PULMONARY PATHOLOGY JOURNAL CLUB
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I. Articles for Discussion

Larsen BT, et al. GLILD revisited: pulmonary pathology of common variable and selective IgA immunodeficiency. Am J Surg Pathol 2020;l44:1073-81

Purpose: To define the histologic pulmonary features in common variable immunodeficiency (CIVD) and selective immunoglobulin A deficiency (IgAD) in an attempt to determine whether they can be distinguished from each other, if any histologic findings correlate with clinical outcomes, and if granulomatous-lymphocytic interstitial lung disease (GLILD) is a distinct pathologic entity.

Methods: Cases were assembled from three institutions (Mayo Arizona, Mayo Rochester, and the University of British Columbia) and were reviewed by five pulmonary pathologists as a group for the presence or absence of specific histopathologic features. Criteria for CVID including below normal limits serum IgG levels combined with low IgA or M levels, poor antibody response to immunization or infection, and exclusion of other forms of hypogammaglobulinemia, while IgAD requirements included isolated serum IgA deficiency with exclusion of other causes of low IgA. GLILD was defined as a combination of lymphoid proliferation plus granulomas.

Results: The study cohort included surgical lung biopsies from 34 cases of CVID and 4 IgAD. Noncaseating granulomas, which were usually in airspaces, were seen in 68% and 50% of CVID and IgAD cases, respectively. Concentric peripheral lamellar fibrosis and/or a lymphangitic pattern reminiscent of sarcoid was seen only in a few of the CVID cases. Plasma cells were readily apparent in 26% of CVID cases and 75% of IgAD cases, while eosinophils were present in a minority of cases. The vast majority of CVID and IgAD cases had one or more pattern of benign lymphoid infiltration, including follicular bronchiolitis, diffuse or nodular lymphoid hyperplasia, LIP pattern, or NSIP pattern. No differences in lymphoid patterns were seen between CVID and IgAD cases. OP, which did not correlate with the presence of granulomas, was present in 74% and 50% of CVID and IgAD cases, respectively. Bronchiectasis/bronchiolectasis was present in 21% of CVID cases and 50% of IgAD cases, while 68% and 50% of CVID and IgAD cases, respectively, showed GLILD. A minority of CVID cases showed organizing pleuritis (see **Table 1**). Of 24 CVID patients with follow-up data, three developed lymphoma, one of whom died. Another CVID patient died of untreatable pulmonary infection. The presence or absence of granulomas was not associated with outcome. Follow-up data was limited to three IgAD patients, all of whom are alive.

Discussion: The histologic findings in CVID are not distinct from IgAD and both diseases can show GLILD.

Take Home Message: Better to issue a descriptive diagnosis than invoke GLILD, which implies a level of specificity for CVID, given that IgAD, connective tissue diseases, adverse drug reaction, and other entities can show similar histologic findings. Think of CVID and IgAD in younger patients with recurrent pneumonia.

Naso JR, et al. HEG1 is a highly specific and sensitive marker of epithelioid malignant mesothelioma. Am J Surg Pathol 2020;144:1143-8

Purpose: To evaluate the sensitivity and specificity of the mucin-like membrane protein HEG homolog 1 (HEG1) in the diagnosis of malignant mesothelioma.

Methods: TMAs containing 40 reactive epithelial mesothelial proliferations, 32 reactive spindle cell mesothelial proliferations, 69 epithelioid mesotheliomas, 32 sarcomatoid mesotheliomas, 167 NSCLCs, and 17 high grade serous ovarian carcinomas, as well as 10 whole slide sections of type B3 thymomas were stained with the SKM9-2 mouse monoclonal HEG1 antibody. Only membranous staining was considered positive in epithelioid mesothelioma, but either membranous or cytoplasmic staining was acceptable for sarcomatoid mesothelioma.

Results: Strong and usually diffuse membranous staining for HEG1 was seen in 94% of epithelioid mesotheliomas. HEG1 stained 44% of sarcomatoid mesotheliomas, usually with moderate intensity. Focal weak to moderately intense staining was present in 18% of ovarian serous carcinoma. Eighty-eight percent of reactive epithelial mesothelial proliferations stained, while 34% of reactive spindle cell mesothelial proliferations did and was usually weak and focal in the latter. Membranous HEG1 staining was not observed in pulmonary carcinomas or thymomas. However, weak diffuse cytoplasmic staining was seen in 4%, 27%, and 15% of pulmonary adenocarcinomas, squamous cell carcinomas, and large cell carcinomas, respectively. No cytoplasmic staining was seen in sarcomatoid carcinomas. The 94% sensitivity of HEG1 for epithelioid mesothelioma was comparable to CK5/6, D2-40, calretinin, and WT1, which ranged from 90 to 96%. HEG1 sensitivity for sarcomatoid mesothelioma was also similar to conventional markers (44% versus 13 to 50%). All HEG1-positive epithelioid mesothelioma also stained with ≥ 2 conventional markers.

