

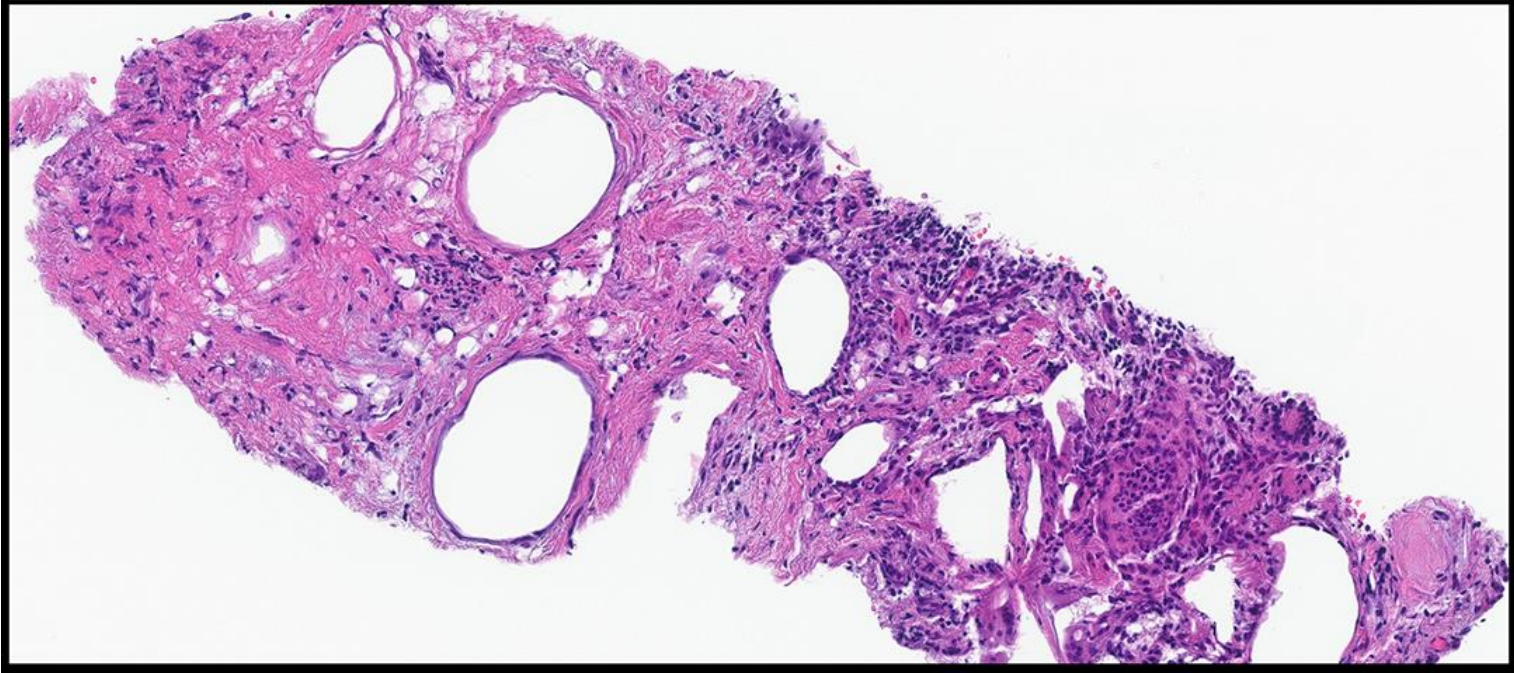
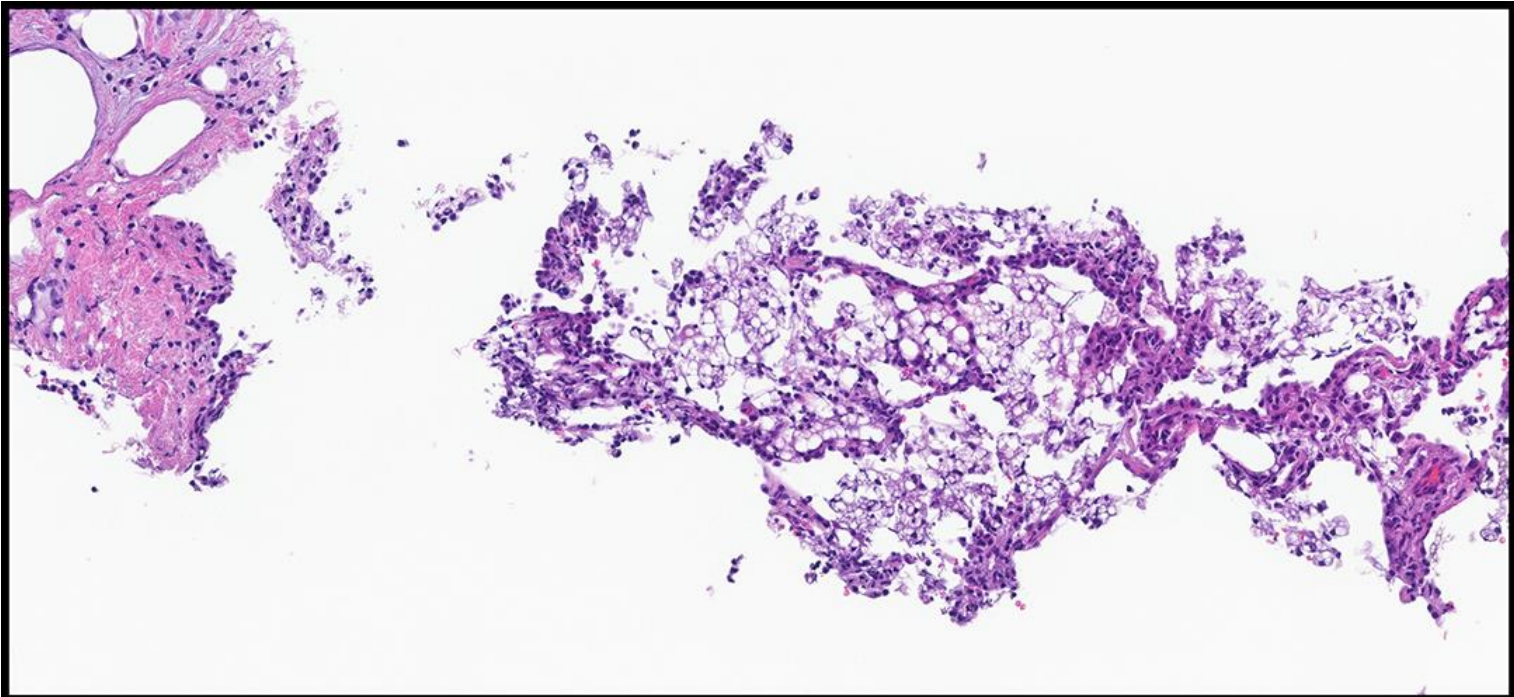


