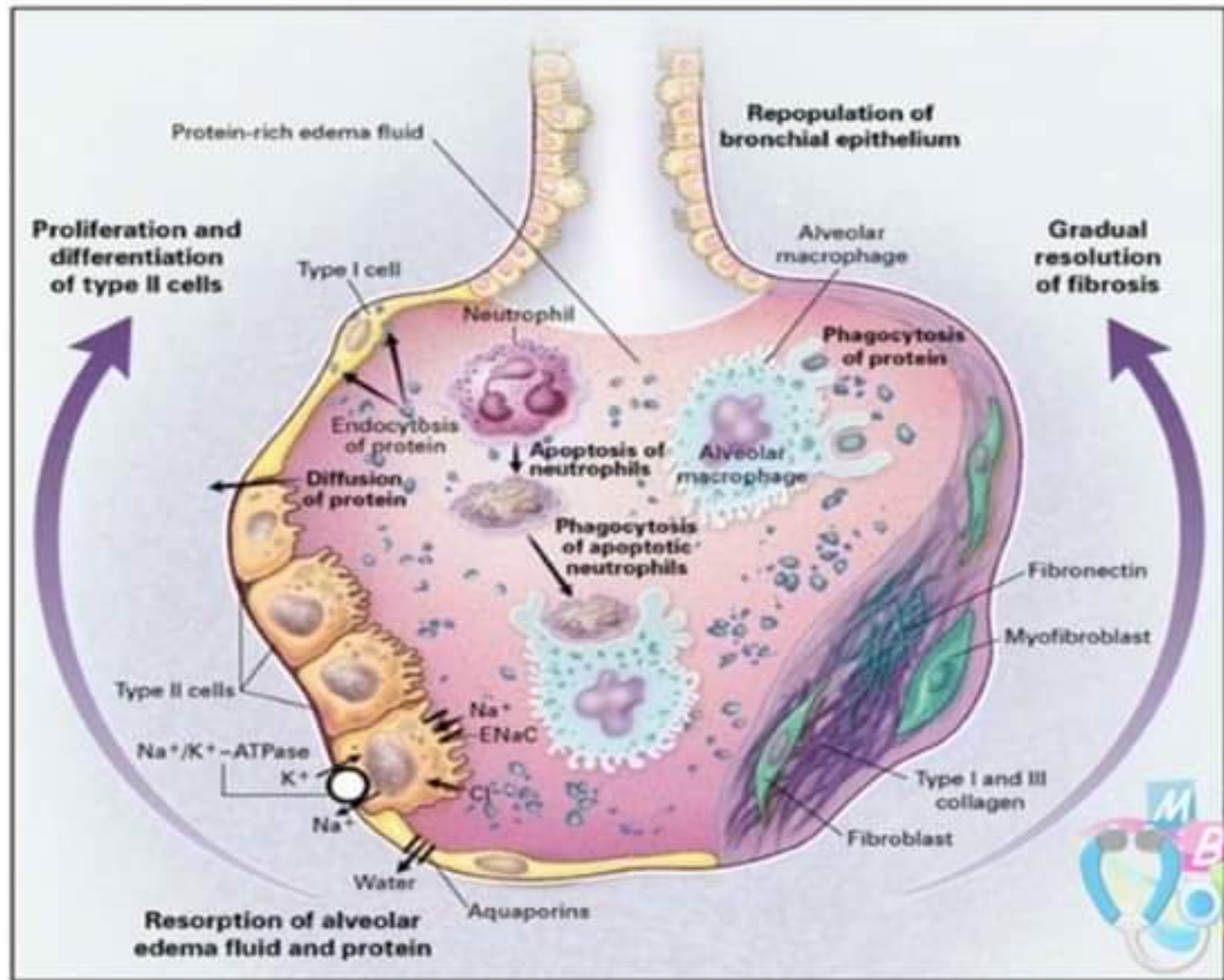


Fb/Nurse-Info

Acute Respiratory Distress Syndrome





ARDS Morphology

Macroscopy

- Dark red
- Air less
- Firm
- Heavy





ARDS Microscopy

Acute phase

- Capillary congestion
- Necrosis of alveolar epithelial cells
- Pulmonary Oedema – interstitium and alveolar
- Hemorrhage
- Neutrophil accumulation – In sepsis
- Hyaline membrane lining the distended alveoli – Most characteristic

(Hyaline membrane – fibrin rich edema fluid admixed with remnants of necrotic epithelial cells.



