Pregnancy and childhood

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A life-course perspective

The example of lung function trajectories

Melén, Koppelman et al. Lancet Child & Adolescent Health 2022

Agustí, Melén et al. Lancet Resp Med 2022
Children are particularly vulnerable to environmental hazards:
- More time outside, physically active
- Higher rates of breathing and ventilation rates relative to body size
- Narrower airways
- Ineffective airway particle filtering
- Underdeveloped detoxification systems
- Typically don’t choose lifestyle and environment

Exposure affects children in many ways:
- In utero exposure; growth impairment, preterm birth
- Lower respiratory infections
- Asthma, lung growth limitation → COPD risk
- Impede cognitive development
- Mortality (600,000 / y globally)
Early life exposure and health in young adults

- **Chronic bronchitis** 5.5%
- **Irreversible airflow limitation** according to COPD-criteria 2%
- Cough, phlegm, recurrent airway infections and respiratory symptoms
- **Air pollution exposure 0-1 y strongly associated (OR 2-3)**

Wang et al, *Eur Resp J* 2021; *Thorax* 2021
Yu et al, *JAMA Open Network* 2022;
*Lancet Regional Health Europe* 2023
How can we mitigate air pollution health effects?

Association between improvement of air quality and differences in lung function growth from age 8 to 24 years

<table>
<thead>
<tr>
<th>Unit of improvement in exposure</th>
<th>PM$_{2.5}$</th>
<th>PM$_{10}$</th>
<th>BC</th>
<th>NO$_x$</th>
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</thead>
<tbody>
<tr>
<td>Difference in FEV$_1$ growth, mL per year (95% CI)$^a$</td>
<td>4.63 (1.64–7.61)</td>
<td>0.72 (–0.91–2.35)</td>
<td>2.80 (0.66–4.93)</td>
<td>1.70 (–0.16–3.57)</td>
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<tr>
<td>Difference in FVC growth, mL per year (95% CI)$^a$</td>
<td>9.38 (4.76–14.00)</td>
<td>2.77 (0.19–5.35)</td>
<td>5.59 (2.30–8.87)</td>
<td>3.29 (0.35–6.23)</td>
</tr>
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Exposure improvement associated with 22% lower risk of having low lung function at age 24 years
Conclusions

• Better air quality – better health, bigger lungs!
• Prevention of chronic adult disease? Start early.