

# What can we learn from the non-aneurysmal infra-renal aortic diameter?

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# Diameter thresholds for AAA

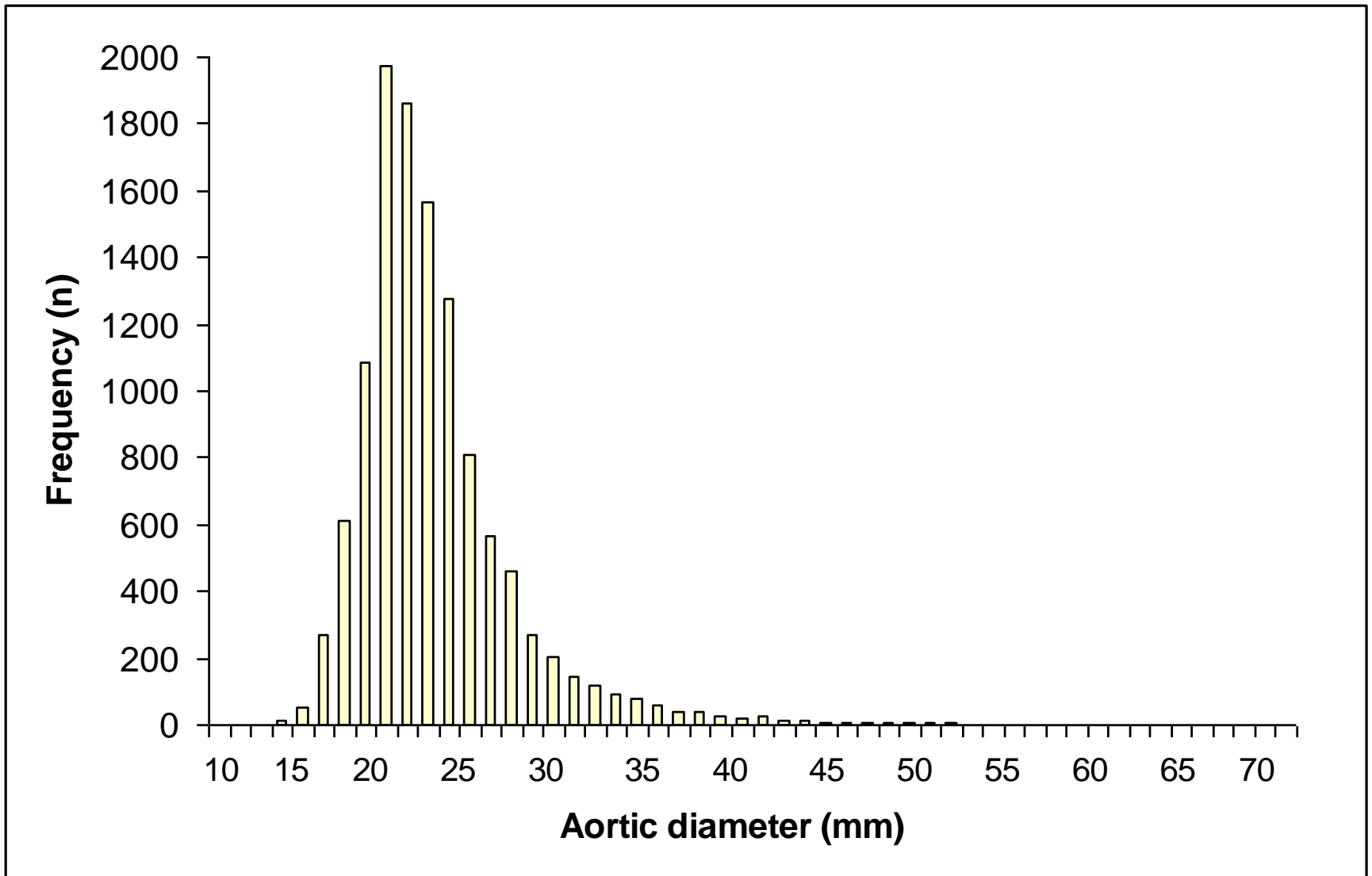
- $\geq 30\text{mm}$  for diagnosis
- 50-55mm for intervention
- Is  $<30\text{mm}$  always normal?

