (kg/m <sup>2</sup> )	27.8 (23.8)	25.0 (24.1)	< 0.05
BSA (m <sup>2</sup> )	2.0 (3.5)	1.8 (3.7)	0.07
ASI (cm/m <sup>2</sup> )	2.1 (3.7)	2.4 (3.7)	< 0.05

Continuous variables described as median and interquartile range.

Significance was calculated using independent t test and Mann Whitney u test.

# Aneurysm characteristics divided by median growth (mm/year) no growth ( $\leq 0$ ), slow growth ( $< 2.8$ ) and fast growth ( $\geq 2.8$ ).

Median growth rate 2.2 mm per year

Variables	No growth	Slow growth	Fast growth	p-value
	n = 56	n = 64	n = 120	
Mean (SD) growth (mm/year)	-	1.4 (0.5)	5.4 (3.7)	< 0.05
Median growth (mm/year)	-	1.4 (1.8)	4.1 (19.4)	
Aneurysm diameter (mm)	41.5 (30)	40.0 (25.0)	45.0 (37.0)	< 0.05
BMI (kg/m <sup>2</sup> )	24.8 (20.3)	25.8 (22.1)	26.2 (24.8)	0.71
BSA (m <sup>2</sup> )	1.9 (3.5)	1.9 (3.6)	1.9 (1.1)	0.12
ASI (cm/m <sup>2</sup> )	2.3 (3.7)	2.2 (3.7)	2.3 (2.1)	0.06
<b>Sex</b>				
Women (%)	29 (52)	28 (44)	63 (53)	0.50
Men (%)	27 (48)	36 (56)	57 (48)	

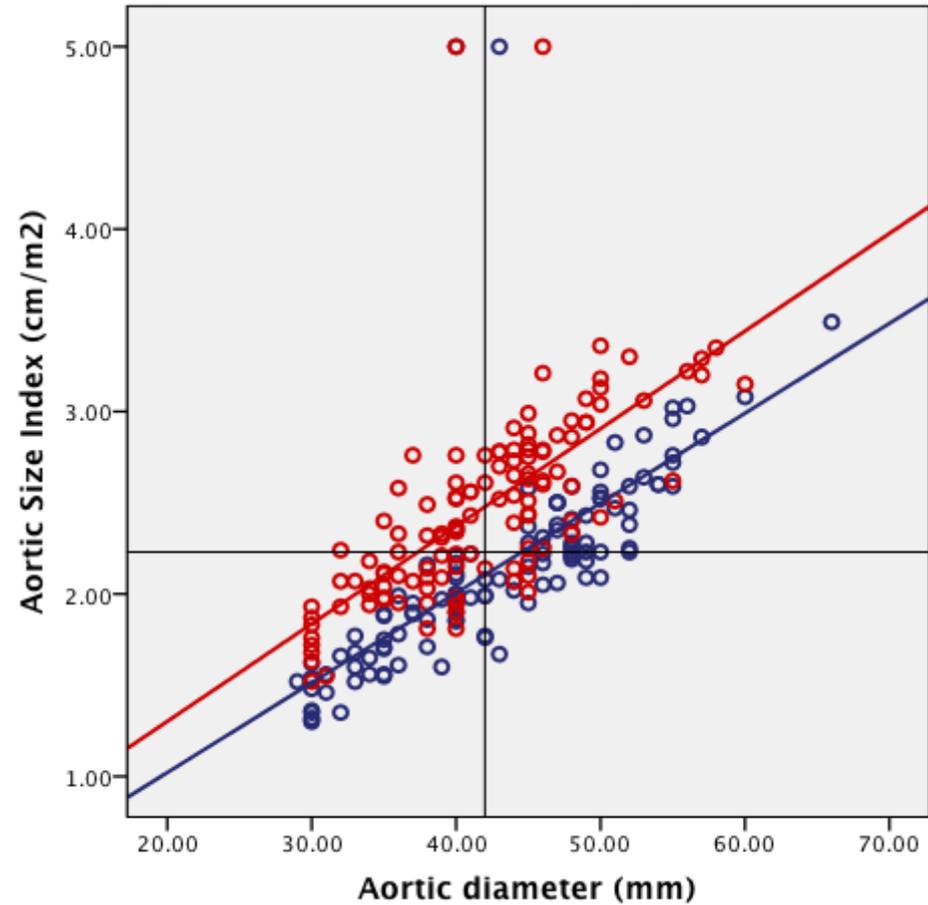
Continuous variables described as median and interquartile range.