Case #71

NAME Educational Activities Committee

Case provided by:

Dr. Fabiola Righi (PGY4) and Dr. Melanie Bois
(Mayo Clinic, Rochester)



1. The decedent is a 60-year-old male who presented to the emergency department with acute on chronic hypoxemic respiratory failure and was found to have bilateral pulmonary granular opacities on a chest CT. Despite extensive interventions he continued to deteriorate and died a week later. Based on the provided histologic images of the lung, what was the decedent's most likely occupation?

- Aerospace machinist
- Coal worker
- Fire eater
- Pigeon breeder
- Shipyard worker

Answer...

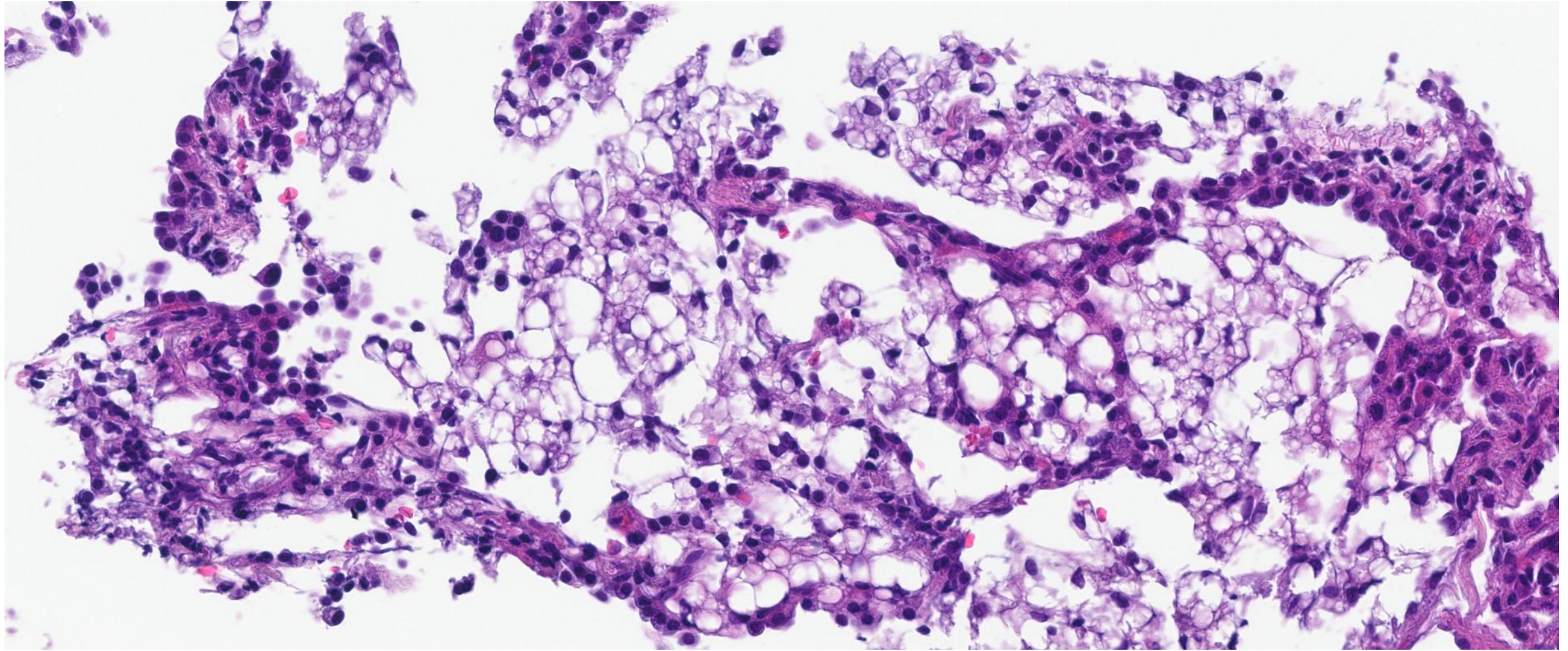
C. Fire eater – (CORRECT ANSWER, 16.67% of responses)