# Not always

.....because of increased risk of:

- future AAA
- other Cardiovascular Disease

# Distribution of aortic diameters in men aged 65yrs+ (n=12,203)



Non-aneurysmal diameter and  
risk of future AAA

# Re-screening studies

- ~33% men with diameters 26-29mm had AAA on re-screen at 3-5yrs

Lindholt JS et al. EJVES 2000;20:369-73

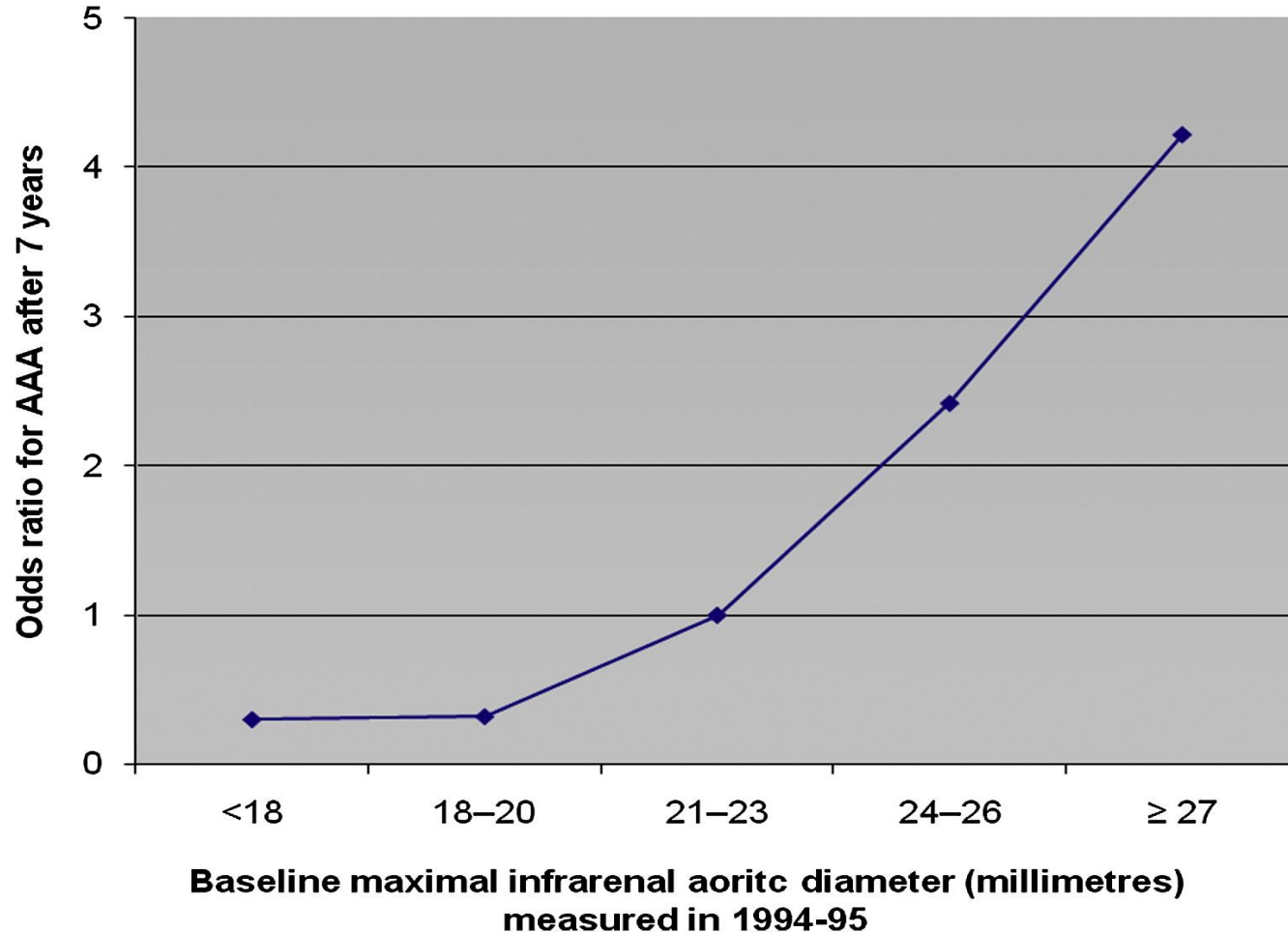
- 2.2% subjects had AAA on re-screen at 4yrs but 71% of these were <25mm at initial screening

