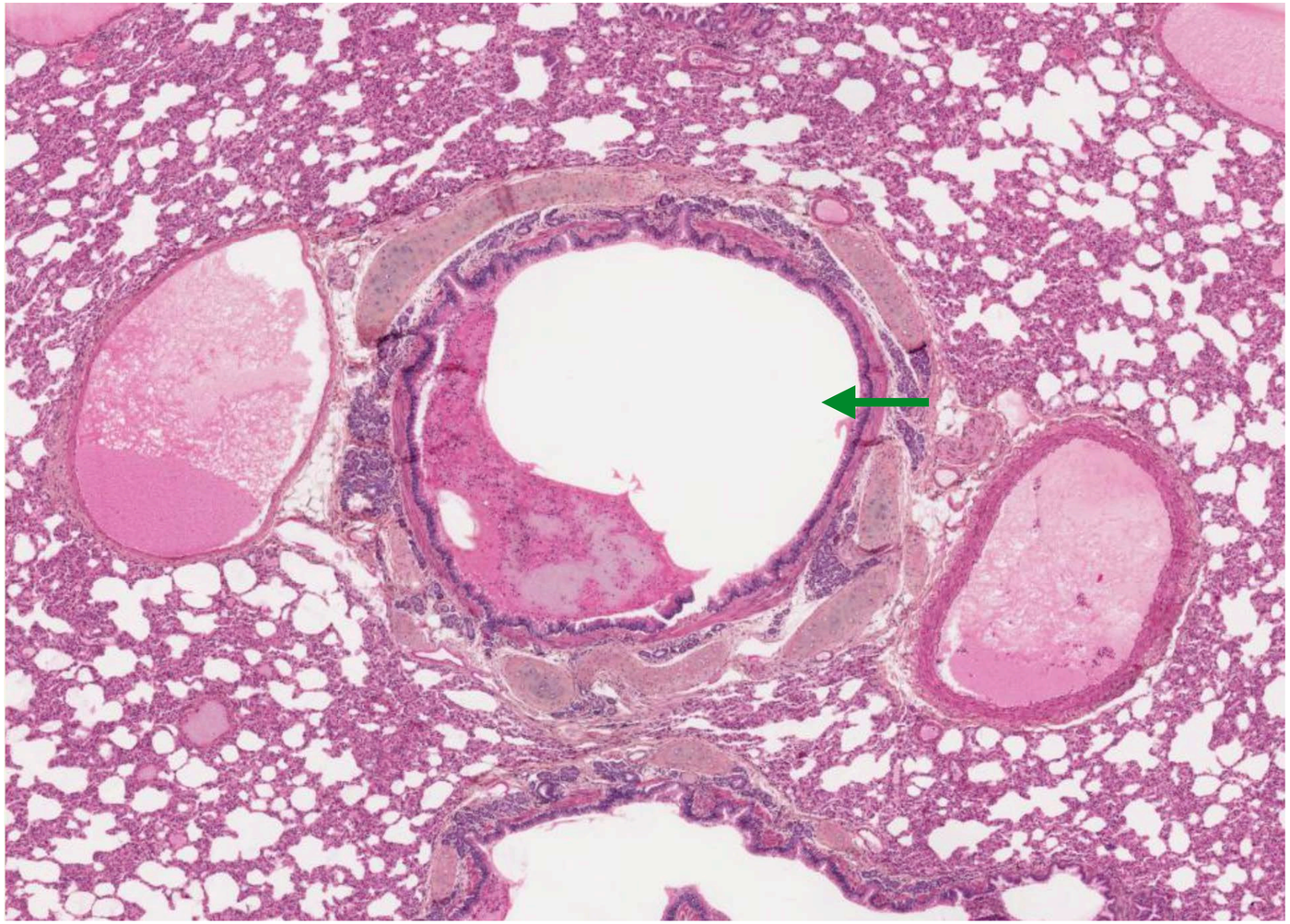
Respiratory System

Readiness Assessment Questions

