Coal Services Health Surveillance Forum

Coal Services

October 2024

Presented by

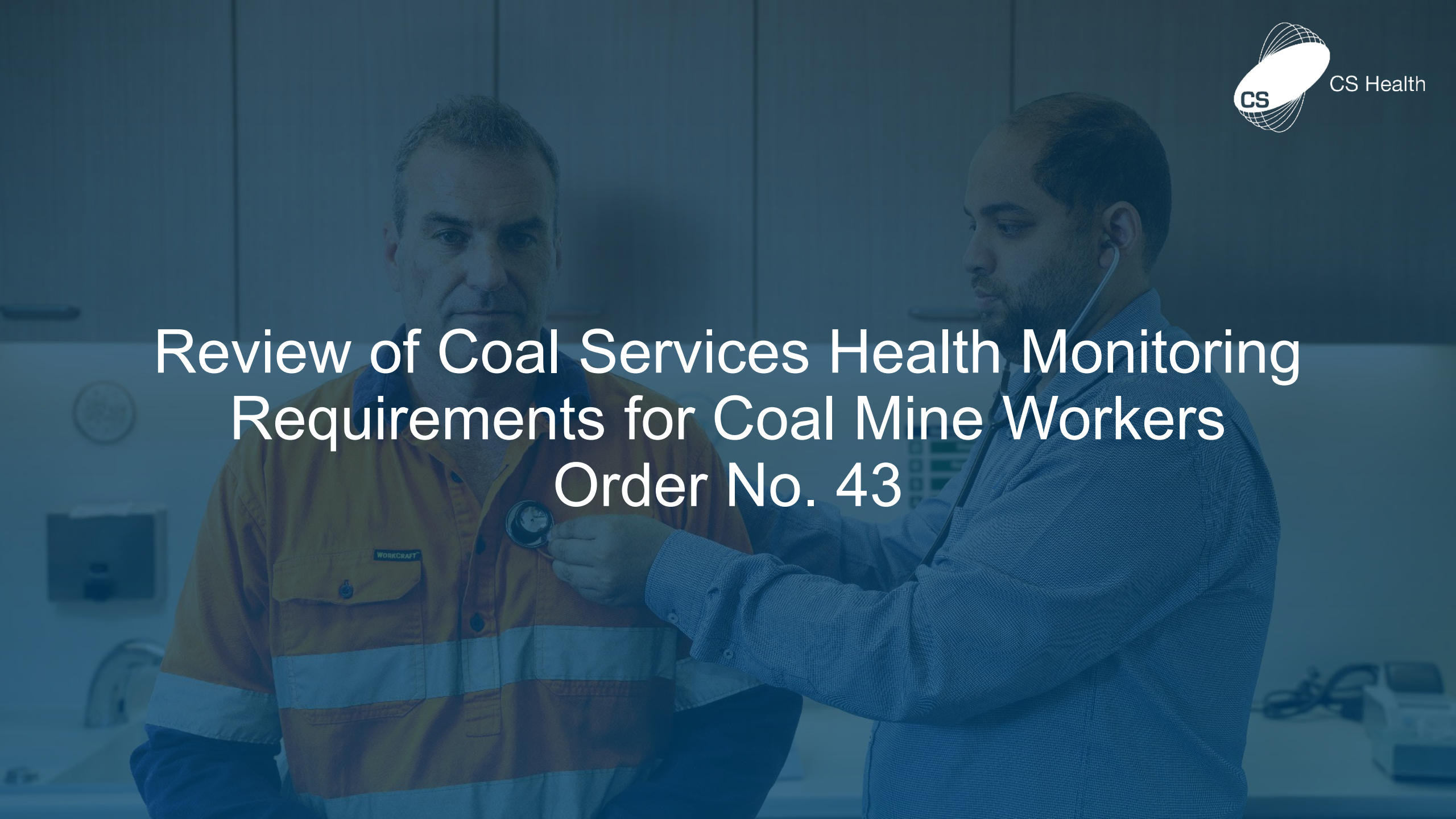
CS Health

Mine Safety Occupational Hygiene

Forum overview

Coal Services

Topic
Welcome
Update on the Review of Order 43
Respiratory System: Anatomy and Physiology
Respiratory Health
Managing Coal Mine Workers with Dust Restrictions- Exposure Monitoring Review
Promoting Lung Health and Lung Function Improvement
Panel Discussion
Close and Network Morning Tea



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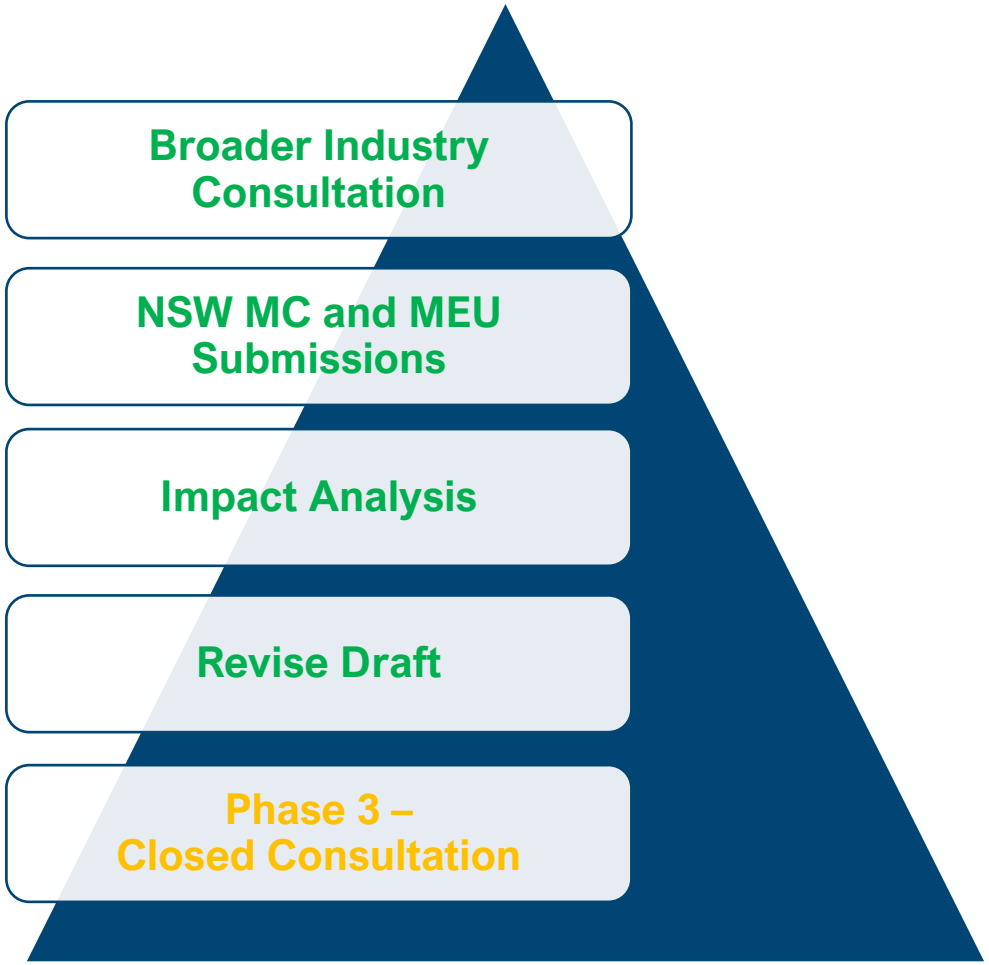
Review of Coal Services Health Monitoring Requirements for Coal Mine Workers Order No. 43

Review of Coal Services Health Monitoring Requirements for Coal Mine Workers Order No. 43

- Phase One - Industry Consultation with Stakeholders completed in 2023
- Draft Order Prototype completed
- Present Draft to Coal Services Board (February 2024) for endorsement
- Phase Two - Industry Consultation (March 2024)
- Collate Feedback and Revise Draft (April / May 2024)
- Impact Analysis and Revise Draft Order (May / June 2024)
- Present Draft to Board for Review and Phase 3 Consultation Approval
- Phase Three - Closed Consultation (NSWMC and MEU) September / October 2024
- Finalised Order to Board for endorsement
- Submit to Minister for sign off (timeframe at discretion of Minister)
- Industry Communication and Education
- Go live with Order ~~(1 January 2025)~~ date to be revised



Review of Coal Services Health Monitoring Requirements for Coal Mine Workers Order No. 43

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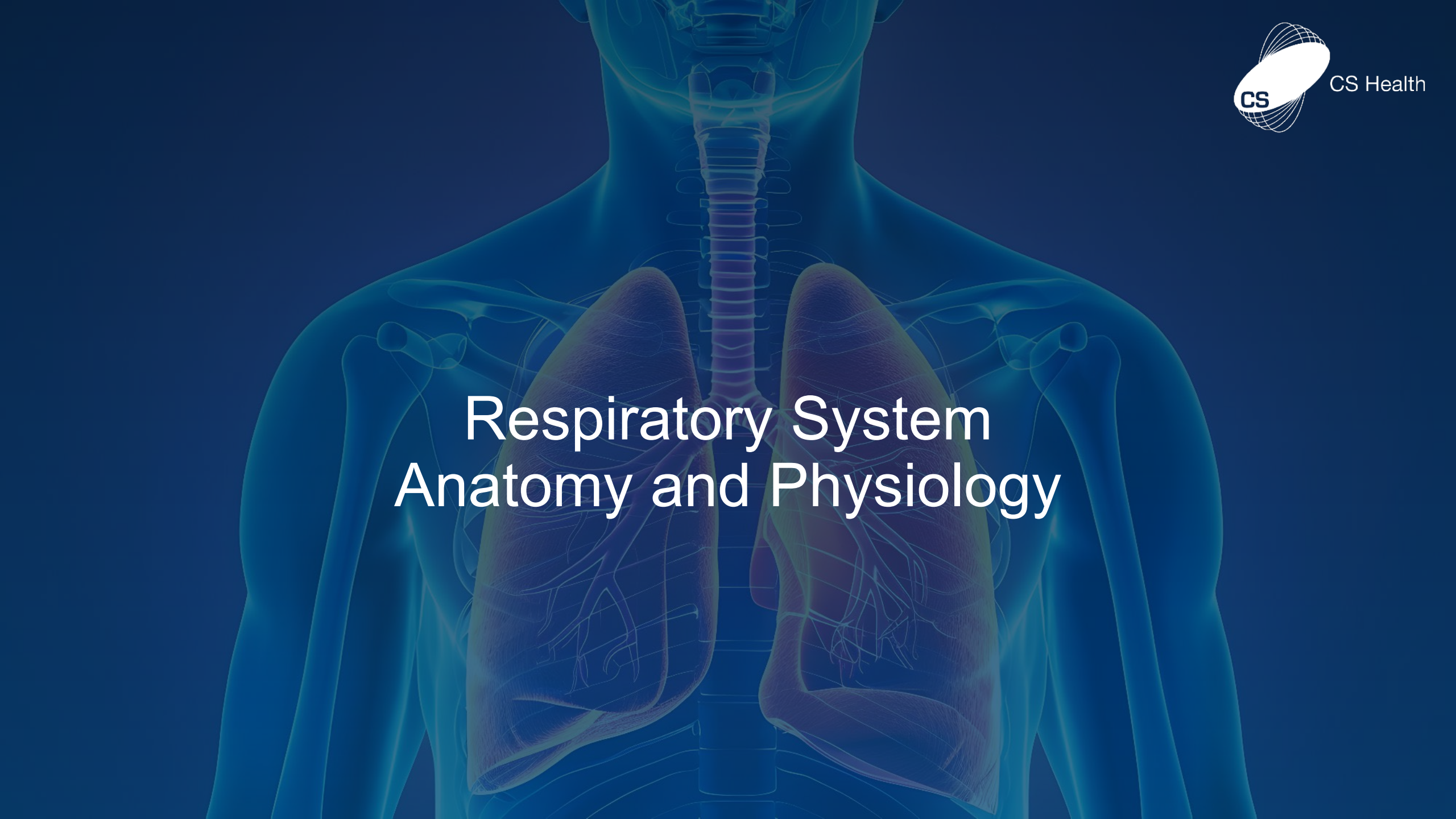
1. Medical Framework
2. Medical frequency
3. Medical risk profile
4. Approved Medical Practitioner Governance
5. Medical disclosures
6. Medical reviews
7. Exit medicals
8. Respirator Fit Testing
9. Medical Assessment – Delays
10. Coal Mine Worker Lists
11. Approved Health Professionals