Lederle FA et al. Arch Int Med 2000;160:1117-21

- 2.8% men had AAA on re-screen at 5yrs

Hafez H et al. EJVES 2008;36:553-8

# Risk of AAA for aortic diameters <30mm Tromsø Study

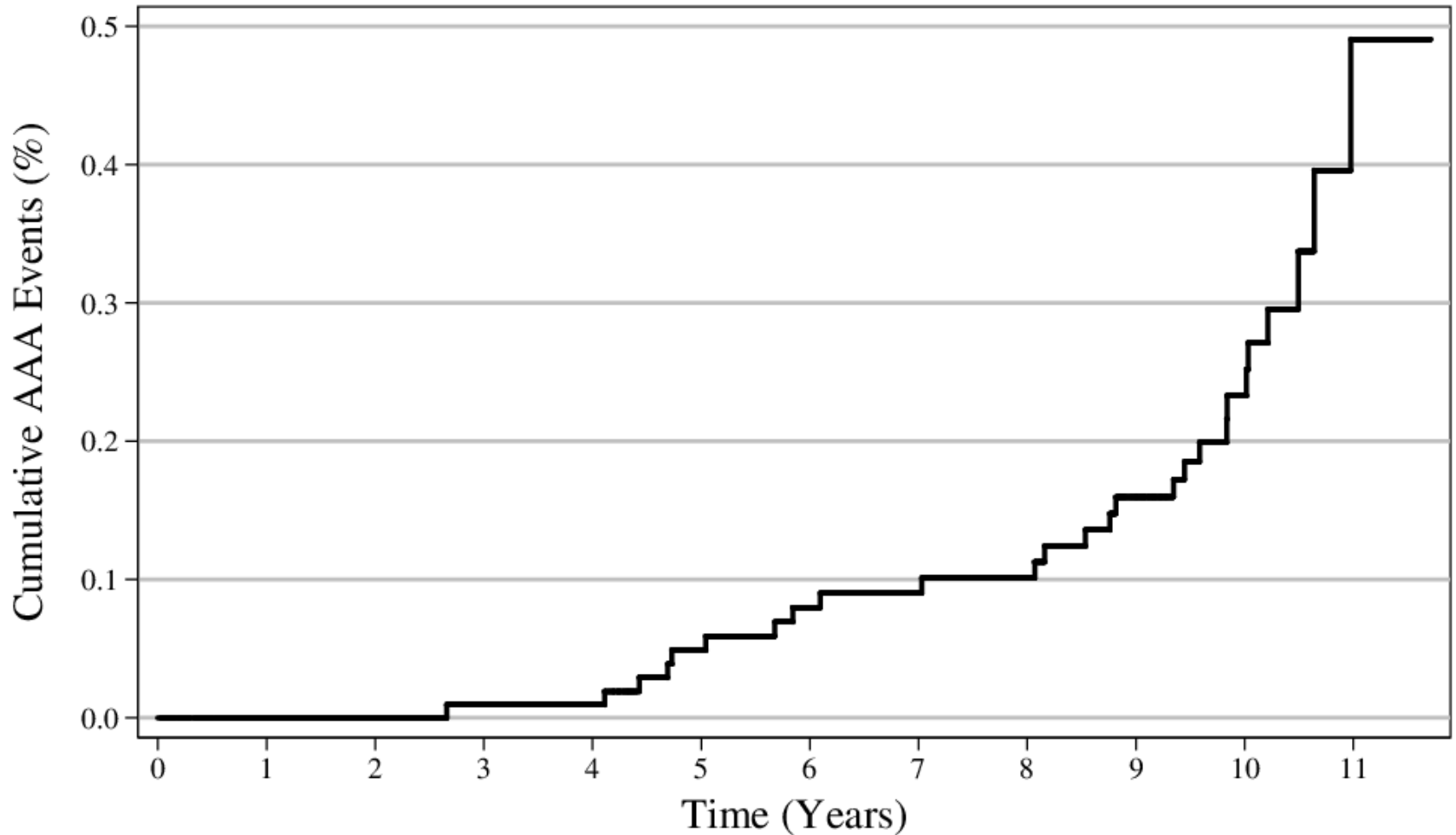


# WA trial: events in men with diameters <30mm at screening (n=11,328)

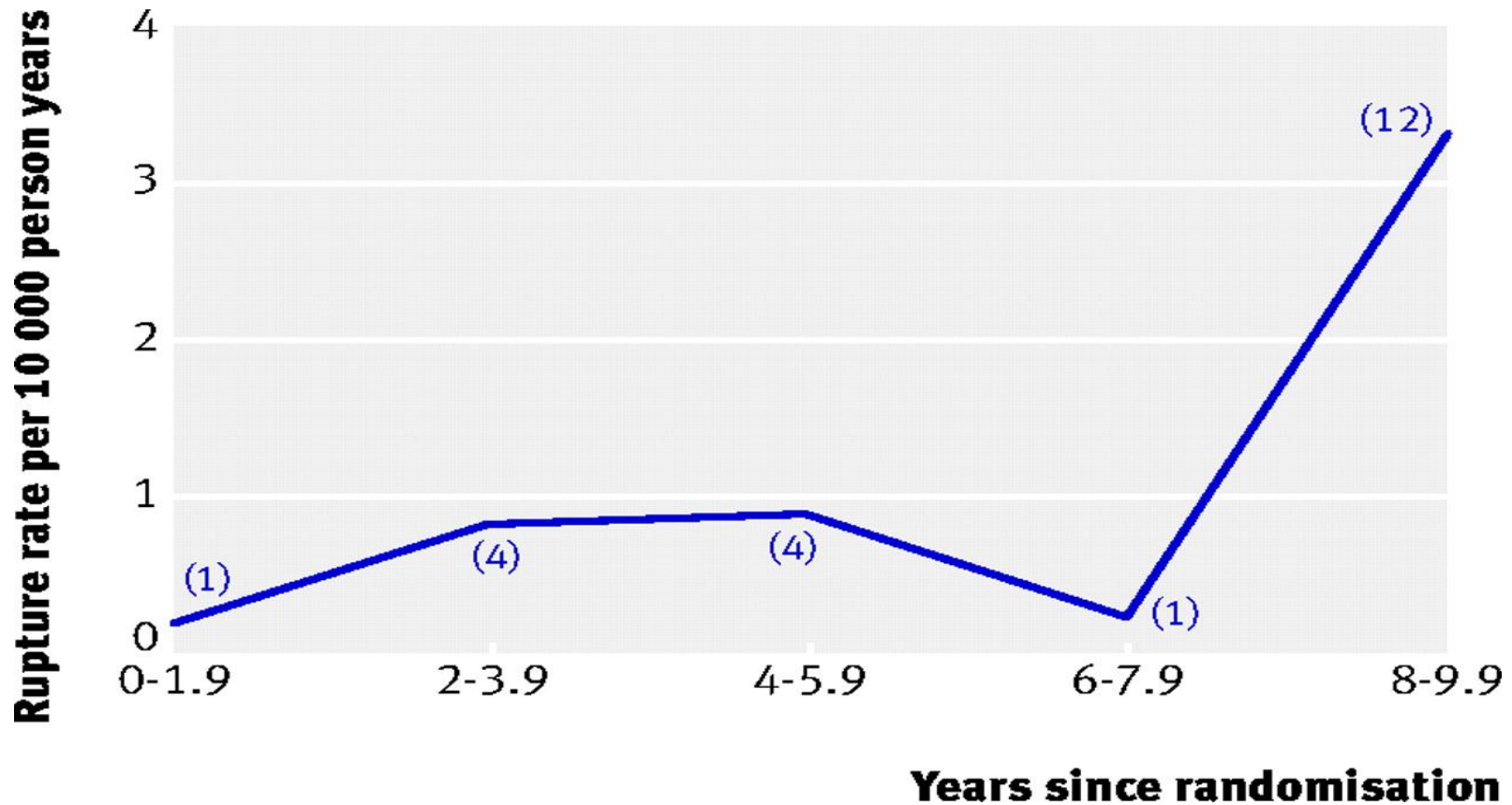
- 10 years of Follow-up
- 2 deaths from rupture:
  - 25mm with rupture 5 yrs later aged 75
  - 27mm with rupture 5yrs later aged 77
- 23 elective interventions (no deaths):
  - 21-28mm at screening
  - 4-10 years later



