Road traffic noise and cardiovascular health

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Direct effects of noise

Stress response

- Stress hormone (adrenalin, cortisol)
- Blood pressure
- Heart rate

Sleep disturbances

- *Conscious*: difficulties falling asleep, wakes up earlier or during night, sleeping medication
- *Unconscious*: changes in sleep stages, body movements during sleep, blood pressure, heart rate, morning cortisol
Chronic effects of noise

Babisch 2006

- Based on 61 studies
- Hypertension in adults
- Myocardial Infarction (MI)

Babisch 2008

![Graph showing the relationship between noise level and odds ratio.](Quiet please, Brussels, May2011)
Stroke

• Many risk factors in common with MI and hypertension
• Ischemic or hemorrhagic event in the brain
• According to WHO, 15 million people suffer stroke worldwide each year
• 3. most common cause of death
• About half suffers from permanent disability
Diet, Cancer and Health cohort

- 57,000 participant (elderly)
- 50-64 years in 1993-1997 (enrolment)
- Questionnaire: smoking, alcohol, BMI, education
- Unique Danish registers
  - All addresses from 1993-2006 (in total 61,873)
  - Follow-up for stroke (1881 cases)
Noise and stroke, exposure

SoundPLAN – the Nordic Prediction Model

- Geographical coordinates for each address
- Height (floor) for each address
- Building polygons
- For all road lines
  - Traffic composition
  - Yearly average daily traffic
  - Traffic speed

AirGIS - dispersion model (regional, urban, street)
Road noise at enrolment

<table>
<thead>
<tr>
<th>$L_{den}$, dB</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 50</td>
<td>5541</td>
<td>10</td>
</tr>
<tr>
<td>50 – 55</td>
<td>16389</td>
<td>31</td>
</tr>
<tr>
<td>55 – 60</td>
<td>12684</td>
<td>24</td>
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<td>10011</td>
<td>19</td>
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<td>65 – 70</td>
<td>5728</td>
<td>11</td>
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<tr>
<td>70 – 75</td>
<td>2490</td>
<td>5</td>
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<tr>
<td>≥ 75</td>
<td>319</td>
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</tbody>
</table>

Limit value 58 dB

Quiet please, Brussels, May 2011
Adjusted for smoking, fruit, vegetables, coffee, alcohol, BMI, physical activity, education, municipality income, noise from railways and airports and air pollution
Results, 50-65 years
Results, > 65 years

![Graph showing the incidence rate ratio of participants above 65 years against L_{den} (dB). The graph indicates a trend where the incidence rate ratio increases with increasing L_{den} values.](Quiet please, Brussels, May2011)
How many extra strokes?

- 5.5 mill inhabitants
- 12 400 new strokes each year
- Exposure distribution of all dwellings in Denmark
- 600 strokes each year due to road traffic noise
- Corresponding to 5% of all strokes