Discussion: HEG1 has similar sensitivity, but higher specificity than conventional mesothelial makers for separating epithelioid mesothelioma from NSCLC. It lacks sensitivity in the diagnosis of sarcomatoid mesothelioma.

Take Home Message: For a new mesothelial marker to gain traction over established ones, it seems that interpretation should be foolproof. The adoption of HEG1 into the armamentarium may be hindered by having to ensure that staining is truly of tumor cells, as vascular endothelium is also positive, that the lesion is not high grade serous ovarian carcinoma, and that at least in epithelioid proliferations, staining is membranous, as cytoplasmic staining can sometimes be seen in pulmonary carcinoma.

Erber R, et al. Prominent entrapment of respiratory epithelium in primary and metastatic intrapulmonary non-epithelial neoplasms: a frequent morphological pattern closely mimicking adenofibroma and other biphasic pulmonary lesions. Virchows Arch 2020;477:195-205

Purpose: To address the diagnostic difficulties that arise from entrapment of native pulmonary epithelium by non-epithelial neoplasms.

Methods: The surgical pathology files from a single institution in Germany were searched for primary and metastatic intrapulmonary neoplasms other than carcinomas diagnosed between 2012 and 2018. Cases with diffuse entrapment of respiratory epithelium were further analyzed by immunohistochemistry.

Results: Of 47 non-epithelial neoplastic surgical lung specimens retrieved, 38 were metastatic and nine were primary. Respiratory epithelial entrapment was present in 49% of cases and was diffuse in 15. The entrapped epithelium frequently exhibited reactive/regenerative changes that mimicked neoplasia. Four distinctive morphologic patterns were recognized. The most common pattern seen in 11 of the 15 (73%) cases was a paucicellular sclerosing low-grade neoplasm containing leaflike gland indistinguishable from adenofibroma and fibroepithelial hamartoma. Neoplasms with this pattern included two primary pulmonary SFTs, one PEComa, one metastatic Wilms tumor, and various sarcomas. One metastatic atypical fibrous histiocytoma presented as a biphasic cellular neoplasm resembling adenomyoepithelioma. A biphasic synovial sarcoma-like pattern was seen in a metastasis of monophasic spindle cell synovial sarcoma, as well as a metastatic unclassified fibrosarcoma-like spindle cell sarcoma. One metastatic embryonal RMS resembled pleuropulmonary blastoma. Only one true pulmonary adenofibroma was identified.

Discussion: Respiratory epithelial entrapment is not uncommon in non-epithelial neoplasms involving the lung. The majority of lesions in the lung with an adenofibromatous appearance represent entities other than adenofibroma. Misdiagnosis of such lesions as innocuous pulmonary adenofibroma has significant prognostic and therapeutic implications.

Take Home Message: Pulmonary adenofibroma is a diagnosis of exclusion. Consider any glandular component in a biphasic lung lesion to represent entrapped native respiratory epithelium until proven otherwise with the aid of immunohistochemical markers of pneumocyte differentiation.

Marchevsky AM, et al. Pathologists should probably forget about kappa. Percent agreement, diagnostic specificity and related metrics provide more clinically applicable measures of interobserver variability. Ann Diag Pathol 2020;47:151561

Purpose: Kappa statistics are commonly used to assess interobserver diagnostic variability in the pathologic literature. This study examines the appropriateness of using this tool.

Methods: Five recent interobserver variability pathology studies were reviewed to assess how kappa values were used to inform the conclusions. The dataset of one study that employed kappa statistics to determine whether IHC improves the accuracy of the diagnosis of SCLC was examined in greater detail.

Results: In a study of 19 pathologists diagnosing 74 challenging lung NE neoplasms, kappa scores were quite variable, ranging from “fair” to “good.” However, when the data were reanalyzed using the majority consensus diagnosis for each case as the gold reference diagnosis, typical carcinoid, atypical carcinoma, SCLC, and LCNEC were diagnosed with > 90% specificity.