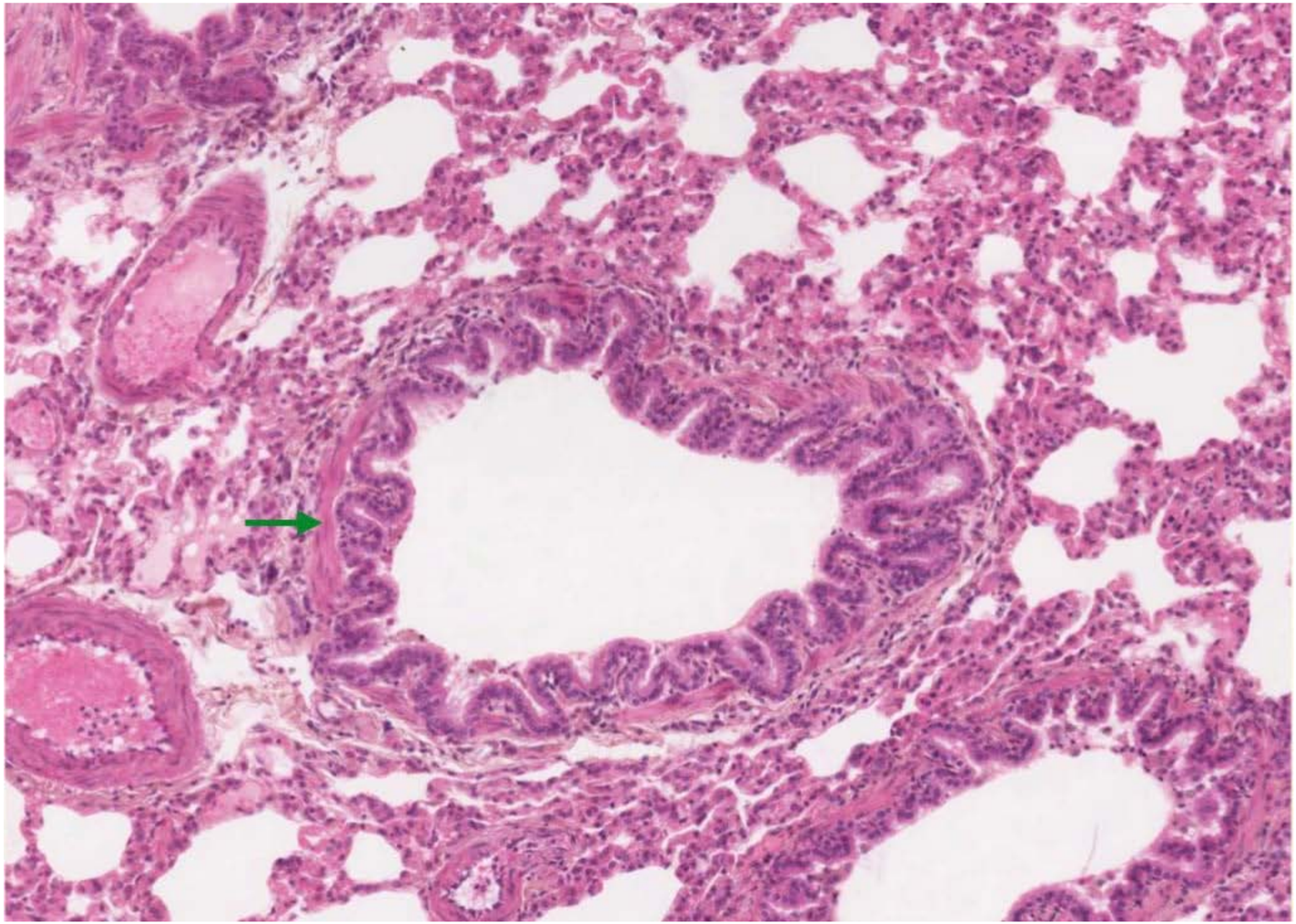
1. Which activity is associated with this segment of the respiratory tract (arrow)?