Significance was calculated using independent t test and Mann Whitney u test.

BMI = Body Mass Index

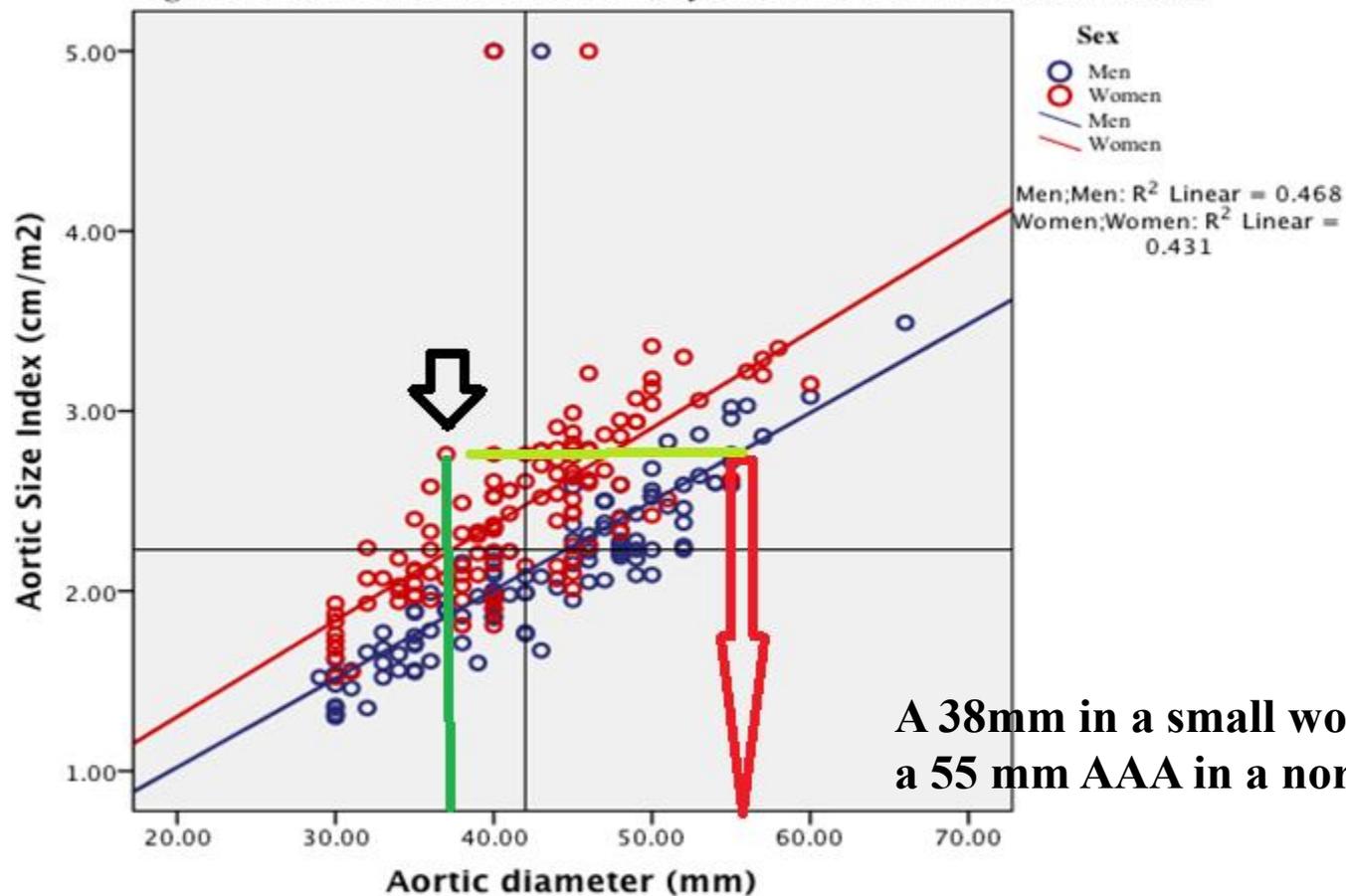
# Results

Figure 1: Aortic size index and aneurysm diameter for men



# Possible value ?

Figure 1: Aortic size index and aneurysm diameter for men and women.



**A 38mm in a small women could be compared to a 55 mm AAA in a normal man**

AAA, surveillance with ASI and diameter ?

Hedvig Löfdahl, J Roy, R.Hultgren, manuscript

## Conclusion

- ✓ There is an association between a high ASI and female sex and high age; although more prospective studies are called for.
- ✓ Aortic size index in combination with aortic diameter could be a useful tool in surveillance programs for AAA patients, especially in women and older patients
- ✓ A high aortic size index should in the future possibly introduce a shorter surveillance interval for a subset of AAA patients.

# Thank you!

# Extra slides att plocka ur vb



<b>Variables</b>	<b>AAA=42 mm n = 121</b>	<b>AAA &gt; 42 mm n = 119</b>	<b>P</b>
