**Definition**

Diffuse pulmonary and alveolar hemorrhages from various causes.

- **Epidemiology**
  The most common cause is Goodpasture syndrome (affects young adults, more common in men than women by a ratio of 9:1) • Less common causes include collagen vascular diseases (more common in women than men), idiopathic disease (pulmonary hemosiderosis), hemorrhagic diathesis, and diffuse coagulation disorder.

- **Etiology, pathophysiology, pathogenesis**
  Bleeding into the alveoli due to immune-mediated capillary damage (antibodies to glomerular and alveolar basement membranes in Goodpasture syndrome) or due to nonimmune-mediated capillary damage • Leads successively to recurrent hemorrhage, hemosiderin deposits, and fibrosis.

**Imaging Signs**

- **Modality of choice**
  CT is preferable to plain radiography.

- **Radiographic findings**
  Nodular, confluent to patchy, edemalike shadows • Predominantly basal and central • In the acute stage there is alveolar shadowing • In the subacute stage there is an interstitial reticulonodular pattern • Resolves within 1–2 weeks • Chronic stage (recurrent hemorrhages) leads to fibrosis.

- **CT findings**
  Findings in the acute stage include ill-defined acinar nodules, circumscribed ground-glass opacities, or diffuse bilateral consolidation that spares the pulmonary periphery • The subacute stage includes micronodules and septal thickening • In the chronic stage there are signs of fibrosis.

- **Pathognomonic findings on CT**
  Acute nodular or interstitial shadowing that rapidly resolves spontaneously.

**Clinical Aspects**

- **Typical presentation**
  Hemoptysis (in 80% of cases but not invariably), dyspnea, cough, and iron-deficiency anemia • Goodpasture syndrome also includes hematuria, renal insufficiency, hypertension • Bronchoalveolar lavage shows hemosiderin-laden macrophages.

- **Therapeutic options**
  Treatment of the underlying disorder • Immunosuppressives • Glucocorticoids • Plasmapheresis.

- **Course and prognosis**
  Variable • Depend on the underlying disorder.

- **What does the clinician want to know?**
  Diagnosis and differential diagnosis • Stage • Follow-up.
Fig. 7.6 Goodpasture syndrome in a 35-year-old man. The CT scans show bilateral, homogeneously dense, ground-glass opacification that has spared only the subpleural parenchyma.
**Differential Diagnosis**

**Pulmonary hemorrhage**
- Goodpasture syndrome: antibodies to basement membrane
- Wegener granulomatosis: ANCA-positive involvement of the paranasal sinuses
- Churg–Strauss syndrome: asthma, blood eosinophilia
- Systemic lupus erythematosus: ANCA-positive
- Polyan giitis: pulmonary and renal syndrome, fever, myalgia, joint pain, 80% of patients are ANCA-positive
- Idiopathic hemosiderosis: occurs in children, no renal involvement, no antibodies

**Pulmonary edema**
- (cardiac, not cardiac)
  - Hemoptysis rare
  - Associated pleural effusion

**Interstitial pneumonia**
- Fever, inflammation parameters
- No hemoptysis
- No renal involvement

**Tips and Pitfalls**

Can be misinterpreted as pulmonary edema or atypical pneumonia.