# WA trial: events in men with diameters <30mm at screening (n=11,328)



# Ruptured in men originally screened as normal in MASS trial

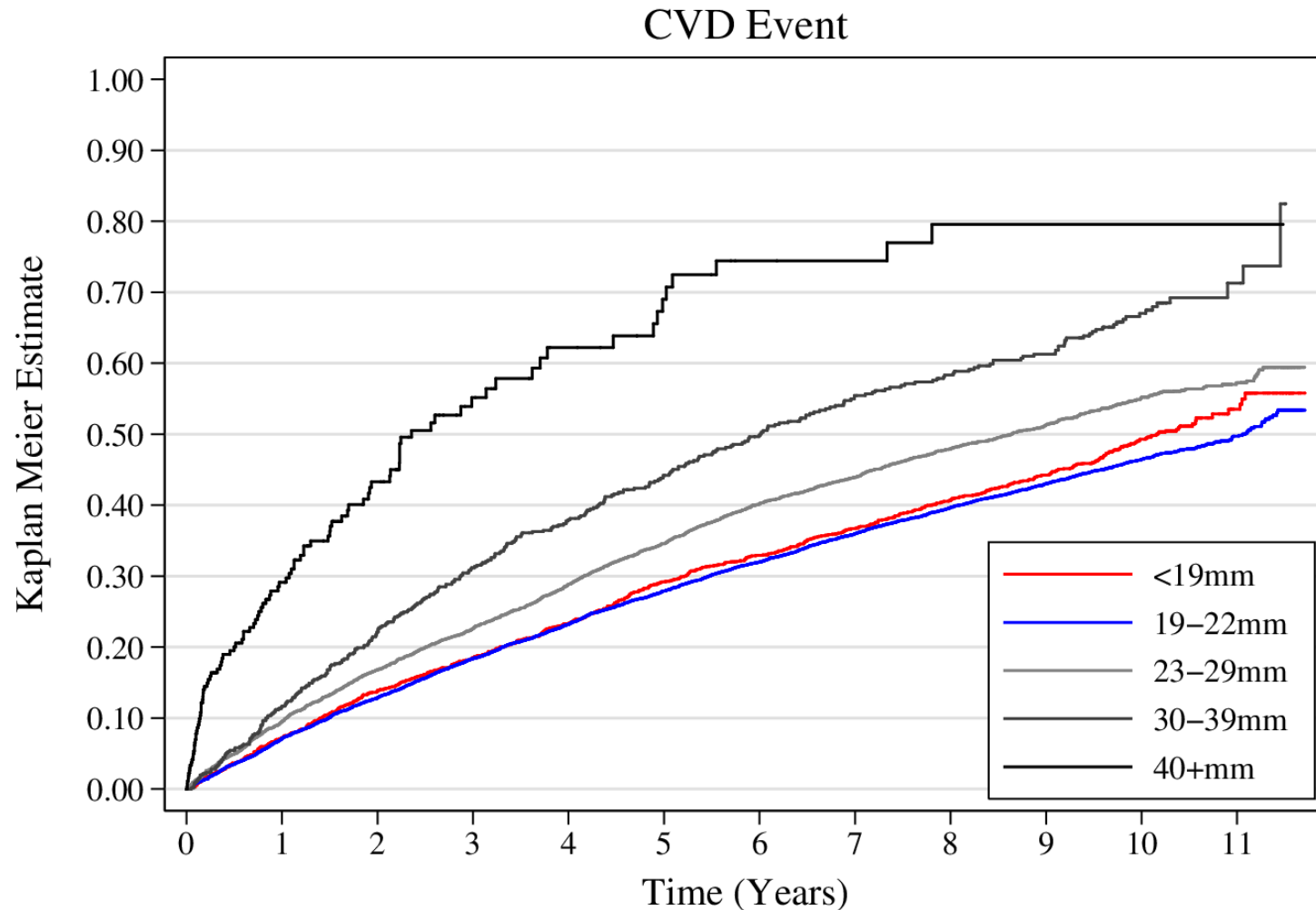


# Interpretation

- For diameters 25-29mm in men:
  - there is a 2X risk of AAA by ~6-7 yrs  
.....and of rupture after ~8yrs
  - re-screening at ~5yrs should be considered
  - ? Less important in diabetes

# Non-aneurysmal diameter and risk of other CVD

# Non-aneurysmal diameter predicts CVD events (n=12,203 men aged 65+yrs)



# Population-based studies of diameter and mortality

<b>Study</b>	<b>Number and gender</b>	<b>Mean age</b>	<b>Reference diameter (mm)</b>
<b>Australia</b>	<b>12,203 M</b>	<b>~73yrs</b>	<b>19-22</b>
<b>Tromsø<sup>1</sup></b>	<b>6,640 M+F</b>	<b>~60yrs</b>	<b>21-23</b>