- Mucous production
- Gas exchange
- Surfactant production
- Delivery of deoxygenated blood



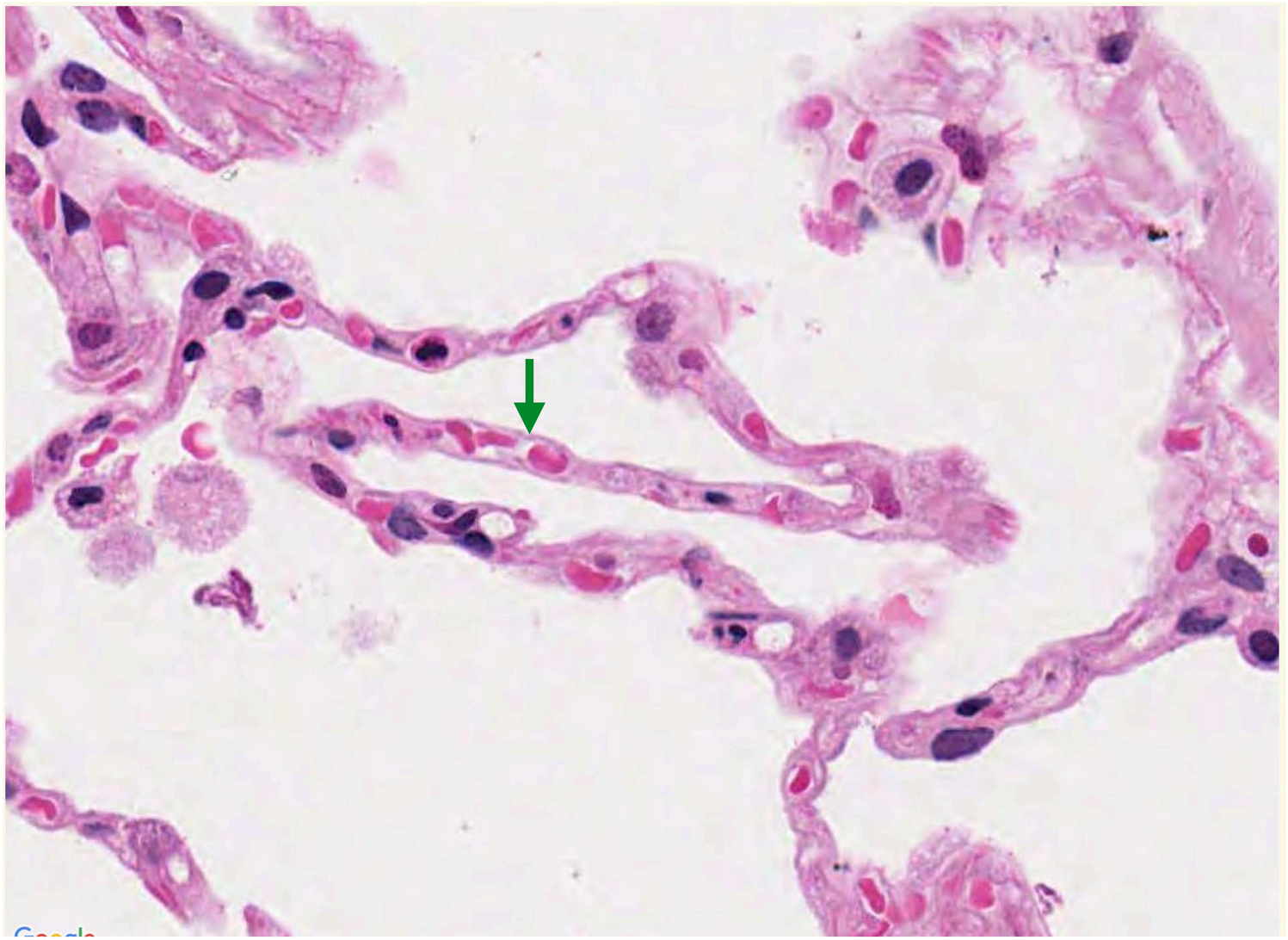
2. How would hypertrophy or hyperplasia of this tissue affect the function of the lung?

