

Resurgence of Black Lung in the U.S. and Australia: *Lessons learned from medical surveillance*

Cecile Rose, MD, MPH

Professor of Medicine

National Jewish Health and University of Colorado

WestON 2017

Disclosures

- Black Lung Clinics Program funding from Health Resources and Services Administration
- Research support from Alpha Foundation for the Improvement of Mine Safety and Health

Acknowledgements

- **Dr. Bob Cohen** and his University of Illinois Chicago (UIC) team (Dr. Leonard Go, Dr. Kirsten Almberg, and their Australian collaborators)
- NIOSH investigators: Dr. Scott Laney, Dr. Cara Halldin, Dr. David Blackley and their collaborators

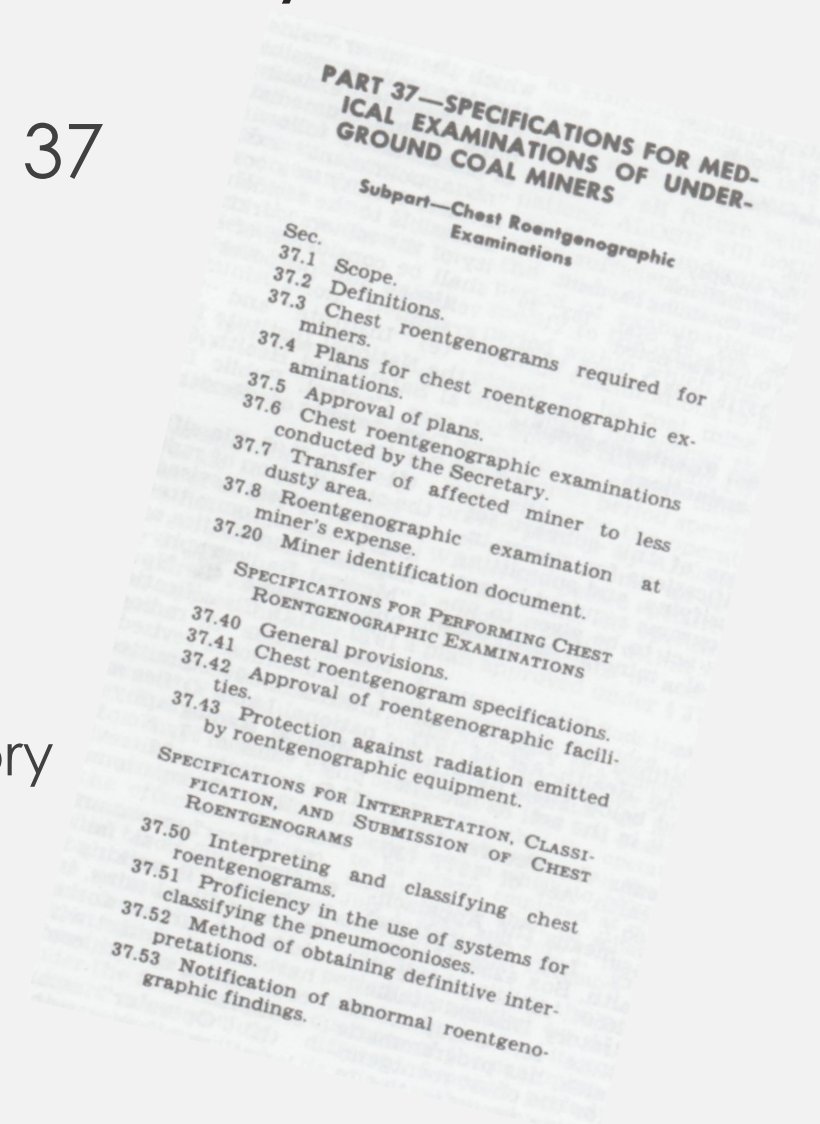
Overview

- Recent trends in Black Lung in the U.S. and Australia
- Risk factors and social context
- Challenges and limitations of medical surveillance
- Lessons learned for occupational health



NIOSH Coal Workers' Health Surveillance Program (CWHSP)

- Code of Federal Regulations 42 CFR Part 37
- Program initiated in 1970
- Purpose:
 - Early detection and prevention of coal worker's pneumoconiosis
 - Provide health information to miners
 - Study the causes and consequences of respiratory diseases associated with coal mining
 - Monitor trends and patterns of disease



After a long period of decline, prevalence of CWP has increased since 2000.