Risk Category Guidelines

Clinical and Service Standard



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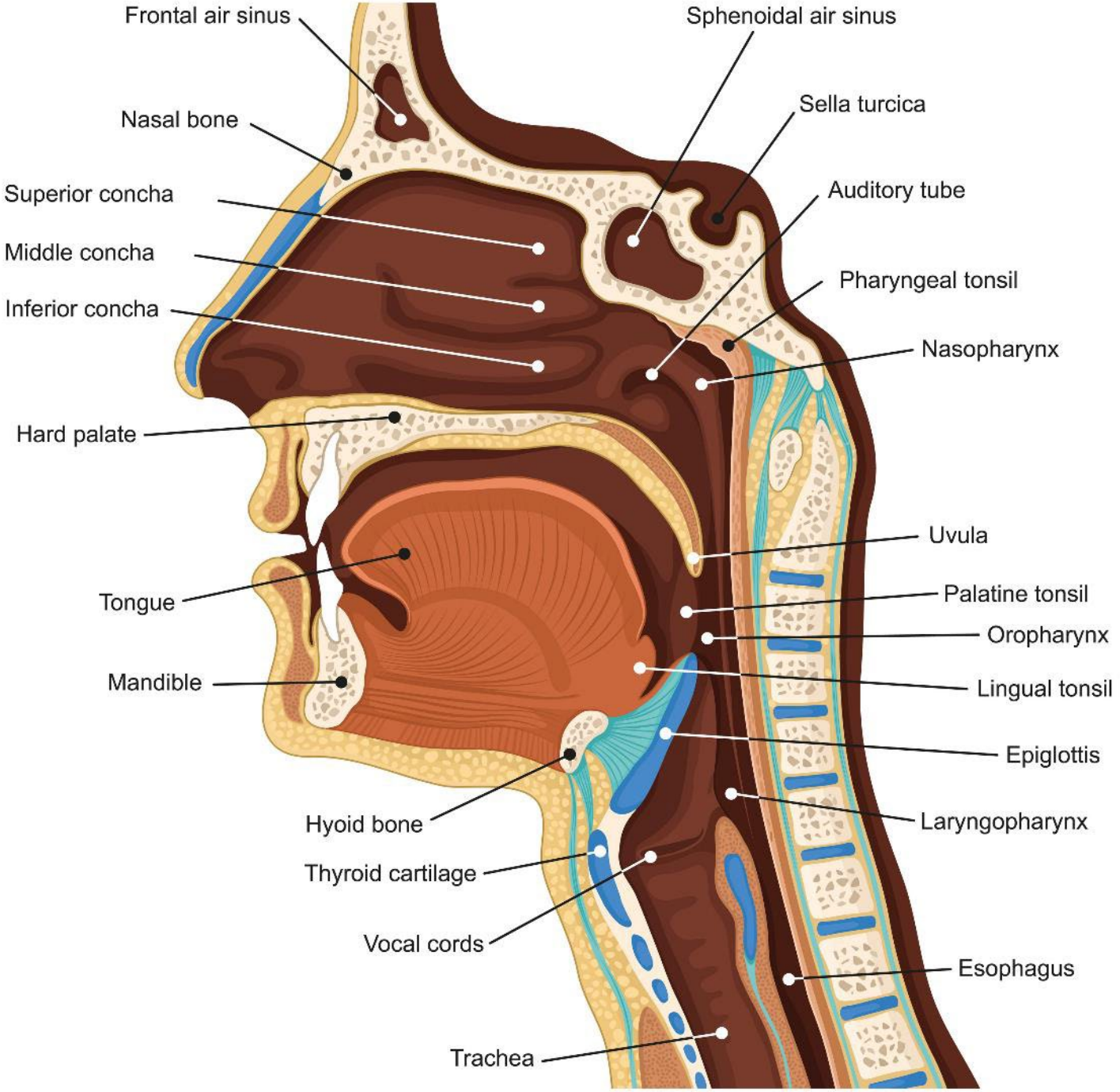
Respiratory System Anatomy and Physiology



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Upper respiratory tract

Nose:
Filters, warms and moisturises air

Mouth:
Avoids resistance, faster

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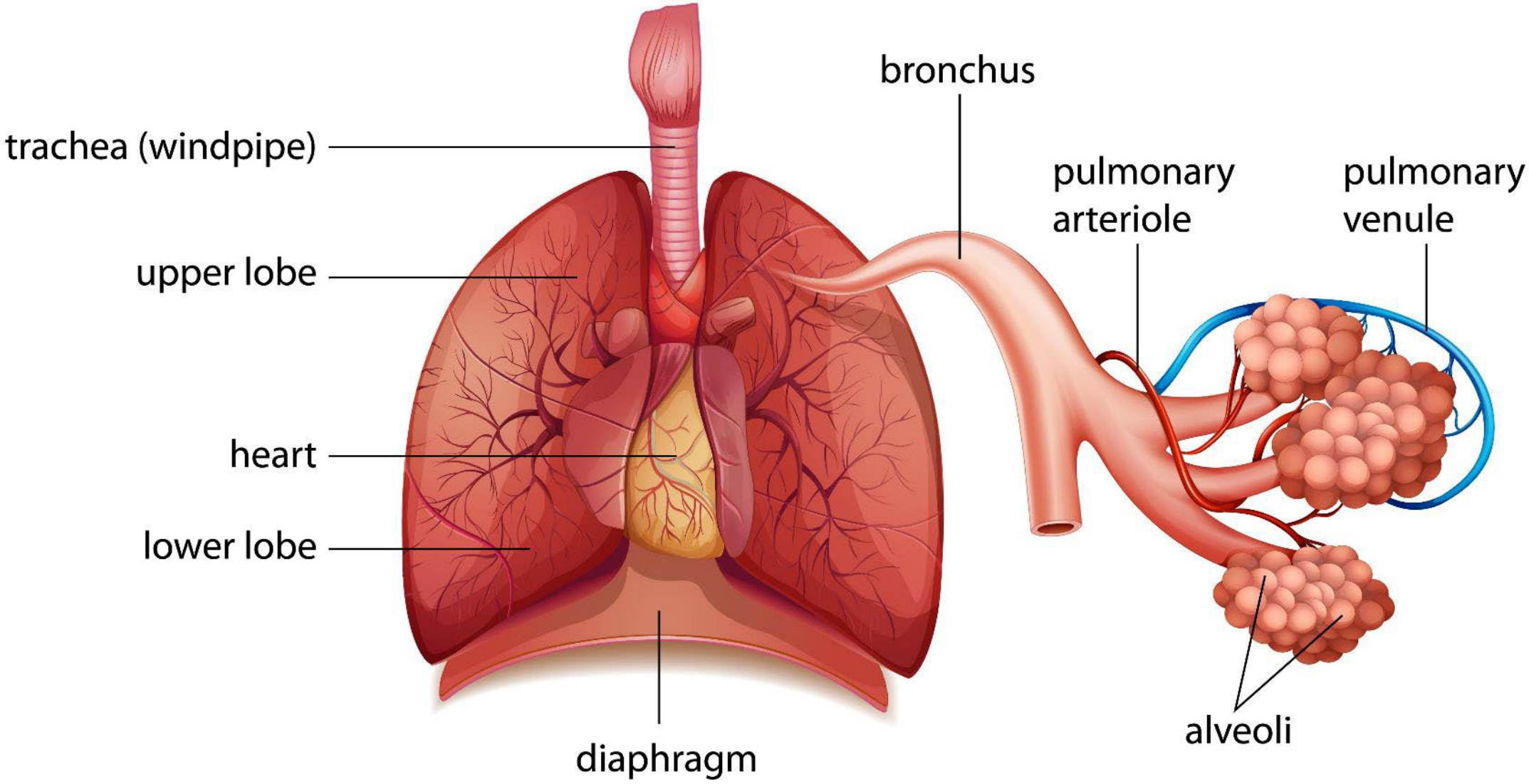
The airways