- Increase clearance of foreign particles
- Decrease rate of gas exchange
- Increase airway resistance
- Decrease airway resistance



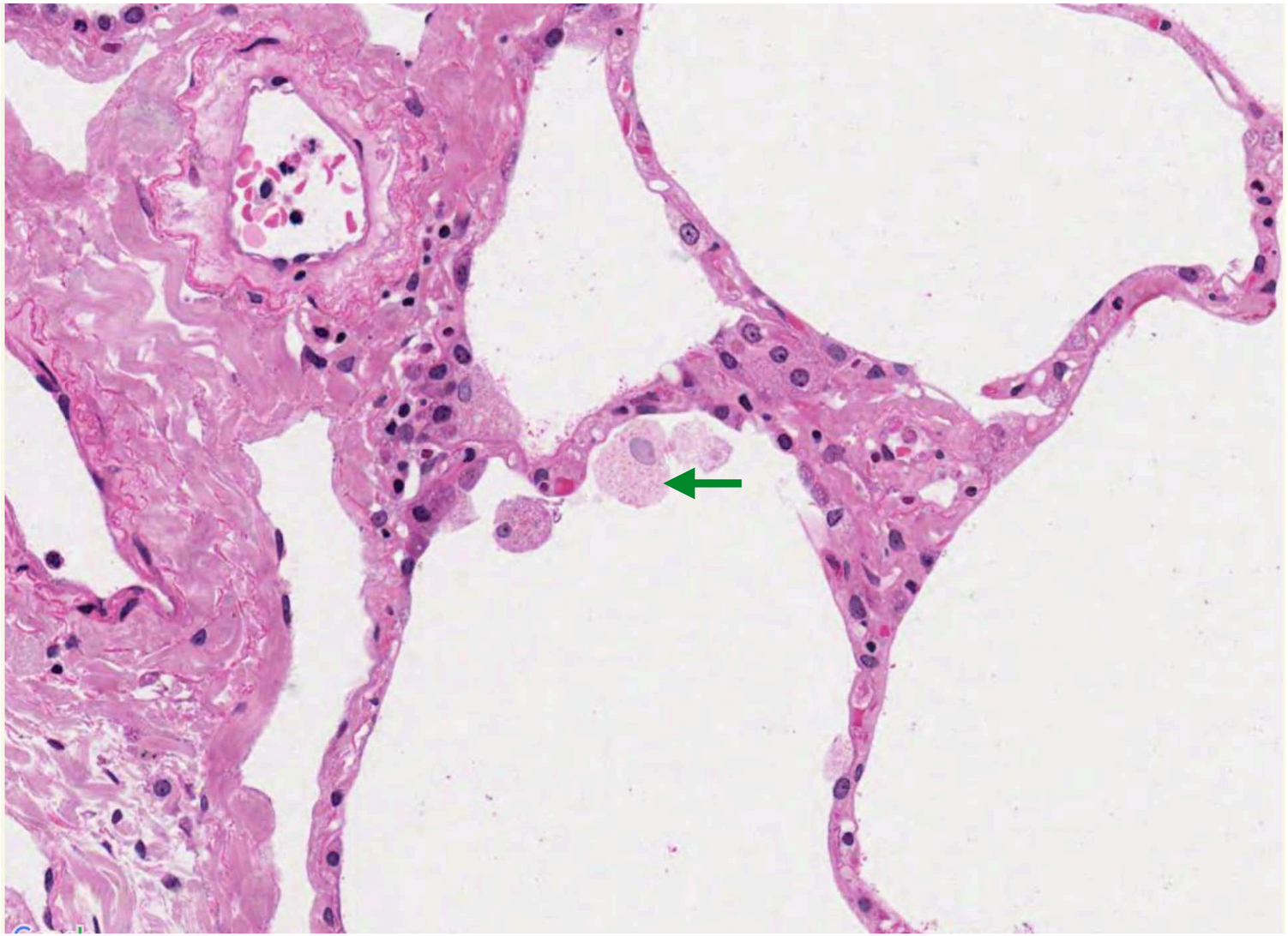
3. How would a thickening of this region affect the performance of the lung?

