



Exposure to endotoxin and lung function in cotton industry.

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Risk Society

Modern society has become a risk society in the sense that it is increasingly occupied with debating, preventing and managing risks that it itself has produced.

Ulrich Beck, "Risk Society". Sage, 1992.

Hazards

Risk management

(technology, complex social structures, etc.)

Hazards are not always easily identified

(science, government, media, etc.)

Cotton production and ginning

- 80% of cotton is produced in Greece
- 120000 workers employed in cotton industry
- Cotton Ginning is the process of separating the cotton fibers from the cotton seeds.





Cotton spinning

- Is the twisting together of drawn out strands of fibers to form yarn





Risk factors regarding lung function

- Total airborne inhalable dust
- Respirable dust / cotton fibers < PM₁₀
- Endotoxin (Gram- bacteria)

Endotoxin

- Large molecules consisting of a lipid and a polysaccharide composed of O-antigen, outer core and inner core joined by a covalent bond;
 - Outer membrane of Gram-negative bacteria - released
 - Dust, cotton dust, or in other materials that are produced or exposed to gram- bacteria.
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- Cotton industry
 - Waste collection
 - Recycling facilities
 - Processing of agricultural products
 - Livestock farming



Health effects

- Exposure to endotoxin associated to respiratory symptoms.
- Occupational diseases:
 - Byssinosis
 - Occupational asthma
- Exposure limits have not been established, only proposed (90EU/m³).

Scope of study

- Investigate the development of obstructive lung diseases to worker in the whole range of cotton industry (vertical approach).
- Investigate the role of exposure to endotoxin

Methods

- Measurements of:
 - Total airborne inhalable dust
 - Respirable dust / cotton fibers < PM10
 - Endotoxin (Gram- bacteria)
- Spirometry tests
- Survey / interview

Results

- Cotton industry workers reported significantly more symptoms of chronic dyspnea and wheezing compared to office workers.

Variable	Cotton industry workers, n (%) (n=256)	Office workers, n (%) (n=148)	p value
Chronic cough	23 (9.0)	11 (7.4)	0.421
Chronic sputum production	22 (8.6)	8 (5.4)	0.198
Chronic dyspnea	28 (10.9)	5 (3.4)	0.005
Chronic wheezing	15 (5.9)	1 (0.7)	0.014

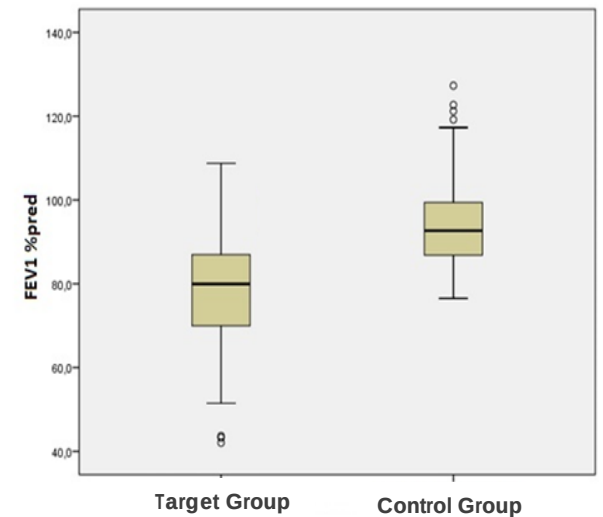
Results

- Greater risk of obstructive lung diseases.

Variable	Cotton industry workers (n=256)	Office workers (n=148)	p value
FEV ₁ (L)	3.25 (0.79)	3.37 (0.76)	0.137
FEV ₁ (% pred)	91.68 (12.01)	94.36 (9.98)	0.016
FVC (L)	3.98 (0.99)	4.02 (0.91)	0.699
FVC (% pred)	90.6 (11.43)	90.0 (11.43)	0.586
FEV ₁ /FVC (%)	81.77 (5.76)	84.20 (5.07)	<0.001
FEV ₁ /FVC (% pred)	98.02 (6.80)	104.51 (6.47)	<0.001
FEV ₁ <80% pred	41 (16%)	4 (2.7%)	<0.001
FEV ₁ /FVC <70%	11 (4.3%)	0 (0%)	0.006

Results

- Significant ($p=0.02$) linear correlation between endotoxin levels and FEV1/FVC among studied workers.
- Exposure to high levels of airborne endotoxin (>2000 EU/ m³) was significantly ($p<0.001$) associated with reduced spirometry scores.
- Endotoxin exposure highly correlated with presence of dyspnea ($p<0.001$), chronic cough ($p=0.016$), and spitting ($p<0.001$).