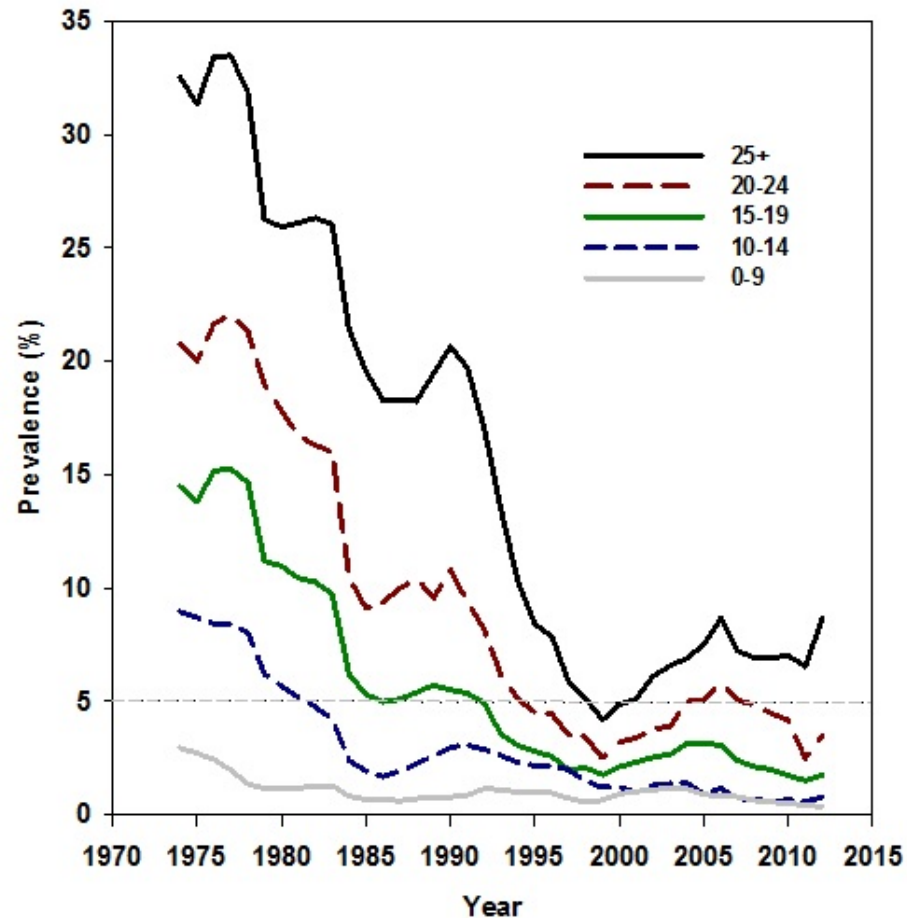


Figure 1 Graph showing rise in prevalence of of CWP over past 2 decades and trends in dust/silica concentrations and/or rate of compliance with dust limits over the same time period.¹³

Increasing prevalence of Progressive Massive Fibrosis in coal miners with >25 years tenure