<b>CVH<sup>2</sup></b>	<b>4,734 M+F</b>	<b>~75yrs</b>	<b>&lt;20</b>
<b>Scotland<sup>3</sup></b>	<b>8,146 M</b>	<b>~70yrs</b>	<b>&lt; 24</b>

1 Forsdahl SH et al. Int J Epidemiol. 2010;39:225-32 ;2Freiberg MS et al. Circulation. 2008;117:1010-7; Duncan JL et al. BMJ 2012;34:e2958

# Population-based studies of non-aneurysmal diameter and mortality

<b>Study</b>	<b>Reference diameter (mm)</b>	<b>Enlarged diameter (mm)</b>	<b>CVD death HR (95%CI)</b>
<b>WA</b>	<b>19-22</b>	<b>23-26</b>	<b>1.3 (1.1,1.4)</b>
		<b>27-29</b>	<b>1.4 (1.1, 1.7)</b>
<b>Tromsø</b>	<b>21-23</b>	<b>24-26</b>	<b>1.2 (0.9,1.6)</b>
		<b>27-29</b>	<b>1.9 (1.2, 2.8)</b>
<b>CVH</b>	<b>20</b>	<b>20-30</b>	<b>1.2 (1.02,1.4)</b>
<b>Scotland</b>	<b>&lt;24</b>	<b>25-29</b>	<b>1.2 (1.04, 1.4)</b>

