Physical activity and the risk to develop AAA

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I have no relevant financial disclosure to declare
Physical activity (PA) and AAA?

- Many studies have shown an association between PA and decreased risk of CVD.
- Few studies investigated the specific association between PA and AAA.
- In the Life-Line screening (USA), a cross-sectional study, those who exercised > once a week had a 14% lower risk of AAA (Kent KC, et al J Vasc Surg 2010).
- In a small cohort study from Malmö, Sweden, reported those who were inactive had a double risk of developing AAAs >50 mm (Lindblad B, et al Eur J Vasc Endovasc Surg 2005).
Methodology

- Research collaboration between Vascular Surgery Uppsala University and Institute of Environmental Medicine, Karolinska, Stockholm
- Swedish Mammography Cohort (SMC) -97
  - 39 227 women born 1914-48
- Cohort of Swedish Men (COSM) -97
  - 48 850 men born 1918-52
- The population is socio-economically representative of entire Sweden
  → 14-15 years of follow-up
  → More than one million personyears
  → Clinical AAAs (hospitalized or death) in 1020 men and 194 women
Results: Waist circumference
- Dose-response analysis
Obesity and AAA

- 30% increased risk of AAA, when comparing increased with normal waist circumference
- Every 5 cm increase was associated with a 15% increased risk up to a threshold value of 100 cm among men and 88 cm among women
- BMI was not associated with AAA

Original article

Obesity and abdominal aortic aneurysm

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Epidemiology and Prevention

Fruit and Vegetable Consumption With Risk of Abdominal Aortic Aneurysm

Otto Stackelberg, MD; Martin Björck, MD, PhD; Susanna C. Larsson, PhD; Nicola Orsini, PhD; Alicja Wolk, DMSoc

Background—Dietary factors affecting the risk of developing abdominal aortic aneurysm (AAA) are scarcely investigated. The aim of this study was to investigate the associations of fruit and vegetable consumption with the risk to develop AAA.

Methods and Results—The prospective Cohort of Swedish Men and the Swedish Mammography Cohort, consisting of 44 317 men and 36 109 women, 46 to 84 years of age at the start of the 13-year follow-up (1998–2010), were used. Fruit and vegetable consumption was assessed at baseline with a 96-item food-frequency questionnaire. By linkage to the Swedish Inpatient Register and the Swedish Vascular Registry (Swedvasc), 1086 primary cases of AAA (222 ruptured) were identified. Cox proportional hazards models were used to estimate hazard ratios with 95% confidence intervals (CIs). Those in the highest quartile of fruit consumption (>2.0 servings/d), in comparison with those in the lowest quartile (<0.7 servings/d), had a 25% (95% CI, 9%–38%) lower risk of AAA, and a 43% (95% CI, 11%–64%) lower risk of ruptured AAA, specifically. Consumption of 2 fruits per day was associated with 31% (95% CI, 11%–47%) lower risk of nonruptured AAA, and 39% (95% CI, 1%–63%) lower risk of ruptured AAA, in comparison with no consumption of fruit. No association was observed between vegetable consumption and AAA risk.

Conclusions—We observed an inverse association between consumption of fruit, but not vegetables, and the risk of AAA, with a more pronounced association with ruptured AAA. (Circulation. 2013;128:795-802.)

Key Words: aortic aneurysm, abdominal ■ antioxidants ■ diet ■ epidemiology ■ risk factors
Fruit and vegetable consumption were assessed with questionnaire at baseline.

Those in the highest quartile of fruit consumption (>2 servings/day) compared to the lowest (<0.7) had a 25% lower risk of non-ruptured AAA, and 43% of ruptured AAA.

No association with intake of vegetables.
Moins de rupture d’anévrisme chez les gros mangeurs de fruits

Une vaste étude suédoise confirme la protection dont bénéficient les consommateurs réguliers de fruits alors que les légumes semblent sans effet.

Dépôt de Nudura, la réduction du risque de rupture d’anévrisme avoisine le 44 % chez les mangeurs de fruits par jour. Cependant, on a mais après 9 fruits par jour, on n’a pas d’effet sur l’anévrisme.
Women increased their risk 11 times if they were active smokers at baseline (1997), compared to ”only” 6.5 times among men. And it took women ”only” 11 years to half the risk after smoking cessation, compared to 20 years for men. Stackelberg O, Björck M, et al. Br J Surg 2014; 101: 1230-1237.
Total alcohol intake and AAA
Gender Differences

10 glasses/w: 20% (6%-32%) lower risk

5 glasses/w: 43% (18%-60%) lower risk

(9/13)
Alcohol Consumption, Specific Alcoholic Beverages, and Abdominal Aortic Aneurysm
Otto Stackelberg, Martin Björck, Susanna C. Larsson, Nicola Orsini and Alicja Wolk
Aortic diameter at AAA screening and lifestyle?