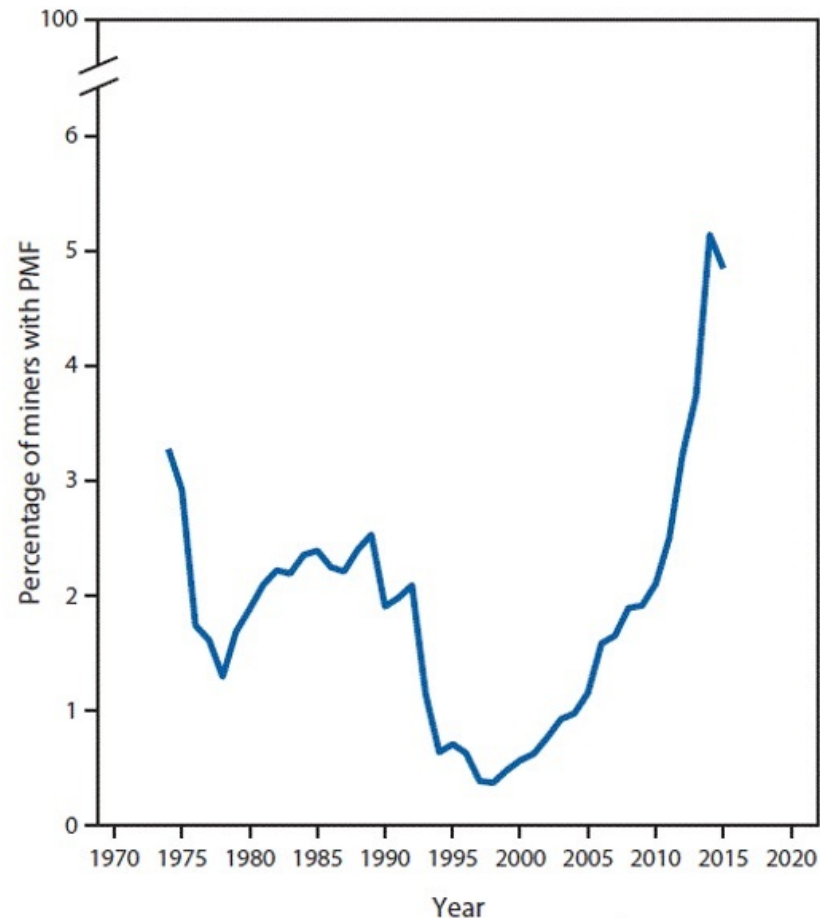
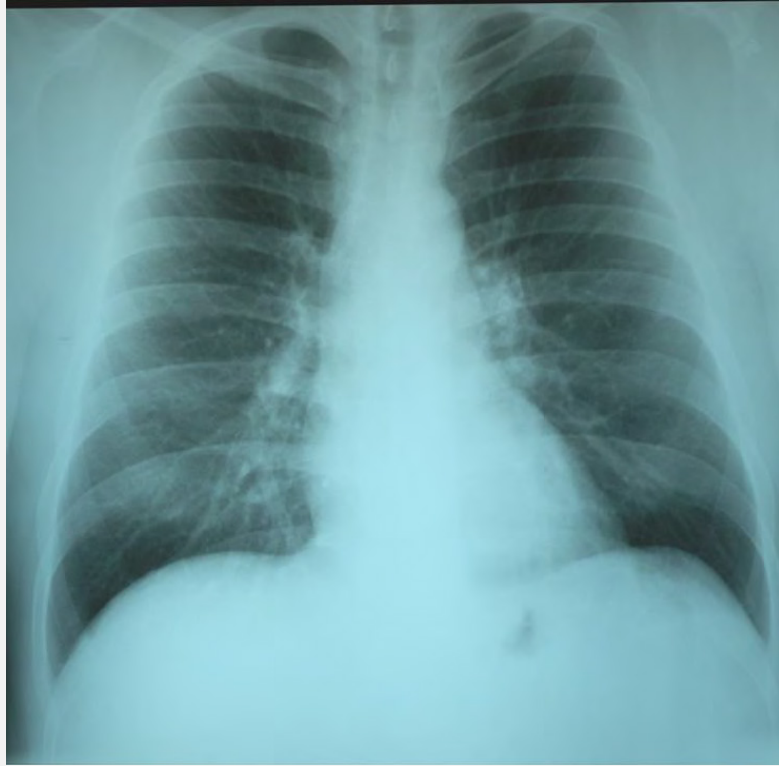


Figure 2 Increasing prevalence of PMF among working underground coal miners with 25 or more years of underground mining tenure (1974-2015) in Kentucky, Virginia, and West Virginia according to the NIOSH Coal Workers' Health Surveillance Program.³