The provided image shows fragments of alveolated lung parenchyma involved by exogenous lipoid pneumonia, also colloquially known as fire-eater's lung. This rare form of pneumonia is most commonly associated with the aspiration/inhalation of hydrocarbons/mineral oils and can present as acute or chronic pneumonitis with nonspecific radiological findings.

Histologically, exogenous lipoid pneumonia is characterized by variably sized lipid vacuoles, generally associated with a histiocytic or giant cell reaction, as the fat-containing product's accumulation in the distal airways and alveoli, lead to an inflammatory reaction that hinders gas exchange.

“Fire eating/breathing” artists are at especially great risk of developing this disorder due to their use of pyrofluid (i.e., liquid petroleum-derived hydrocarbon-based products) during their performances, which can easily be aspirated.

Chronic use of petroleum-based lubricants and decongestants, lip-gloss, vegetable oils, paints and pesticides have also been linked to this finding in the lung.



Higher power image of exogenous lipoid pneumonia with characteristic variably sized lipid vacuoles associated with a histiocytic or giant cell reaction

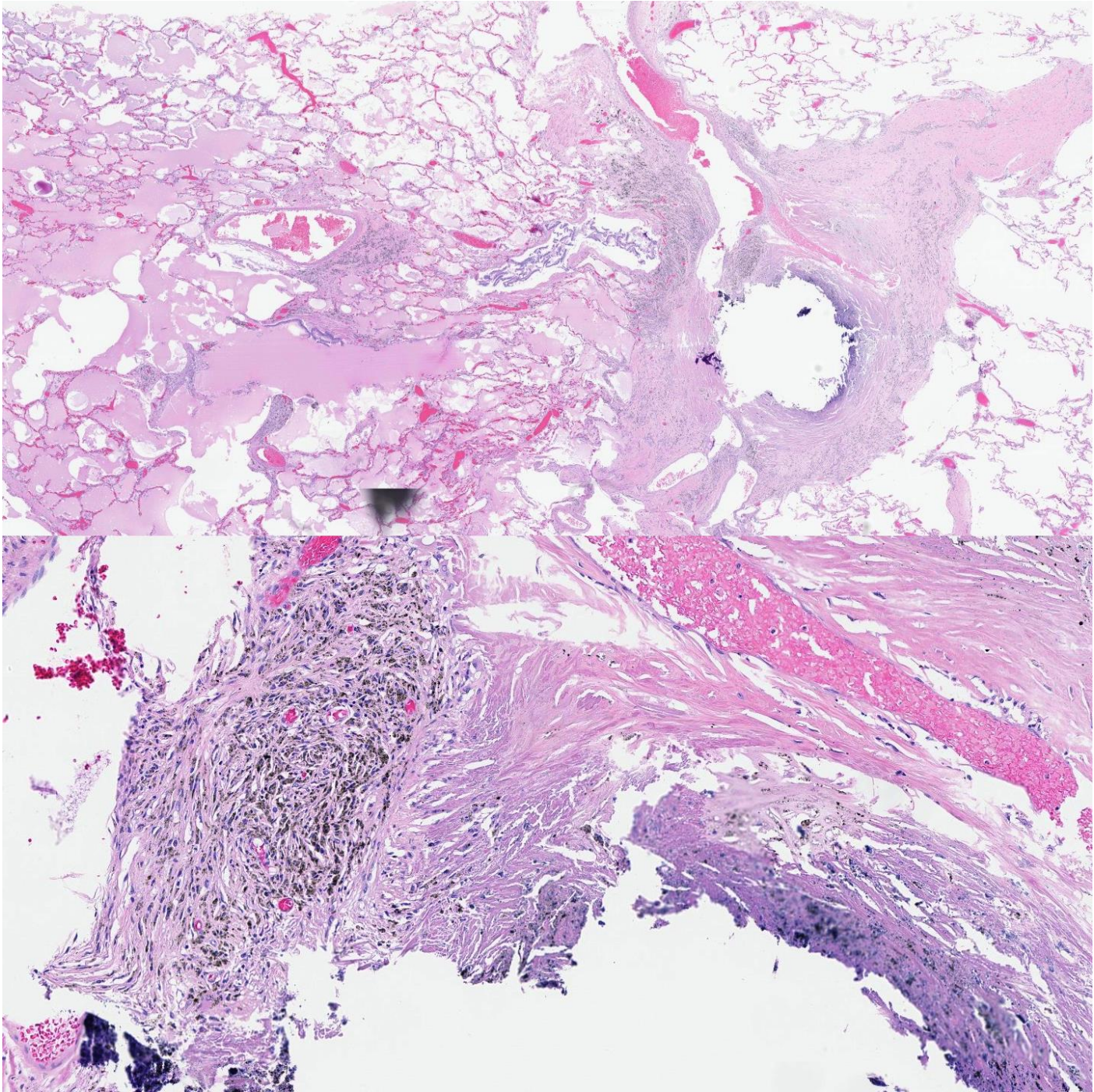
A. Aerospace machinist (17.71% of responses)

