Adenoma and carcinoma components in colonic tumors show discordance for KRAS mutation.

Hershkovitz D, Simon E, Bick T, Prinz E, Noy S, Sabo E, Ben-Izhak O, Vieth M.

Hum Pathol 2014; 45(9):1866-71.

http://www.ncbi.nlm.nih.gov/pubmed/24998492

To address the issue of whether KRAS mutation analysis can be effectively determined from adenomas associated with colonic adenocarcinoma 70 cases were studied for both the adenoma component and carcinoma component separately by direct DNA sequencing. Sixteen (23%) cases showed discordant results. Discordancy was more often associated with less depth of tumor invasion. False-positive, false-negative, and incorrect specific mutations were identified as discordancies. The authors conclude that the invasive component of colorectal carcinoma is the preferred tissue for KRAS mutation analysis.

Distinctive histopathologic phenotype in resection specimens from patients with Crohn's disease receiving anti–TNF-α therapy.

Schaeffer DF, Walsh JC, Kirsch R, Waterman M, Silverberg MS, Riddell RH.

Hum Pathol 2014; 45(9):1928-35.

http://www.ncbi.nlm.nih.gov/pubmed/25022570

This case-controlled study is the first to document histologic changes in resected bowel from Crohn's disease patients treated with anti-TNF-alpha agents. The study group consisted of 62 patients with Crohn's disease who underwent small bowel or ileocolonic resection within 6 months of taking anti-TNF alpha therapy. The control group did not receive biologic therapy within 6 months of surgical resection. The study group had significantly less inflammation in all bowel wall layers, but there was no difference in mucosal erosion or ulceration. The study group also had significantly higher prevalence of muscularis mucosae reduplication. There were no differences in the degree of crypt architectural distortion or incidence of pyloric gland metaplasia. The study group exhibited submucosal hyalinizing fibrosis in a distinctive pattern which was not observed in the control group, and showed significantly more fibrous obliteration of the muscularis mucosae. The authors found no evidence that the histologic features seen in patients exposed to anti-TNF-alpha therapy had any clinically significant effect on the patients' course.

The expression of δ-catenin in esophageal squamous cell carcinoma and its correlations with prognosis of patients.

Zhang JY, Bai CY, Bai YQ, Zhang JY, Wu ZY, Wang SH, Xu XE, Wu JY, Zhu Y, Rui Y, Li EM, Xu LY.

Hum Pathol 2014; 45(10):2014-22.

http://www.ncbi.nlm.nih.gov/pubmed/25090917

Untreated primary esophageal squamous cell carcinoma resections (n=299) were evaluated for expression of delta-catenin, a member of the catenin adhesion molecule family primarily expressed in the CNS. Upregulation has been reported previously in some epithelial tumors. Controls included adjacent normal squamous epithelium, dysplastic squamous epithelium, and chronically inflamed squamous epithelium. Delta-catenin expression was analyzed by IHC and mRNA expression, and *in vitro* effects of delta-catenin on ESCC cells migration and proliferation was also performed. The authors found that delta-catenin expression was increased in ESCC as compared to normal squamous epithelium, and expression correlated with TNM stage and lymph node metastasis. High delta-catenin expression was an independent prognostic factor that correlated with shorter patient survival. Delta-catenin overexpression enhanced ESCC cell migration but had no effect on proliferation. The authors conclude that overexpression of delta-catenin acts as an oncoprotein and is associated with poor prognosis in esophageal squamous cell carcinoma.

How reliable is immunohistochemical staining for DNA mismatch repair proteins performed after neoadjuvant chemoradiation?

Vilkin A, Halpern M, Morgenstern S, Brazovski E, Gingold-Belfer R, Boltin D, Purim O, Kundel Y, Welinsky S, Brenner B, Niv Y, Levi Z.

Hum Pathol 2014; 45(10):2029-36.

http://www.ncbi.nlm.nih.gov/pubmed/25150747

In 32 rectal cancer patients with available preneoadjuvant biopsy and postneoadjuvant resection specimens, IHC for mismatch repair proteins was compared to a control group of 39 rectosigmoid cancer patients who had not received neoadjuvant therapy. Qualitative and quantitative scores were given for each stained slide. Overall, biopsy findings disagreed with resection findings in 18.5% of the study group, and only 7.7% of the control group, which was statistically significant. Nonagreement occurred to some extent with each of the four MMR proteins. The authors conclude that for rectal cancer, IHC should be performed on the biopsy specimen rather than on the post-treatment resection specimen.