More severe CWP (PMF) and more rapidly progressive pneumoconiosis (RPP)



Healthy Lung

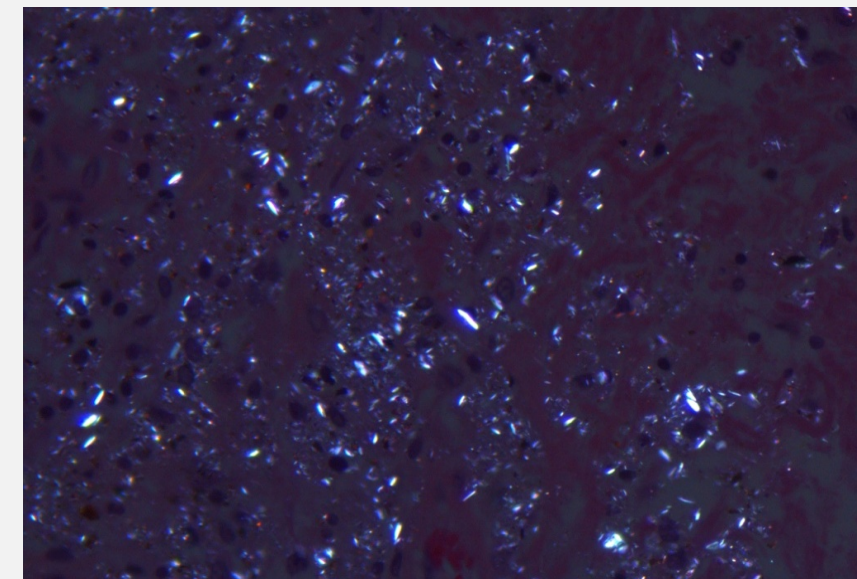
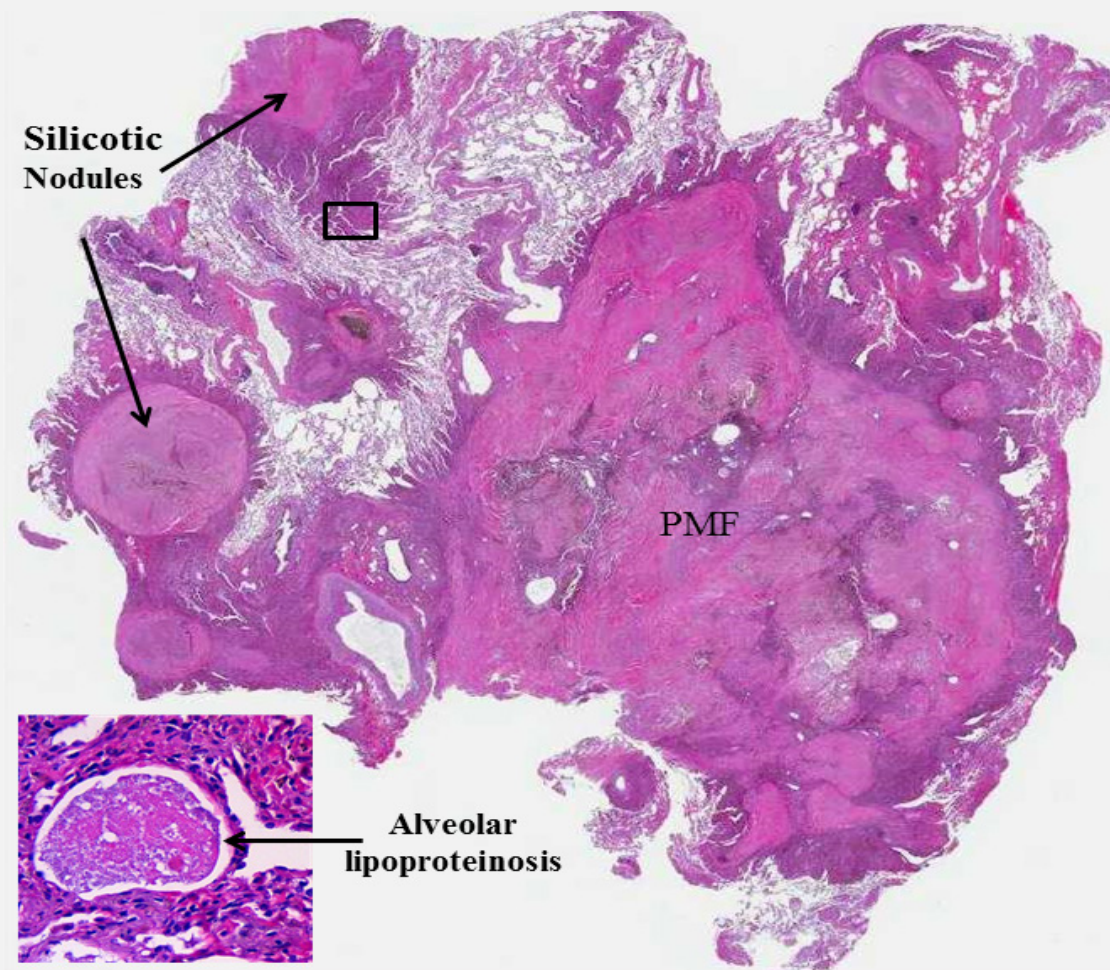