Proposed measures

- Replace older machines with new
- Personal Protective Equipment (breathing)
- Dust filtering/evacuation systems
- Ventilation
- Workplace height
- Spirometry tests on a regular basis

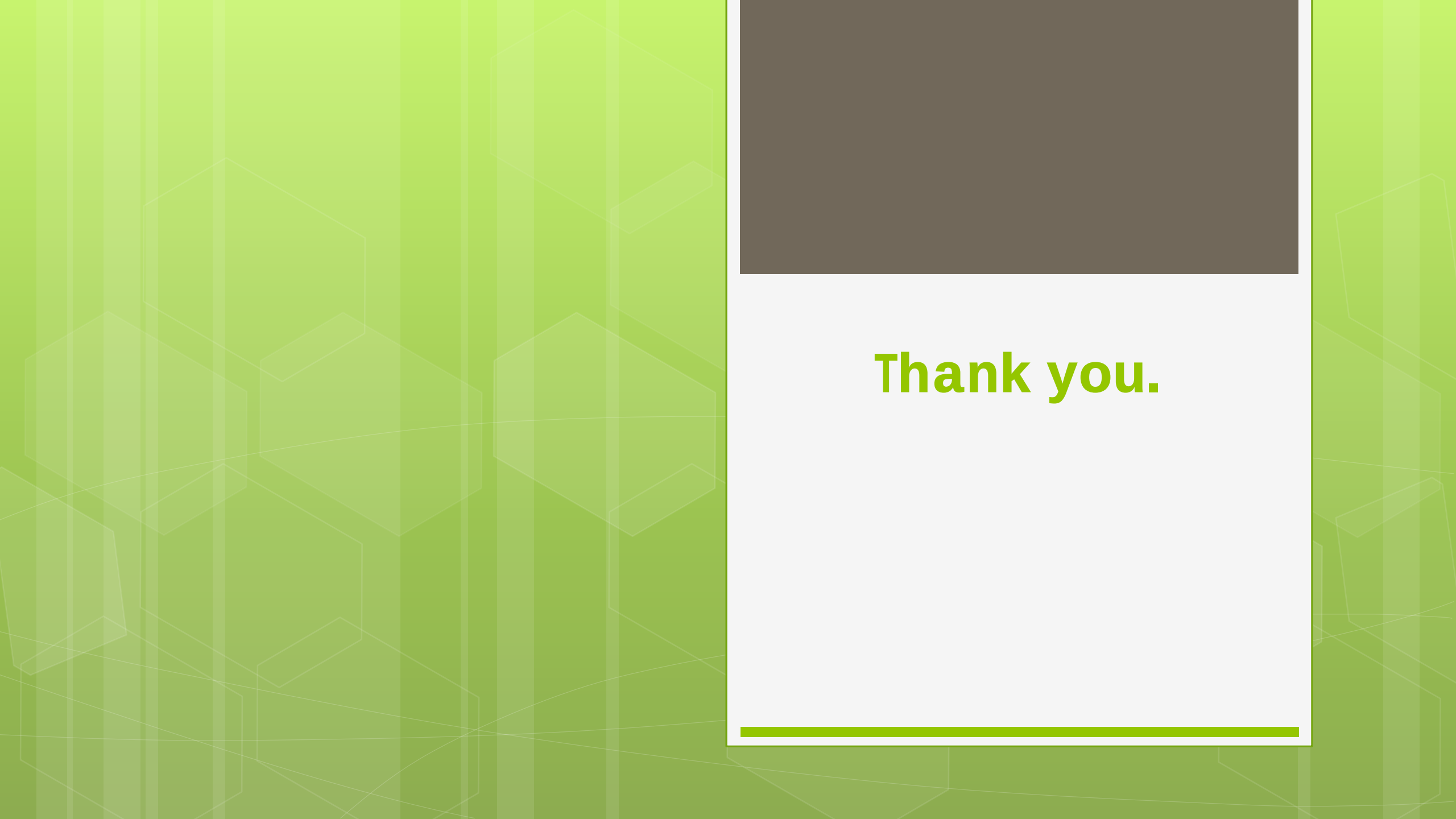


Suggestions

- Measuring endotoxin levels may be a useful tool for the prevention of obstructive respiratory disorders among exposed workers.
- Need for consensus on endotoxin exposure limits at workplaces.

Research ...



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Thank you.