

# LEARNING THE CONCEPTS AND INTERPRETATION OF PLAIN FILM INTERSTITIAL LUNG DISEASE PATTERNS UTILIZING CLAY MODELS: A RESIDENT TEACHING TOOL



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## OBJECTIVE

To demonstrate the use of clay models as a 3D teaching tool for the recognition and interpretation of interstitial lung disease patterns on radiology imaging studies.

## METHODS/MATERIALS

Plain film imaging is often the first step in the diagnosis of interstitial lung diseases (ILD), which can often be a challenge for new radiologists. ILD involves a wide range of pulmonary pathologies, some of which with atypical presentations. Causes of ILD include idiopathic, exposure-and autoimmune-related. Regardless of cause inflammation of the interstitial space can lead to scarring/fibrotic and stiff lungs.

When visible on chest radiography, fibrotic interstitial lung diseases may be differentiated by the distribution of various findings such as reticulation, cystic changes and bronchiectasis. While it is understood that computed tomography (CT) provides more sensitive and specific evaluation of the lung parenchyma than chest radiography, radiology trainees may still benefit from the hands-on tactile and visual experience of clay modeling.

Usual Interstitial Pneumonia (UIP) is a subtype of idiopathic ILD. Hallmark features of UIP include, peripheral basilar predominant reticulation, bronchiectasis, and, in typical cases, honeycombing. Non-specific interstitial pneumonia (NSIP) is the second most common ILD pattern. Chest radiographs are often normal, but may demonstrate lower lobar ground glass opacities and patchy, reticulonodular pattern.

Clay models of UIP and NSIP were created, using chest radiograph references. CT correlates were depicted where available.

## RESULTS

The application of clay models as an 3D educational tool, can expand to recognize patterns of interstitial lung disease for early diagnosis and treatment. Extrapolating common ILD patterns onto 3D Clay models exploits the imagination with visual and tactile senses that will stimulate, merge and sustain the recognition of ILD patterns on plain film. Many radiology residents have difficulty recognizing the various types of ILD for which radiology plays a central role in diagnosis and treatment.

Fig 1: Usual Interstitial Pneumonia (UIP)

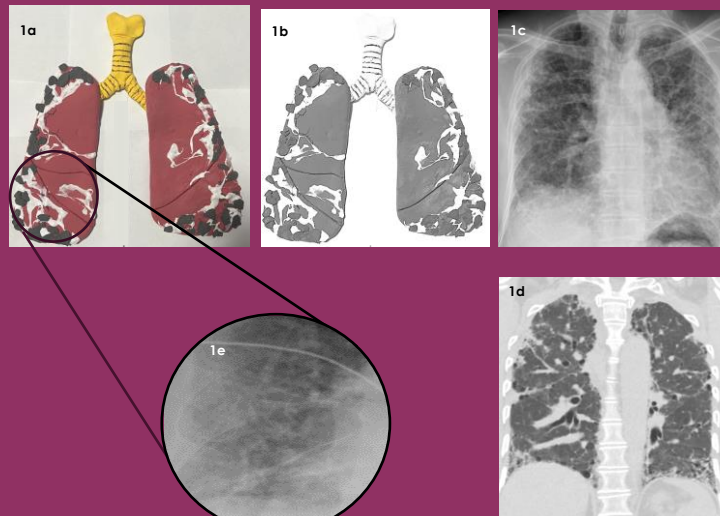


Fig 1a: Clay model depiction UIP of a common subtype of ILD often consisting of bilateral reticular marking/fibrosis and peripheral subpleural cysts.  
1b: Clay model with black/white overlay to resemble appearance on plain film.  
1c: Reference CXR of UIP used to create clay model.  
1d: Corresponding CT thorax, more sensitive for UIP.  
1e: Enlarged area of clay model, shown to correlated w/ CXR reference.

Fig 2: Non-Specific Interstitial Pneumonia (NSIP)

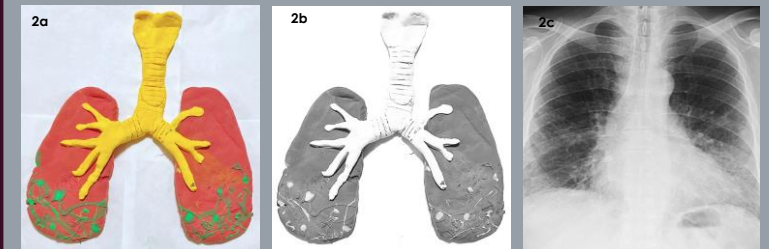


Fig 2a: Clay model depiction of NSIP consisting of grey reticulonodular opacities and green, scattered ground glass opacities in the lower lobes.  
Fig 2b: Clay model with black/white overlay to resemble appearance on CXR.  
Fig 2c: CXR depiction of NSIP, adapted from Radiology Key. (<https://radiologykey.com/nonspecific-interstitial-pneumonia-2/>)

## CONCLUSION

Using clay models to teach lung diseases can be an effective and engaging educational strategy in medical and healthcare training and especially to understand the most difficult concepts of interstitial lung diseases. Two most common ILD patterns have been depicted for further learning. Clay models can provide a hands-on and visual approach to help students and healthcare professionals understand the anatomy of the respiratory system and complex diseases of the lungs.

## REFERENCES

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