Discussion: The authors conclude that kappa statistics are of little value when comparing the opinion of multiple rates against a gold reference diagnosis and propose that sensitivity, specificity, and positive and negative predictive values be used instead.

Take Home Message: Stop using kappa values in pathology studies that focus on interobserver variability.

Raghu G, et al. Diagnosis of hypersensitivity pneumonitis in adults: an official ATS/JRS/ALAT clinical practice guideline

Purpose: To produce a collaborative guideline on the diagnosis of HP.

Methods: A multidisciplinary panel of experts was convened to propose diagnostic criteria and a diagnostic algorithm with graded recommendations about whether to perform a diagnostic intervention.

Results: Recommendations were tailored to whether a patient has clinical and radiographic manifestations of nonfibrotic or fibrotic HP. It was agreed upon that clinicians should take a thorough history and that validated questionnaire be devised to identify potential exposures. For patients with nonfibrotic clinicoradiographic manifestations, BAL for lymphocyte cellular analysis is recommended and TBBx is suggested, while surgical lung biopsy should be undertaken only when all other testing has been nondiagnostic. Surgical lung biopsy is suggested in patients with fibrotic clinicoradiographic manifestations, unless other testing is diagnostic. The histopathologic criteria for HP are nicely laid out in **Table 7** and the algorithm and levels of diagnostic confidence in **Figures 6 and 7** are also worth a look.

Discussion/Take Home Message: This is a tour de force on the diagnosis of HP with all the tables, charts and photomicrographs you'll need, including an illuminating list of offending antigens and their corresponding HP monikers, ranging from salami producer's lung to tiger-nut alveolitis. The latter can arise from occupational exposure to macerated tiger nuts, which are an ingredient in Horchata, a popular cold drink in the Valencia region of Spain that originated in 13th century (recipe at http://holafoodie.com/recipe/tiger-nut-horchata/).

II. Articles for Notation

Original Articles

Boland JM, et al. Ki-67 labeling index in pulmonary carcinoid tumors: comparison between small biopsy and resection using tumor tracing and hot spot methods. Arch Pathol Lab Med 2020;144:982-90

Purpose: To correlate Ki-67 labeling index in small lung biopsies and subsequent resection specimens.

Methods: One representative slide of a biopsy/cell block and its paired resection specimen from 55 patients were scanned and evaluated for Ki-67 labeling index using automated hot spot and

tumor tracing methods. A digital pen tool was used to encircle areas with ≥ 85% tumor to indicate regions for analysis, taking care to exclude areas with folds and staining artifacts. A second annotation layer composed of 10 fixed-size boxes in the hottest staining region totaling 0.11 square millimeters was used for the hot spot method. Cases with < 300 tumor cells or a complete lack of Ki-67 staining were excluded. Manual Ki-67 assessment in at least five high-power fields both randomly and in hot spot areas was also performed in 10% of cases for quality control.

Results: Forty-one typical carcinoids and 14 atypical carcinoids were analyzed. No discrepancies were identified between the manual and automated assessments. Median hot spot Ki-67 labeling indices were significantly greater (by 0.7%) in resection specimens than biopsies, whereas results for median tumor tracing was the opposite (by 0.5%). By receiver-operating characteristic analysis, Ki-67 cutoffs to predict atypical histology were similar for biopsies and resections using the hot spot method, whereas the tracing method required different cutoffs. The scope of this study did not permit robust analysis of the prognostic value of Ki-67 independent of WHO classification.

Take Home Message: On small biopsies, neither the hot spot or tumor tracing methods perfectly reflect the labeling index on resection, with the former tending to underestimate and latter tending to overestimate Ki-67. The hot spot results in this study suggest "hotter" areas of the tumor may be unsampled on biopsy. A Ki-67 hot spot cutoff value of 3.5% can distinguish typical from atypical carcinoid on both biopsy and resection.

Buendia-Roldan I, et al. A major genetic determinant of autoimmune diseases is associated with the presence of autoantibodies in hypersensitivity pneumonitis. Eur Respir J 2020;56:1901380

Purpose: A subgroup of patients with HP have autoantibodies with or without clinical manifestations of autoimmune disease. This study examines the allele frequencies of class II HLA alleles in this subgroup.

Methods: Autoantibody screening for ANA, Rh factor, anti-SSA/Ro and La, and anti-CCP was performed on 170 patients with HP. HLA typing was performed using PCR.

Results: Sixty HP patients had autoantibodies. Compared to autoantibody-negative HP patients, the frequency of the HLA-DRB1*03:01 allele was increased in HP patients with autoantibodies (10.8% versus 0.45%). The presence of this allele was associated with higher mortality.

