Normal Chest X-ray:

1. Lungs

- **Appearances**: Clear, no abnormal opacities (no signs of infection, fluid, mass, or collapse).
- **Lung fields**: Equal in size, with visible vascular markings extending to the periphery.
- **Costophrenic angles**: Sharp and clear (blunting could indicate fluid).
- **No consolidation**, **nodules**, or **masses**.

2. Heart

- **Size**: Should be less than half the width of the chest on a PA

(posteroanterior) film — called the **cardiothoracic ratio**.

- **Shape**: Normal borders; no enlargement or abnormal contour.

3. Mediastinum and Trachea

- **Trachea**: Should be central.
- **Mediastinum**: Normal width, no signs of widening (could indicate masses or bleeding).
- **Aortic arch** and other vessels should be normal for age.

4. Diaphragm

- **Right diaphragm** is usually slightly higher than the left.
- Should have a smooth, domed shape.

- No signs of elevation or flattening (flattening may suggest hyperinflation like in COPD).

5. Bones and Soft Tissues

- **Ribs, clavicles, spine**: Intact, no fractures or lesions.
- **Soft tissues**: No swelling, subcutaneous emphysema, or abnormal densities.

6. Pleura

- **No pleural thickening**, **effusion** (fluid), or **pneumothorax** (air).

Pneumonia can be caused by different types of germs:

1. Bacteria

1. Streptococcus pneumoniae (Pneumococcus)

- **Most common cause** of bacterial pneumonia worldwide.
- Often follows a **cold or flu**, when the body is weak.
- Can cause **lobar pneumonia** (affecting one lobe of lung).
- **Symptoms**: sudden fever, chills, chest pain, productive cough with **rust-colored sputum**.
- Preventable by **pneumococcal vaccine** (PCV13, PPSV23).

Causes / Risk Factors

- Caused by **Gram-positive diplococcus** *Streptococcus pneumoniae*.
- Common after **viral infections** (cold, influenza).
- Higher risk in:
  - Elderly (>65 years)
  - Children <5 years
  - Patients with chronic illness (COPD, diabetes, heart disease)
  - Immunocompromised (HIV, cancer, post-surgery)
  - Alcoholics, smokers

Symptoms

- Sudden **high fever & chills**
- **Sharp chest pain** (pleuritic)
- **Productive cough** with **rust-colored sputum** (classic sign)
- Shortness of breath, rapid breathing
- Fatigue, body weakness

- In severe cases: confusion (elderly), sepsis, low blood pressure

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Treatment

- **Antibiotics** (first line):
  - **Amoxicillin** or **Penicillin G** (if no resistance).
  - **Macrolides** (Azithromycin, Clarithromycin) if resistant or allergic.
  - **Cephalosporins** (Ceftriaxone, Cefotaxime) in hospitalized patients.
  - **Fluoroquinolones** (Levofloxacin, Moxifloxacin) in severe/resistant cases.
- **Supportive care**:
  - Oxygen therapy if breathing difficulty.
  - IV fluids for dehydration.
  - Paracetamol for fever/pain.

- **Prevention**:
  - **PCV13** (children, immunocompromised, elderly).
  - **PPSV23** (elderly and high-risk adults).

2. Haemophilus influenzae

- Second most common cause (especially in children, elderly, and COPD patients).
- Causes **bronchopneumonia** (patchy infection in both lungs).
- **Symptoms**: fever, shortness of breath, productive cough.
- Can be prevented with the **Hib vaccine**.

Causes / Risk Factors

- Caused by **Gram-negative coccobacillus** *Haemophilus influenzae*.

- **Second most common cause** of bacterial pneumonia.
- More frequent in:
  - **Children** (especially unvaccinated)
  - **Elderly**
  - Patients with **COPD, asthma, or chronic lung disease**
  - **Smokers** and **immunocompromised** individuals
- Infection usually spreads from the **upper respiratory tract** down to the lungs.
- Can cause **bronchopneumonia** → patchy infection in multiple areas of both lungs.