Simple Pneumoconiosis



PMF

Silicotic nodules, interstitial fibrosis and alveolar lipoproteinosis in a 54 yo coal miner with rapidly progressive pneumoconiosis



[Cohen, Petsonk, Rose, et al.
Am J Resp Crit Care Med 2016;193:673]

ORIGINAL ARTICLE

Rapidly progressive coal workers' pneumoconiosis in the United States: geographic clustering and other factors

V C dos S Antao, E L Petsonk, L Z Sokolow, A L Wolfe, G A Pinheiro, J M Hale, M D Attfield

Occup Environ Med 2005;62:670-674. doi: 10.1136/oem.2004.019679

Original article



Pneumoconiosis among underground bituminous coal miners in the United States: is silicosis becoming more frequent?

A Scott Laney, Edward L Petsonk, Michael D Attfield

Workplace

ORIGINAL ARTICLE

Coal workers' pneumoconiosis in the United States: regional differences 40 years after implementation of the 1969 Federal Coal Mine Health and Safety Act

Eva Suarfhana,^{1,2} A Scott Laney,² Eileen Storey,² Janet M Hale,² Michael D Attfield²

RESEARCH AND PRACTICE

Potential Determinants of Coal Workers' Pneumoconiosis, Advanced Pneumoconiosis, and Progressive Massive Fibrosis Among Underground Coal Miners in the United States, 2005-2009

A Scott Laney, PhD, Edward L Petsonk, MD, Janet M Hale, BS, Anita L Wolfe, BS, and Michael D Attfield, PhD



MMWR

Morbidity and Mortality Weekly Report

Weekly

August 25, 2006 / Vol. 55 / No. 33

Advanced Cases of Coal Workers' Pneumoconiosis — Two Counties, Virginia, 2006

Short report



Coal workers' pneumoconiosis and progressive massive fibrosis are increasingly more prevalent among workers in small underground coal mines in the United States

A Scott Laney, Michael D Attfield

Coal Workers' Pneumoconiosis-Related Years of Potential Life Lost Before Age 65 Years — United States, 1968-2006

Quartz Exposure Can Cause Pneumoconiosis in Coal Workers

Morbidity and Mortality Weekly Report

Pneumoconiosis and Advanced Occupational Lung Disease Among Surface Coal Miners — 16 States, 2010-2011



MMWR

Morbidity and Mortality Weekly Report

Weekly

July 6, 2007 / Vol. 56 / No. 26

Advanced Pneumoconiosis Among Working Underground Coal Miners — Eastern Kentucky and Southwestern Virginia, 2006

NPR Reports: Many PMF cases found in retired miners who never participated in NIOSH CWHSP. *Why don't miners participate?*

Holes in the social safety net:

- 1985 – 2005, employment in the Appalachia coal mining industry declined by 56% due to
 - Cost of coal relative to oil and natural gas
 - Increased mechanization
 - Shift to contract labor
- Fear of job loss
- Fear of disease and associated disability
- Mistrust of government

Black Lung: Where are we now?

