

Spatial association of occupational and environmental exposure factors and respiratory cancers in the US

Preliminary data on laryngeal cancer

Omur Cinar Elci, MD, PhD

James L. Wilson, PhD

Muge Akpinar-Elci, MD, MPH

Brody School of Medicine at East Carolina University

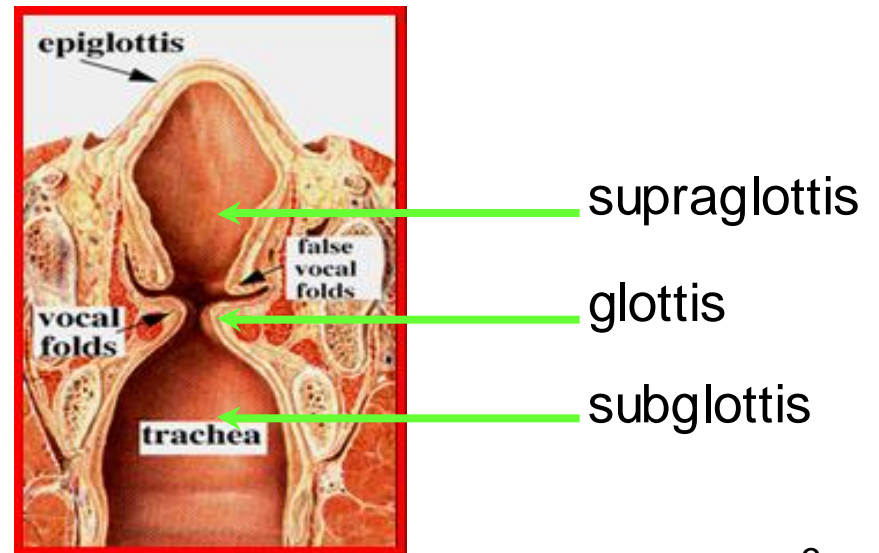
Greenville, NC

Outlines

- Occupational exposures & respiratory cancer
 - Laryngeal cancer
- Previous studies
- Preliminary data on spatial weighting

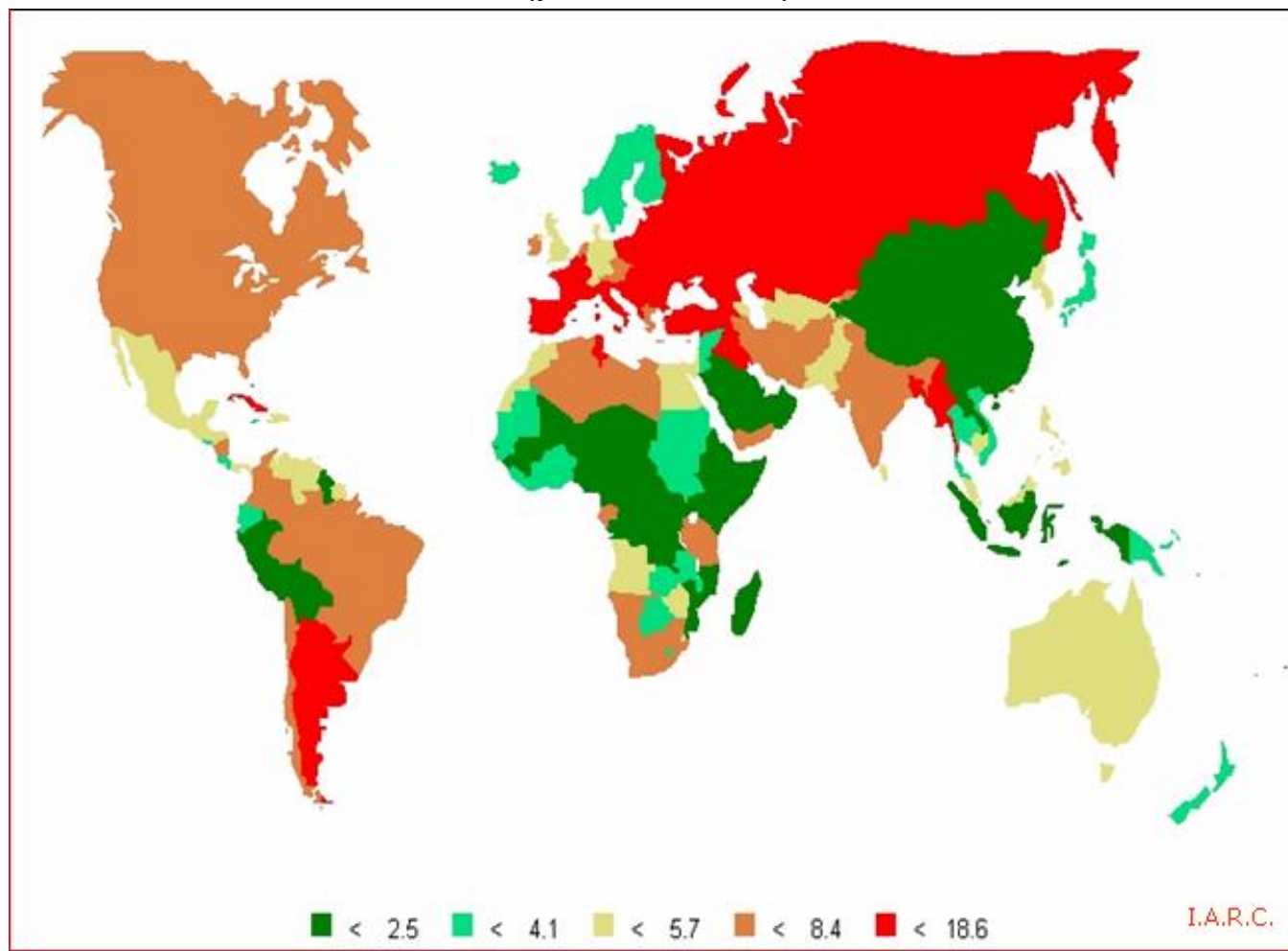
Why laryngeal cancer?

