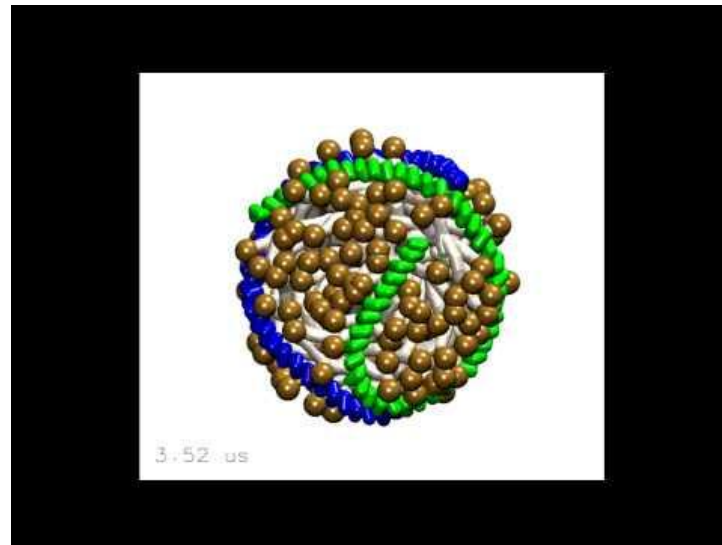


# Seroepidemiological associations between high density lipoprotein and abdominal aortic aneurysms

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# Background

- A recent meta-analysis of 3327 men aged 65 to 83 years showed a protective association between HDL and presence of AAA
- The Thromsø cohort study showed that subjects with high HDLc had 70% lower incidence of AAA than those with low HDLc (<1.25 mmol/L).
- Golledge J, van Bockxmeer F, Jamrozik K, McCann M, Normann PE. Association between serum lipoproteins and abdominal aortic aneurysm. *Am J Cardiol*. 2010 May 15;105(10):1480-4.
- Singh K, Bønaa KH, Jacobsen BK, Bjørk L, Solberg S. Prevalence of and risk factors for abdominal aortic aneurysms in a population-based study: The Tromsø Study. *Am J Epidemiol*. 2001 Aug 1;154(3):236-44.
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# Aim

- Confounded by coexisting atherosclerosis?
- If it triggers AAA, does it also influence the natural course of AAA?
- Consequently, the role of Hdl in AAA was assessed in two Danish epidemiological studies:
  1. Large scaled case- control study using aortoiliac occlusive diseased as controls
  2. Long term follow up study , the progression rate of AAA and need for later follow up.

# Material and methods

## Case-control study

- *The Danish Vascular Registry*
- Reporting is mandatory for all Danish vascular surgical departments and the registry covers 99.2% of all the vascular procedures in DK.  
Pre-operative Hdl measurement is recommended.
- Elective AAA repair or aorto-iliac vascular surgical reconstruction due to asymptomatic AAA, intermittent claudication (IC) or rest pain from 1990-2010
- 42 507 cases were identified of whom:
  - 6 560 asymptomatic AAA
  - 23 496 IC or ischemic rest pain.Had Hdl measured preoperatively

# Material and methods

long term follow up study

- *The Viborg Study*
- Population-based screening trial
- 112 of 122 male 65-74 yr old patients with a small AAA (def.: 3-5 cm) diagnosed in 1994
- Baseline interview, examination and Hdl determination, scanned annually and referred for a CT scan and surgical consideration, if the AAA exceeded 5 cm in diameter

# Statistics

- *Case-control study - the Danish Vascular Registry*

The level of Hdl was compared between AAA and controls by students t-test to test for an univariate association and to identify potential confounders to be used in a multiple linear regression analysis adjusting for these confounders.

- *Long term follow up cohorte: The Viborg Study*

Individual expansion rates in the the Viborg study were calculated by linear regression analysis.

Students t-tests and bivariate Pearson's correlations analyses were used to identify potential confounders to be used in a multiple linear regression analysis adjusting for these confounders ( $p < 0.1$ ).

These potential confounders were also used in Cox's regression analysis concerning an association of the need for later surgical repair and S-Hdl levels above and below the median.