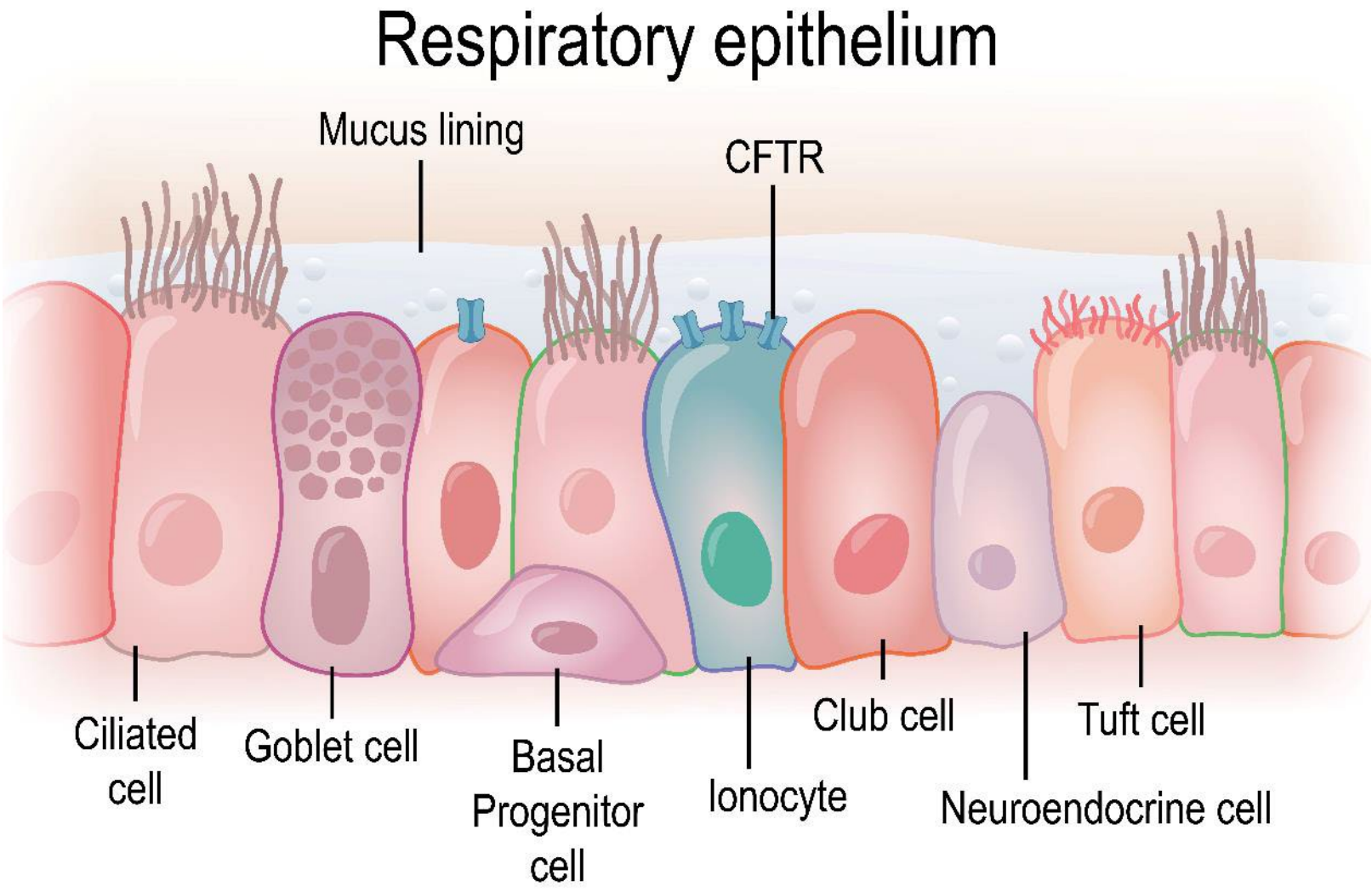
- Trachea
- Bronchus
- Bronchioles

Human Respiratory System



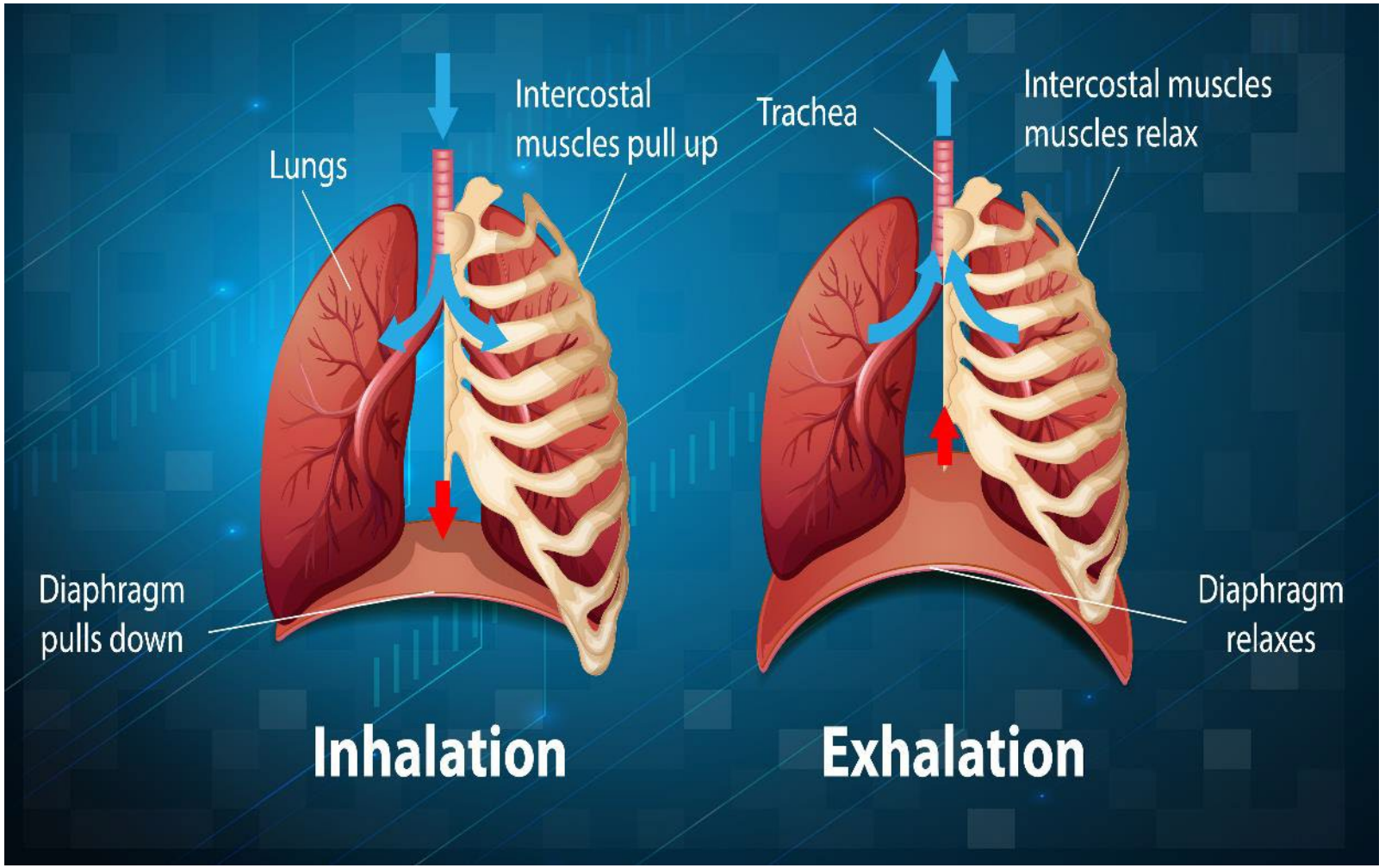
Airway walls

Mucus lining and cilia catch and remove particles



Muscles of respiration

- Diaphragm
- Inspiratory muscles
- Expiratory muscles



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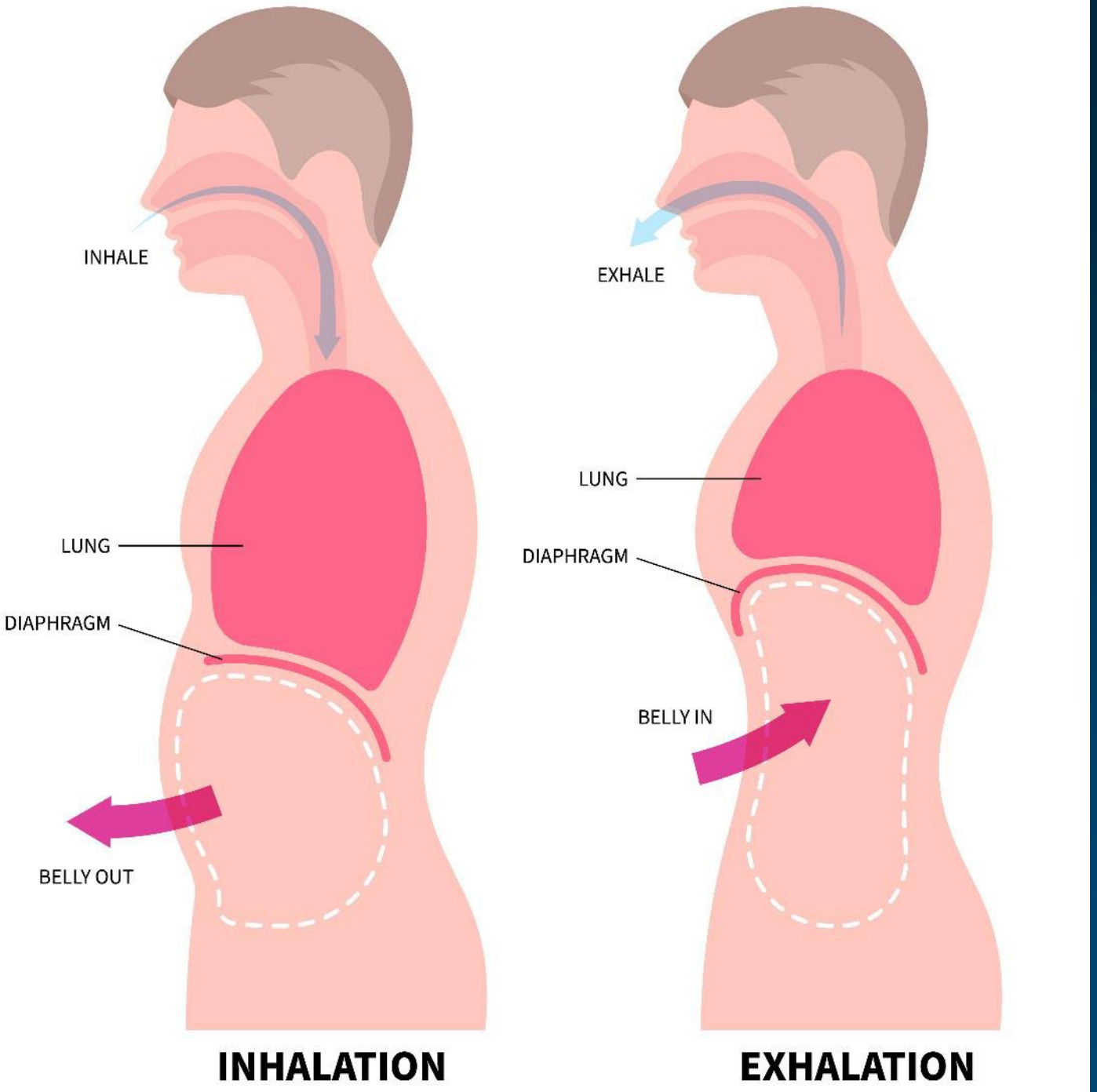
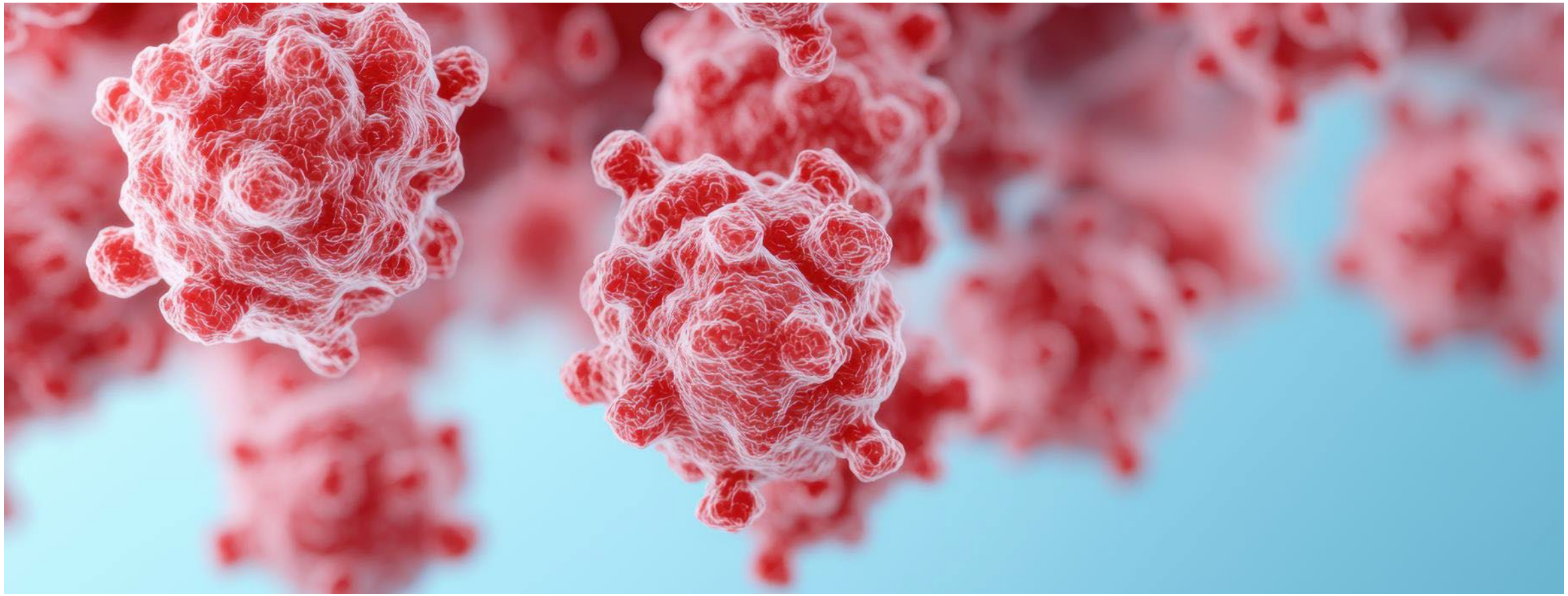
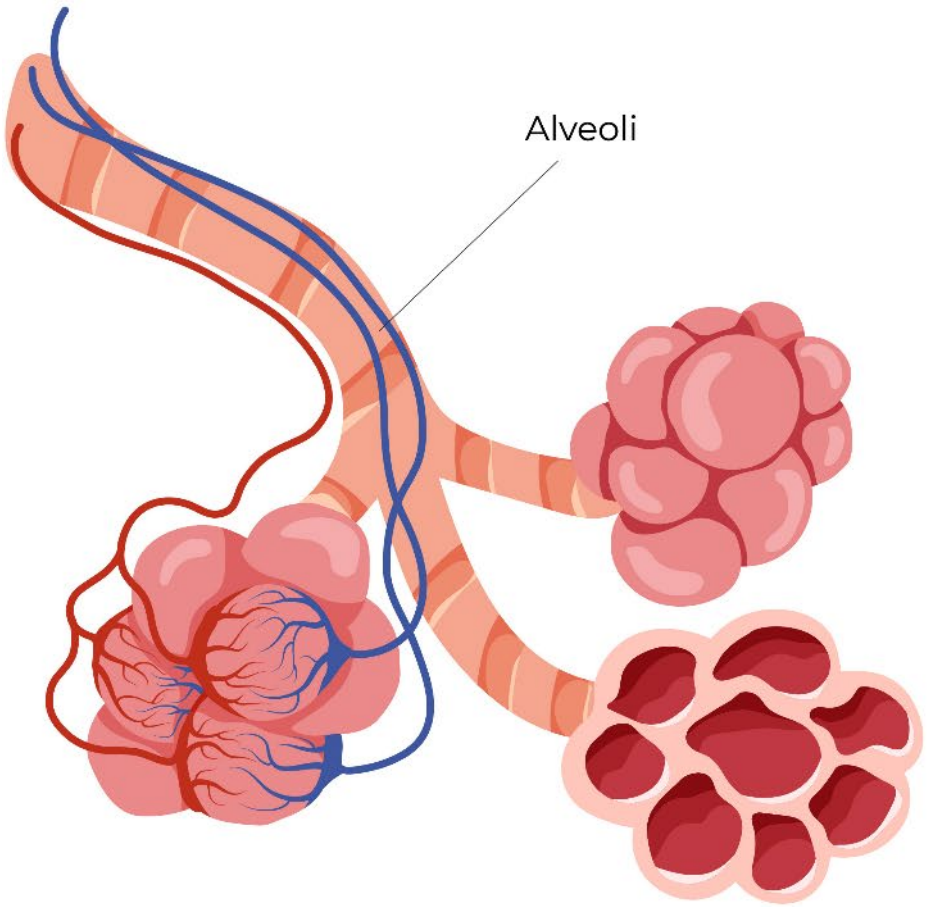
Diaphragmatic breathing