<b>BMI (kg/m<sup>2</sup>)</b>	25.7 (23.6)	26.1 (24.8)	<b>0.11</b>
<b>BSA (m<sup>2</sup>)</b>	1.9 (3.7)	2.0 (3.6)	<b>0.55</b>
<b>ASI (cm/m<sup>2</sup>)</b>	2.0 (3.7)	2.6 (3.3)	<b>&lt; 0.05</b>
<b>Growth (mm/year)</b>	1.6 (31.7)	2.7 (33.6)	<b>&lt; 0.05</b>

# Mean growth rate grouped by aneurysm size (defined as the AAA median, 42 mm) and sex.

Variables	Men		P-value	Women		P-value
	AAA ≤ 42 mm	AAA > 42 mm		AAA ≤ 42 mm	AAA > 42 mm	
	n = 58	n = 62		n = 63	n = 57	
Growth per year (%)	4.1 (71)	5.5 (60)	0.41	5.5 (59)	6.6 (55)	0.98
Growth per year (mm)	1.5 (24.3)	2.7 (33.6)	0.02	2.2 (22.0)	2.4 (25.2)	0.19

Continuous variables described as median and interquartile range.

Significance was calculated using independent t test and Mann Whitney u test.

Men (%)                                      27 (48)                                      36 (56)                                      57 (48)

Continuous variables described as median and interquartile range.