- Less studied
- Environmental and occupational factors
- Special morphology



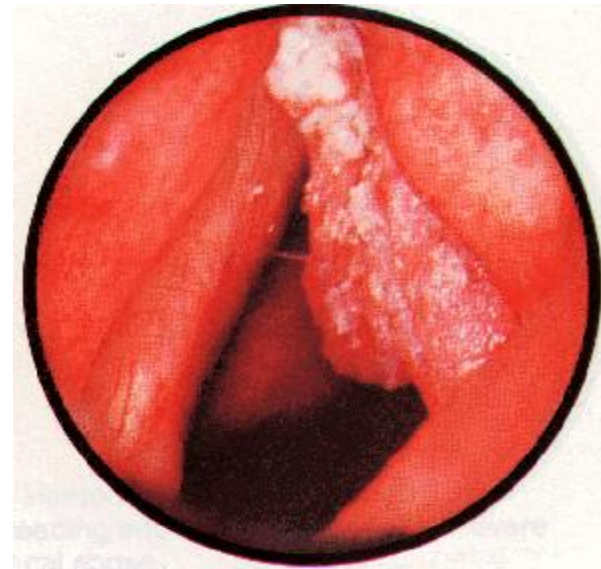
Laryngeal cancer in the world

Age standardized incidence rate of laryngeal cancer in men
(per 100,000)



Laryngeal cancer in the US

- Over 10,000 new cases each year in the U.S.
- 90.6% squamous cell carcinoma
- Etiology:
 - Smoking
 - Alcohol
 - Dietary factors
 - Exposures
 - Genetic



Previous studies

- Occupational exposures and laryngeal cancer
 - Occupational risk factors
 - Job exposure matrix based exposure assessment
 - Largest laryngeal cancer series
 - 940 male laryngeal cancer cases
 - 1,519 male controls
- *Elci et al. Scand J Work Environ Health 2001;27(4):233-239*
- *Elci et al. Scand J Work Environ Health 2002;28(4):278-284*
- *Elci et al. J Occup Environ Med. 2003;45:1100–1106*

Excess risk with exposure

Supraglottic tumors

OR (95%CI)

- Silica 1.8 (1.3-2.3)*
- Cotton 1.6 (1.1-2.5)*
- PAH 1.3 (1.1-1.7)
- Diesel exhaust 1.5 (1.2-1.9)*
- Gasoline exhaust 1.5 (1.1-2.0)*