# Results

## *The Danish Vascular Registry*

Dichotomous variables	AIOD N (proportion)	AAA N (proportion)	Odds ratio (95% C.I.)
Female	8 286 (0.47)	1 092 (0.17)	4.39 (4.09;4.72)*
Current smoking	10 009 (0.58)	3 039 (0.52)	0.75 (0.71;0.80)*
Diabetes	2 174 (0.13)	444 (0.07)	0.56 (0.50;0.62)*
IHD	4 141 (0.24)	2 134 (0.36)	1.76 (1.65;1.87)*
Hypertension	7 459 (0.43)	3 065 (0.51)	1.38 (1.30;1,47)*
Continuous variables	AIOD Mean (SD)	AAA Mean (SD)	P-value
Age (kg)	69.4 (11.6)	70.2 (8.3)	<0.001*
Body mass index	27.8 (8.6)	26.3 (4.2)	<0.001*
Creatinine Clear.	81.7 (8.7)	81.0 (7.6)	0.661

# Results

## *Case control study: The Danish Vascular Registry*

AAA : 0.89 (2.99) mmol/l vs. AOID: 1.59 (5.74) mmol/l,  $p < 0.001$

	Unstandardized Coefficients		P-value
	B	Std. Error	
(Constant)	1,324	,227	,000
AAA	-,268	,130	,039*
Age	,003	,003	,208
Gender	-,225	,118	,057
Bodymass index	-,001	,003	,696
Smoking	,106	,111	,340
Diabetes	,063	,164	,698
Hypertension	-,568	,115	,000*
Ischemic heart disease	,103	,125	,412



# Results

## *The Viborg study*

Mean observation time: 8.1 (4.5) years,

Dichotomous variables	Aneurysmal growth Mean (SD) of No vs Yes	S-Hdl Mean (SD) of No vs Yes
<b>Current smoking (N=66)</b>	<b>2.02 (1.59) vs. 3.51 (3.12)*</b>	1.19 (0.28) vs 1.24 (0.39)
Previous AMI (N=17)	2.95 (2.83) vs. 2.85 (2.18)	1.22 (0.36) vs 1.15 (0.25)
Hypertension (N=29)	2.92 (2.79) vs. 2.97 (2.58)	1.20 (0.31) vs. 1.26 (0.44)
Atherosclerotic disease (N=36)	3.16 (2.06) vs 2.48 (1.83)	1.20 (0.32) vs. 1.23 (0.41)
Use of glucocorticoid (N=10)	2.99 (2.80) vs 2.43 (1.97)	1.19 (0.34) vs. 1.36 (0.39)
<b>Use of beta-blockers (N=16)</b>	3.00 (2.74) vs 2.38 (2.70)	1.23 (0.35) vs. 1.04 (0.21)*
Use of low dose aspirin (N=52)	3.25 (3.26) vs 2.56 (1.85)	1.23 (0.39) vs. 1.19 (0.31)
Use of ACE inhibitors (N=13)	2.93 (2.78) vs. 2.87 (2.39)	1.22 (0.33) vs. 1.19 (0.48)
Continuous variables (r)	Aneurysmal growth Pearsson´s r	S-Hdl Pearsson´s r
<b>Age (years)</b>	<b>0.17**</b>	-0.07
Body mass index (kg/m <sup>2</sup> )	-0.02	0.10
Systolic blood pressure (mmHg)	0.13	-0.11
Diastolic blood pressure (mmHg)	0.08	-0.15
Ankle brachial index	0.15	0.03
<b>Initial max. AAA diameter (mm)</b>	<b>0.44*</b>	0.07

# Results

## *The Viborg study*

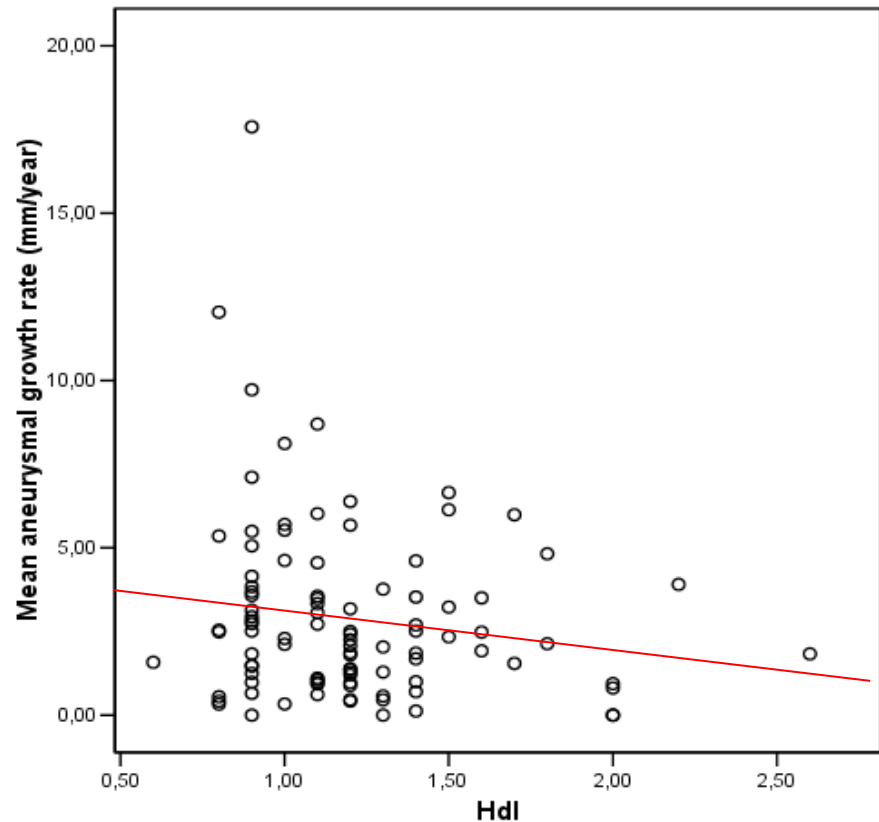
- Association with growth rate:

$$r = -0.18$$

( $P=0.07$ )

- Partial  $r = -0.23$

( $P=0.008$ )



# Results

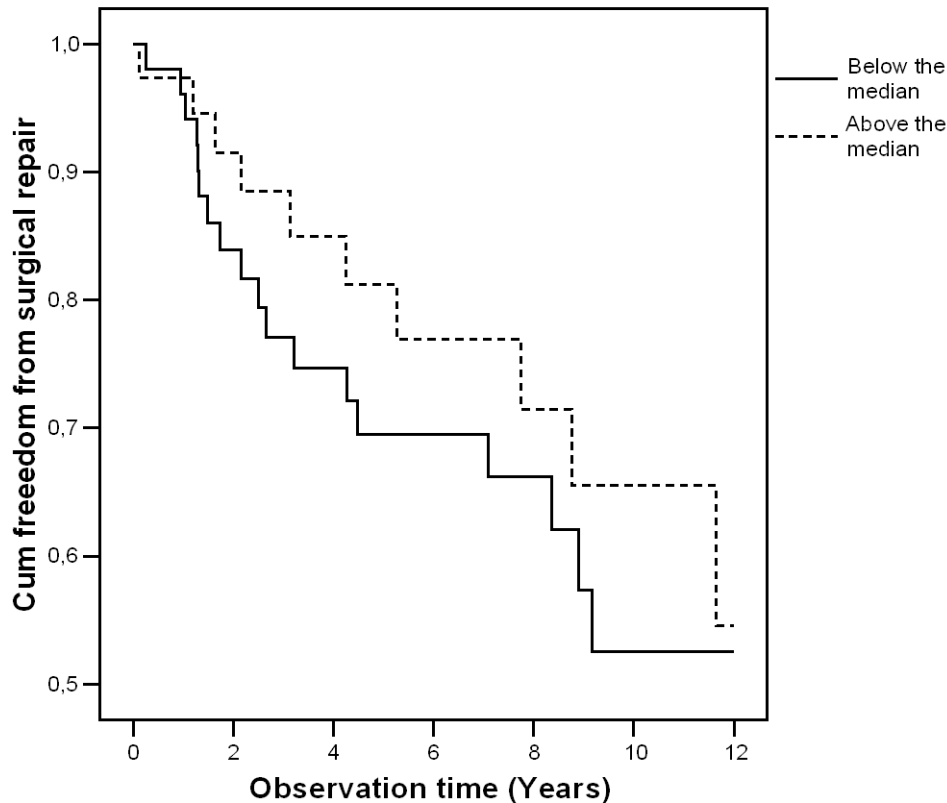
## *The Viborg study*

- **Need for surgical repair**

Crude HR: 0.50,  
95% C.I.: 0.16;1.53,  $p=0.22$

Adjusted HR: 0.18,  
95% C.I.: 0.04;0.74,  $p=0.018$

- Stratified above and below the median level of Hdl  
Adjusted HR: 0.39,  
95% C.I.: 0.15;0.96,  $p=0.041$



# Conclusion

- Cases with AAA had significantly lower Hdl levels than AOID patients
  - previous described association seems not only due to coexisting atherosclerosis
- In a long term follow up cohort of small AAA, high levels of Hdl protected against expansion and need for later surgical repair.
- Medical interventional trials could be considered