- Increased incidence
- Increased severity
- Rapid progression
- Geographic clustering
- Higher prevalence associated with smaller mine size
- Lower seam heights
- More silica exposure

Factors that may be important in resurgence of severe CWP

- Changes in mining machinery and production
- Higher proportion of submicron size particles
- Narrower seam heights – more respirable silica
- Longer shifts, more overtime
- Smaller mining operations
- Economic instability
 - Less worker training
 - Less likely to seek medical surveillance
- Fewer unionized mines

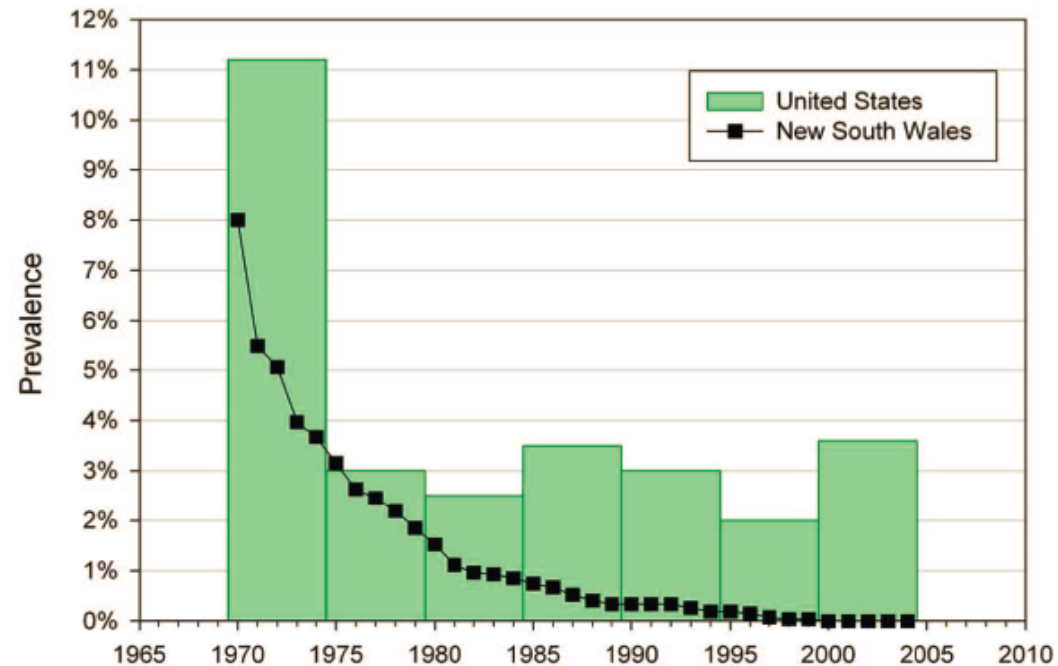


Varying permissible exposure levels to coal mine dust

Country / Region	Concentration mg/m ³
US (MSHA)	1.5 (2014)
China	3.5
QLD	3 (shift adjusted)
NSW	2.5
NIOSH recommended	1.0