Take Home Message: Around one-third of patients with HP have autoantibodies. While autoantibodies are not themselves an adverse prognostic feature, the presence of the HLA-DRB1*03:01 allele is associated with reduced survival.

Duarte-Neto A, et al. Pulmonary and systemic involvement in COVID-19 patients assessed with ultrasound-guided minimally invasive autopsy. Histopathology 2020;77:186-197

Purpose: To present the results of ultrasound-guided minimally invasive autopsies in ten Brazilian patients infected with COVID-19.
Methods: After packing the body with resistant plastic, ultrasound was used to guide sampling of organs with 14G coaxial needles through 10 cm openings made on relevant sites on the body surface.

Results: DAD was seen in all patients, along with "intense pleomorphic cytopathic effects" in the airway epithelium and alveolar cells (see **Figure 2 E and F**). All patients had a "high density" of alveolar megakaryocytes and 80% had fibrinous thrombi in alveolar arterioles.

Take Home Message: Ultrasound-guided minimally invasive autopsy appears to provide useful information while potentially reducing the risk of aerosol exposure in settings that lack negative-pressure autopsy rooms.

Griffin J, et al. Digital pathology for intraoperative frozen section diagnosis in thoracic specimens: an evaluation of a system using remote sampling and whole slide imaging diagnosis. J Clin Pathol 2020;73:503-6

Purpose: To assess concordance of glass and digital slide diagnoses following implementation of remotely supervised specimen sampling and frozen section diagnosis after reorganization of a multisite institution led to histopathology being located in a separate hospital from some surgical specialties.

Methods: Cases from the first two years of digital frozen section reporting at an institution in the United Kingdom were reviewed and those with potential discordances between digital and glass slides were assessed in detail by three thoracic pathologists (see **Box 1** for non-concordance criteria).

Results: Frozen section to final diagnosis concordance between digital and glass slides was 92.6% among 211 cases. The 15 non-concordant cases included a missed MALT lymphoma, pneumocytoma diagnosed as "could be inflammatory or carcinoid," metastatic prostatic adenocarcinoma misinterpreted as carcinoid, and poorly differentiated carcinoma with necrosis interpreted as infarct (check out **Table 1** for full details). In eight cases, the discordance was determined to be unlikely due to viewing the frozen section slide digitally. One incident of critical relevance related to digital pathology was identified, in which the whole slide image had blurring artifact and attempted rescanning resulted in complete scanner failure due to coverslip mounting solution adherent to the lens, necessitating rapid travel across the city to review the frozen section slide by light microscopy.

Take Home Message: Digital pathology is comparable to light microscopy for frozen section diagnosis of thoracic specimens. Recurrent areas of difficulty when using a digital pathology system for frozen section diagnosis include recognizing metastatic renal cell carcinoma and detecting primary malignancy obscured by necrosis or inflammation.

Howlander N, et al. The effect of advances in lung-cancer treatment on population mortality. N Engl J Med 2020;383:640-9

Purpose: To evaluate population-level U.S. mortality trends attributable to NSCLC and SCLC and assess the contributions of lung cancer incidence and lung cancer-specific survival to these trends.

Methods: SEER data from 2001 through 2016 were used.

Results: For NSCLC, mortality decreased even faster than incidence during the study time period. There was also substantial improvement in survival over time that corresponded to the timing of approval of targeted therapy. As compared to a 3.1% decrease annually from 2008 through 2016, NSCLC incidence-based mortality among men decreased 6.3% annually from 2013 through 2016. NSCLC-specific survival in men improved from 26% to 35% for those diagnosed in 2001 and 2014, respectively (check out **Figure 1** to appreciate the downward slope). Similar patterns were seen in women and across races and ethnic groups. An observed decline in SCLC mortality was due almost entirely to a decline in incidence rather than improved survival.

Take Home Message: Finally, some good news! Mortality from NSCLC in the U.S. is falling, and survival is improving, thanks to a combination of reduced incidence and targeted therapies.

Menter T, et al. Postmortem examination of COVID-19 patients reveals diffuse alveolar damage with severe capillary congestion and variegated findings in lungs and other organs suggesting vascular dysfunction. Histopathology 2020;77:198-209

Purpose: To summarize the pathologic findings in comprehensive autopsies of patients with COVID-19

Methods: Full autopsies were performed on 21 patients from two hospitals in Switzerland. As a safety precaution, 4% phosphate-buffered formalin was instilled into the mouth, nose, and pharynx two hours prior to autopsy. An *in-corpore* technique similar to that used in forensic settings (described in supplemental Doc. S1 for those interested) was used.