◆ Symptoms

- **Fever and chills**
- **Productive cough** (sputum often yellow or green)
- **Shortness of breath / wheezing**

- **Chest pain** (sometimes)
- In children: may also cause **epiglottitis, meningitis, ear infections**
- Severe cases: can lead to **bacteremia (blood infection) or sepsis**

◆ Treatment

- **Antibiotics** (first choice):
  - **Amoxicillin-clavulanate**
  - **Cephalosporins** (Ceftriaxone, Cefotaxime)
  - **Macrolides** (Azithromycin, Clarithromycin)
  - **Fluoroquinolones** (Levofloxacin, Moxifloxacin) for resistant strains
- **Supportive care**:
  - Oxygen therapy (if breathing difficulty)
  - IV fluids for hydration

    - Fever control with paracetamol/ibuprofen
- **Prevention**:
    - **Hib vaccine** (Haemophilus influenzae type b vaccine) – protects children and high-risk adults from severe infections.

3. Staphylococcus aureus

- Often causes pneumonia **after influenza infection**.
- Can form **abscesses** or cause **necrotizing pneumonia** (lung tissue destruction).
- More common in **hospital-acquired pneumonia (HAP)** or patients on ventilators.

Causes / Risk Factors

- Caused by **Gram-positive cocci** *Staphylococcus aureus*.
- Often occurs **after influenza infection** (secondary bacterial pneumonia).
- Common in:
  - **Hospital-acquired pneumonia (HAP)**
  - **Ventilator-associated pneumonia (VAP)**
  - **Immunocompromised patients**
  - **IV drug users**
- Can spread through the bloodstream → **hematogenous spread** from skin infections, endocarditis, or abscesses.

Symptoms

- **High fever & chills**
- **Productive cough** (sputum may be purulent or blood-stained)
- **Shortness of breath**

- **Pleuritic chest pain**
- **Complications** (unique to S. aureus):
  - **Lung abscesses** (pus-filled cavities)
  - **Necrotizing pneumonia** (destruction of lung tissue)
  - **Empyema** (pus in pleural space)
  - Can progress to **sepsis**

Treatment

- **Antibiotics (based on sensitivity):**
  - **Methicillin-sensitive S. aureus (MSSA):**
    - Nafcillin, Oxacillin, or Cefazolin
  - **Methicillin-resistant S. aureus (MRSA):**
    - **Vancomycin** (IV)
    - **Linezolid** (alternative)
- **Supportive care:**
  - Oxygen therapy for hypoxemia
  - IV fluids, electrolyte balance

    - Drainage if abscess or empyema forms
- **Prevention:**
    - Good infection control in hospitals
    - Proper sterilization of ventilators & equipment

4. Klebsiella pneumoniae

- Common in **alcoholics, diabetics, or hospitalized patients**.
- Produces **thick, jelly-like sputum (currant jelly sputum)**.
- Causes severe, often **fatal** pneumonia with lung destruction.

Causes / Risk Factors

- Caused by **Gram-negative bacillus** *Klebsiella pneumoniae*.

- Found in the **normal gut flora**, but becomes pathogenic in weakened individuals.
- **High-risk groups:**
  - **Alcoholics** (classic association)
  - **Diabetics**
  - **Hospitalized patients** (especially ICU)
  - Patients on **ventilators**
  - People with **weakened immunity**
- Often associated with **hospital-acquired pneumonia (HAP)**.

◆ Symptoms

- **High fever & chills**
- **Productive cough** with **thick, sticky, blood-tinged sputum** → called **“currant jelly sputum”** (classic sign).
- **Severe chest pain & shortness of breath**

- Rapid progression to **lung necrosis & cavitation** (tissue destruction).
- Can lead to **empyema (pus in pleural cavity)** and **septicemia**.
- Higher **mortality rate** compared to other bacterial pneumonias.

◆ Treatment

- **Antibiotics (based on sensitivity testing, as resistance is common):**
  - **Carbapenems** (Imipenem, Meropenem) – often used for severe infections.
  - **Cephalosporins** (Ceftriaxone, Cefotaxime) – if sensitive.
  - **Aminoglycosides** (Gentamicin, Amikacin) – sometimes in combination.
  - **Polymyxins** (Colistin) – for multidrug-resistant strains.

- **Supportive care:**
  - Oxygen therapy and ventilator support if needed.
  - IV fluids & electrolytes.
  - Drainage if abscess/empyema forms.
- **Prevention:**
  - Strict **hospital infection control** practices.
  - Limit unnecessary use of antibiotics (to prevent resistance).

5. Mycoplasma pneumoniae

- Known as **“walking pneumonia”** (milder form).
- Affects **young adults & students** living in crowded areas (hostels, army).
- **Symptoms**: dry cough, headache, fatigue (less severe than other bacterial pneumonias).