ARDS Microscopy

Acute phase

- Capillary congestion
- Necrosis of alveolar epithelial cells
- Oedema
- Hemorrhage
- Neutrophil accumulation
- Hyaline membrane

MORPHOLOGY

1. Acute phase of ARDS, Microscopic examination
 1. Capillary congestion
 2. Necrosis of alveolar epithelial cells,
 3. Interstitial and intra-alveolar edema and hemorrhage
 4. With sepsis collections of neutrophils in capillaries
 5. The most characteristic finding is hyaline membrane particularly lining the distended alveolar ducts
- Such membranes consist of fibrin-rich edema admixed with remnants of necrotic epithelial cells



brightly eosinophilic hyaline membranes

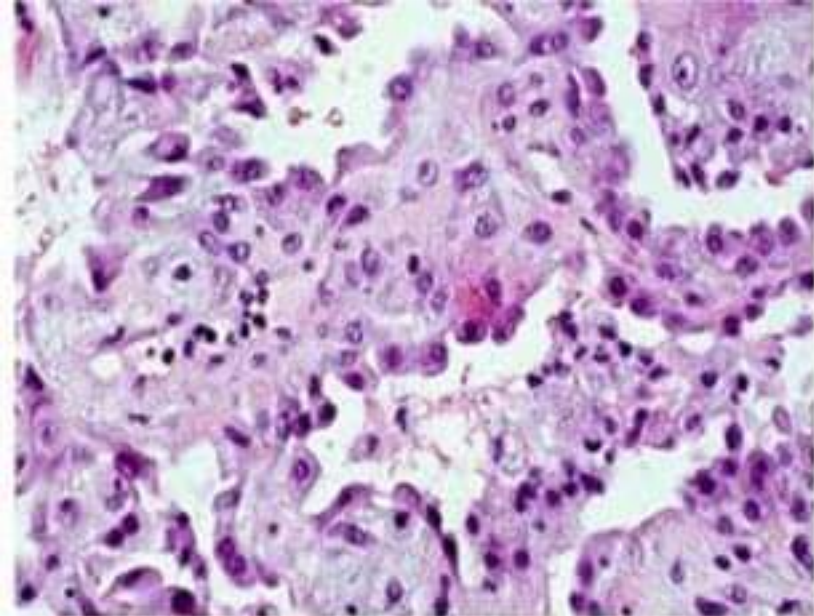
regenerative hyperplasia of Type 2 pneumocytes (examples)