- Increase pulmonary blood pressure
- Increase compliance
- Decrease rate of gas exchange
- Decrease fluid absorption



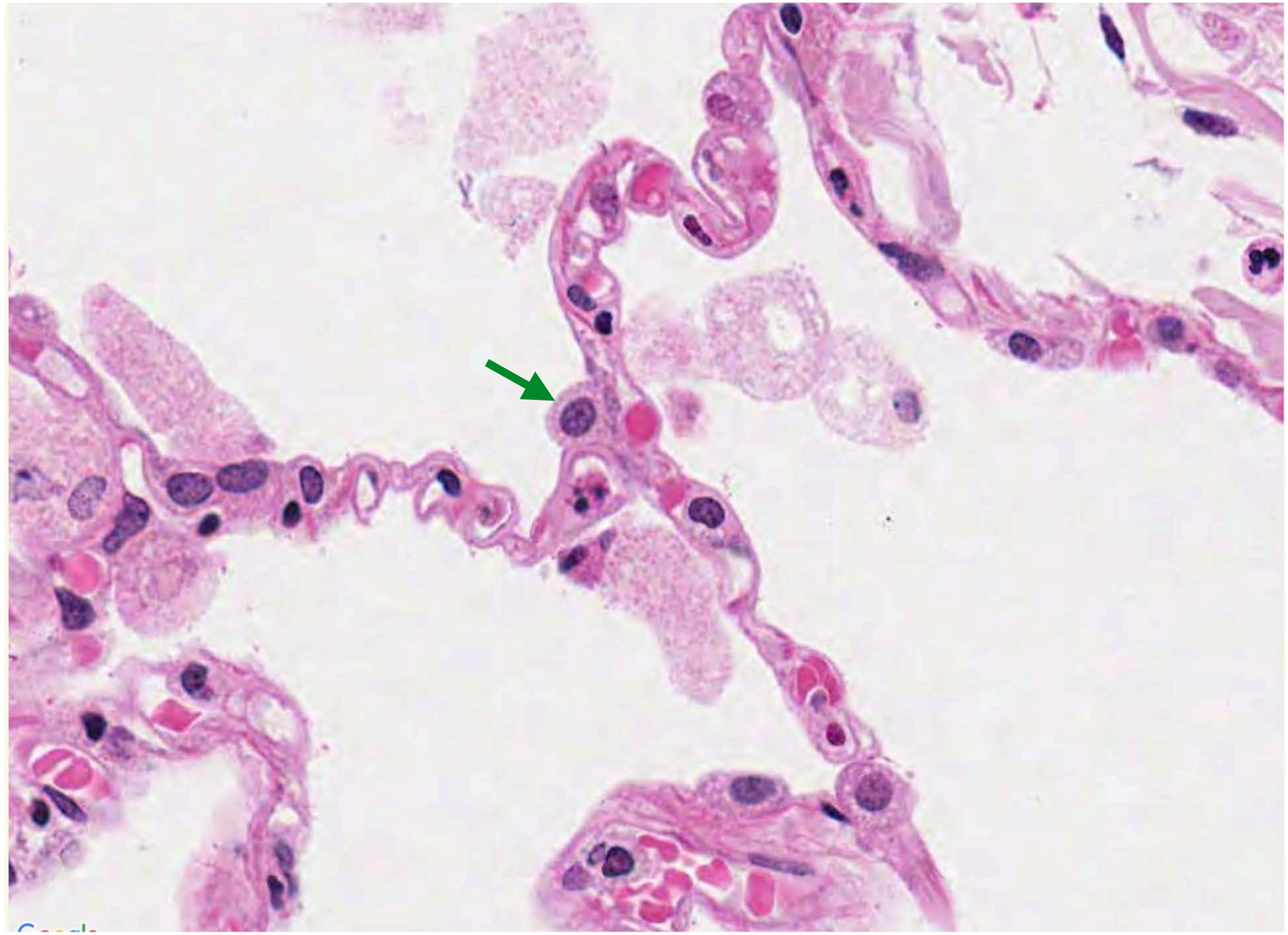
4. What is the primary function of this cell?