Berylliosis is one of the most common disorders associated with aerospace industry workers. Beryllium exposure tends to occur via inhalation of beryllium fumes or dust, but it can also be absorbed through the skin. Insoluble inorganic particles can remain in the body for many years and can lead to noncaseating granulomatous lung disease that can evolve into fibrosis. Although giant cells are present within our biopsy, lipid vacuoles would be unlikely in berylliosis.

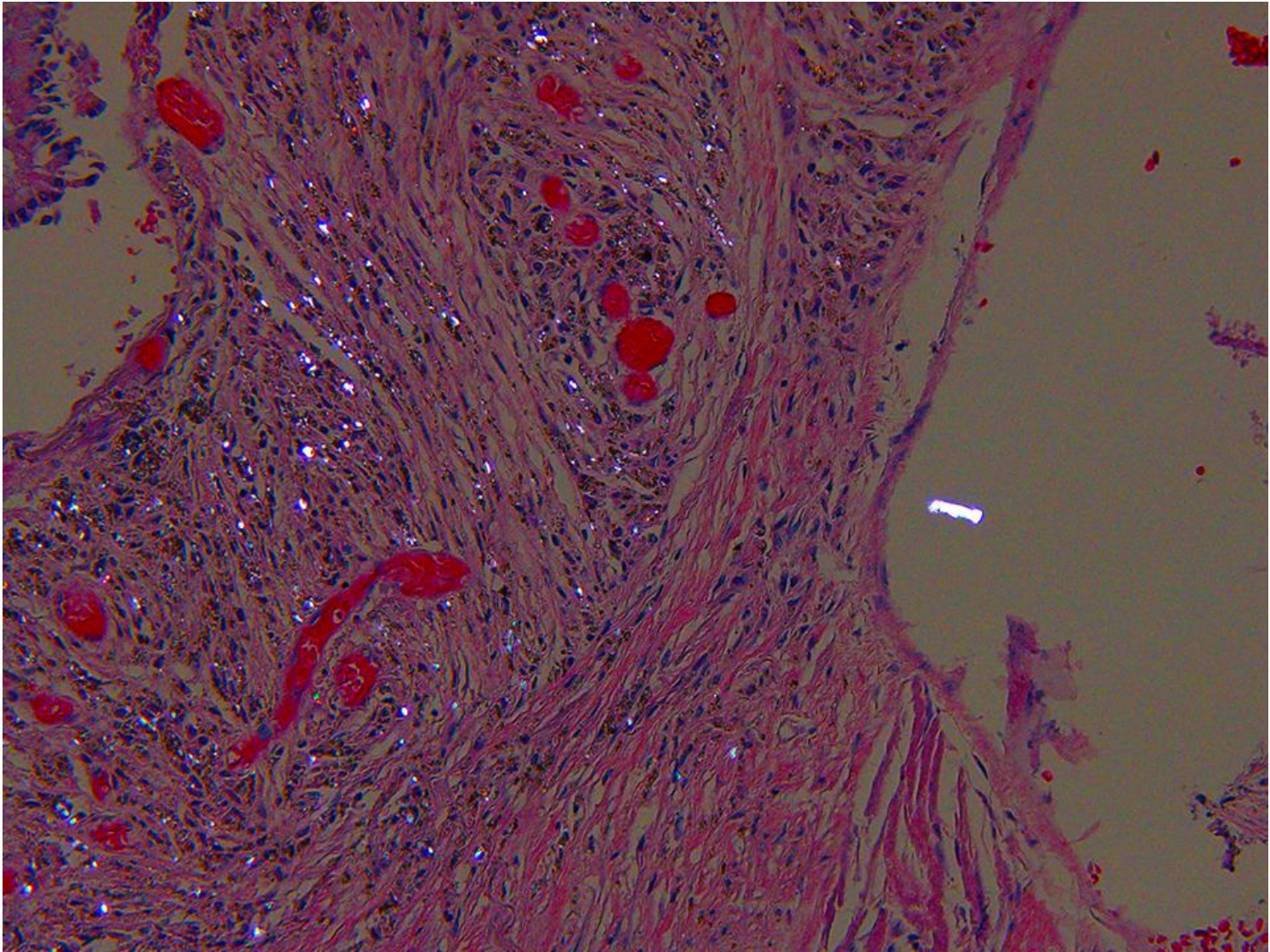
B. Coal worker (16.46% of responses)