ARDS Microscopy

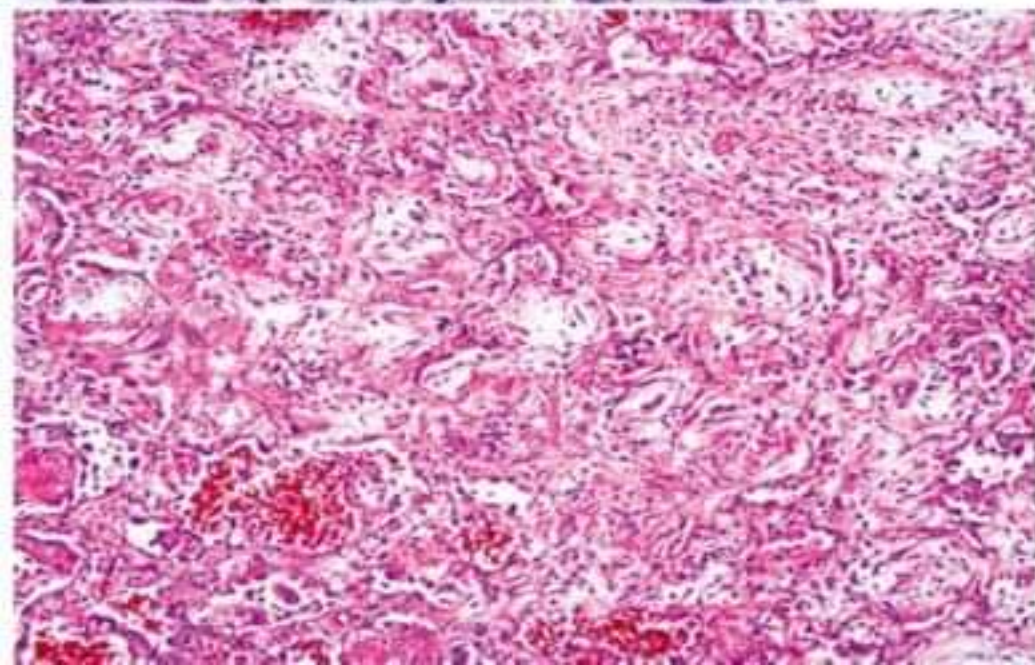
Organizing phase

- Proliferation of type 2 pneumocytes
- Organization of the fibrin exudate
- Intraalveolar fibrosis
- Thickening of the alveolar septa – proliferation of interstitial cells and deposition of collagen