- Produce surfactant
- Engulf large particulate matter
- Form part of air-blood barrier
- Synthesize collagen



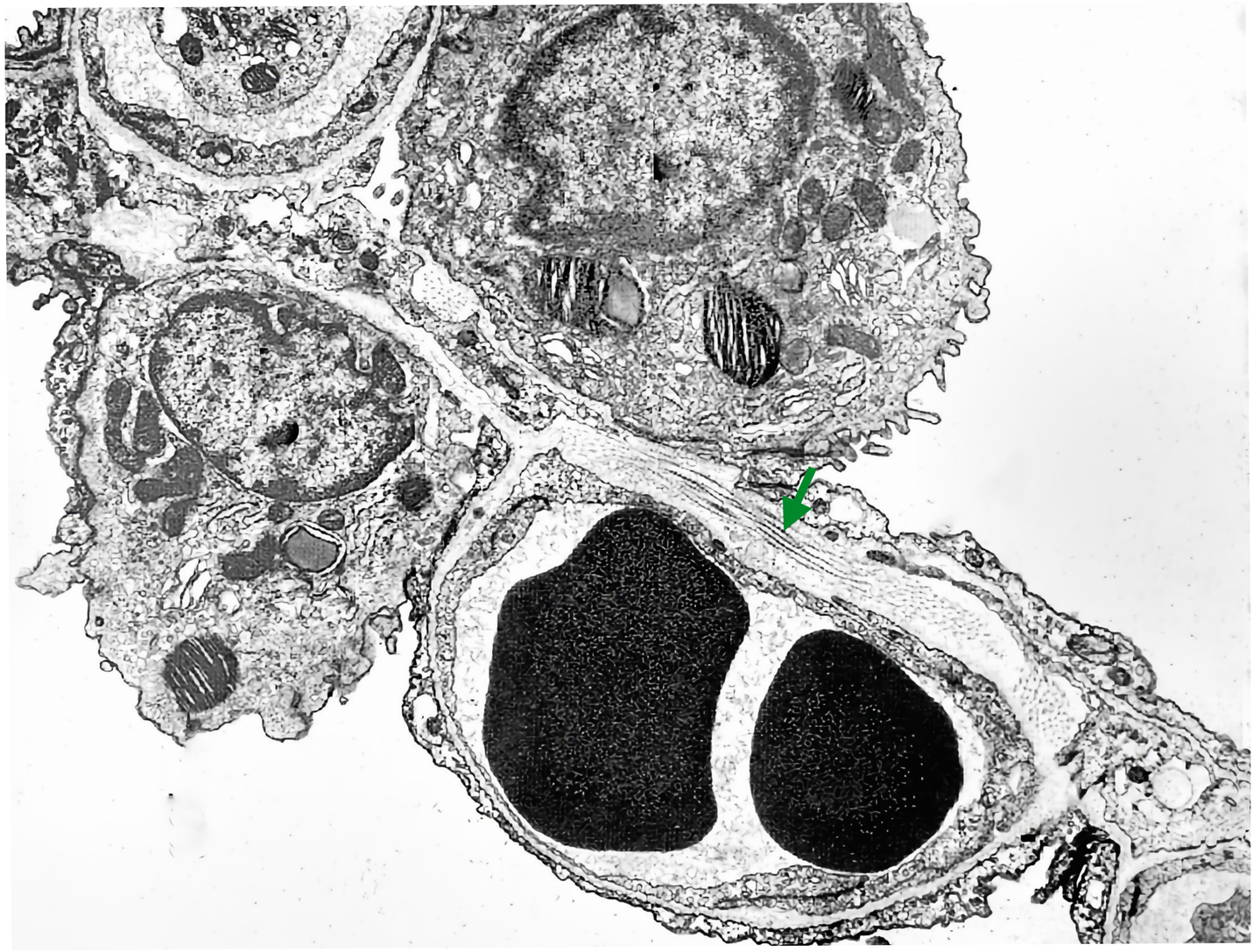
5. Which alveolar property would be **least** impacted by a loss of this type of cell?