Results: DAD was seen in all 21 cases, which was exudative in 76%. Pulmonary vascular abnormalities included massive pulmonary capillary congestion in all cases, microthrombi of alveolar capillaries in 45%, PE in 19%, hemorrhage in 14%, and vasculitis in 5%. Superimposed diffuse bronchopneumonia and severe tracheitis were each present in 29% of cases, while reactive pneumocytes and syncytial cells were seen in 52% of cases.

Take Home Message: DAD and pulmonary vascular pathology are major findings in patients succumbing to COVID-19.

Nelson ND, et al. Mucinous cell clusters in infantile congenital pulmonary airway malformations mimic adult mucinous adenocarcinoma but are not associated with poor outcomes when appropriately resected. Am J Surg Pathol 2020;44:1118-29

Purpose: To determine whether there are histologic features that distinguish mucinous cell clusters (MCCs) in congenital pulmonary airway malformations (CPAMs) from mucinous adenocarcinoma in adults.

Methods: All CPAMs with MCCs at a single U.S. institution over a 17-year period were retrospectively reviewed. Ten lepidic predominant mucinous adenocarcinomas served as controls.

Results: Forty-four CPAMs contained 671 MCCs, which were often numerous, widespread, located outside of large cysts, featured complex architecture, and had nuclear features similar to adult mucinous adenocarcinomas. No recurrent disease was identified in patients with completely resected CPAMs for whom adequate follow-up was available.

Take Home Message: Despite their histologic similarity to mucinous adenocarcinoma, do not apply adult lung cancer terminology to MCCs in CPAMs, as they do not confer malignant behavior.

Roy-Chowdhuri S, et al. Collection and handling of thoracic small biopsy and cytology specimens for ancillary studies: guideline from the College of American Pathologists in collaboration with the American College of Chest Physicians, Association for Molecular Pathology, American Society of Cytopathology, American Thoracic Society, Pulmonary Pathology Society, Papanicolaou Society of Cytopathology, Society of Interventional Radiology, and Society of Thoracic Radiology. Arch Pathol Lab Med 2020;144:933-58

Purpose: Puts forth clinical practice guidelines for obtaining, handling, and processing small tissue samples from thoracic sites.

Methods: Literature on procurement and rapid on-site evaluation of small thoracic samples, as well as ancillary testing thereof was systematically reviewed to inform recommendations.

Results: Sixteen recommendations, ranging from “rapid on-site evaluation should be used if available when performing EBUS TBNA” to “proceduralist should attempt to obtain a minimum of three core sample when performing transthoracic core needle biopsy” were produced.

Take Home Message: These recommendations seem like common sense, though this paper might be useful to have at the ready should your proceduralists need additional guidance obtaining adequate material and/or triaging samples appropriately.

Saito T, et al. Prognostic impact of mucin spread, tumor cell spread, and invasive size in invasive mucinous adenocarcinoma of the lung. Lung Cancer 2020;146:50-7

Purpose: Compare the prognostic impact of mucin spread, tumor cell spread, and invasive size in invasive mucinous adenocarcinoma (IMA) of the lung to determine which is the most reliable predictor for use as a T descriptor

Methods: Radiologic size, invasive size, mucin spread size (maximum diameter of mucin regardless of presence of tumor cells), and tumor cell spread size (area of epithelial tumor growth to include lepidic growth when present) were assessed in 27 completely resected pT1-4N0M0 IMAs and differences in recurrence-free survival were analyzed.

Results: Both tumor cell spread size and invasive size, but not mucin spread size, were significantly smaller than radiologic size. Multivariate analysis showed mucin spread size, tumor cell spread size, and invasive size were all significant predictors of recurrence-free survival.

Take Home Message: This study suggests it does not particularly matter which size parameter in mucinous adenocarcinoma is used, as they all appear clinically meaningful.

Tsai HK, et al. INSM1 expression in a subset of thoracic malignancies and small round cell tumors: rare potential pitfalls for small cell carcinoma. Mod Pathol 2020;33:1571-80

Purpose: Evaluate the robustness of INSM1 as a diagnostic marker of small cell carcinoma (SCLC) in the context of histologic mimics.

Methods: IHC was performed using an anti-INSM1 mouse monoclonal antibody on 231 tumors encompassing a variety of thoracic neuroendocrine and non-neuroendocrine carcinomas, lymphomas, and sarcomas.

