DECLARATION OF CONFLICT OF INTEREST

• None
Intensity versus duration of cycling: impact on all-cause and coronary heart disease mortality: The Copenhagen City Heart Study.

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The Copenhagen City Heart Study

- A prospective cardiovascular population study of a random sample of 20,000 men and women aged 20-100 years.

- The first examination was carried out from 1976 to 1978. This presentation is based on the 3rd examination from 1991 to 1994.

- A total of 16,563 people was invited, out of these 10,135 (61.2%) participated in the examination. Participants who had experienced myocardial infarction, stroke or cancer (n = 1669) were excluded from the analysis, so were the non-cyclists (n = 3430).

- Leaving 5106 healthy people, 2398 men and 2708 women aged 21 to 90 years for analysis.
Intensity and Duration

- **INTENSITY** was graded into: Slow, average, fast based on the individual’s own perception of intensity.

- We found that a relative scale of intensity is more appropriate than an absolute scale, when the age-span is large (21-90 years), and when the participants have wide differences in levels of physical fitness.

- **DURATION**, 3 levels: < 0.5 h, 0.5-1 h, and >1 h on average per day.
End points

• Participants were followed for an average of 18 years from the examination in 1991-1994 until 2009 or death.

• Total number of deaths during follow-up was: 1172, of these 146 were CHD deaths.
Statistical methods

• Relative risks calculated from Cox proportional hazards regression analysis with age as the underlying timescale.

• The expected lifetime was calculated by integrating the predicted survival curve estimated in the Cox-model.

• We adjusted for the following potential confounders:
  Age
  HDL-cholesterol
  Number of different sports activities
  Household income
  BMI
  Smoking
  Systolic BP
  Alcohol consumption
  Diabetes
Relative risk of all-cause and coronary heart disease death for men and women in relation to duration and intensity of cycling.

<table>
<thead>
<tr>
<th>Duration</th>
<th>Intensity</th>
<th>Total death Multivariate adjusted(^a) HR (95% CI)</th>
<th>CHD death Multivariate adjusted(^a) HR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Slow</td>
<td>1 (ref.)</td>
<td>1 (ref.)</td>
</tr>
<tr>
<td>&lt; 0.5 h/day</td>
<td>Average</td>
<td>0.67 (0.49-0.92)</td>
<td>0.43 (0.20-0.90)</td>
</tr>
<tr>
<td></td>
<td>Fast</td>
<td>0.54 (0.31-0.94)</td>
<td>0.18 (0.02-1.42)</td>
</tr>
<tr>
<td>0.5-1 h/day</td>
<td>Average</td>
<td>0.87 (0.57-1.33)</td>
<td>1.20 (0.50-2.89)</td>
</tr>
<tr>
<td></td>
<td>Fast</td>
<td>0.70 (0.51-0.95)</td>
<td>0.32 (0.15-0.67)</td>
</tr>
<tr>
<td></td>
<td>Slow</td>
<td>0.44 (0.28-0.69)</td>
<td>0.26 (0.07-0.96)</td>
</tr>
<tr>
<td>&gt; 1 h/day</td>
<td>Average</td>
<td>0.85 (0.53-1.35)</td>
<td>1.03 (0.40-2.61)</td>
</tr>
<tr>
<td></td>
<td>Fast</td>
<td>0.71 (0.52-0.97)</td>
<td>0.49 (0.24-1.00)</td>
</tr>
<tr>
<td></td>
<td>Slow</td>
<td>0.68 (0.46-1.01)</td>
<td>0.27 (0.08-0.89)</td>
</tr>
</tbody>
</table>

\(^a\)Adjusted for age, gender, number of sports activities, BMI, systolic blood pressure, HDL-cholesterol, smoking, income, alcohol, and diabetes.
Multivariate-adjusted survival benefit for a person with BMI 20-25, without diabetes, systolic BP under 140 mm Hg (and no use of antihypertensive medication), mean value of HDL-cholesterol, current smoker, income above average, has fewer than 21 drinks per week, and with one other sport activity. The reference person is one that in addition to these criteria rides a bicycle slowly (red) or less than 0.5 h/day (green).
Effects of exercise

- Maximal oxygen uptake improves
- Insulin sensitivity increases
- Lipid profile improves
- Blood pressure lowers
- Platelet aggregation increases
- Fibrinolytic activity increases
- Cardiac function improves
- Immune function improves
- Inflammation markers reduces
- Obesity reduces
- Psychological function improves (stress reduces, well-being improves)

- These improvements are all more pronounced in high-intensity exercise
Conclusion

• This observational study has shown that the intensity and not the duration of cycling (and walking) is of most importance in relation to all-cause and to CHD mortality.

• This association was even more pronounced for CHD death.

• Recommendation to all adults would be that brisk cycling is preferable to slow.