Should the grading of colorectal adenocarcinoma include microsatellite instability status?

Rosty C, Williamson EJ, Clendenning M, Walters RJ, Win AK, Jenkins MA, Hopper JL, Winship IM, Southey MC, Giles GG, English DR, Buchanan DD.

Hum Pathol 2014; 45(10):2077-84.

http://www.ncbi.nlm.nih.gov/pubmed/25149551

This prospective cohort study investigated the effect of microsatellite instability by immunohistochemistry for MMR proteins and/or by molecular methods for MSI on patient survival in relationship to current WHO 3-tiered and WHO/AJCC 2-tiered tumor grading systems. The study included 738 colorectal cancer patients and stratified death due to all causes, CRC-related deaths by histologic type, histologic grade, and MSI status. There was significantly better overall and CRC-specific survival for MSI tumors compared with MSS tumors of all histologic types. MSS high-grade tumors were significantly more associated with overall and CRC-specific mortality. The authors propose a new grading system such that the "low-grade" category would include histologic low grade (MSS and MSI) and also histologic high grade with MSI, while the "high-grade" category would only include histologic high-grade with MSS. The authors do note that their histologic grading was based on the least differentiated component present in one 40x field, rather than assessing the whole tumor as recommended by the AJCC.

Germline mutation of RPS20, encoding a ribosomal protein, causes predisposition to hereditary nonpolyposis colorectal carcinoma without DNA mismatch repair deficiency.

Nieminen TT, O'Donohue MF, Wu Y, Lohi H, Scherer SW, Paterson AD, Ellonen P, Abdel-Rahman WM, Valo S, Mecklin JP, Järvinen HJ, Gleizes PE, Peltomäki P.

Gastroenterology 2014; 147(3):595-98.

http://www.ncbi.nlm.nih.gov/pubmed/24941021

This is a genetics study in a family with familial colorectal cancer type X, a hereditary nonpolyposis colorectal carcinoma syndrome with no defects in mismatch repair proteins. The authors describe a novel germline mutation resulting in truncation and inactivation of RPS20,

which encodes a component of the 18S ribosomal subunit, resulting in a defect in pre-ribosomal RNA maturation, and a dominant predisposition to colorectal cancer in this family.

Eosinophilic esophagitis in adults is associated with IgG4 and not mediated by IgE.

Clayton F, Fang JC, Gleich GJ, Lucendo AJ, Olalla JM, Vinson LA, Lowichik A, Chen X, Emerson L, Cox K, O'Gorman MA, Peterson KA.

Gastroenterology 2014; 147(3):602-9.

http://www.ncbi.nlm.nih.gov/pubmed/24907494

This prospective, randomized, double-blind, placebo-controlled trial evaluated the role of IgE in the development of eosinophilic esophagitis in adults. Patients with EoE who were given anti-IgE therapy for 16 weeks had no difference in symptoms or tissue eosinophil counts as compared to patients given placebo. Retrospective immunofluorescence analysis revealed granular extracellular IgG4 deposits in EoE patients, but not in controls. Also, serum IgG4 reactive to the four foods most commonly associated with EoE (milk, nuts, wheat, and egg) was increased in the EoE patients. The authors conclude that EoE in adults is an IgG4-associated disease process, and not an IgE-associated allergy.

SMARCB1 (INI1)-negative rhabdoid carcinomas of the gastrointestinal tract: clinicopathologic and molecular study of a highly aggressive variant with literature review.

Agaimy A, Rau TT, Hartmann A, Stoehr R.