- Doesn’t show up well on X-ray, often misdiagnosed.

Causes / Risk Factors

- Caused by **Mycoplasma pneumoniae**, a **bacteria without a cell wall**.
- Commonly causes **mild, atypical pneumonia**.
- **High-risk groups:**
  - **Young adults and students** (hostels, military barracks, dormitories)
  - People in **crowded living conditions**
  - Can occur **year-round**, often in **schools or workplaces**

◆ Symptoms

- **Mild, gradual onset** of illness
- **Dry cough** (non-productive)

- **Headache**, **fatigue**, and general malaise
- **Low-grade fever** (less severe than classic bacterial pneumonia)
- Sometimes **sore throat** or mild **shortness of breath**
- **Chest X-ray**: may show subtle or patchy infiltrates; often **misdiagnosed**

◆ Treatment

- **Antibiotics effective against atypical bacteria:**
  - **Macrolides**: Azithromycin, Clarithromycin
  - **Tetracyclines**: Doxycycline (for adults)
  - **Fluoroquinolones**: Levofloxacin, Moxifloxacin (in resistant cases)
- **Supportive care:**
  - Rest and hydration
  - Antipyretics (paracetamol) for fever

    - Symptomatic treatment for cough (if needed)
- **Prevention:**
    - Avoid close contact in crowded spaces during outbreaks
    - Good hand hygiene and respiratory etiquette.

6. Legionella pneumophila

- Causes **Legionnaires' disease** (severe pneumonia).
- Spread through **contaminated water systems** (AC cooling towers, showers).
- **Symptoms**: high fever, cough, diarrhea, confusion.
- Can be very dangerous in elderly or immunocompromised patients.

Causes / Risk Factors

- Caused by **Legionella pneumophila**, a **Gram-negative bacterium**.
- Causes **Legionnaires' disease**, a severe form of pneumonia.
- **Transmission:**
  - Inhalation of **aerosols from contaminated water systems**
    - Air conditioning cooling towers
    - Showers, faucets, hot tubs
    - Fountains and plumbing systems
- **High-risk groups:**
  - Elderly (>50 years)
  - Smokers
  - Immunocompromised patients (HIV, cancer, transplant recipients)
  - People with chronic lung disease

◆ Symptoms

- **High fever** and chills
- **Cough** (may be dry or productive)

- **Shortness of breath / rapid breathing**
- **Diarrhea, nausea, vomiting** (extra-pulmonary symptom)
- **Confusion or altered mental status** (especially in elderly)
- Muscle aches and headache
- Severe cases can lead to **respiratory failure, shock, or multi-organ failure**

◆ Treatment

- **Antibiotics effective against Legionella:**
  - **Macrolides**: Azithromycin (first-line)
  - **Fluoroquinolones**: Levofloxacin, Moxifloxacin (alternative or severe cases)
  - **Tetracyclines**: Doxycycline (sometimes used)
- **Supportive care:**

    - Oxygen therapy for breathing difficulty
    - IV fluids for dehydration
    - Intensive care for severe cases (ventilator support if needed)
- **Prevention:**
    - Proper maintenance and disinfection of water systems
    - Avoid stagnant water in AC units and fountains

2. Viruses

1. Influenza Virus (Flu)

- Most common viral cause in adults.
- Often leads to **secondary bacterial pneumonia** (especially Streptococcus pneumoniae or Staphylococcus aureus).
- **Symptoms:** sudden fever, chills, body aches, cough, sore throat, fatigue.

- **Causes / Risk Factors**
- Caused by **Influenza viruses**: types A, B, and C (Type A most severe).
- **Primary viral pneumonia** can occur, or it may cause **secondary bacterial pneumonia** (commonly *Streptococcus pneumoniae* or *Staphylococcus aureus*).
- **High-risk groups:**
- Elderly (>65 years)
- Children <5 years
- Pregnant women
- Immunocompromised individuals
- Patients with chronic diseases (asthma, diabetes, heart disease)
- **Transmission:** Respiratory droplets from infected individuals.
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- ◆ **Symptoms**
- **Sudden onset** of high fever and chills
- **Body aches (myalgia)** and headache
- **Fatigue and weakness**

- **Cough** (usually dry) and **sore throat**
- Sometimes **runny nose, nausea, vomiting**
- Severe cases may develop **shortness of breath** and **secondary bacterial pneumonia**

- ◆ **Treatment**
- **Supportive care:**
- Rest and hydration
- Oxygen therapy if hypoxia occurs
- Antipyretics for fever (paracetamol, ibuprofen)
- **Antiviral therapy** (if started within 48 hours of symptom onset):
- **Oseltamivir (Tamiflu)**
- **Zanamivir** (inhaled)
- **Peramivir** (IV, in severe cases)
- **Prevention:**

- Annual **influenza vaccination** (inactivated or live-attenuated)
- Hand hygiene, masks, and avoiding crowded places during outbreaks
- Prompt treatment of secondary bacterial infections if they occur.

