# Contrastive Explanations

**Common Contrasts**

- Tumor vs. Cyst
- Malignant vs. Benign
- Bacterial vs. Viral
- Acute vs. Chronic

**"Why P rather than Q?"**

**Method Steps**
1. Identify fact P
2. Generate foil Q
3. Find differences

**Fact (Predicted)**

✓ **Pneumonia**
- Consolidation present
- Fever: 38.5°C
- WBC: 15,200
- Productive cough

VS

**Foil (Alternative)**

✗ **Bronchitis**
- No consolidation
- Mild fever typical
- Normal/slight ↑ WBC
- Dry cough common

🔄 **Key Differentiating Features**

| | |
|---|---|
| Consolidation on X-ray | Elevated WBC count |
| Bacterial markers | Lobar pattern |

**Generated Contrastive Explanation**

"The diagnosis is **pneumonia** rather than **bronchitis** because the X-ray shows **consolidation** and lab results indicate **bacterial infection**, which are not typical for bronchitis."
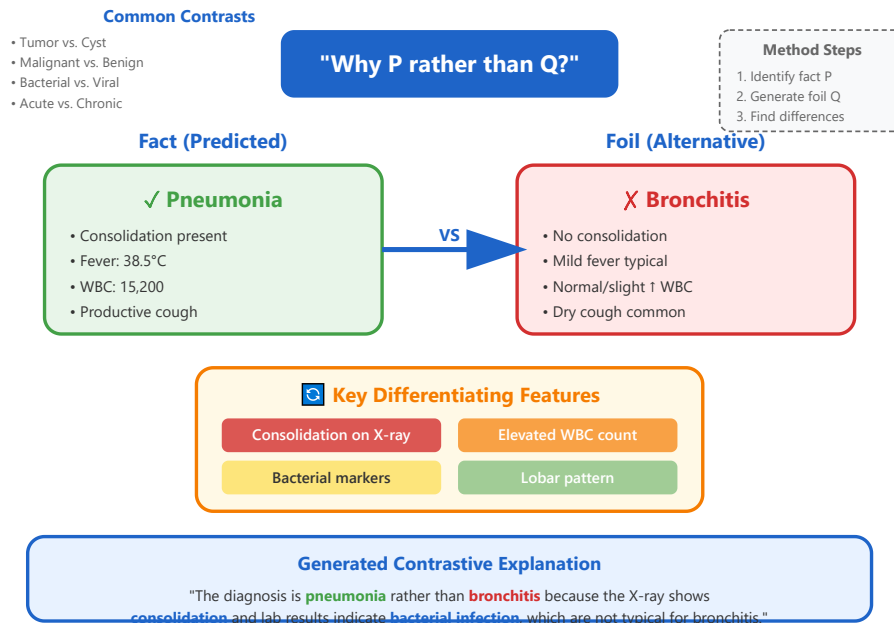
⚖️ **Comparison Analysis**

Explains why the model chose one diagnosis over plausible alternatives

🔄 **Differential Features**

Identifies the specific features that distinguish between outcomes

🎯 **Foil Generation**

Creates meaningful alternative scenarios for comparison

💡 **Enhanced Understanding**

Improves comprehension by showing what the diagnosis is NOT