Am J Surg Pathol 2014; 38(7):910-20.

http://www.ncbi.nlm.nih.gov/pubmed/24503755

This study describes the clinical history, immunohistochemical findings and molecular alterations in two carcinomas from the stomach and cecum with exclusive rhabdoid features. The patients died of disease at 6 and 10 months, respectively. The tumors coexpressed

vimentin, pancytokeratin, and EMA. Both showed complete loss of nuclear SMARCB1/INI1. Molecular analysis (KRAS, EGFR, BRAF, PIK3CA, and microsatellite studies) revealed a CpG-island methylator phenotype in the cecal tumor (CIMP(+)/MLH1(-)/BRAF(V600E)/MSI-H), confirming epithelial origin. The gastric tumor showed poorly differentiated adenocarcinoma in regional nodes, again confirming epithelial derivation. Other genes tested were wild type in both cases. Literature review (a total of 39 cases) revealed a glandular component in 33%. Affected sites were: stomach (13), colon (11), small bowel (10), and distal esophagus (5). Of the 34 patients with follow-up ≥12 months, 29 (85%) died within 1 year (mean: 4 mo). Molecular tests were performed in 8/39 cases. A CIMP(+)/BRAF(V600E)/MLH1(-) phenotype was found in 3/4 right colon tumors. Loss of nuclear SMARCB1 protein was noted in 3/6 cases tested. This study highlights the heterogeneity of rhabdoid GI neoplasms and supports their epithelial derivation. Rhabdoid phenotype likely represents a common pathway of dedifferentiation with frequent loss of SMARCB1 and a highly aggressive course. The CIMP phenotype represents a novel subset of rhabdoid GI carcinomas. This rare variant should be distinguished from proximal-type epithelioid sarcoma and other SMARCB1-deficient mimics.

Gastrointestinal biopsy findings of autoimmune enteropathy: a review of 25 cases.

Masia R, Peyton S, Lauwers GY and Brown I.

Am J Surg Pathol 2014; 38:1319-29.

http://www.ncbi.nlm.nih.gov/pubmed/25188868

Autoimmune enteropathy (AIE) is a rare immune-mediated disorder causing severe diarrhea. The authors characterize the GI biopsy findings in 25 children and adults. The most common finding on small intestinal biopsy was villous blunting, expansion of the lamina propria by mixed mononuclear inflammation, and neutrophilic cryptitis with or without crypt microabscesses (52% of cases). The second most common pattern was indistinguishable from celiac disease, with villous blunting and intraepithelial lymphocytosis (20% of cases). Increased crypt apoptosis with minimal inflammation, resembling acute graft-versus-host disease, was observed in 16% of the cases. Abnormalities outside the small intestine were present in all cases with available biopsies, and the stomach was most commonly affected. AIE may thus be regarded as a pan-gastrointestinal autoimmune disorder, and biopsies from sites other than the small bowel may facilitate the diagnosis.

The utility of immunohistochemistry in subtyping adenocarcinoma of the ampulla of Vater.

Ang DC, Shia J, Tang LH, Katabi N, Klimstra DS

Am J Surg Pathol 2014; 38:1371-79.

http://www.ncbi.nlm.nih.gov/pubmed/24832159

Histologic classification of ampullary carcinomas into intestinal, pancreatobiliary or other subtypes can sometimes be difficult. Immunohistochemical (IHC) stains may allow distinction between the subtypes. A total of 105 ampullary carcinomas were subtyped first by H&E evaluation and then by an IHC panel composed of CK7, CK20, CDX2, MUC1, and MUC2, and the added value of IHC was analyzed. By a subtyping schema incorporating the combination staining patterns, "intestinal subtype" was defined as having (1) positive staining for CK20 or CDX2 or MUC2 and negative staining for MUC1, or (2) positive staining for CK20, CDX2, and MUC2, irrespective of the MUC1 result; and "pancreatobiliary subtype" was defined as having positive staining for MUC1 and negative staining for CDX2 and MUC2, irrespective of CK20 results. By combining this schema with H&E evaluation, 97 of the 105 cases (92%) could be classified into either intestinal or pancreatobiliary subtype. In particular, immunophenotyping allowed categorization of 75% of poorly differentiated adenocarcinomas and 69% of cases with mixed histologic features as either intestinal or pancreatobiliary subtype. Most mucinous adenocarcinomas (88%) were clearly intestinal subtype by IHC. This IHC schema enhanced the subtyping of ampullary carcinoma and, in combination with H&E evaluation, allowed a dichotomous classification in 92% of the cases. The authors conclude that should further independent studies reaffirm the findings, this subtyping schema may serve as a valuable tool in both diagnostic and research settings.