Coal worker's pneumoconiosis is among the most well-known occupational diseases in the world. This disorder results from the accumulation of fine inhaled coal dust that cause an inflammatory reaction within the lung. Alveolar macrophages engulf the dust and stimulate inflammation, leading to collagen accumulation surrounding the particles which eventually progress to fibrosis. Although initially yielding small nodules, continued exposure can lead to larger nodules that coalesce to form progressive massive fibrosis.

Coal nodule on a decedent with history of working in the underground coal industry

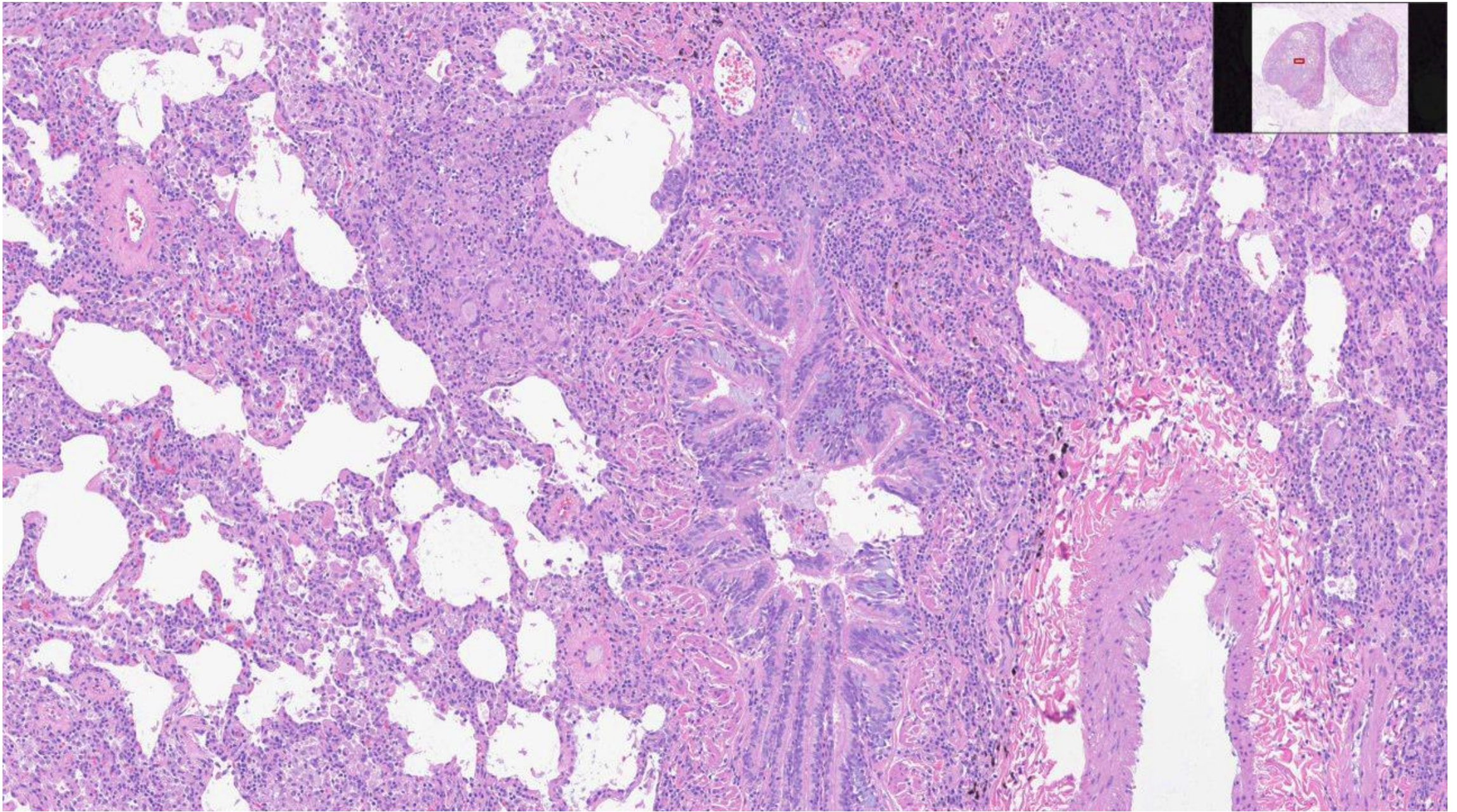


Birefringent silica-type