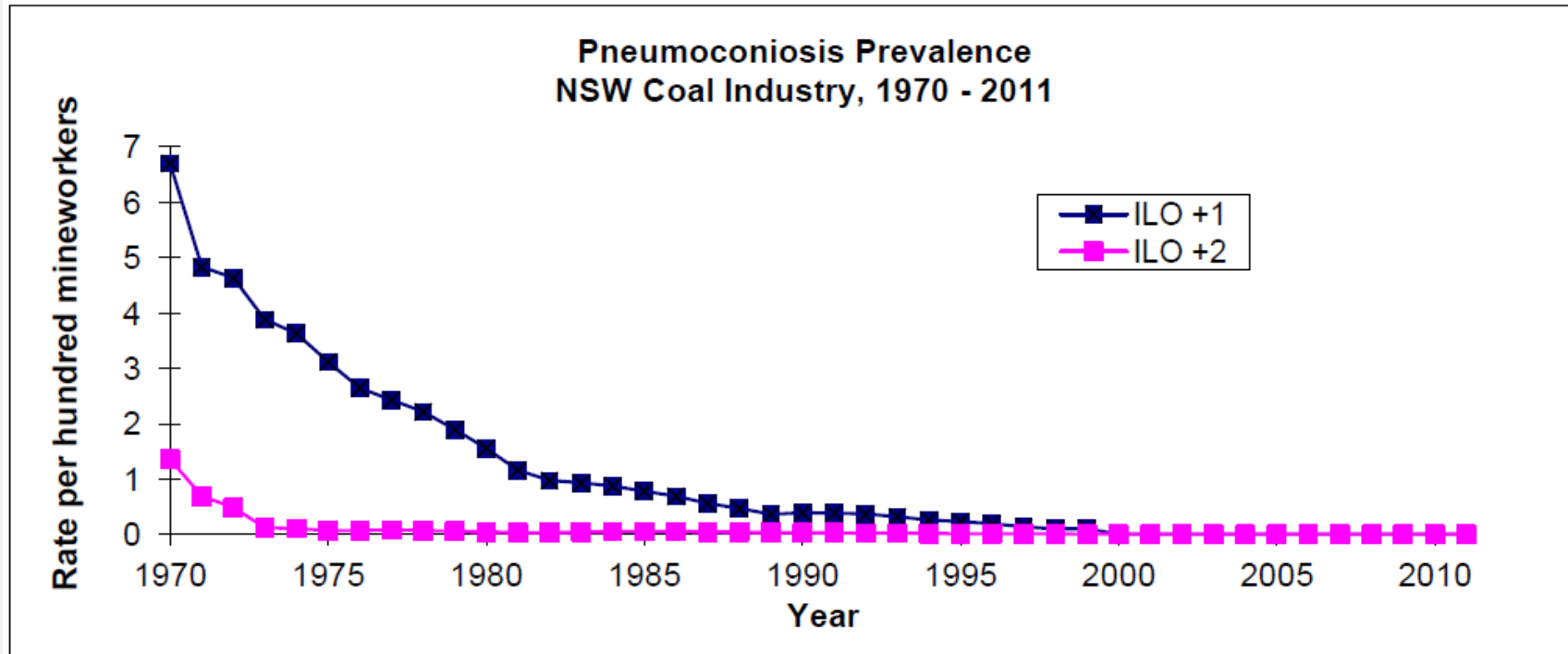
Prevalence disparity in CWP despite higher permissible dust levels in Australia vs U.S.

Prevalence of pneumoconiosis, ILO category 1/0 or greater among U.S. underground coal miners and New South Wales coal industry employees, by year.



Joy GJ, Colinet JF, Landen DD. Coal workers' pneumoconiosis prevalence disparity between Australia and the United States. *Min Eng.* 2012;64(7)