* Observed dose-response relationship

Dose-response

Risk of laryngeal cancer by exposure intensity levels and anatomic location*				
Exposure intensity	All cases	Supraglottic	Glottic	Others
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
SILICA DUST				
Low	1.4 (1.0-2.1)	1.4 (0.9-2.4)	1.5 (0.8-2.9)	1.3 (0.7-2.4)
Medium	1.5 (1.1-2.0)	1.8 (1.2-2.6)	0.8 (0.5-1.5)	1.6 (1.1-2.5)
High	1.7 (1.1-2.6)	2.2 (1.3-3.6)	1.2 (0.5-2.6)	1.2 (0.5-2.4)
COTTON DUST				
Low	0.8 (0.4-1.6)	0.9 (0.3-2.2)	1.2 (0.4-3.6)	0.5 (0.1-2.2)
Medium	1.2 (0.6-2.7)	1.1 (0.4-3.3)	1.4 (0.4-4.9)	1.6 (0.5-4.9)
High	1.7 (1.1-2.9)	2.4 (1.3-4.2)	0.8 (0.3-2.8)	1.6 (0.7-3.6)
DIESEL EXHAUST				
Low	1.5 (1.1-1.8)	1.2 (0.9-1.7)	2.0 (1.4-2.9)	1.4 (1.0-2.0)
Medium	1.7 (1.2-2.3)	1.8 (1.2-2.7)	1.3 (0.8-2.4)	1.8 (1.1-2.8)
High	1.6 (1.0-2.4)	2.0 (1.2-3.2)	1.0 (0.4-2.3)	1.3 (0.7-2.6)
GASOLINE EXHAUST				
Low	1.5 (1.2-2.0)	1.3 (0.9-1.8)	2.0 (1.3-2.9)	1.6 (1.1-2.3)
Medium	1.8 (1.3-2.5)	1.8 (1.2-2.8)	1.4 (0.7-2.5)	2.2 (1.4-3.5)
High	-	-	-	-

* age, smoking, and alcohol adjusted -, No cases.

Non-smokers and non-drinkers

- 189 cases and 536 controls

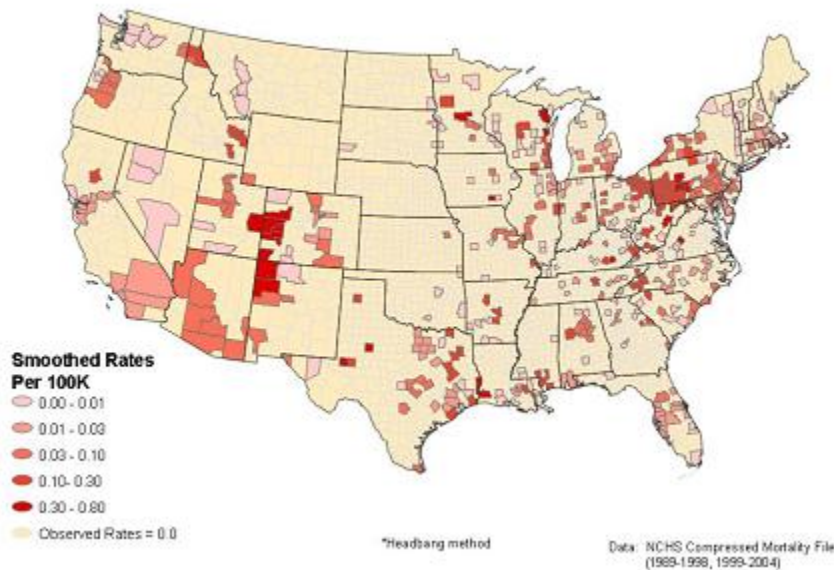
Risk of laryngeal cancer by dust exposures and anatomic localization of the tumor among nonsmoker and nondrinker

Exposure (ever/never)	All cases (n: 189)	Supraglottic (n: 86)	Glottic (n: 47)	Others (n: 56)
	OR (95% CI)* n _{cases} /n _{controls}	OR (95% CI)* n _{cases} /n _{controls}	OR (95% CI)* n _{cases} /n _{controls}	OR (95% CI)* n _{cases} /n _{controls}
Silica	1.4 (0.9-2.1) 42/98	1.7 (1.1-3.0) 23/98	1.3 (0.6-2.8) 10/98	0.9 (0.4-2.0) 9/98
Grain dust	1.6 (0.6-3.9) 8/13	0.5 (0.1-3.5) 1/13	2.5 (0.7-9.1) 3/13	2.6 (0.8-8.5) 4/13
Leather dust	1.5 (0.4-5.2) 5/7	0.8 (0.1-6.7) 2/7	1.3 (0.2-11.3) 1/7	2.3 (0.5-11.9) 2/7
Asbestos	1.0 (0.6-1.5) 33/99	1.3 (0.7-2.2) 19/99	0.5 (0.2-1.3) 4/99	1.1 (0.5-2.2) 10/99
Wood dust	0.9 (0.5-1.5) 22/70	1.1 (0.6-2.2) 13/70	0.6 (0.2-1.8) 4/70	0.7 (0.3-1.8) 5/70
Cotton dust	0.7 (0.3-1.6) 8/32	0.8 (0.3-2.3) 4/32	0.7 (0.2-3.3) 2/32	0.6 (0.1-2.6) 2/32