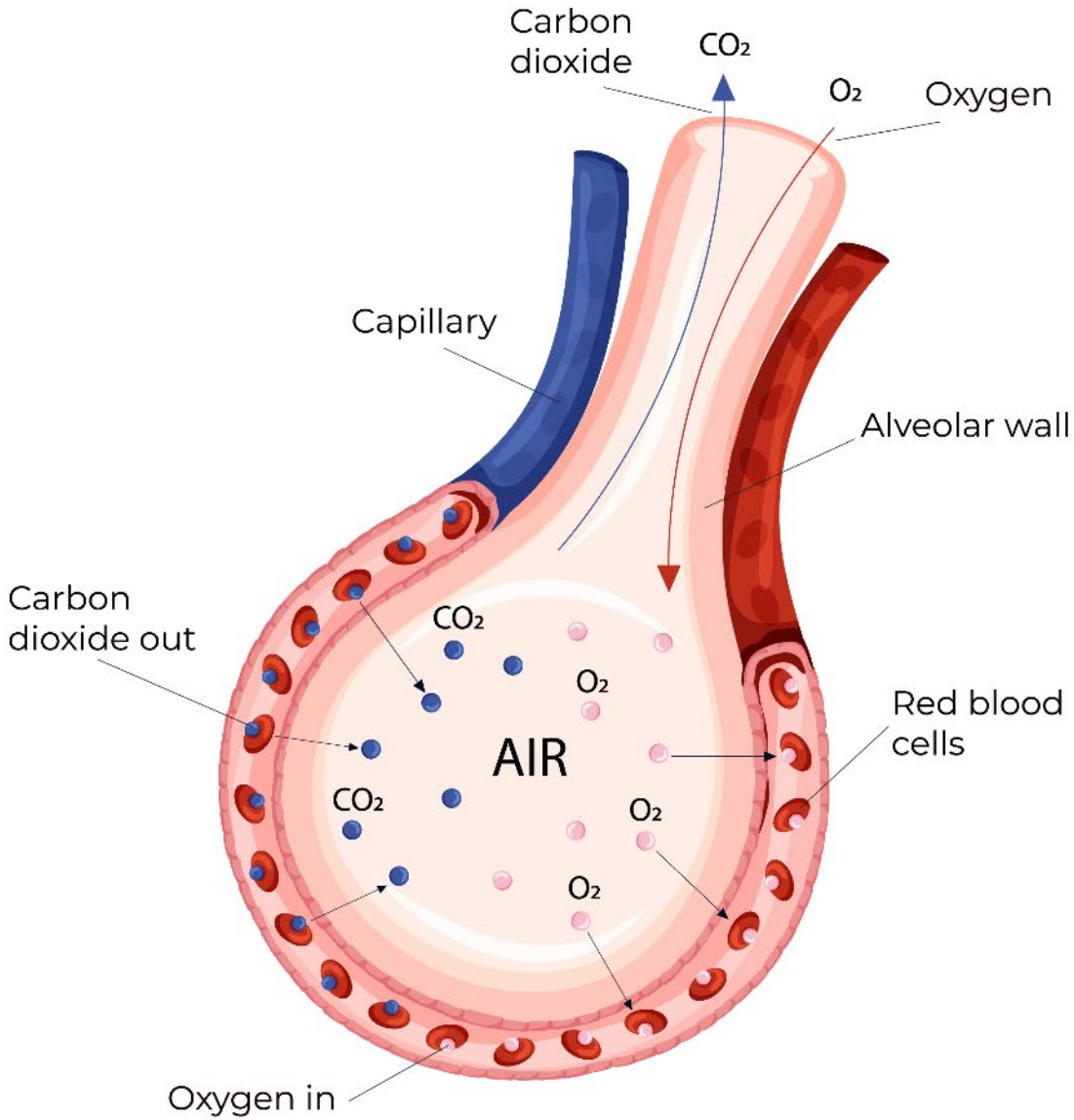


Alveoli

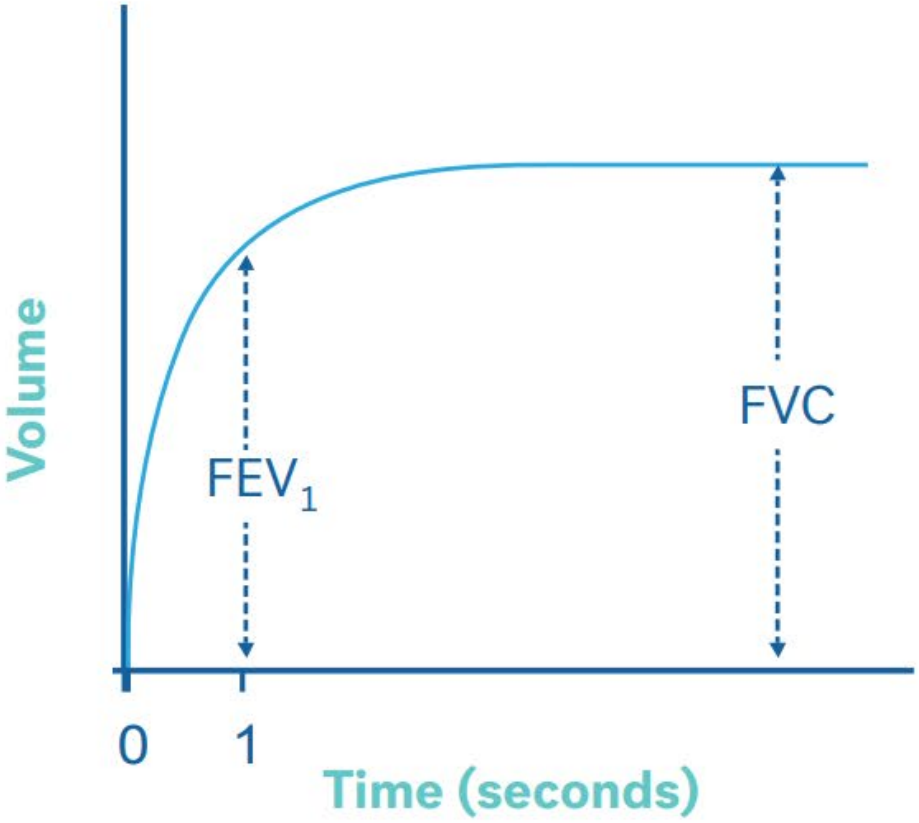


Alveolus gas exchange





Understanding spirometry



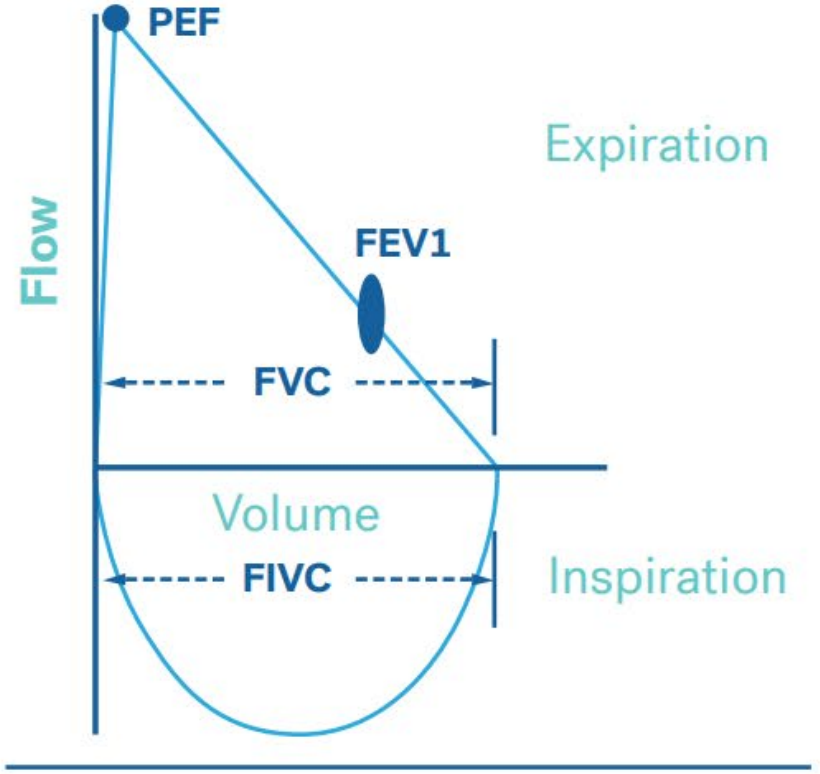


Image: National Asthma Council Australia. The Spirometry Handbook for primary care. Melbourne; National Asthma Council Australia: 2023.

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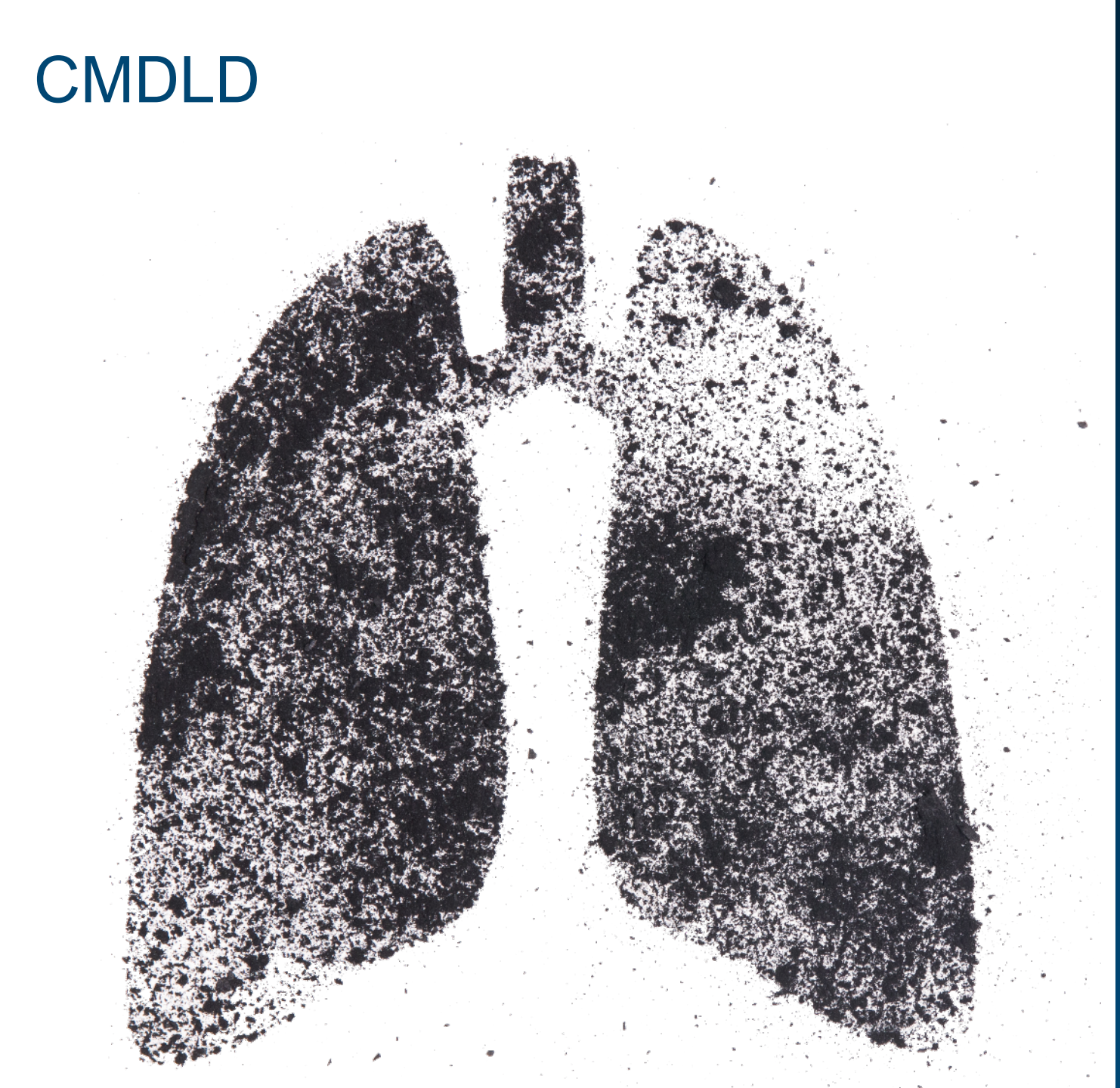
Respiratory Health

Coal Mine Dust Lung Disease (CMDLD)

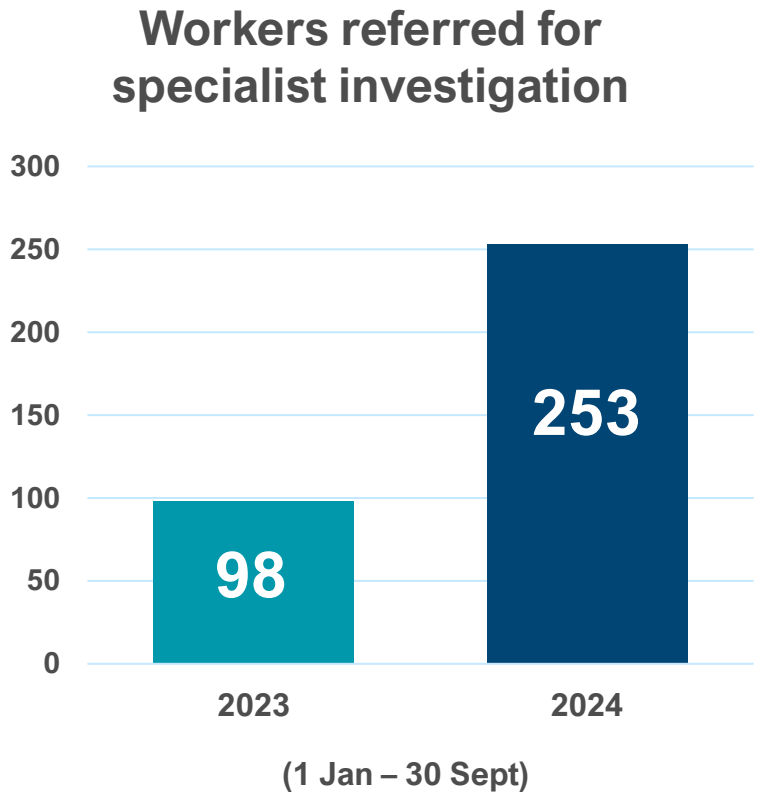
CMDLD



- Coal Workers Pneumoconiosis
- Silicosis
- Mixed dust disease
- Dust-related diffuse fibrosis
- Chronic obstructive pulmonary disease
- Emphysema
- Chronic bronchitis