crystals within the
nodules

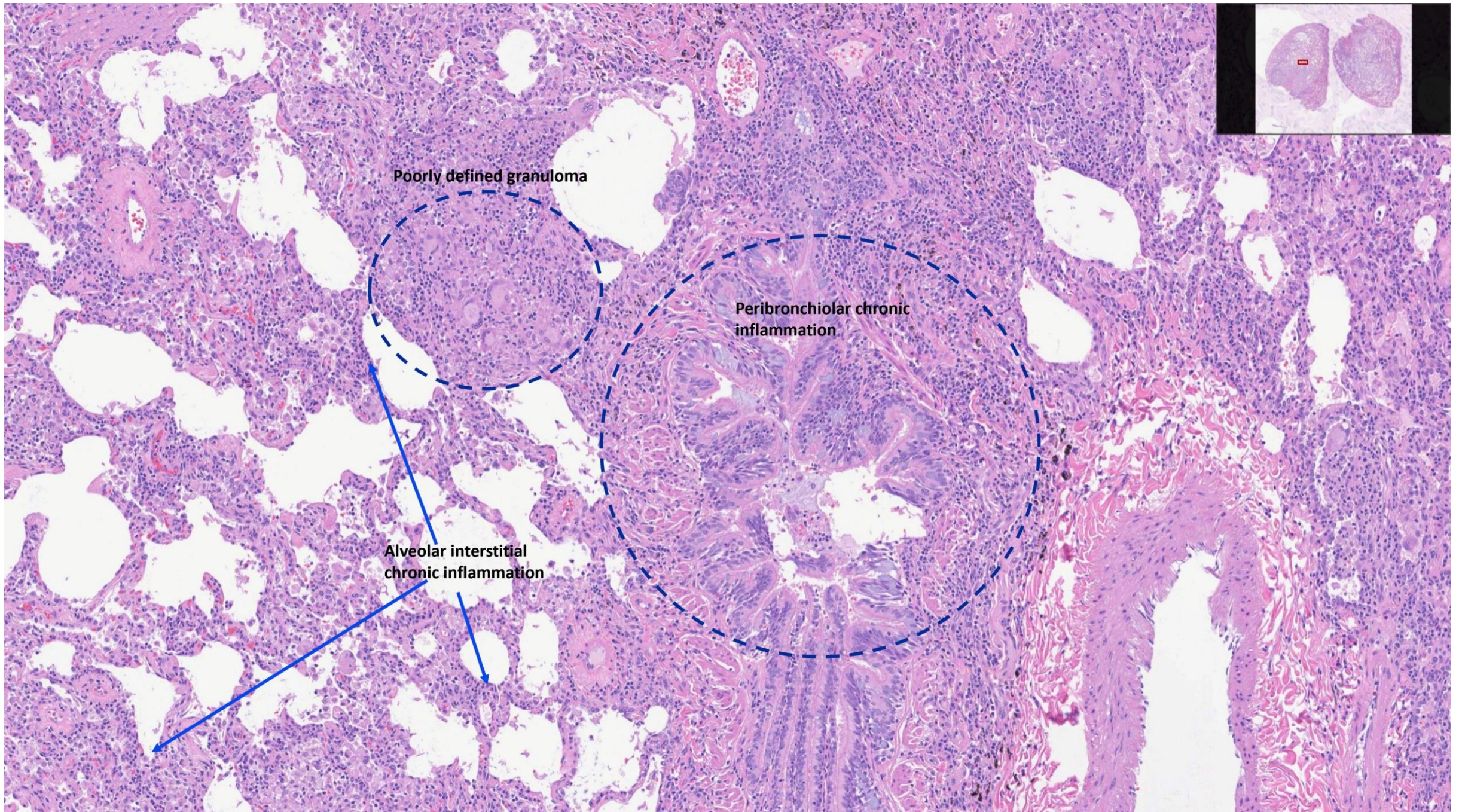


D. Pigeon breeder (32.5% of responses)

Pigeon breeder's lung is a well documented type of hypersensitivity pneumonitis (HP). Exposure stems from highly antigenic proteins excreted in bird droppings and bloom (a waxy powder that coats the feathers). Common findings in HP include lymphocyte-predominant interstitial infiltrates, poorly formed nonnecrotizing granulomas, and cellular bronchiolitis. The degree and length of antigenic exposure is directly related to disease progression, and continuous antigen exposure increases the risk for fibrotic development. Lipid vacuoles would be unlikely.