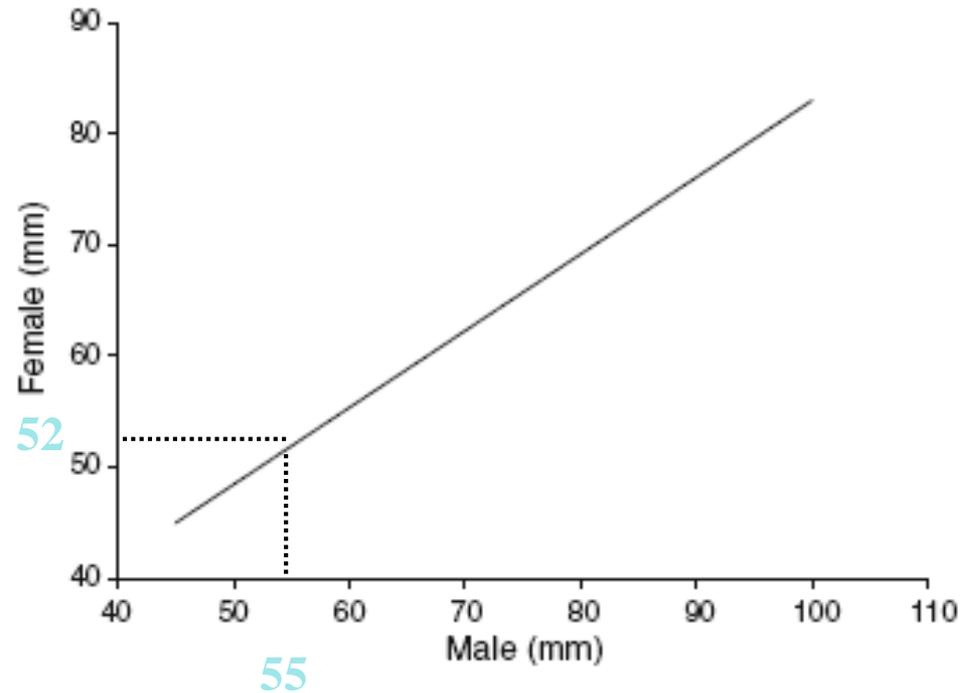
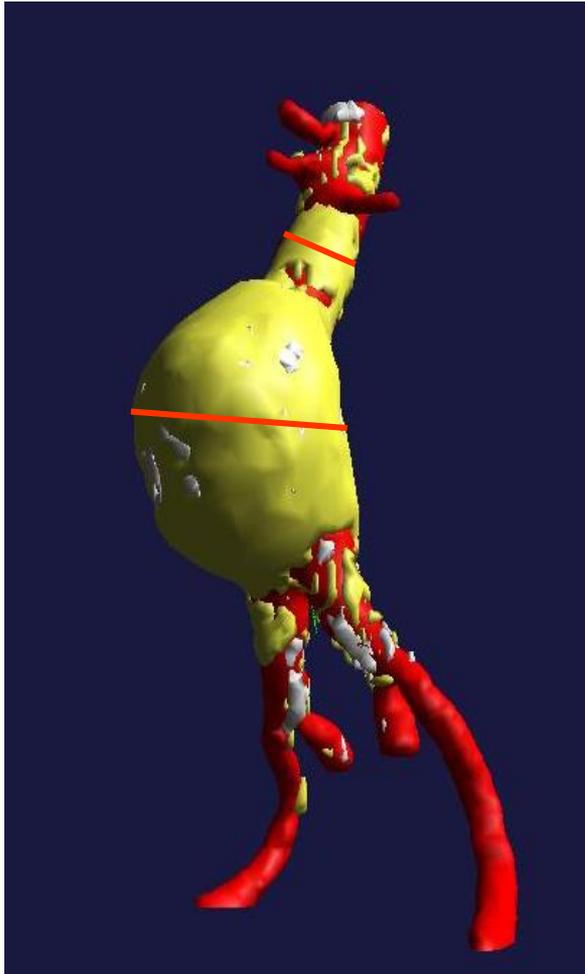
Significance was calculated using independent t test and Mann Whitney u test.