Specialist Respiratory Investigations

Overview referrals and outcomes as at 30 September



253 **Workers referred for specialist investigation**
(1 Jan – 30 Sept 2024)

45 **Confirmed cases with lung conditions/disease**
(occupational and non-occupational)

30 **Total reportable lung diseases**

5 **Cases of mine dust lung disease**

2 **Coal workers pneumoconiosis and silicosis**

Specialist Respiratory Investigations

Worker Profile (Basic), 1 January to 30 September 2024

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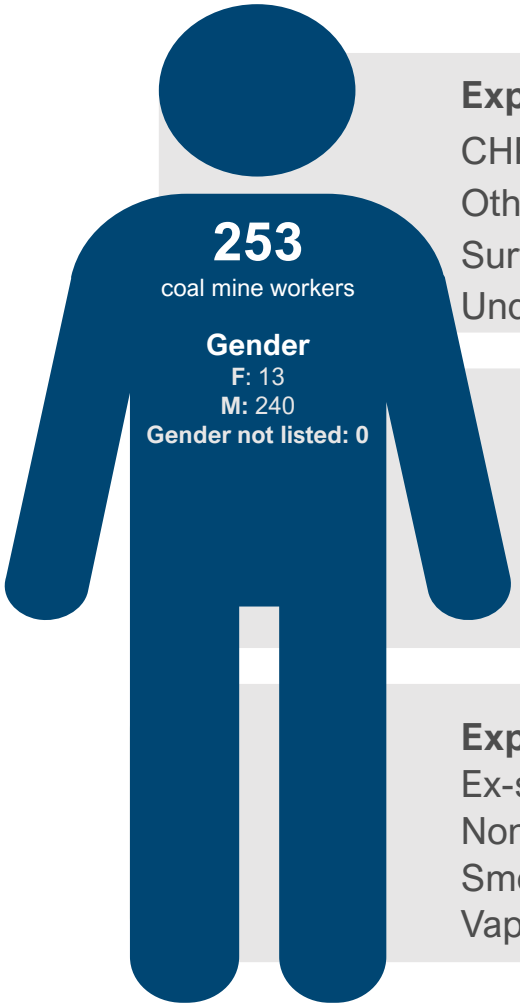
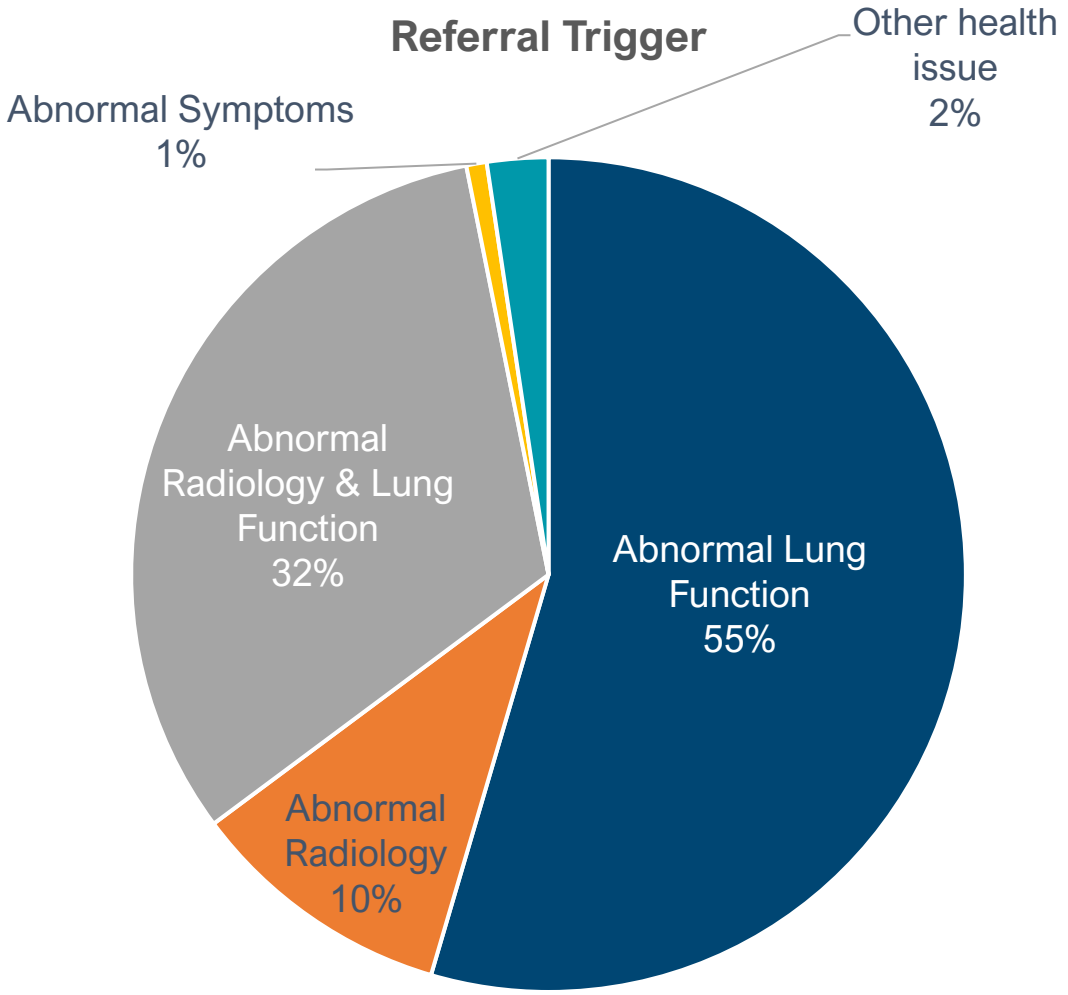
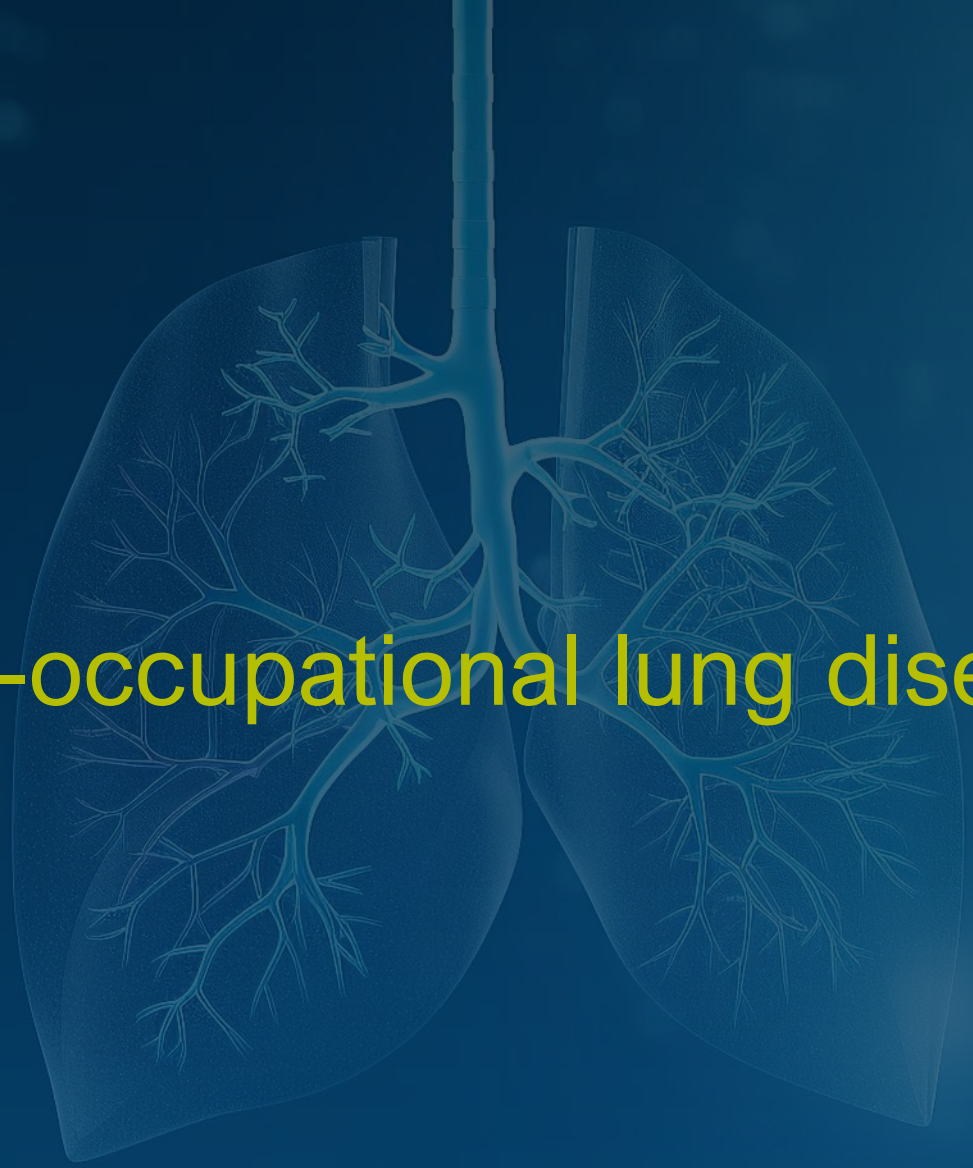


Exposure Environment (primary)	
CHPP	29
Other	2
Surface / Open Cut	160
Underground	62

Exposure Years (Respirable Dust)	
Less than 10 years	82
10 - 20 years	105
More than 20 years	66

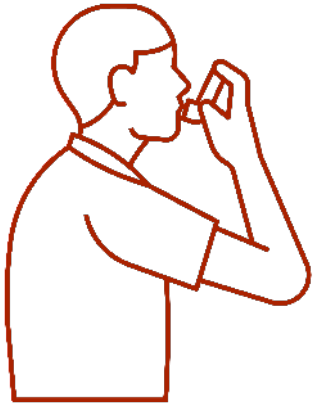
Exposure Years – Smoking / Vaping	
Ex-smoker	68
Non-Smoker	90
Smoker	94
Vaping	1





Non-occupational lung disease

Population Health 2022
Australian Bureau of Statistics

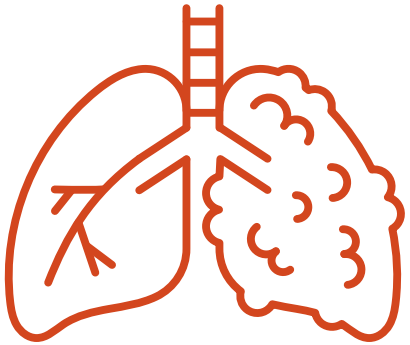


Asthma

10.8% of the population

12.2% women

9.4% men



COPD

2.5% of the population

7% aged 65 years+

Smoking and Vaping

10.6% current smokers

14.4% have vaped

Occupational and non-occupational lung disease

If causing lung function impairment:

Will need restrictions

More regular monitoring

- Restrictions vary but aim to reduce exposure to dust / exclude from dust exposure
- Requires enhanced dust monitoring and periodic review of work tasks