- Gas exchange
- Clearance of foreign particles
- Alveolar tension
- Repair of tissue damage



6. How would an increase in this material affect the lung?

- Increase the rate of gas exchange
- Decrease the rate of airflow
- Decrease lung compliance
- Increase alveolar fluid



Application Questions

A 54-year-old patient visits your office complaining of shortness of breath during light to moderate activity. The patient also reports a persistent cough that is usually worse in the morning. The patient was a moderate smoker who started smoking in their 20s but recently quit. They started an exercise program but had trouble participating due to difficulty breathing while exercising. The patient's blood pressure is 134/72 mm Hg, heart rate is 72 bpm, and SpO_2 is 94%. A physical exam is unremarkable. Parameters from a blood test are within normal ranges except for cholesterol which is 252 mg/dL and alpha-1 antitrypsin with is 70 mg/dL (normal 100 - 220 mg/dL). The results from a spirometry test show a FEV_1/FVC (forced expiratory volume in 1 sec / forced vital capacity) of 0.4 (normal is around 0.8). A biopsy of the lung reveals the images below..

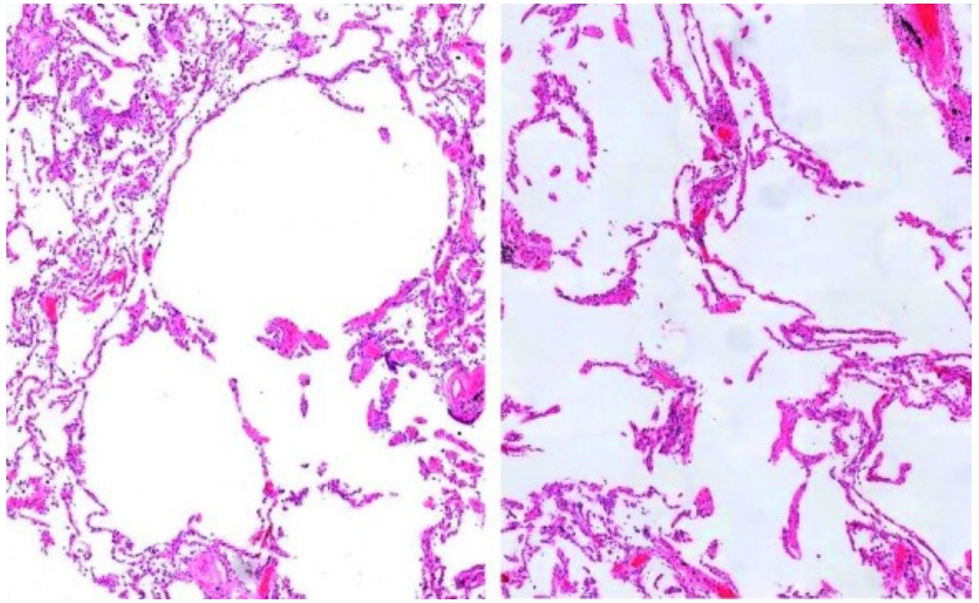
Which drug or treatment is the best choice to relieve the patient's difficulty breathing while exercising?

A. Beta-1 agonist (e.g., dobutamine)

B. Beta-2 agonist (e.g., albuterol)

C. Glucocorticoid (e.g., fluticasone)

D. Surfactant



A 65-year-old patient presents with dyspnea and a persistent cough. The patient recently retired from a long career with Cal Fire where they spent most of their career battling forest fires in the western states.. The patient's blood pressure is 144/78 mm Hg, heart rate is 68 bpm, and SpO2 is 97%. A spirometry test measures a FEV1/FVC of 0.9 but total forced vital capacity is 68% of normal. A biopsy of the alveolar space reveals the images below. The inset is at higher magnification.

Which drug would best slow progression of disease in the patient?

A. Beta-2 agonist

B. Glucocorticoid (e.g., prednisone)

C. Anti-fibrotic (e.g., pirfenidone)

D. Anticholinergic (e.g., tiotropium)