Histologic categorization of fibrotic cancer stroma in the primary tumor is an independent prognostic index in resectable colorectal liver metastasis.

Ueno H, Konishi T, Ishikawa Y, Shimazaki H, Ueno M, Aosasa S, Saiura A, Hase K, Yamamoto J.

Am J Surg Pathol 2014; 38:1380-86.

http://www.ncbi.nlm.nih.gov/pubmed/24832160

The prognostic role of the desmoplastic reaction (DR) in primary colorectal tumors was investigated in patients with colorectal liver metastasis (CRLM). The DR in primary tumors was classified as mature (keloid-like collagen), intermediate, or immature (myxoid stroma). Review of 412 patients who underwent hepatectomy for CRLM at 2 institutions was conducted. Immature DR was associated with higher T and N stages, higher primary tumor grade, synchronous and larger size of liver metastasis, and extrahepatic disease ($P \leq 0.0001$ to 0.002). The DR type significantly influenced the rate of recurrence in extrahepatic sites, including the lung, peritoneum, and local region in the primary tumor ($P \leq 0.0001$ to 0.03). The five-year overall survival rates after hepatectomy were the highest in the mature group (58.9%), followed by the intermediate (42.1%) and immature (26.7%) group. Multivariate analysis revealed that the DR type was an independent prognostic factor along with T stage of the primary tumor, size of liver metastasis, and presence of extrahepatic disease. The authors conclude that characterizing the DR in the primary tumor is valuable in evaluating prognostic outcome after hepatectomy in CRLM patients.

Evaluation of intestinal biopsies for pediatric enteropathy: a proposed immunohistochemical panel approach.

Martin BA, Kerner JA, Hazard FK, Longacre TA.

Am J Surg Pathol 2014; 38:1387-95.

http://www.ncbi.nlm.nih.gov/pubmed/25188866

Congenital enteropathies are rare disorders with significant clinical consequences; however, definitive diagnosis based on morphologic assessment of duodenal biopsies with routine stains alone is often impossible. To determine the role of immunohistochemistry (IHC) in the evaluation for microvillous inclusion disease, congenital tufting enteropathy (intestinal epithelial dysplasia), and enteroendocrine cell dysgenesis, a series of duodenal biopsies from 26 pediatric patients with chronic/intractable diarrhea was retrospectively reviewed. IHC stains for CD10, EpCAM, chromogranin, and villin were performed on all biopsies, and the results were correlated with hematoxylin and eosin and ultrastructural findings using electron microscopy, when available. The authors conclude that the routine use of an IHC panel of CD10, EpCAM, and chromogranin is warranted in patients

meeting specific age and/or clinical criteria, as the morphologic findings of congenital enteropathies may be subtle, focal, or inapparent on routine stains.

Small bowel adenocarcinomas complicating Crohn's disease are associated with dysplasia: a pathologic and molecular study

Svrcek M, Piton G, Cosnes J, Beaugerie L, Vermeire S, Geboes K, Lemoine A, Cervera P, El-Murr N, Dumont S, Scriva A, Lascols O, Ardizzone S, Fociani P, Savoye G, Le Pessot F, Novacek G, Wrba F, Colombel J-F, Leteurtre E, Bouhnik Y, Cazals-Hatem D, Cadiot G, Diebold M-D, Rahier J-F, Delos M, Flejou J-F, Carbonnel F.

Inflamm Bowel Dis 2014; 20(9): 1584-92.