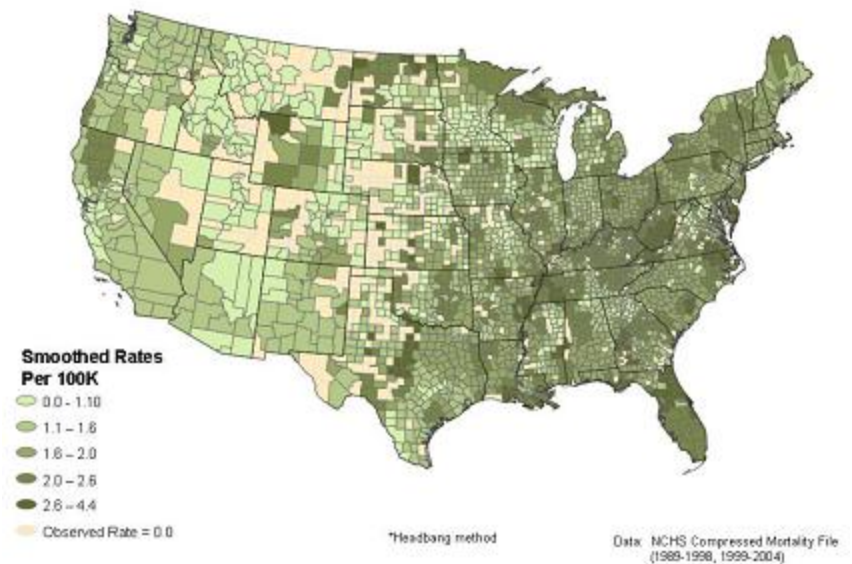
* Age adjusted

Silicosis and laryngeal cancer mortality rates

US Crude Mortality from Silicosis 1995-2004
Smoothed Rates*, Population 15 Years and Older

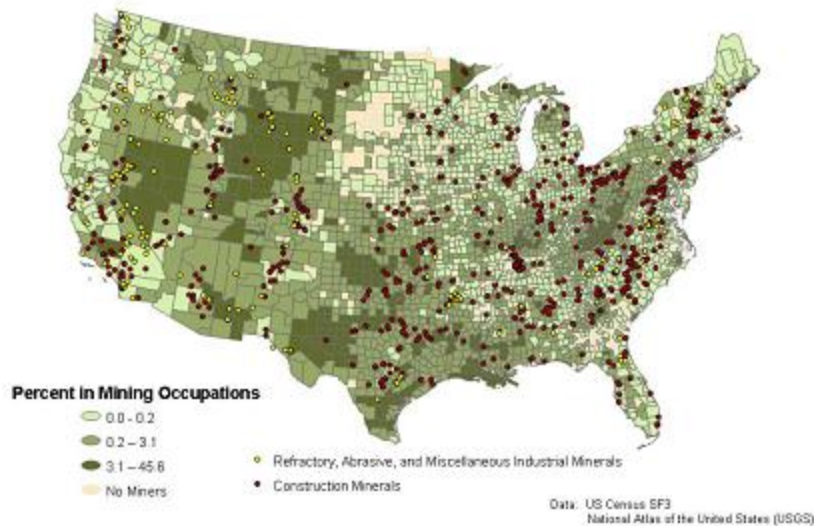


US Crude Mortality from Laryngeal Cancer 1995-2004
Smoothed Rates*, Population 15 Years and Older

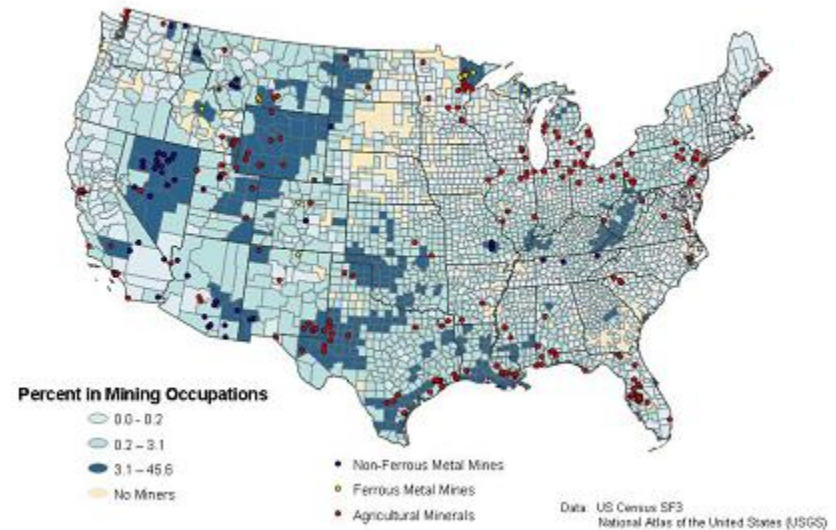


Distribution of mining occupations

Percent 16 years and over in Mining Occupations (2000)
with Selected Mining Operations (2003)—Excluding Metals and Agriculture