EMI = Body Mass Index

BSA = Body Size Area

ASI = Aortic Size Index

# Aortaaneurysm maximum diameter in women and men

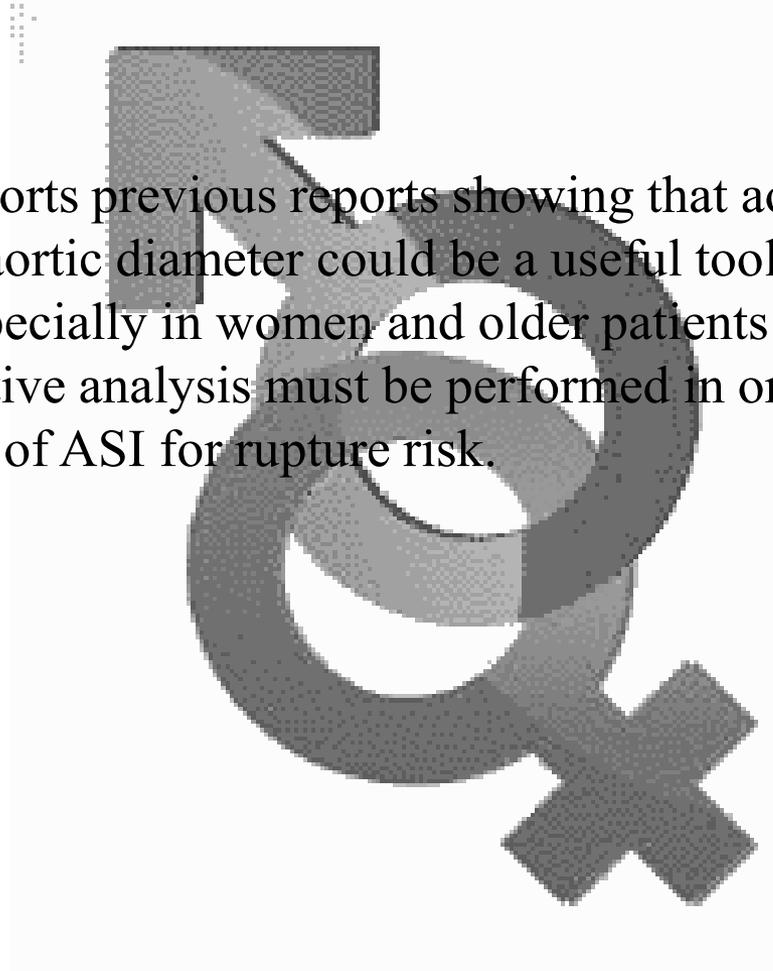


Forbes et al  
Ann. Vasc. Surg 2006

- **Results:** Women had a higher mean age, but did not differ from men regarding comorbidities. The aortic diameter was similar between women and men (41.5mm versus 43.0mm,  $p=0.21$ ). Women had a smaller body size area and a larger aortic size index (2.4 versus 2.1,  $p<0.05$ ). Older patients had a higher aortic size index compared to younger patients. The median growth rate for the cohort was 2.2 mm per year. No difference in growth rate was shown between women and men. Larger aneurysms (median 45.0 mm) had a higher growth rate compared to smaller aneurysms (2.7 mm versus 1.6 mm,  $p<0.05$ ).

## Conclusion

- The results supports previous reports showing that aortic size index, combined with aortic diameter could be a useful tool for improved surveillance, especially in women and older patients with small AAA. Further prospective analysis must be performed in order to define the predictive value of ASI for rupture risk.



# Rupture risk and surveillance

<u>Maximal aortic diameter</u>	<u>Rupturerisk, %/yr</u>	<u>Surveillance</u>
27-29	0	2 years women
30-39	0	2 years
39-44	0	1 year
45-49	0.5–2	6 months
49-54 (kvinnor, yngre, oroliga)		3 months /intervention

## Consider intervention

<u>Maximal aortic diameter</u>	<u>Rupturerisk, %/yr</u>
5.5-5.9	3–10
6.0–6.9	10–20
7.0–7.9	20–40
>8.0	30–50

Vårdprogram SLL Kärkirurgklinikerna 2010

SVS guidelines, Chaikof, JVS 2008

Nicholls SC, et al, Rupture in small abdominal aortic aneurysms. J Vasc Surg 1998;28:884–888

# Rupture risk gender:

**Rupture risk associated with female sex ( HR 3 (1.99-4.5))**

*Brown LC, Powell JT. Ann Surg. 1999*

**Higher proportion of women found among patients with ruptured AAA <55 mm**

*Heikkinen J Vasc Surg. 2002*

**Four times higher rupture risk for women with aneurysms 5.0-5.9 cm compared to men**

*Brown JVS 2003*

**Women have a shorter time to rupture compared to men with the same diameter of the AAA**

*Wilson JVS 2003*

**Proportion of women with AAA presenting with rupture is significantly higher compared to intact AAA (21 % vs 16%)**

*McPhee, JVS 2007*

**More women are not treated although diagnosed (73% men vs 56 % women)**

*Murabee, JVS 2008*

# Aim

- To study the possible correlation between
  - Body Surface Area (BSA)
  - Aortic Diameter (AD)
  - Aortic Size Index (ASI)
  - Aneurysm Growth Rate