• 14,249 in this cohort were screened for AAA at 65-75 years (most were 65 years old)

• 168 (1.2%) had an AAA (diameter ≥30 mm) (compared to 1,020 clinical cases among men in the previous investigation)
Main results AAA screening

- Moderate alcohol consumption and diabetes were associated with a smaller aortic diameter
- Walking/bicycling for >40 min/day, verses almost never, was associated with lower AAA hazard (0.59)

Conclusions—This prospective study confirms that modifiable lifestyle-related factors are associated with AAD and with AAA disease. (*J Am Heart Assoc.* 2017;6:e004725. DOI: 10.1161/JAHA.116.004725.)
Cohort: Subjects and methods

- 38,952 men and 31,449 women, 45-84 years
- Questionnaires in 1997, baseline
- 17 years of follow-up (1998 to 2014)
- 1340 AAA events (241 ruptures)
- Hazard ratios were calculated with multivariable Cox proportional hazard regression models
- Confounders: age, sex, education level, smoking, alcohol intake, fruit&veget. intake, comorbidities, waist circumference, BMI
How was Physical activity (PA) measured?

- Participants reported total 24-hour physical activity in five questions with predefined response categories and one open question on hours spent sleeping.
- A total activity score was created.
- A metabolic equivalent (MET, kcal/kg) of sitting quietly for 1 hour = 1.
- The median MET/24 hours was 48.
Every 2.2 reduction of MET (sitting instead of walking for one hour) resulted in an increased risk of having an AAA of 5%, and of having a rupture of 11%.
Conclusions: Modifiable risk-factors and AAA

- Avoid abdominal adiposity
- Eat fruit twice a day (especially if you smoke!)
- Stop smoking, in particular if you are a woman
- Drink moderately with alcohol, which means:
  - 1-10 glasses of wine per week (or equivalent in other beverages) if you are a man
  - 1-5 glasses per week if you are a women
- Exercise 40 minutes per day!
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Palau de Congressos | Valencia, Spain
<table>
<thead>
<tr>
<th>Type of activity</th>
<th>Events/ Person-years$^{(1)}$</th>
<th>Model 1$^{(2)}$ HR (95% CI)</th>
<th>Model 2$^{(3)}$ HR (95% CI)</th>
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</thead>
<tbody>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sitting down/watching TV, h/d</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>&lt;1</td>
<td>102/130,647</td>
<td>1.00 (Ref.)</td>
<td>1.00 (Ref.)</td>
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<tr>
<td>1-2</td>
<td>579/507,530</td>
<td>1.22 (0.99 – 1.51)</td>
<td>1.13 (0.91 – 1.39)</td>
</tr>
<tr>
<td>&gt;3</td>
<td>659/415,745</td>
<td>1.34 (1.08 – 1.65)</td>
<td>1.11 (0.90 – 1.37)</td>
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<tr>
<td>Walking/Bicycling, min/d</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hardly ever</td>
<td>240/118,849</td>
<td>1.00 (Ref.)</td>
<td>1.00 (Ref.)</td>
</tr>
<tr>
<td>&lt;20</td>
<td>301/236,033</td>
<td>0.70 (0.59 – 0.83)</td>
<td>0.79 (0.67 – 0.94)</td>
</tr>
<tr>
<td>20-40</td>
<td>352/240,063</td>
<td>0.64 (0.54 – 0.76)</td>
<td>0.80 (0.67 – 0.95)</td>
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<tr>
<td>&gt;40</td>
<td>447/358,978</td>
<td>0.65 (0.54 – 0.77)</td>
<td>0.80 (0.67 – 0.95)</td>
</tr>
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<td>Exercise, h/wk</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1</td>
<td>324/215,460</td>
<td>1.00 (Ref.)</td>
<td>1.00 (Ref.)</td>
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<tr>
<td>1</td>
<td>255/226,962</td>
<td>0.85 (0.72 – 1.01)</td>
<td>0.92 (0.77 – 1.09)</td>
</tr>
<tr>
<td>2-3</td>
<td>359/345,257</td>
<td>0.69 (0.59 – 0.81)</td>
<td>0.79 (0.67 – 0.93)</td>
</tr>
<tr>
<td>&gt;3</td>
<td>402/266,242</td>
<td>0.80 (0.68 – 0.95)</td>
<td>0.91 (0.77 – 1.08)</td>
</tr>
</tbody>
</table>

AAA indicates Abdominal Aortic Aneurysm; CI, Confidence Interval; HR, Hazard Ratio.

1) Reported numbers were based on complete set data and do not add up due to missing data.

2) Attained age was used as timescale. Stratified by sex and mutually adjusted for the three physical activity variables reported in the table.

3) Similar to Model 1 with additional adjustments for smoking habits, educational level, waist circumference, alcohol consumption, energy intake, fruit consumption, diabetes, hypertension, hypercholesterolemia, and cardiovascular disease.
Total activity score and risk of AAA

P overall=0.032
P for non-linearity=0.015
Total activity score and risk of ruptured AAA

P overall = 0.043
P for non-linearity = 0.058