Proliferation of type II pneumocytes

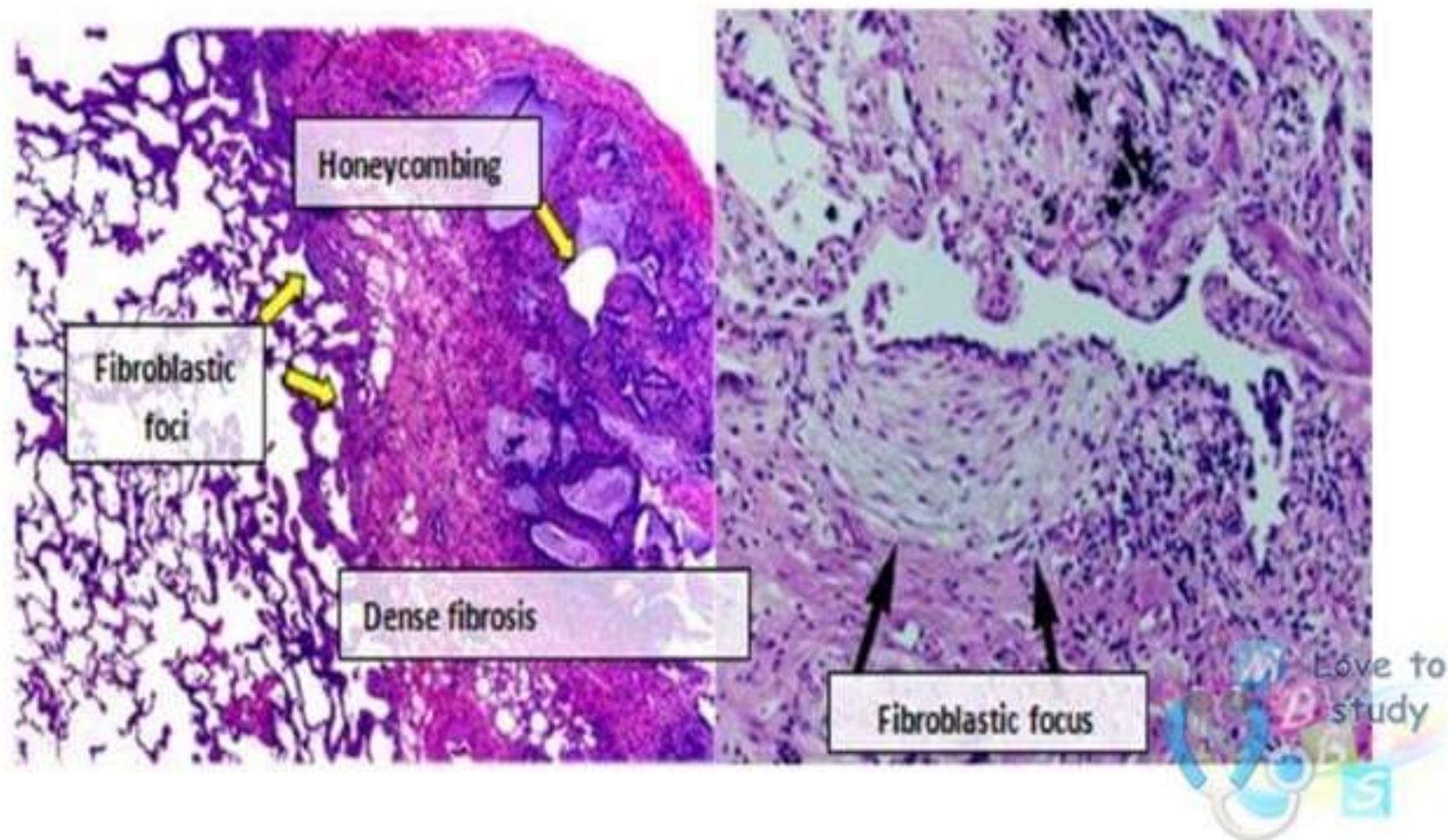


 Love to study
Proliferation of fibroblasts

- Honeycomb lung



Honeycomb lung



Acute Respiratory Distress syndrome

*It is a medical condition occurring in critically ill patients characterized by widespread inflammation in the lungs. **ARDS** is not a particular disease, rather it is a clinical phenotype which may be triggered by various pathologies such as trauma, pneumonia and sepsis.*

- Damage to vascular endothelium
- Damage to alveolar epithelial cells

} Diffuse



ARDS outcomes

- Death – 60- 40%
- Resolution - rare
- Fibrosis – Honey comb lung



- Oedema due to microvascular and alveolar epithelial injury
 - * Injury to alveolar lining cells
 - * Injury to alveolar endothelium

- Followed by
 - localized pneumonia
 - Generalized – Acute respiratory distress syndrome (ARDS)