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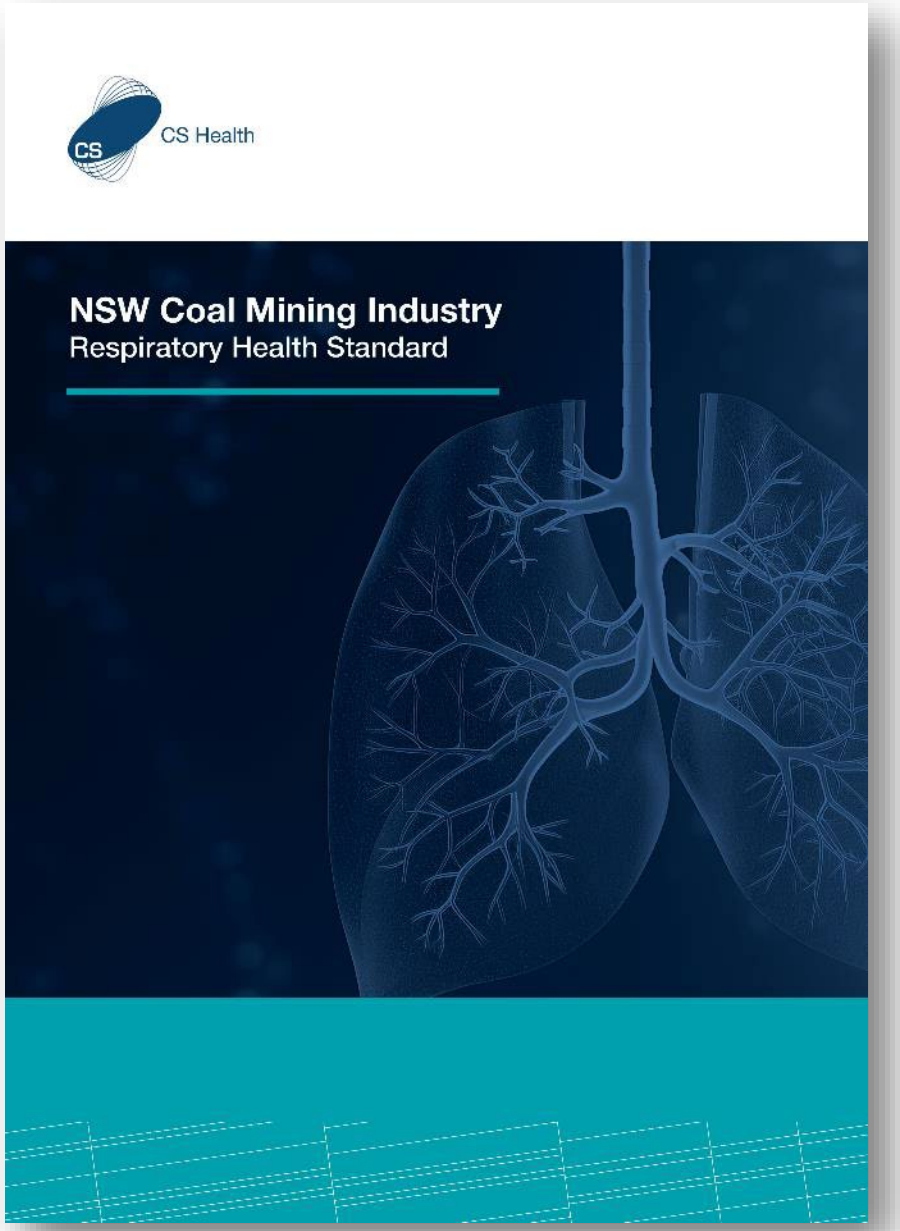
Respiratory Health Standard

Respiratory Health Standard



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- Remote work
- Use of BA
- Dust exposure
- Isocyanate use
- Other respiratory hazards
- Underground work

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Case Study #1

Underground miner: male, 59 years old

- Underground coal miner since 1983
- Smoker, 18 packs/year
- Normal spirometry until 2015
- PRISm 2018 – CXR 0/0, requested repeat test in 12 months
- PRISm 2021 – CXR 0/0, referred to GP and requested repeat test in 6 months
- Returned in 2023

Underground miner: male, 59 years old

2023:

- Spirometry now obstructive with a significant fall in FEV1
- Some improvement with Ventolin, but still abnormal

FVC (ex only) **Your FEV1 / Predict**

Test Date	19/07/2023 10:13:53 AM	Interpretation	--
Post Time	19/07/2023 10:34:11 AM	Predicted	Quanjer (GLI), 2012

	Pre								Post
Parameter	**Best**	**LLN**	**Z-Score**	**%Pred**	**Pred**	**Trial 3**	**Trial 2**	**Trial 4**	**Best**
FVC [L]	**4.14**	2.98	0.43	106	3.90	4.14	4.09	4.12	**4.58**
FEV1 [L]	**2.02***	2.32	-2.31	66	3.06	1.99*	1.97*	2.02*	**2.44**
FEV1/FVC [%]	**48.8***	66.5	-4.07	-	78.5	48.0*	48.1*	49.1*	**53.4***
FEF25-75 [L/s]	**0.88***	1.32	-2.19	33	2.67	0.83*	0.71*	0.88*	**0.97***
PEF [L/s]	**7.34**	-	-	-	-	7.19	6.98	7.34	**7.59**
Session Quality		Pre	FEV1 - A, FVC - A (FVC Var=0.02L (0.6%); FEV1 Var=						
		Post	FEV1 - A, FVC - A (FVC Var=0.12L (2.5%); FEV1 Var=0						

Underground miner: male, 59 years old

CLFT 2024:

- Mild obstruction
- FEV1 < LLN, 72% predicted
- Positive BRT – remaining obstructive
- DLCOc mildly impaired, 56% predicted

HRCT:

- Scattered high density partially calcified solid nodules noted
- Nonspecific subpleural right lateral costophrenic recess nodule noted
- Normal-appearing intrapulmonary lymph nodes noted on the fissures
- Subtle upper zone ground-glass centrilobular nodules
- Mild upper zone centrilobular emphysema

Underground miner: male, 59 years old

Respiratory Physician assessment:

- COPD with some reversibility
- Mild emphysema
- Simple CWP

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Case Study #2

Open cut miner: female, 47 years old

- Working in open cut coal mines since 2019
  - 2 years cleaning
  - 3 years haul truck
- Non-mining, non-dust exposed jobs prior to this
- No past history of lung disease
- Current smoker, 24 packs/year

Open cut miner: female, 47 years old

- Spirometry obstructive from entry
- Periodic 2024
- Decline from past spirometry
- Obstructive
- Negative response to Ventolin

	Pre							
Parameter	**Best**	**LLN**	**Z-Score**	**%Pred**	**Pred**	**Trial 1**	**Trial 3**	**Trial 2**
FVC [L]	**3.25**	2.80	-0.66	91	3.55	3.25	3.11	3.25
FEV1 [L]	**1.77***	2.25	-2.94	62	2.86	1.76*	1.72*	1.77*
FEV1/FVC [%]	**54.4***	69.9	-3.96	67	80.9	54.1*	55.3*	54.4*
FEF25-75 [L/s]	**0.77***	1.67	-2.85	27	2.89	0.81*	0.86*	0.77*
PEF [L/s]	**4.90**	-	-	-	-	4.49	4.29	4.90
Session Quality		Pre		FEV1 - A, FVC - A (FVC Var=0.00L (0.0%); FEV				

* Indicates value outside normal range or significant post change.

Inline Filter EasyOne Filter SP

Open cut miner: female, 47 years old

CLFT:

- Obstructive
- Impaired gas diffusion

HRCT:

- Early emphysema

Open cut miner: female, 47 years old

Diagnosis:

- COPD
- Emphysema

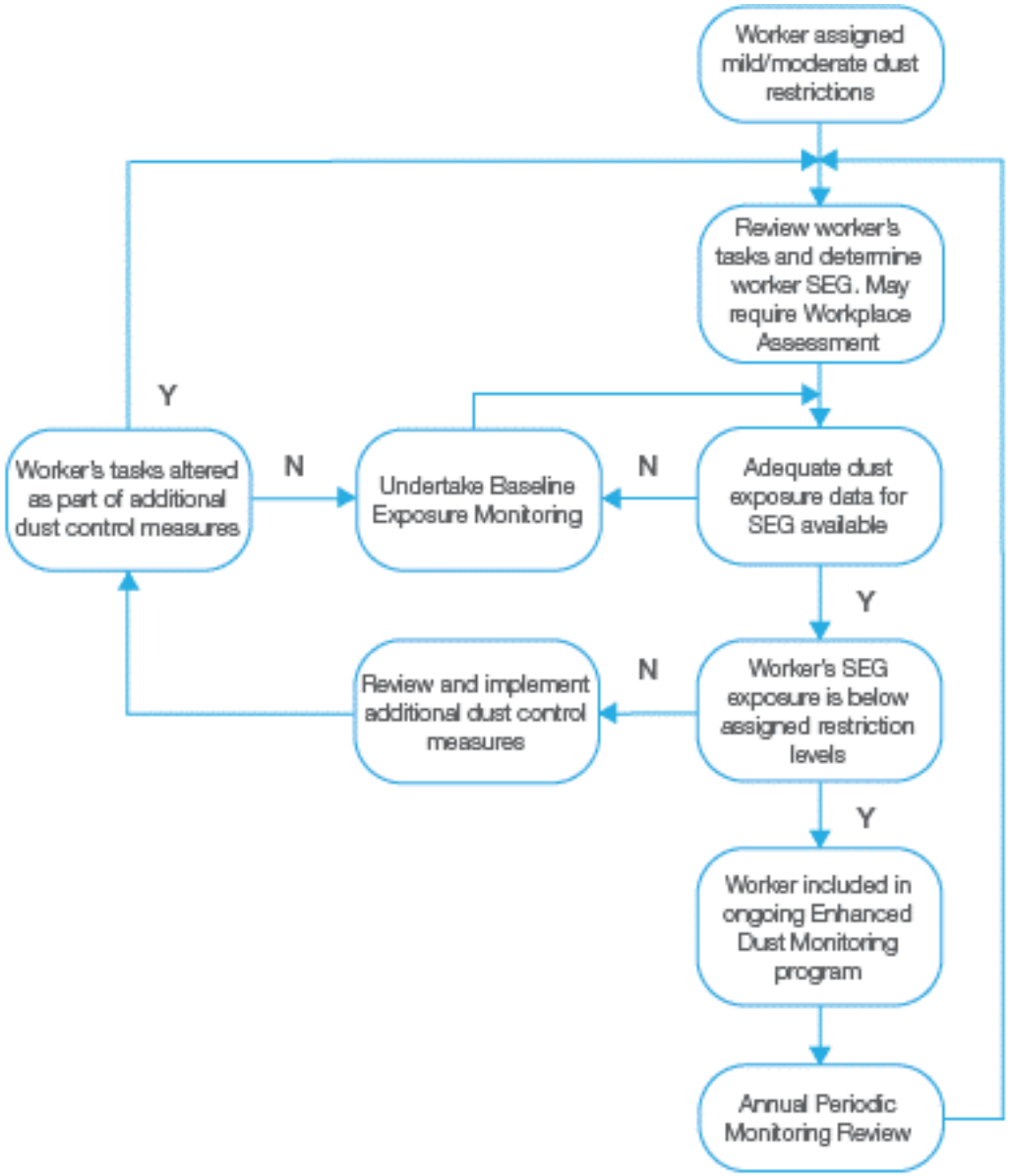
Management:

- Moderate dust restriction
- Annual CLFT

Coal Services

Managing Coal Mine Workers with Dust Restrictions – Exposure Monitoring Review

Recommendations for Exposure Monitoring Review



- Review tasks and determine SEG (Similar Exposure Group) allocation
- Review available exposure monitoring data
  - **If insufficient data**, undertake further exposure monitoring
  - **If data is adequate**:
    - *Exposure data < assigned restrictions:* Include worker in enhanced monitoring program and conduct annual periodic review
    - *Exposure data > assigned restrictions:* Review and implement additional dust control measures or consider alteration of tasks; and undertake further monitoring to determine if < assigned restrictions

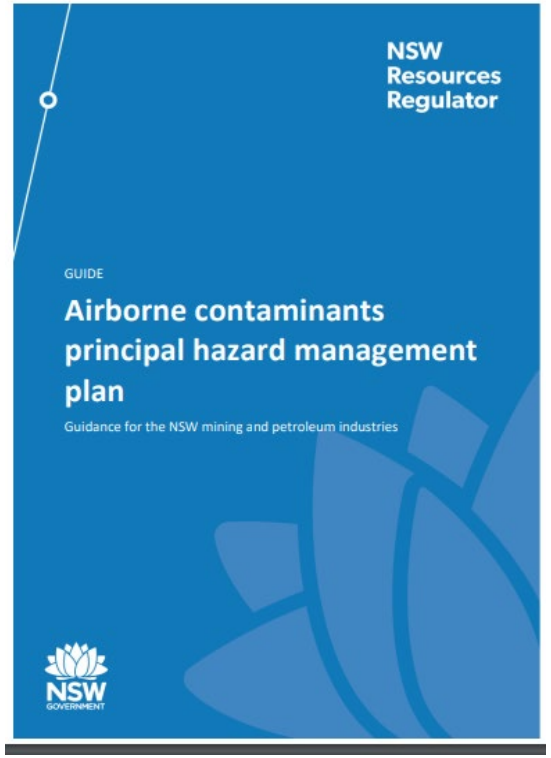
Recommendations for Exposure Monitoring Review: Worked Example

Similar Exposure Group	Respirable Dust Assigned WES 0.5mg/m^3		Respirable Quartz Assigned WES 0.025mg/m^3		Inhalable Dust Assigned WES 5mg/m^3	
	(n)	Average	(n)	Average	(n)	Average
CP01 - CHPP production	10	0.12	10	0.020	8	0.7
CP03 - CHPP laboratory	2		2		2	
CS01 - Pre-strip and overburd	11	0.05	11	0.014	7	0.5
CS06 - Field maintenance	3	0.05	3	0.027	2	
CU02.1 - Development produ	170	0.21	170	0.020	32	1.7
CU07 - VCD installers	3	0.19	3	0.017	11	5.4

- n – number of samples
- CHPP laboratory – insufficient data so further monitoring needed
- Average results < restriction limits
  - Annual periodic review
- Average results > restriction limit
  - Review tasks to determine additional controls and reassess

References for Exposure Monitoring Process

- SEGs - groups of workers who share similar exposure risks due to the frequency, manner of tasks performed, and the materials and processes used.
- NSW Resources Regulator Guide '*Airborne contaminants principal hazard management plan*'.
- *NSW Resources Regulator TRG Monitoring and control of worker exposure to airborne dust* – consultation draft
- Recognised Standard 14: Monitoring Respirable Dust in Coal Mines Coal Mining Safety and Health Act 1999



FAQs

Coal Services

Does the individual worker with dust restrictions need to be monitored?
It is recommended that workers with dust restrictions are periodically monitored as part of an ongoing enhanced exposure monitoring strategy. This ensures that any potential individual worker variations are assessed and understood.

