Lung Disease and Gas Exchange

Fibrosis thickens alveolar walls and reduces stretch; emphysema destroys alveolar walls and elastic recoil; both reduce gas exchange or ventilation.

Healthy alveolus compared with fibrosis and emphysema



healthy
short distance, big area

fibrosis
thicker wall, less stretch

emphysema
less area, less recoil

Key terms

fibrosis	scar tissue thickens the alveolus walls, so the diffusion distance increases and the lungs stretch less.
emphysema	alveolus walls are destroyed, so alveoli merge and surface area falls.
elasticity / elastic recoil	the ability of the lungs to stretch and spring back; lost in emphysema.
diffusion distance	how far gases travel across the alveolar wall; longer in fibrosis.
ventilation rate	the volume of air breathed per minute; reduced when lungs cannot stretch or recoil.
asthma, TB, lung cancer	other lung diseases that reduce gas exchange or ventilation in different ways.

I can...

- [ ] Interpret information on the effects of lung disease on gas exchange and/or ventilation

EXAM TRAP

"Lungs are damaged" earns nothing. Name the change (thicker wall, destroyed walls, loss of elasticity) and its effect on diffusion distance, surface area or ventilation, as the question asks.

4 marks: what earns them

1. Fibrosis: scar tissue thickens the alveolus wall, so the diffusion distance is greater / diffusion is slower
   Not: lungs are damaged; less oxygen gets in with no cause; wall is thinner
2. Fibrosis: lungs are less elastic / cannot stretch, so less air is breathed in (ventilation reduced)
   Not: lungs do not work; less oxygen alone
3. Emphysema: alveolus walls are destroyed / alveoli merge, so the surface area for gas exchange is smaller
   Not: alveoli burst with no effect on area; thicker walls
4. Emphysema: loss of elastic recoil, so air is not forced out / less fresh air drawn in, so ventilation is reduced / concentration gradient is weaker
   Not: lungs lose elasticity with no consequence stated; ventilation reduced with no mention of recoil or elasticity

Remember

Fibrosis: thick wall, long distance.
Emphysema: walls lost, area lost.
Less elastic means poorer ventilation.

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