2. Respiratory Syncytial Virus (RSV)

- Most common cause in **infants and young children**.
- Can cause **bronchiolitis** along with pneumonia.
- **Symptoms:** runny nose, wheezing, cough, difficulty breathing, fever.

Causes / Risk Factors

- Caused by **Respiratory Syncytial Virus (RSV)**, a **single-stranded RNA virus**.

- Most common cause of **viral pneumonia and bronchiolitis in infants and young children**.
- **Transmission:** Respiratory droplets from coughing, sneezing, or direct contact.
- **High-risk groups:**
  - Infants (<1 year), especially premature babies
  - Young children (<2 years)
  - Elderly individuals (>65 years)
  - Immunocompromised patients
  - Children with chronic lung disease or congenital heart disease

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◆ Symptoms

- **Runny nose** and nasal congestion
- **Wheezing** and cough
- **Difficulty breathing / rapid breathing**
- **Fever** (usually low to moderate)

- Poor feeding and irritability in infants
- Severe cases may lead to **hypoxia** and hospitalization

◆ Treatment

- **Supportive care** (main treatment):
  - Oxygen therapy for hypoxia
  - Hydration (oral or IV fluids)
  - Suctioning of nasal secretions in infants
  - Fever management with paracetamol
- **Antiviral therapy:**
  - **Ribavirin** (rarely used; only in severe cases or high-risk patients)
- **Prevention:**
  - Good hand hygiene and avoiding contact with sick individuals
  - **Palivizumab** (monoclonal antibody) prophylaxis for high-risk infants

- Avoid crowded places for infants during RSV season’

3. Coronaviruses

- Includes **SARS-CoV-2 (COVID-19)** and other strains like SARS-CoV, MERS-CoV.
- Can cause severe pneumonia and **acute respiratory distress syndrome (ARDS)**.
- **Symptoms:** fever, dry cough, fatigue, shortness of breath, loss of taste/smell (specific to COVID-19).

Causes / Risk Factors

- Caused by **coronaviruses**:
  - **SARS-CoV-2** → COVID-19

- **SARS-CoV** → Severe Acute Respiratory Syndrome
- **MERS-CoV** → Middle East Respiratory Syndrome

- **Transmission:**
  - Respiratory droplets, aerosols, or contact with contaminated surfaces.
- **High-risk groups:**
  - Elderly (>60 years)
  - People with **chronic diseases** (diabetes, heart disease, lung disease)
  - Immunocompromised individuals
  - Healthcare workers or those in close contact with infected patients

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◆ Symptoms

- **Fever**
- **Dry cough**
- **Fatigue / body aches**

- **Shortness of breath / difficulty breathing**
- **Loss of taste or smell** (specific to COVID-19)
- Sore throat, headache, nasal congestion
- Severe cases:
  - **Pneumonia** with lung infiltrates
  - **Acute Respiratory Distress Syndrome (ARDS)**
  - Multi-organ failure in critical cases

◆ Treatment

- **Supportive care:**
  - Oxygen therapy for hypoxia
  - Mechanical ventilation in severe ARDS
  - Fluids and electrolyte balance
  - Antipyretics for fever
- **Antiviral / specific therapies (for COVID-19):**

    - **Remdesivir**
    - **Paxlovid** (nirmatrelvir + ritonavir)
    - **Monoclonal antibodies** (for high-risk patients, depending on variants)
- **Prevention:**
    - COVID-19 vaccination (primary series + boosters)
    - Masks, social distancing, and hand hygiene
    - Isolation of infected individuals.

4.Adenoviruses

- Common in **children and military recruits**.
- Can cause mild to severe pneumonia.
- **Symptoms:** fever, sore throat, cough, conjunctivitis (sometimes).