# Estimated risk

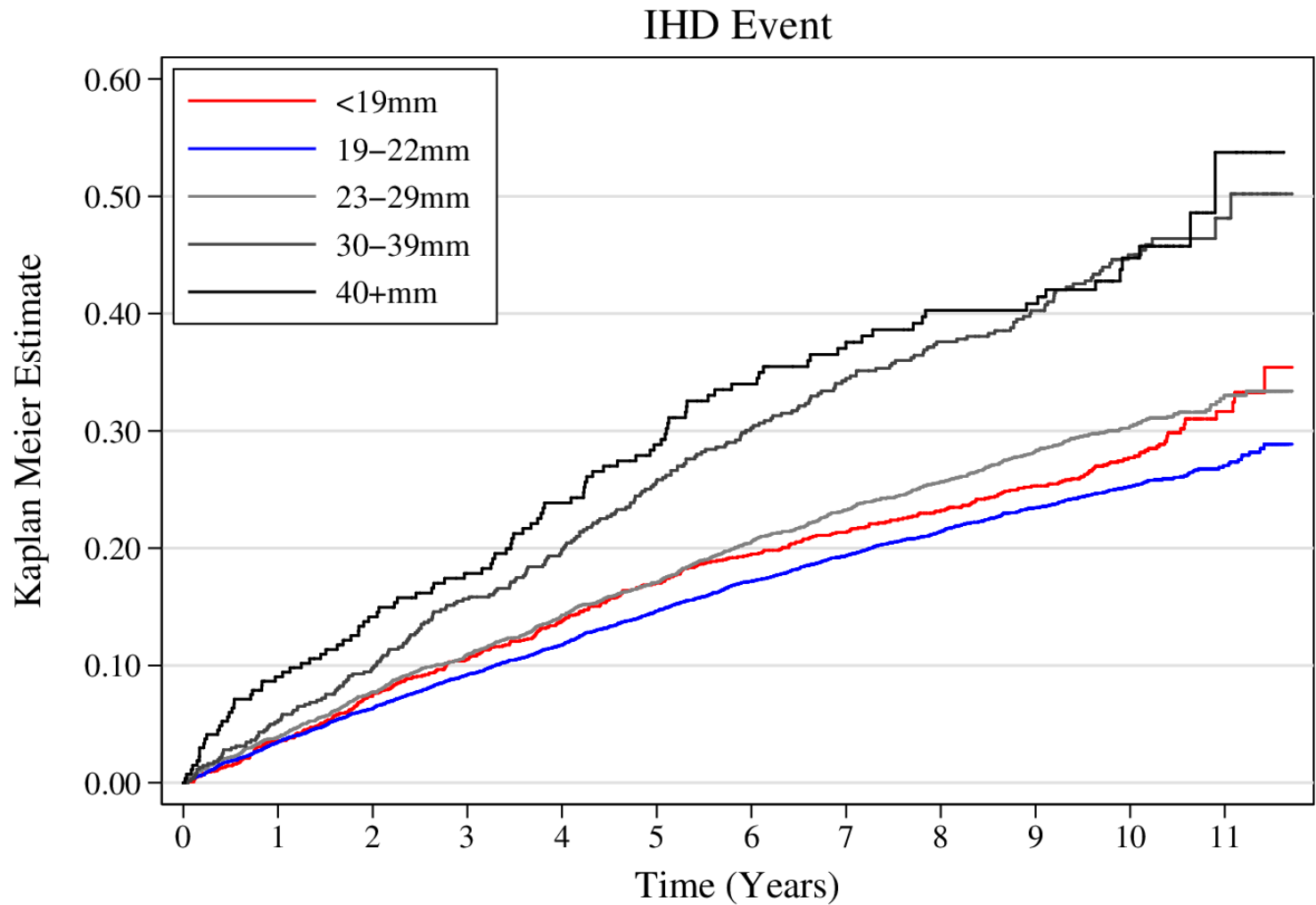
- Upper limit of reference range probably ~23mm in men
- CVD death increased by ~5% per mm above this
- 15-20% of men aged 65+ yrs have diameters in the 23 -30mm range
- This is independent of other CVD risk factors and not due to AAA deaths



# Why does diameter predict CVD death?

- May just be a surrogate (like aortic stiffness or calcification)
- Enlarged wall may:
  - release pro-inflammatory cytokines (eg I-L6)
  - cause mural thrombus (and D-dimer release)

# Can an aorta be too small?



# Conclusions

- Aortic diameter of ~19-22mm is probably normal in older men
- Aortic diameter of ~23-29mm is not normal
  - 25-29mm: risk of future AAA
  - 23-29mm: risk of other CVD
- Aortic diameter <19mm may not be normal
  - risk of other CVD

# Future implications

- Aortic diameter is a simple marker of global cardiovascular risk
- Available in all men attending for screening at no extra cost
- What do we do about it?
  - ? modify risk factors
  - ? need for trial of active intervention

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