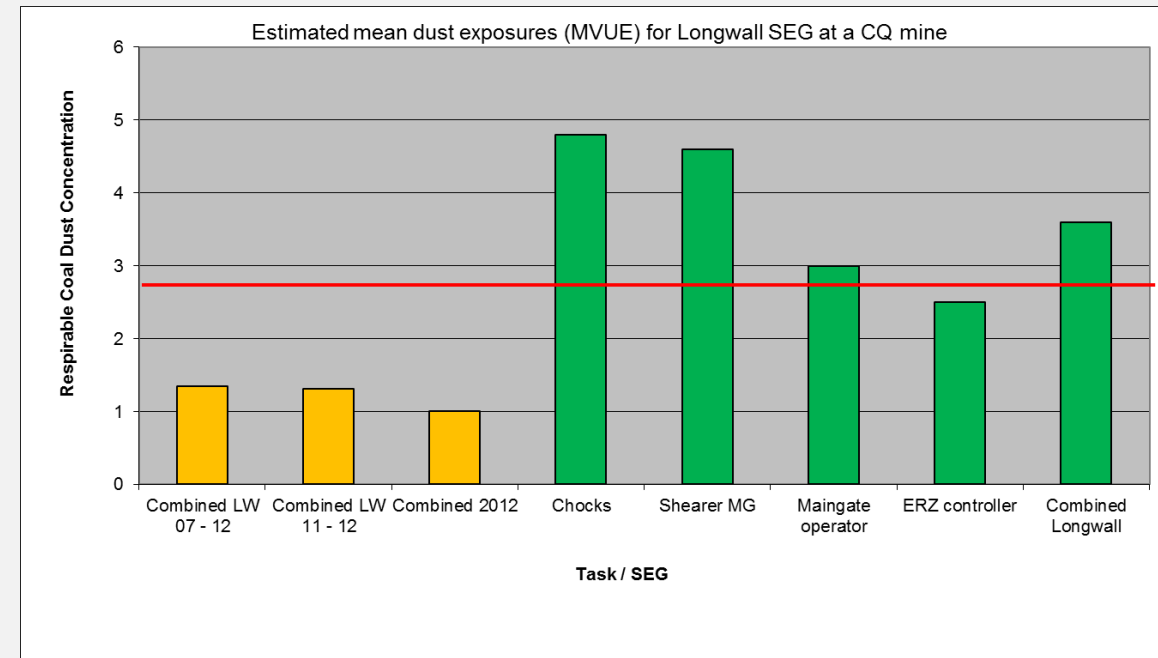
Problem solved . . . Or is it?



The ILO classification of x-rays is a method of grading based on x-ray appearance and may be, in practical terms, interpreted as the following:
ILO+1 = people with diagnostic features of dust exposure but no clinical symptoms
ILO +2 = People with more severe dust exposure than above and likely to have symptoms

Trends in exposure to coal mine dust

- 2010 report shows **increasing levels** of coal mine dust in New South Wales due to:
 - Inadequate water suppression
 - Inadequate ventilation
 - Damaged equipment
 - Poor work practices



2015: 2 cases of CWP in Australian coal miners

Case 1

- Worked 18 years (11 in UK, 7 in Queensland)
- 5 years at the face
- Chest x-rays in 2007 and again in 2009 showed CWP, but it was not diagnosed until 2016 when the CFMEU requested review by MDs from US and South Africa.

Case 2

- Began mining in early 1970's
- Worked 25 years
- Continuous miner operator/ roof bolter/shuttle car operator
- Miner left employment due to poor health. No chest x-ray obtained.

How did this happen?



Coal mining town: Moranbah, Queensland

- Town entirely based on mining
- Population 8,965
- Itinerant population of 1500 FIFO – Fly In Fly Out Miners





Review of respiratory component of the
medical assessment of Queensland coal mine
workers

Malcolm Simm, MD – Monash University

Bob Cohen, MD -- UIC

Deborah Glass, PhD – Monash University



Changes in coal mining in Australia

- 30 years since the first longwall shear introduced (increased mechanization)
- Methane drainage led to deeper mining, more friable/dusty coal, ventilation challenges
- Increased production pressures:
 - Longer work shifts
 - Less machine maintenance
 - Increased time at the face
 - Less supervision
 - Less training



Shift in focus of medical surveillance

- With perception that Black Lung was no longer a problem, the government program shifted from medical surveillance for early CWP detection to fitness for work exams.
- No B readers in the country; radiologists and general practitioners reading chest x-rays were looking for general medical conditions, not dust diseases.

Medical surveillance: Lessons learned

- Surveillance is essential to **monitor dust disease trends and detect new health hazards** – especially with changes in production/industrial process.
- Medical surveillance is important to **assess efficacy of primary preventive** strategies.
- Voluntary programs likely **underestimate the problem**.
- **Retired/former workers and subcontractor miners** should be included in surveillance of diseases with latency.
- Programs should be staffed by **trained experts** (i.e., ILO B readers, certified spirometry technicians).
- Programs must **stay true to mission/purpose**: targeted to detect and prevent occupational dust diseases, not fitness for duty exams.

Questions?