Causes / Risk Factors

- Caused by **Adenoviruses**, a group of **double-stranded DNA viruses**.
- Can cause **mild to severe pneumonia**, depending on the strain.
- **High-risk groups:**
  - **Children**, especially under 5 years
  - **Military recruits** living in close quarters
  - Immunocompromised patients
- **Transmission:**
  - Respiratory droplets from coughing or sneezing
  - Direct contact with contaminated surfaces or fomites

◆ Symptoms

- Fever
- **Sore throat**
- **Cough** (may be dry or productive)
- **Conjunctivitis** (red eyes) in some cases

- Nasal congestion, runny nose
- Severe cases: **shortness of breath, hypoxia, or pneumonia requiring hospitalization**

◆ Treatment

- **Supportive care** (main treatment):
  - Oxygen therapy for breathing difficulty
  - Hydration and rest
  - Antipyretics for fever
  - Symptomatic treatment for cough
- **Antiviral therapy:**
  - Usually **not required** in healthy individuals
  - **Cidofovir** may be used in **severe or immunocompromised cases**
- **Prevention:**
  - Good **hand hygiene** and respiratory etiquette

- Avoid close contact with infected individuals
- Military recruits sometimes receive **live oral adenovirus vaccines** (specific strains).

5. Parainfluenza Viruses

- Cause pneumonia, especially in **young children**.
- Can also cause **croup** (barking cough).

Causes / Risk Factors

- Caused by **Parainfluenza viruses (types 1–4)**, **RNA viruses** of the Paramyxoviridae family.
- Commonly affects **young children**.
- Can cause **bronchitis, pneumonia, and croup (barking cough)**.

- **Transmission:**
  - Respiratory droplets from coughing or sneezing
  - Direct contact with contaminated surfaces
- **High-risk groups:**
  - Infants and toddlers (<5 years)
  - Immunocompromised individuals

◆ Symptoms

- **Fever** (usually mild to moderate)
- **Cough** (dry or productive)
- **Shortness of breath / rapid breathing**
- **Croup**: harsh, barking cough, hoarseness
- Runny nose and nasal congestion
- Wheezing in some cases
- Severe cases may require hospitalization for **hypoxia or pneumonia**

◆ **Treatment**

- **Supportive care** (mainstay):
  - Oxygen therapy for breathing difficulty
  - Hydration and rest
  - Antipyretics for fever (paracetamol/ibuprofen)
  - Suctioning for infants with nasal congestion
- **Antiviral therapy:**
  - Generally **not required**, as most cases are self-limiting
- **Prevention:**
  - Hand hygiene, avoiding contact with sick children
  - Isolating infected children in daycare or school settings
  - No routine vaccine available.

6. Other viruses

- **Human metapneumovirus (hMPV)** – similar to RSV, mostly in children and elderly.
- **Varicella-zoster virus (chickenpox virus)** – rarely causes pneumonia in adults.

1. Human Metapneumovirus (hMPV)

- **Causes / Risk Factors:**
  - RNA virus, closely related to RSV.
  - Common in **children under 5 years** and **elderly**.
  - Transmitted via respiratory droplets.
- **Symptoms:**
  - Fever, cough, runny nose
  - Wheezing, shortness of breath
  - Mild to moderate pneumonia
- **Treatment:**
  - Supportive care: oxygen therapy, hydration, fever control

- Usually self-limiting; antivirals are not routinely used

◆ 2. Varicella-Zoster Virus (VZV, Chickenpox Virus)

- **Causes / Risk Factors:**
  - DNA virus causing chickenpox.
  - Pneumonia is **rare**, mostly in **adults** or immunocompromised patients.
  - Occurs via **reactivation or primary infection**.
- **Symptoms:**
  - Fever, cough, shortness of breath
  - Sometimes rash associated with chickenpox
  - Can progress to severe pneumonia or respiratory failure in adults
- **Treatment:**
  - **Antivirals:** Acyclovir (especially in adults or severe cases)

    - Supportive care: oxygen therapy, hydration, fever control
- **Prevention:**
    - Chickenpox vaccine (especially in children and non-immune adults).

3. Fungi

1. Histoplasma capsulatum

- Found in **bird and bat droppings**.
- Causes **histoplasmosis**, often in the Ohio and Mississippi River valleys.
- Usually **mild in healthy people**, severe in immunocompromised patients.

Causes / Risk Factors

- Caused by **Histoplasma capsulatum**, a **dimorphic fungus**.