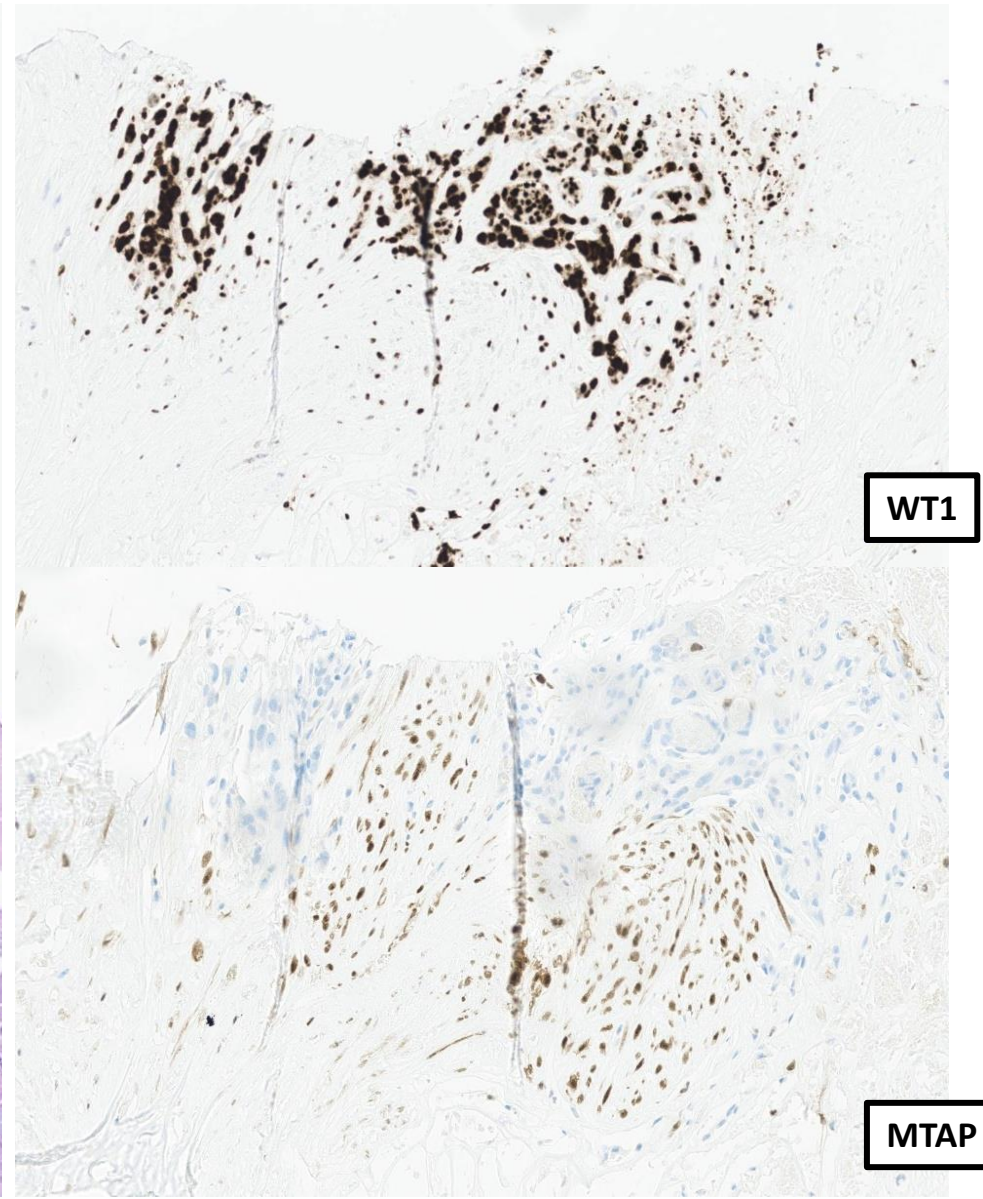
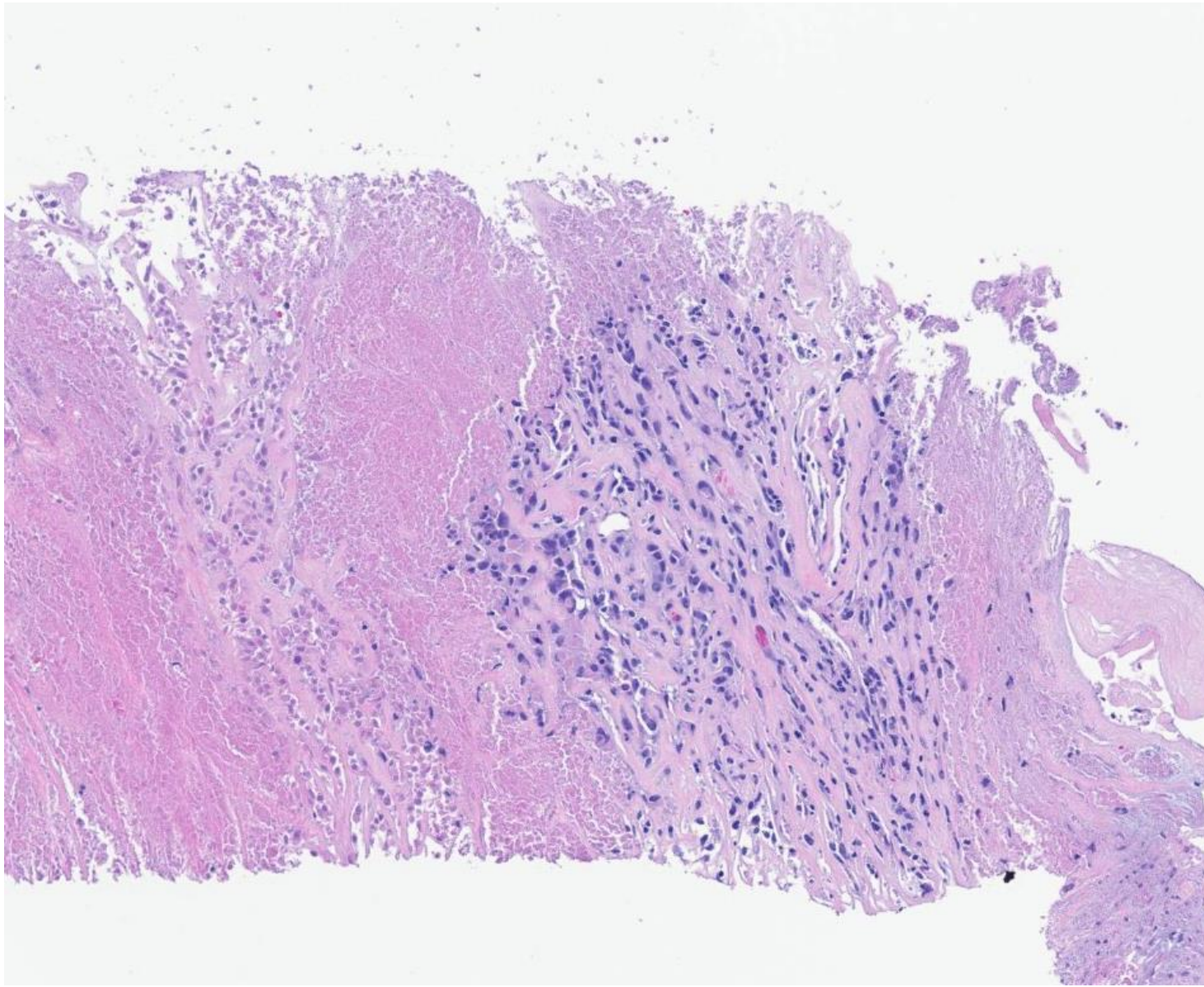
Picture courtesy of Dr. Jackie Chan (Pulmonary pathology fellow, Mayo Clinic, Rochester)