Results: For SCLC, INSM1 was 81.5% sensitive and 82.7% specific when an optimal diagnostic cutoff *H*-score of 50 was used. Of SCLCs that were negative for both chromogranin and synaptophysin, 79% showed nuclear expression of INSM1. All carcinoids and 75% of LCNECs tested stained with INSM1. INSM1 expression was observed in 18% of lung adenocarcinomas, 12% of lung squamous cell carcinomas, 40% of thymic carcinomas, 33% of adenoid cystic carcinomas, 5% of DLBCLs, 36% of alveolar RMS, 17% of Ewing sarcoma, 0% of NUT carcinomas, 0% of synovial sarcomas, and 0% of DSRCTs (see **Table 2**).

Take Home Message: INSM1 expression is seen in most SCLCs, including those that are negative for chromogranin and synaptophysin. While the authors point out that focal weak INSM1 staining is not diagnostic of SCLC, what is not emphasized is that some histologic mimics of SCLC occasionally show strong and diffuse INSM1 expression (see **Figure 1A**).

van der Vis JJ, et al. Pulmonary fibrosis and a TERT founder mutation with a latency period of 300 years. Chest 2020;158:612-9

Purpose: Genetic anticipation, or the earlier onset of symptoms with successive generations, has been described in families with TERT mutations. The study examines the number of generations that pass before pulmonary fibrosis is clinically apparent in families with a novel TERT mutation.

Methods: Genotyping for the TERT c.2005C>T mutation in 1015 patients with pulmonary fibrosis, 1237 patients with ILD without fibrosis, and 529 healthy controls in the Netherlands was performed.

Results: None of the patients with ILD without fibrosis or healthy controls carried the c.2005T TERT mutation, while 13 of the 1015 with pulmonary fibrosis did. Among the novel TERT mutation carriers, four had a common ancestor seven generations earlier.

Take Home Message: It's not simply the presence of a mutation, but genetic anticipation that sometimes results in clinically apparent disease. In some cases of short telomere-related pulmonary fibrosis, this equates to a latency period > 300 years and a great-great-great-great-great grandparent to blame.

Review Articles

Inoue Y, et al. Diagnostic and prognostic biomarkers for chronic fibrosing interstitial lung diseases with a progressive phenotype. Chest 2020;158:646-59

A summarization of the current understating state regarding potential biomarkers in IPF and other chronic fibrosing ILDs, including a discussion of markers of epithelial cell dysfunction (such as KL-6), extracellular matrix turnover (including MMP-1), and immune dysregulation (various chemokine ligands and interleukins).

Nicholson AG, et al. COVID-19 related lung pathology: old patterns in new clothing? Histopathology 2020:77:169-72

Nicely captures the rapidly expanding literature to date on the histopathologic features of COVID-19, framing it within the context of what is already known about acute lung injury.

Shih AR, Mino-Kenudson M. Update on spread through air spaces (STAS) in lung cancer. Histopathology 2020;77:173-80

A comprehensive review on the evolution of the concept of STAS, the body of evidence showing its importance as a prognostic indicator, and a refreshingly dispassionate discussion of the controversies regarding ex vivo artifacts with an acknowledgement that more work is needed to improve recognition, especially on frozen section, and achieve consensus on this histologic finding.

Toki M, et al. The role of spread through air spaces (STAS) in lung adenocarcinoma prognosis and therapeutic decision making. Lung Cancer 2020;146:127-33

Another detailed review on STAS that touches on similar issues and concepts as the above article. There is a nice flow chart (**Figure 1**) detailing suggested management (i.e. lobectomy versus limited resection) based on the presence or absence of preoperative imaging findings predictive or STAS and/or STAS on intraoperative frozen section.

Case Reports

Hashimoto H, et al. Progressively increasing density of the solid center of a ground-glass nodule in a solitary pulmonary capillary hemangioma: a case report. Pathol Int 2020;70:568-73

Case Summary: A 49-year-old man with an incidental ground glass nodule on CT that increased in size and density over 5 years was found to have a solitary pulmonary capillary hemangioma on resection. The nodule was comprised of a capillary proliferation amidst collapsed alveolar septa accompanied by intralesional collagenous fibers. CD31 and CK7 highlighted the capillaries and alveolar pneumocytes, respectively.

Take Home Message: Add pulmonary capillary hemangioma to the catalog of uncommon lesions that can radiographically mimic lung cancer.