- Found in **soil contaminated with bird or bat droppings**.
- **Transmission:** Inhalation of fungal spores.
- **High-risk groups:**
  - People in **Ohio and Mississippi River valleys** (endemic areas)
  - Immunocompromised individuals (HIV/AIDS, transplant patients)
  - People with chronic lung disease

◆ Symptoms

- Often **mild or asymptomatic** in healthy individuals
- Fever, chills
- Cough (dry or productive)
- Chest pain
- Fatigue, body aches
- Severe cases (immunocompromised) may show:

- Shortness of breath
- Hypoxia
- Dissemination to other organs (liver, spleen, CNS)

◆ Treatment

1. **Mild cases:** Often **self-limiting**, no treatment needed
2. **Moderate to severe cases:**
   - **Itraconazole (oral)** – first-line
   - **Amphotericin B (IV)** – severe or disseminated disease
3. **Supportive care:** Oxygen therapy, hydration, rest, fever management

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◆ Prevention

1. Avoid exposure to **bird or bat droppings**

- Use **protective masks** in endemic areas
- Immunocompromised individuals may require **prophylactic antifungals.**

2. Coccidioides immitis / C. posadasii

- Causes **coccidioidomycosis (Valley Fever)**.
- Found in **desert soil in Southwestern USA and Mexico**.
- Can cause **pneumonia and systemic infection**.

Causes / Risk Factors

- Caused by **Coccidioides immitis** or **Coccidioides posadasii**, **dimorphic fungi**.
- Found in **desert soil** of Southwestern USA (Arizona, California) and Mexico.

- **Transmission:** Inhalation of fungal spores from disturbed soil (dust storms, construction, farming).
- **High-risk groups:**
  - Residents of **endemic desert regions**
  - Immunocompromised individuals (HIV/AIDS, transplant recipients)
  - People with chronic lung disease

◆ Symptoms

- Fever, chills
- Cough (dry or productive)
- Chest pain
- Fatigue and body aches
- Rash may occur in some cases (desert rheumatism)
- Severe or disseminated infection can affect **skin, bones, CNS**, causing meningitis or systemic disease

- Shortness of breath in severe pulmonary involvement

◆ Treatment

- **Mild cases:** Often **self-limiting**, may not require antifungal therapy
- **Moderate to severe cases:**
  - **Fluconazole or Itraconazole (oral)** – first-line treatment
  - **Amphotericin B (IV)** – for severe or disseminated disease
- **Supportive care:** Oxygen therapy, hydration, rest

◆ Prevention

- Avoid exposure to **dust in endemic areas**

- Use **masks or respirators** during construction, farming, or soil disruption
- Immunocompromised individuals may require **prophylactic antifungals.**

3. Blastomyces dermatitidis

- Found in **soil rich in decaying organic matter**.
- Causes **blastomycosis**, can affect lungs and skin.

Causes / Risk Factors

- Caused by **Blastomyces dermatitidis**, a **dimorphic fungus**.
- Found in **soil rich in decaying organic matter**, especially near rivers and wooded areas.

- **Transmission:** Inhalation of fungal spores from disturbed soil.
- **High-risk groups:**
  - Residents in endemic regions (e.g., Ohio and Mississippi River valleys, Great Lakes region)
  - Immunocompromised individuals (HIV/AIDS, transplant recipients)
  - People with chronic lung disease

◆ Symptoms

- Fever, chills
- Cough (dry or productive, sometimes with blood)
- Chest pain
- Shortness of breath
- Fatigue and body aches
- **Disseminated disease:**
  - Skin lesions (ulcerative or wart-like)

- Rarely affects bones, genitourinary tract, or CNS

◆ Treatment

- **Mild to moderate cases:**
  - **Itraconazole (oral)** – first-line therapy
- **Severe or disseminated cases:**
  - **Amphotericin B (IV)** – especially for immunocompromised patients
- **Supportive care:** Oxygen therapy, hydration, fever control

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◆ Prevention

- Avoid exposure to **dusty soil or decaying organic matter** in endemic areas

- Use **masks or respirators** if exposure is unavoidable
- Immunocompromised individuals may need **prophylactic antifungals.**

4. Aspergillus species

- Common in the environment (soil, decaying vegetation).
- Can cause **invasive aspergillosis** in immunocompromised patients.
- Rarely infects healthy lungs.

Causes / Risk Factors

- Caused by **Aspergillus species**, commonly **A. fumigatus**.
- Found in **soil, decaying vegetation, compost, and dust**.