Does a worker with dust restrictions need to wear a dust monitor every day?
Workers with dust restrictions should not need to wear a dust monitor every day. A statistically valid SEG sampling strategy combined with periodic monitoring should provide sufficient data to accurately assess the worker's exposure level.

What is enhanced dust monitoring?
Enhanced dust monitoring involves reviewing tasks performed by workers and SEGs and collecting a statistically valid number of results to determine exposure levels. Workers with dust restrictions should be periodically monitored, and their work tasks reviewed as part of the exposure monitoring program. This may include workplace assessments. The NSW Resources Regulator Guide – Airborne contaminants principal hazard management plan and the upcoming NSW Resources Regulator Technical Reference Guide – Monitoring and control of worker exposure to airborne contaminants will provide additional guidance on relevant sampling strategies.

FAQs

Coal Services

Can a worker with an 8-hour time-weighted average dust restriction work a 12-hour shift

Yes, a worker can work a 12-hour shift. However, shift length and roster patterns should be considered, as they may require adjustments to the dust restriction level. It is advisable to consult an occupational hygienist to determine if adjustments are needed based on the worker's specific roster pattern.

What happens for contractors where sites are less likely to accommodate restricted workers?

Contract employers and workers may face challenges in such situations. Contract companies and workers may need support and access to site-specific occupational exposure data to determine whether dust exposure levels in SEGs are suitable for workers with dust restrictions.

Can real time dust monitors be used to assess compliance to dust restriction levels?

Real-time dust monitors should not be used for assessing compliance with dust restrictions. Personal exposure monitoring assessments must follow relevant Australian standards and WHS (MPS) Regulation requirements. However, real-time monitors are useful tools for investigating exposure sources and reviewing control effectiveness.

What role can respiratory protective equipment (RPE) play?

Respiratory Protective Equipment (RPE) can be used as part of an overall control strategy for workers with dust restrictions. In accordance with section 36 of the NSW WHS Regulations, RPE should only be used as a control after higher level engineering controls have been considered first. RPE can also be used as an interim control measure while higher-order controls are being developed and implemented. An employers RPE program should align with the applicable sections of AS/NZS 1715:2009, Selection, use and maintenance of respiratory protective equipment.

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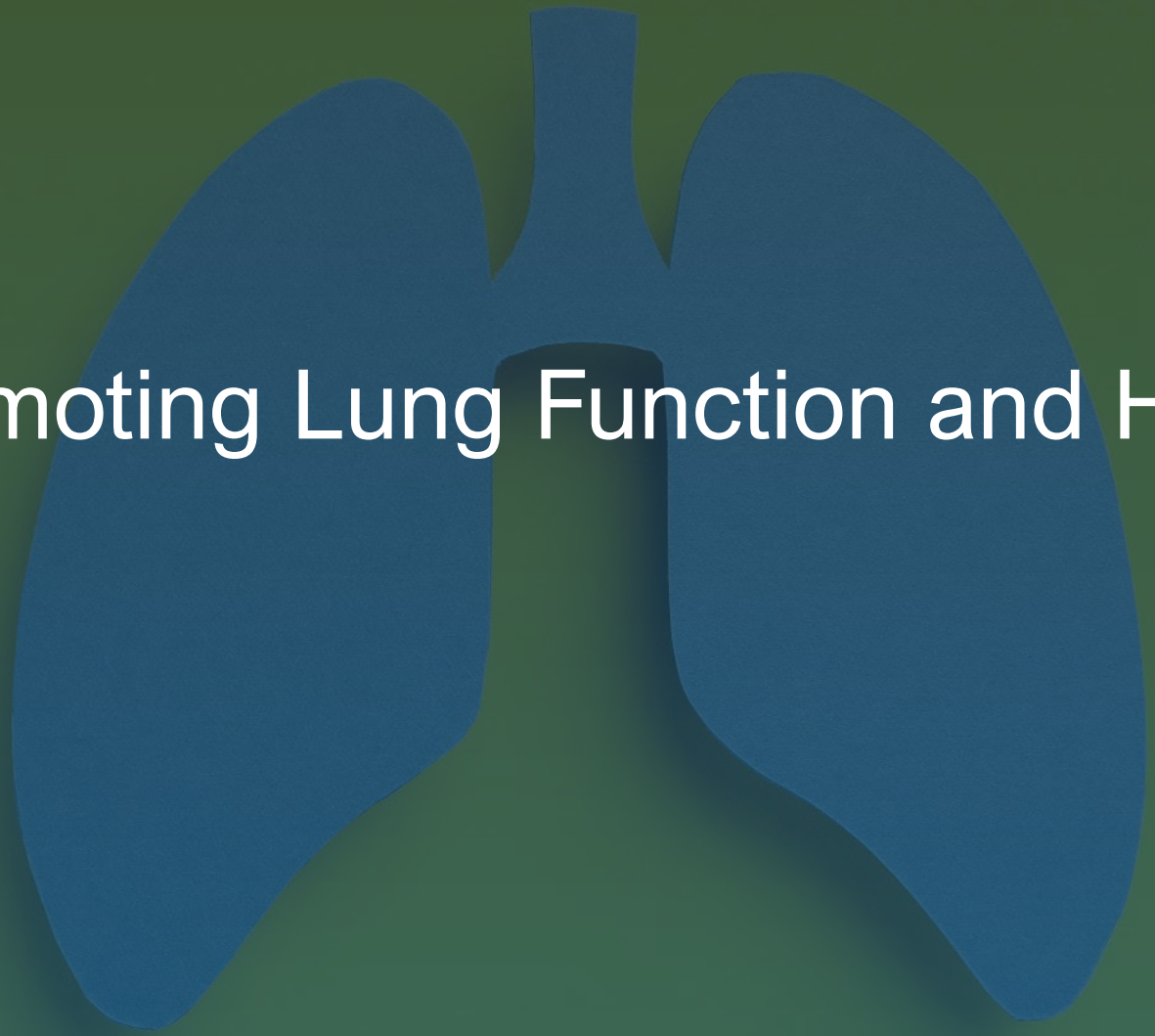
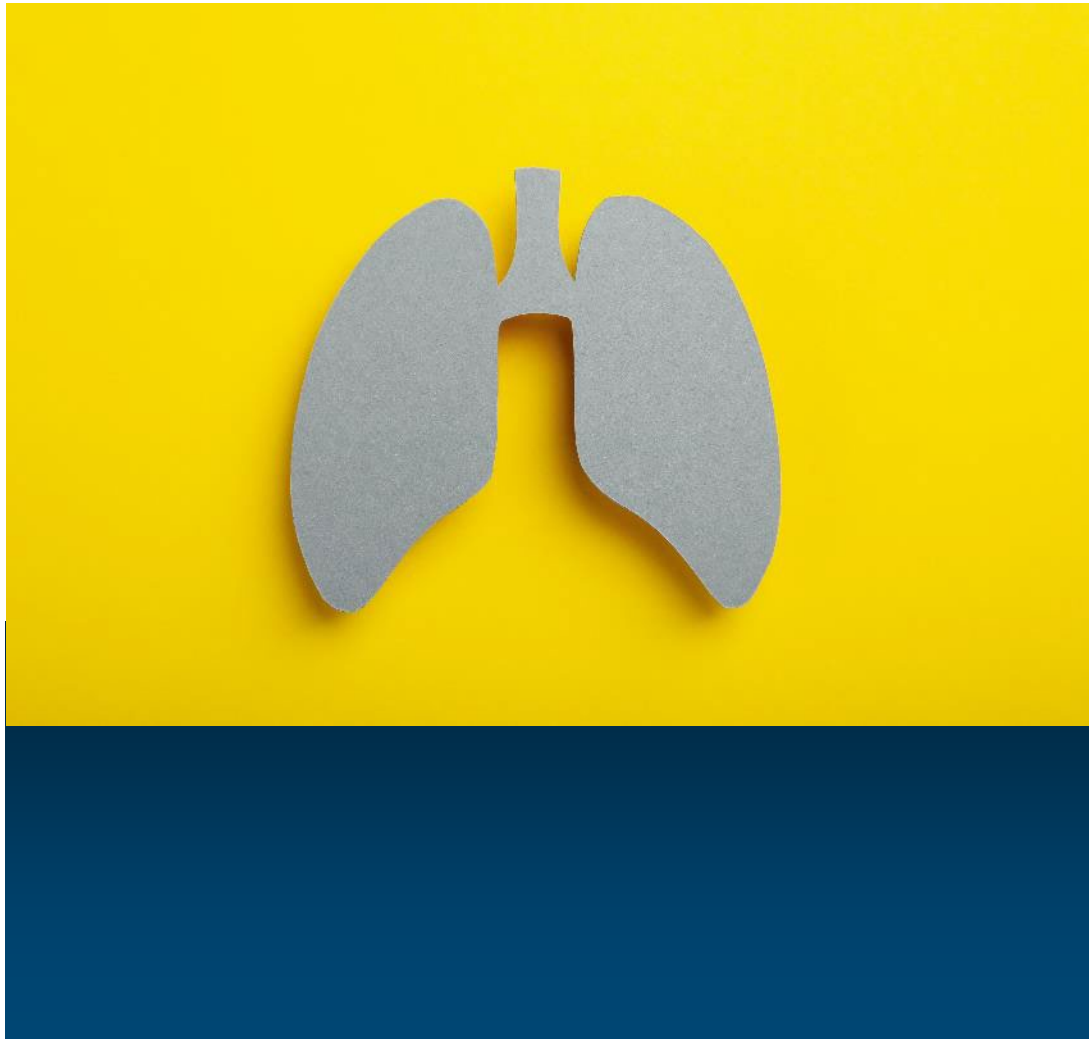


Promoting Lung Function and Health

Overview

1) Management of existing conditions e.g. Asthma
2) Quit Smoking
3) Physical Activity
4) Weight Management
5) Breathing Exercises



Smoking and Vaping

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EUROPEAN RESPIRATORY *journal*
FLAGSHIP SCIENTIFIC JOURNAL OF ERS

The impact of smoking cessation on respiratory symptoms, lung function, airway hyperresponsiveness and inflammation

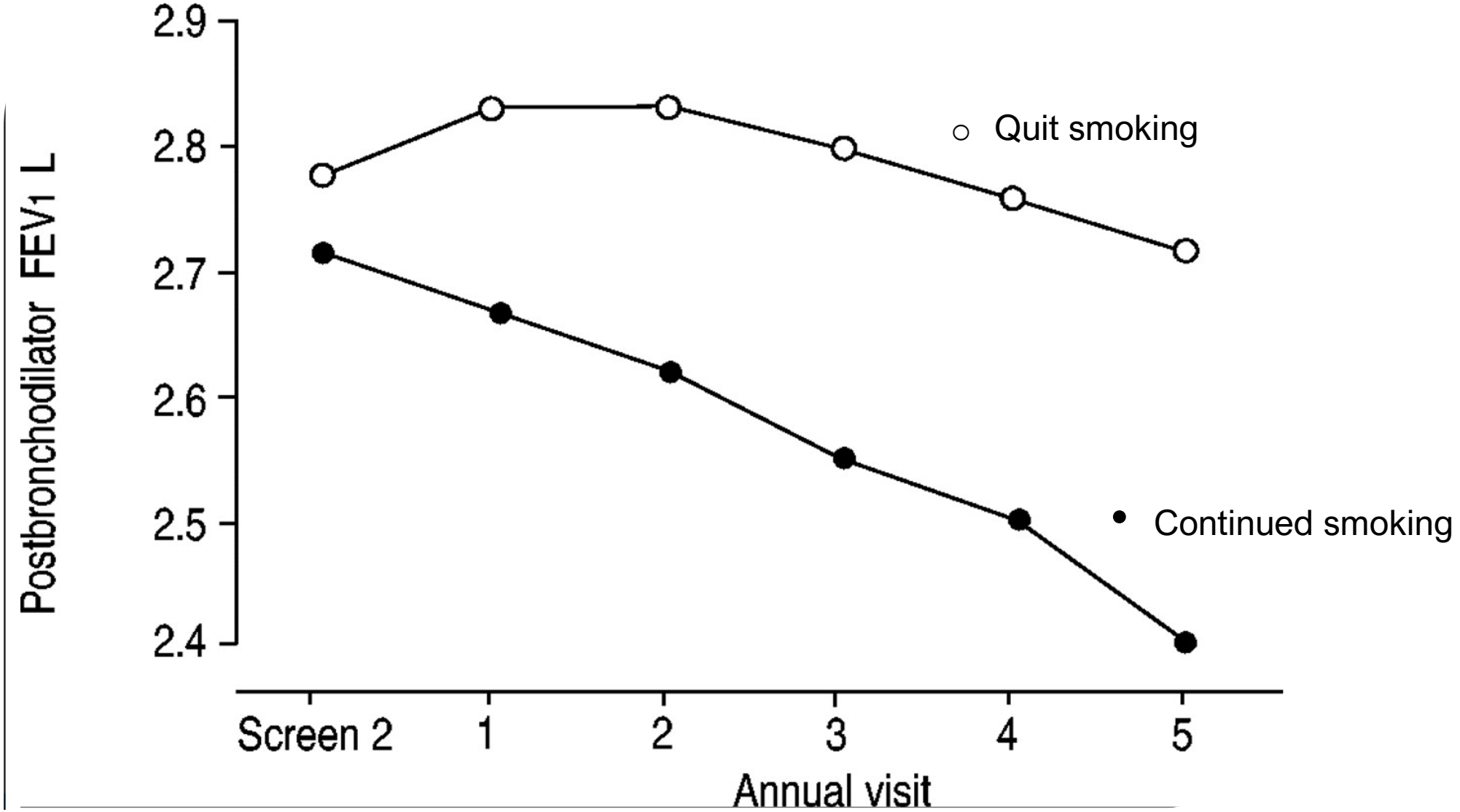
B.W.M. Willemse, D.S. Postma, W. Timens, N.H.T. ten Hacken