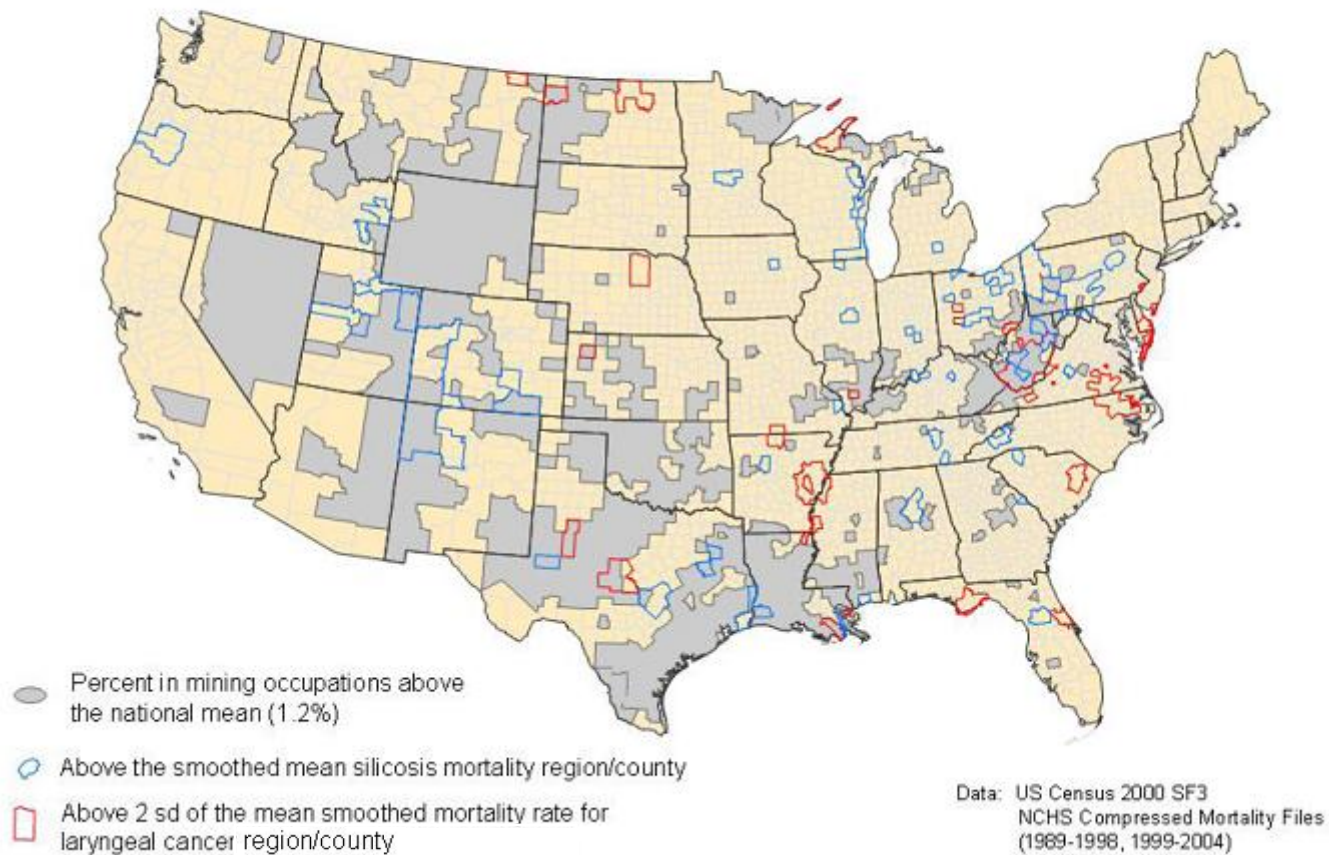


Percent 16 years and over in Mining Occupations (2000)
with Selected Mining Operations (2003)—Metal and Agricultural



Overlaying

**Overlays of Mining Occupational Regions and
Regions of Higher Laryngeal Cancer and Silicosis Mortality**



Strengths and limitations

- Available technology
- Tracking environmental exposures and health problems
- Limited data
- Confounding factors

Conclusion

- Valuable tool for tracking
- Multidisciplinary collaboration
- Seeing the big picture