- **Transmission:** Inhalation of airborne spores.
- **High-risk groups:**
  - Immunocompromised individuals:
    - **HIV/AIDS patients**
    - **Organ transplant recipients**
    - **Cancer patients** (chemotherapy)
    - **Long-term corticosteroid users**
  - Rarely affects healthy individuals

◆ Symptoms

- Fever and chills
- Cough (may be dry or produce blood-tinged sputum)
- Shortness of breath and rapid breathing
- Chest pain
- Severe cases may progress to **hemoptysis** (coughing blood), **lung necrosis**, or **disseminated infection** affecting other organs

◆ Treatment

- **First-line antifungal:** Voriconazole (oral or IV)
- **Alternative antifungals:**
  - Amphotericin B (for severe or refractory cases)
  - Posaconazole or Isavuconazole (for resistant infections)
- **Supportive care:** Oxygen therapy, hydration, fever management
- **Surgical intervention:** Rarely required for localized lung lesions or abscesses

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◆ Prevention

- Avoid exposure to **dusty environments or decaying vegetation** if immunocompromised

- Use **HEPA filtration** in hospital wards for high-risk patients
- Prophylactic antifungals may be used in **severely immunocompromised patients.**

5. Cryptococcus neoformans / Cryptococcus gattii

- Found in **soil contaminated with bird droppings**, especially pigeons.
- Can cause **severe pneumonia and meningitis**, mainly in immunocompromised patients (HIV/AIDS).

Causes / Risk Factors

- Caused by **Cryptococcus neoformans** or **Cryptococcus gattii**, **encapsulated yeast fungi**.

- Found in **soil contaminated with bird droppings**, especially **pigeons**.
- **Transmission:** Inhalation of fungal spores.
- **High-risk groups:**
  - Immunocompromised patients:
    - **HIV/AIDS**
    - Organ transplant recipients
    - Long-term corticosteroid users
  - Rarely affects healthy individuals (more common with C. gattii)

◆ Symptoms

- Fever and chills
- Cough (dry or productive)
- Shortness of breath and chest pain
- Fatigue and malaise
- **Severe cases / immunocompromised patients:**

- Can disseminate to **central nervous system**, causing **meningitis**
- Headache, neck stiffness, altered mental status

◆ Treatment

1. **Mild to moderate pulmonary infection:**
   - **Fluconazole (oral)** – first-line
2. **Severe or disseminated infection:**
   - **Amphotericin B (IV) + Flucytosine**, followed by **Fluconazole maintenance**
3. **Supportive care:** Oxygen therapy, hydration, fever management

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◆ Prevention

- Avoid exposure to **bird droppings**, especially pigeon habitats
- Use protective masks in high-risk areas
- Maintain **immune health** and follow prophylactic antifungals in severely immunocompromised patients.

6. Pneumocystis jirovecii (formerly P. carinii)

- Opportunistic fungus causing **Pneumocystis pneumonia (PCP)**.
- Occurs almost exclusively in **immunocompromised patients**, especially **HIV/AIDS**.

Causes / Risk Factors

- Caused by **Pneumocystis jirovecii**, an **opportunistic fungus**.

- Almost exclusively affects **immunocompromised patients**, especially:
  - **HIV/AIDS patients** with low CD4 counts (<200 cells/µL)
  - Organ transplant recipients
  - Patients on long-term corticosteroids or chemotherapy
- **Transmission:** Likely via inhalation of airborne spores from infected individuals, though exact route is not fully known.

◆ Symptoms

- Gradual onset of **fever**
- **Non-productive (dry) cough**
- **Shortness of breath** and rapid breathing
- Fatigue and weight loss
- Severe cases may develop **hypoxia** and **respiratory failure**

◆ Treatment

- **First-line therapy:**
  - **Trimethoprim-sulfamethoxazole (TMP-SMX)** – oral or IV depending on severity
- **Alternative therapies** (if TMP-SMX intolerant):
  - Pentamidine (IV)
  - Atovaquone (oral)
  - Clindamycin + Primaquine
- **Adjunctive therapy:**
  - **Corticosteroids** in moderate to severe PCP with hypoxia
- **Supportive care:** Oxygen therapy, hydration, rest

◆ Prevention

- **Prophylactic TMP-SMX** in high-risk HIV/AIDS patients (CD4 <200)
- Minimize exposure to respiratory infections in immunocompromised patients
- Maintain good immune health where possible.