European Respiratory Journal 2004 23: 464-476; **DOI:** 10.1183/09031936.04.00012704

Smoking and Vaping

- Smoking is a leading cause of death and disability in NSW
- If you quit before:
  - **age 35**
    similar life expectancy to a non-smoker
  - **age 50**
    you ***halve your risk of dying*** before you turn 65

Smoking and Vaping



Support for quitting

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BMJ Open

Visit this Journal BMJ

BMJ Open. 2016; 6(6): e011045.
Published online 2016 Jun 9. doi: 10.1136/bmjopen-2016-011045

PMCID: PMC4908897
PMID: 27288378

Journal Article

Estimating the number of quit attempts it takes to quit smoking successfully in a longitudinal cohort of smokers

Michael Chaiton,[1,2] Lori Diemert,[1] Joanna E Cohen,[1,2,3] Susan J Bondy,[1,2] Peter Selby,[1,2] Anne Philipneri,[1] and Robert Schwartz[1,2]

▸ Author information ▸ Article notes ▸ Copyright and License information PMC Disclaimer

Support for quitting

- May take **30 or more** quit attempts before being successful
- Relapse is common
- More successful with help i.e. nicotine patches, counselling

Support for quitting

- GP Support
- NSW Quitline 137848 (13 QUIT) icanquit.com.au
- CS Health Quit Smoking Initiative

Physical activity and lung health

Eur Respir J. Author manuscript; available in PMC 2023 Aug 4.

PMCID: PMC9259762

Published in final edited form as:

NIHMSID: NIHMS1801341

Eur Respir J. 2022 Aug; 60(2): 2101821.

PMID: 34996832

Published online 2022 Aug 4. doi: 10.1183/13993003.01821-2021

The association of lung function and pulmonary vasculature volume with cardiorespiratory fitness in the community

Jenna McNeill,[1,2] Ariel Chernofsky,[3,4,2] Matthew Nayor,[5] Farbod N Rahaghi,[6] Raul San Jose Estepar,[6] George Washko,[6] Andrew Synn,[7] Ramachandran S Vasan,[8] George O'Connor,[8] Martin G Larson,[3,4] Jennifer E Ho,[9,2] and Gregory D Lewis[5,2]

Physical activity and lung health

Less than 1 in 4 Australian adults meet the physical activity guidelines

Higher exercise capacity is associated with

- Higher FEV1
- Higher FVC
- Higher DLCO

Exercise for lung health

Exercise to make you short of breath builds exercise capacity and improves lung function.

- Swimming
- HIIT (High Intensity Intermittent Training)
- Dancing

- Breathe control exercises
  - Yoga, Pilates, Tai Chi

Rate of Perceived Exertion (RPE)

6	No exertion
7	
8	
9	
10	
11	Light
12	
13	Somewhat hard
14	
15	Hard (heavy)
16	
17	Very hard
18	
19	
20	Maximal exertion

Maintaining a Healthy Weight

CS Health

Published in final edited form as:

Expert Rev Respir Med. 2018 September ; 12(9): 755–767. doi:10.1080/17476348.2018.1506331.

The effect of obesity on lung function

Ubong Peters and **Anne E. Dixon***

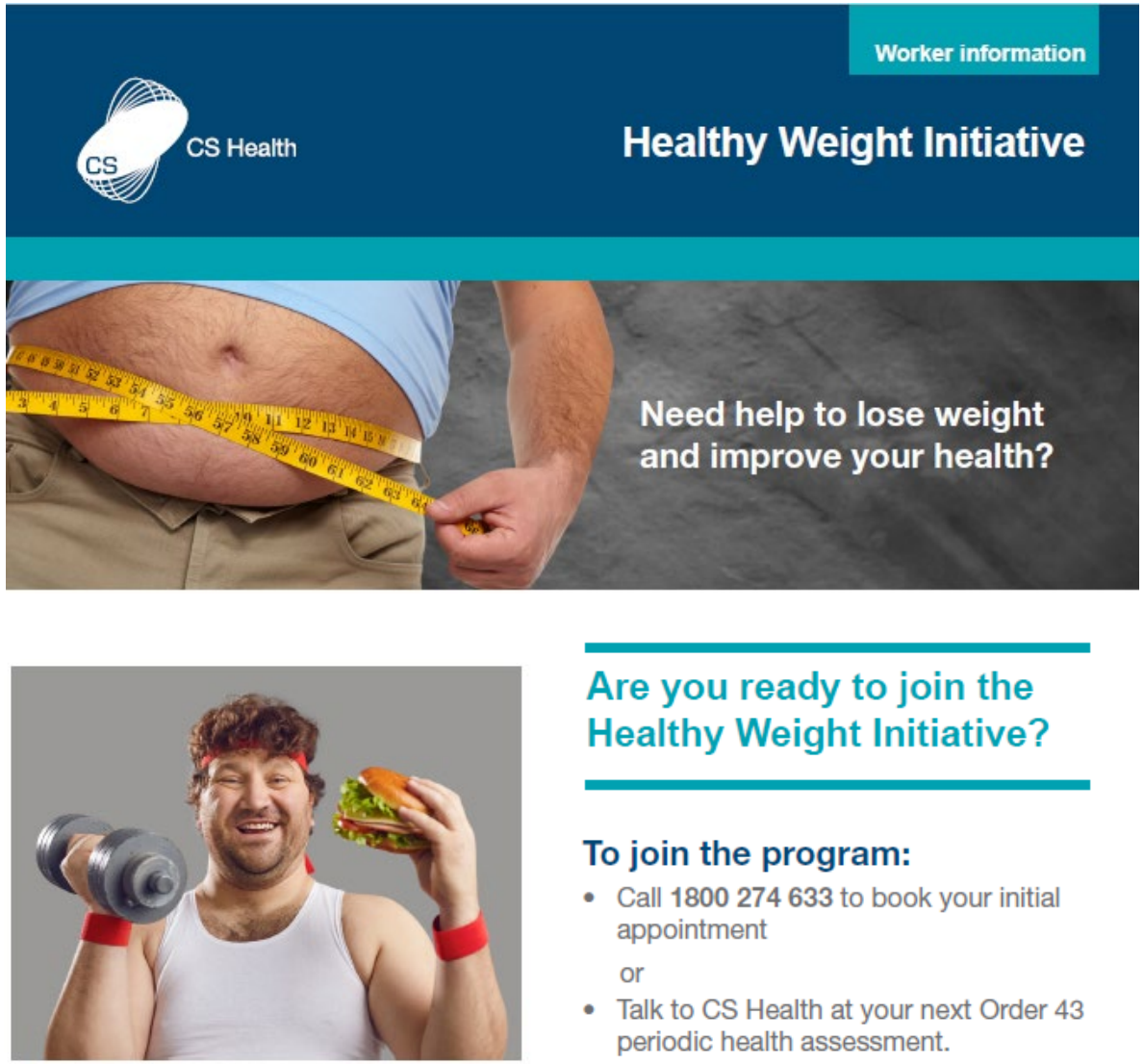
University of Vermont Larner College of Medicine, Burlington, Vermont.

Maintaining a Healthy Weight

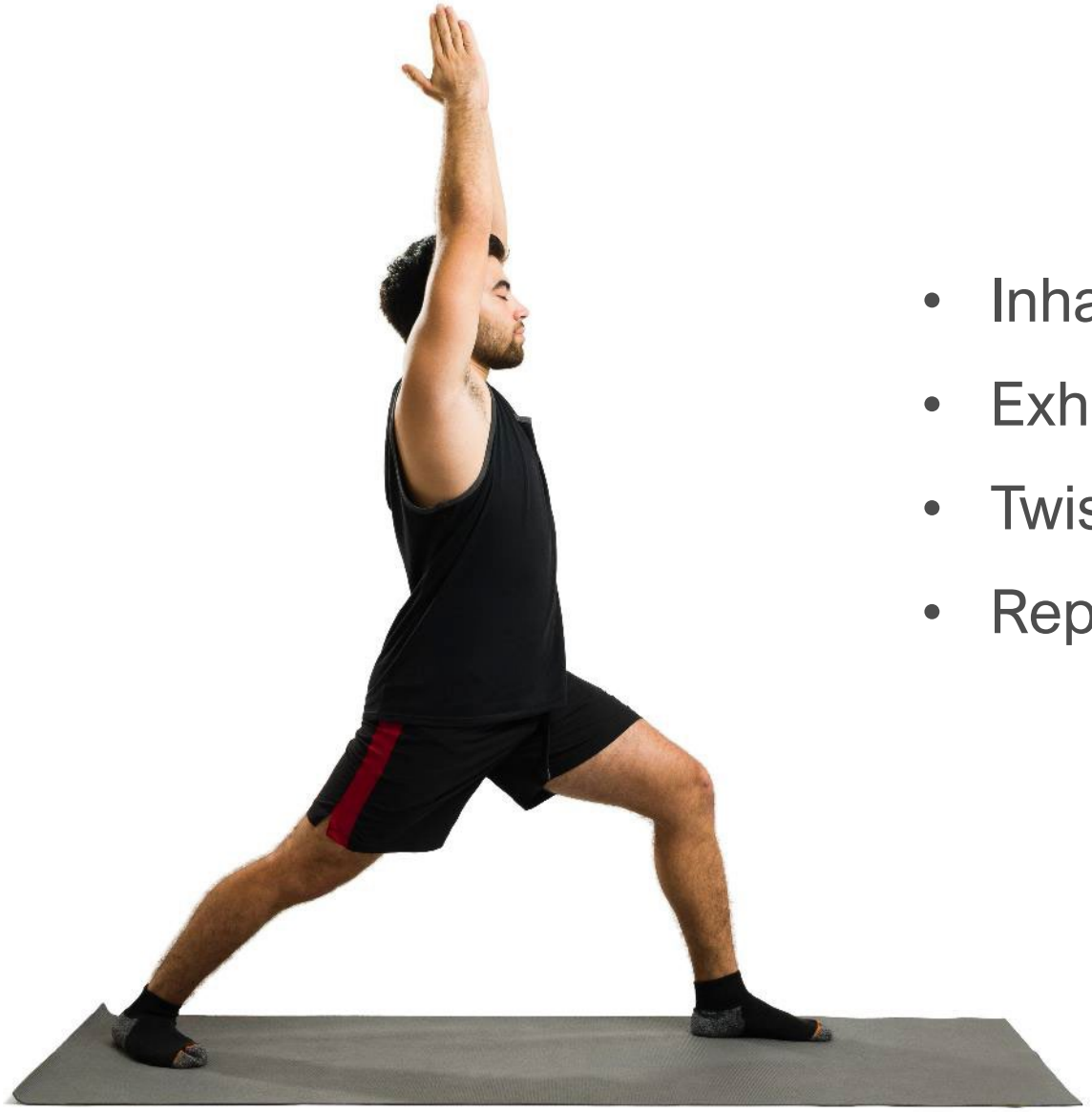
- Being overweight can affect your lungs
- Achieving a healthy weight can improve lung function

Support for a Healthy Weight

- Dietary Guidelines
  eatforhealth.gov.au
- GP Support
- CS Health Healthy Weight Initiative



Standing Breathing Exercise



- Inhale and lift your arms above your head
- Exhale and lower your arms
- Twist trunk to stretch rib cage
- Repeat

Lung health devices

Take home messages

- Your lungs are checked every periodic health assessment.
- Smoking, being overweight and being unfit can harm your lungs and can compound exposure to dust.
- You can help your lungs by:
  - **Quitting smoking**
  - **Exercise** that makes you puff **to improve your fitness**
  - Keep a **healthy weight**
  - **Breathing exercises** if you have lung disease

Respiratory Health Standard Resources

CS Health

CS Health