Neonatal respiratory distress syndrome - READ

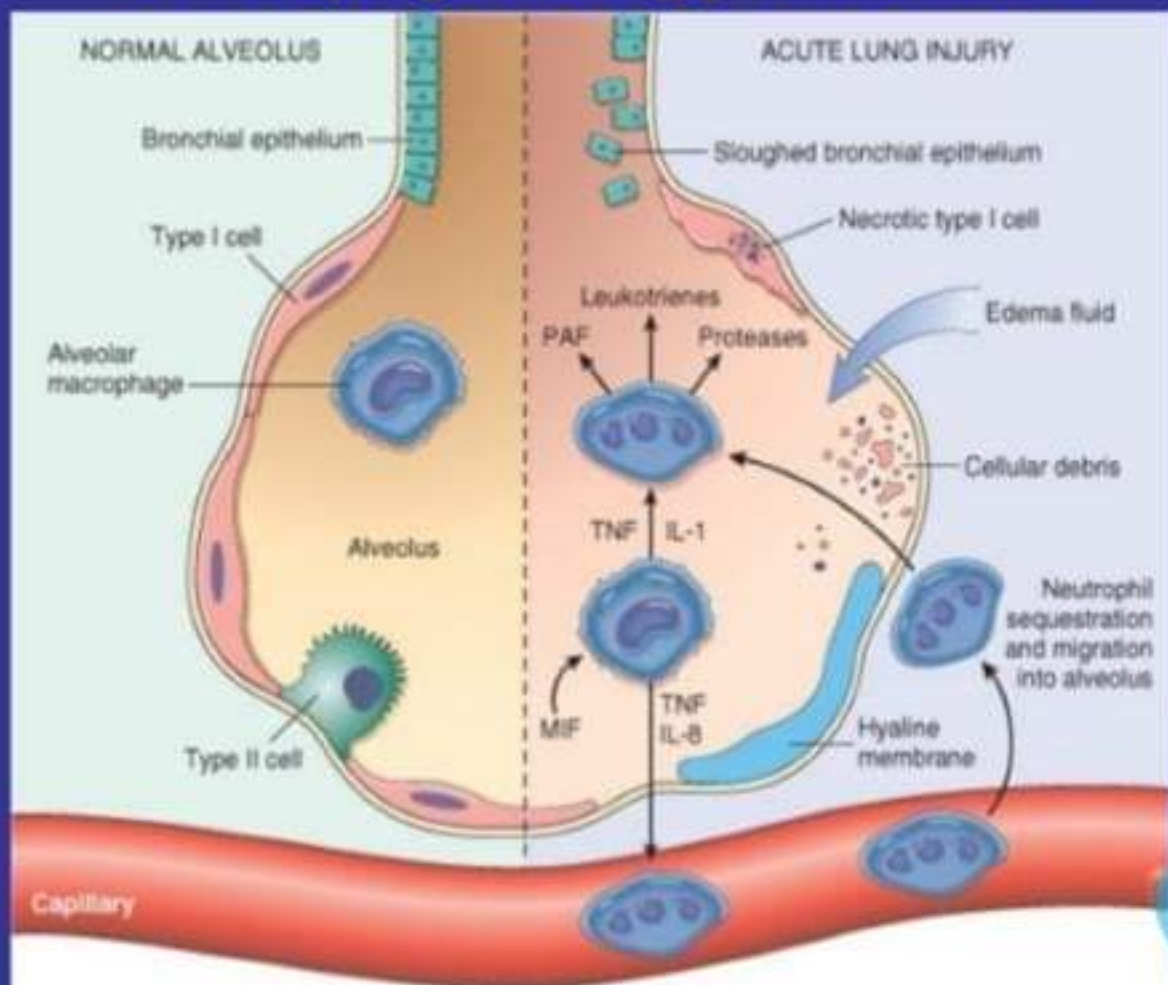


Causes for ARDS

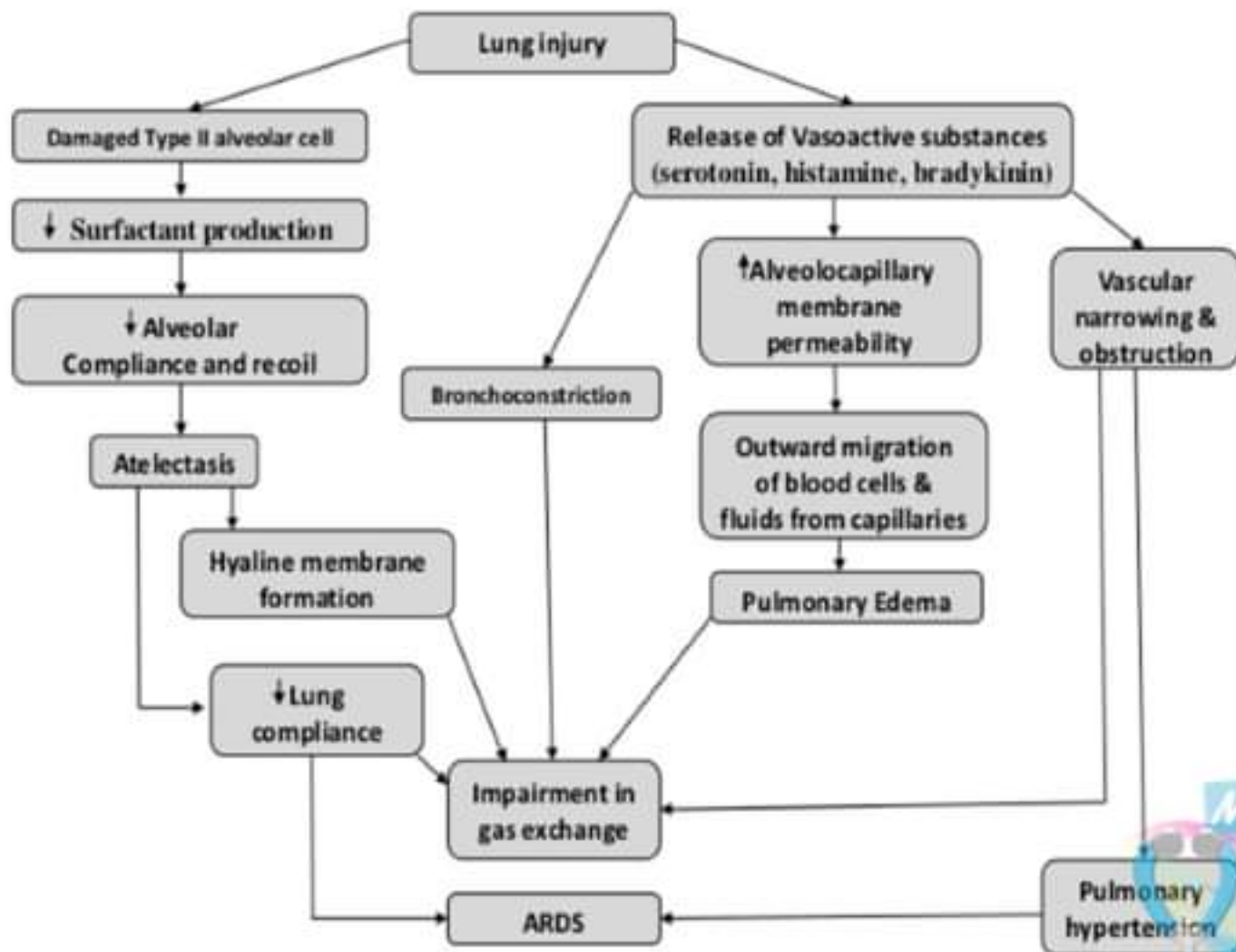
Respiratory (direct)	Non-Respiratory (indirect)
Aspiration	Blood transfusion reactions
Near-drowning	Burns (massive)
O ₂ toxicity	DIC
Pneumonia (all types)	Drug abuse
Post-pneumonectomy	Fat embolism
Raised ICP (head injury)	Pancreatitis (acute)
Smoke inhalation	Prolonged cardiopulmonary bypass
Thoracic irradiation	Sepsis
Trauma (lung contusion/ injury)	Shock (severe and prolonged)
Vasculitis	



Pathophysiology of ARDS



SCHEMATIC REPRESENTATION OF PATHOPHYSIOLOGY OF ARDS



Acute respiratory distress syndrome (ARDS)

- microscopically - proliferative phase
 - pneumocytes II proliferation + hyaline membranes phagocytosis (macrophages)
 - P II differentiate into pneumocytes I
 - interstitial fibroblasts proliferation → interstitial fibrosis = honeycomb lung



ARDS

Pathological Stages

- Initial "exudative" stage-diffuse alveolar damage within the first week
- "Proliferative" stage-resolution of pulmonary edema, proliferation of type II alveolar cells, squamous metaplasia, interstitial infiltration by myofibroblasts, and early deposition of collagen.
- Some patients progress to a third "fibrotic" stage, characterized by obliteration of normal lung architecture, diffuse fibrosis, and cyst formation



ARDS

Pathological Stages

- There are three stages
 1. Initial **exudative stage**
 2. **Proliferative stage**
 3. Some progressed to **fibrotic stage**



1. Exudative stage

- * Diffuse alveolar damage seen in the first week

2. Proliferative stage

- * Proliferation of type I pneumocytes + phagocytosis of hyaline membrane by macrophages.
- * Pneumocyte type II differentiate into type I.
- * Interstitial fibroblast proliferation leads to

3. Fibrotic stage

- * Fibroblast proliferation leads to fibrosis of the interstitium = Honey comb lung (loss of lung alveolar architecture – cyst formation due to fibrosis encasing the alveoli.)