Picture courtesy of Dr. Jackie Chan (Pulmonary pathology fellow, Mayo Clinic, Rochester)

E. Shipyard worker (16.67% of responses)

Shipyard work has been extensively associated with asbestos exposure and risk for the development of mesothelioma. Asbestos-related disease tends to have a very long (>25 years) latency from exposure to onset of disease, and typically leads to pleural plaques or thickening. Mesothelioma is a malignant tumor highly associated with asbestos exposure that can originate in any mesothelial lined tissue, presenting as infiltrative bland-appearing tumor cells of mesothelial lineage.



Pleural tissue involved by high-grade epithelioid mesothelioma on a patient with history of asbestos exposure. Neoplastic cells show nuclear positivity for WT1 (mesothelial lineage marker) and loss of MTAP.

REFERENCES

1. Betancourt SL, Martinez-Jimenez S, Rossi SE, et al. Lipoid pneumonia: spectrum of clinical and radiologic manifestations. *AJR Am J Roentgenol*. 2010 Jan;194(1):103-9. doi: 10.2214/AJR.09.3040. PMID: 20028911.
2. DeLight N, Sachs H. Pneumoconiosis. [Updated 2022 Jul 25]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK555902/>
3. Dell' Omo M, Murgia N, Chiodi M, Giovenali P, Cecati A, Gambelunghe A. Acute pneumonia in a fire-eater. *Int J Immunopathol Pharmacol*. 2010 Oct-Dec;23(4):1289-92. doi: 10.1177/039463201002300437. PMID: 21244782.
4. Inai K. Pathology of mesothelioma. *Environ Health Prev Med*. 2008 Mar;13(2):60-4. doi: 10.1007/s12199-007-0017-6. Epub 2008 Feb 28. PMID: 19568882; PMCID: PMC2698271.
5. Morell F, Roger A, Reyes L, et al. Bird fancier's lung: a series of 86 patients. *Medicine (Baltimore)*. 2008 Mar;87(2):110-130. doi: 10.1097/MD.0b013e31816d1dda. PMID: 18344808.
6. Musani, A.I. (2019) Pulmonary disease Vol 103. 3rd edn. Philadelphia, PA: Elsevier.
7. Pielaszkiewicz-Wydra M, Homola-Piekarska B, Szcześniak E, et al. Exogenous lipoid pneumonia - a case report of a fire-eater. *Pol J Radiol*. 2012 Oct;77(4):60-4. doi: 10.12659/pjr.883631. PMID: 23269939; PMCID: PMC3529714.
8. Sizar O, Talati R. Berylliosis. [Updated 2023 Feb 5]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK470364/>
9. Takemura T, Akashi T, Ohtani Y, et al. Pathology of hypersensitivity pneumonitis. *Curr Opin Pulm Med*. 2008 Sep;14(5):440-54. doi: 10.1097/MCP.0b013e3283043dfa. PMID: 18664975.