http://www.ncbi.nlm.nih.gov/pubmed/25029614

These authors performed a pathologic, immunohistochemical and molecular characterization of adenocarcinomas and dysplasias of the small intestine that occurred in the setting of Crohn's disease. They evaluated adenocarcinomas from 41 patients, 20 of which were associated with dysplasia. The overall prevalence of dysplasia or carcinoma in resection specimens was found to be 1.5%. The median age at cancer diagnosis was 47 years, and the median disease duration was 13 years. The majority (79%) of the adenocarcinomas were detected incidentally during surgery or upon pathologic examination of resection specimens, and almost all (82%) were found in the terminal ileum. Dysplasia occurred adjacent to adenocarcinoma in 9 cases, distant from adenocarcinoma in 4 cases, was found both adjacent to and distant from adenocarcinoma in 7 cases, and was high grade in 16 cases. Aberrant nuclear B-catenin and p16 staining was more frequently observed in adenocarcinoma (52% and 38%, respectively) compared to dysplasia (20% and 15%, respectively), indicating that Wnt signaling abnormalities are a later event in the dysplasia-adenocarcinoma sequence. In contrast, abnormal p53 expression occurred with similar frequency in both dysplasia and adenocarcinoma (59% and 60%, respectively), indicating that p53 mutation may be an early step in Crohn's disease-associated carcinogenesis. *KRAS* mutations were more common (23%) among Crohn's disease-associated adenocarcinoma compared to BRAF mutations (4%), and *PIK3CA* mutations were absent. The authors conclude that the immunohistochemical and molecular features of small bowel dysplasia and adenocarcinoma arising in the setting of Crohn's disease have many similarities to those described in colorectal cancer associated with ulcerative colitis.

Colonic phenotype of the Ileum in Crohn's disease: a prospective study before and after ileocolonic resection.

Ascolani M, Mescoli C, Palmieri G, Sica G, Calabrese E, Peruzziello C, Onali S, Albertoni L, Lolli E, Condino G, Pallone F, Rugge M, Biancone L

Inflamm Bowel Dis 2014; 20 (9): 1555-61.

http://www.ncbi.nlm.nih.gov/pubmed/25054336

This study assessed colonic metaplasia of the ileal epithelium in 22 patients with Crohn's disease by comparing histochemical expression of small intestinal sialomucins and colonic sulfomucins (high iron diamine-alcian blue stain), and CD10 immunoexpression, a marker of small intestinal phenotype, in ileal resection specimens *versus* biopsies of the neoterminal ileum at 6 and 12 month intervals. They also evaluated whether expression of these markers correlated with disease recurrence in this patient group. The authors report that expression of sulfomucins was higher in the ileum of resection specimens than in 6 and 12 month follow-up biopsies of the neoterminal ileum, whereas CD10 expression and sialomucins were lower in surgical specimens compared to biopsies of the neoterminal ileum. Their findings suggest that colonic metaplasia may develop in the ileum of patients with established Crohn's disease; however, no significant differences with respect to these markers were reported between patients who did *versus* those who did not experience disease recurrence.

HPV-related squamous neoplasia of the lower anogenital tract: an update and review of recent guidelines.

Maniar K, Nayar R

Adv Anat Pathol 2014; 21 (5): 341-358.

http://www.ncbi.nlm.nih.gov/pubmed/25105936

This review discusses recommendations for pathologic examination and reporting of HPV-associated intraepithelial neoplasia of the cervix, vagina, vulva, anus, perianal skin, penis, and scrotum as enumerated by the Lower Anogenital Squamous Terminology (LAST) working group in 2012. Historic and current terminology, as well as utility and limitations of

immunohistochemical (p16, Ki67, ProEx C, L1) and molecular (HPV 16/18 mRNA, telomerase TERC, HPV genotyping) biomarkers are included.

Long-term recurrence of neoplasia and Barrett's epithelium after complete endoscopic resection.

Anders M, Bahr C, Abbas El-Masry M, Marx AH, Koch M, Seewald S, Schachschal G, Adler A, Soehendra N, Izbicki J, Neuhaus P, Pohl H, Rosch T.

Gut 2014; 63:1535-43.

http://www.ncbi.nlm.nih.gov/pubmed/24389236

This European study addresses the long-term recurrence of Barrett's after widespread endoscopic mucosal resection (EMR). Of 179 patients with neoplastic Barrett's, of whom 81 had complete eradication of Barrett's and neoplasia, 32 had Barrett's recurrence and 5 had recurrent neoplasia after a mean of 44 months (1 low-grade, 1 high-grade, 3 adenocarcinoma). Cancer recurrence still is a concern even after negative biopsies. Strictures are a significant complication of widespread endotherapy and require additional endoscopy sessions with risk of perforation.

Morphology and natural history of familial adenomatous polyposis-associated dysplastic fundic gland polyps.

Arnason T, Liang W-Y, Alfaro E, Kelly P, Chung DC, Odze RD, Lauwers GY.

Histopathology 2014; 65:351-62.

http://www.ncbi.nlm.nih.gov/pubmed/24548295

This study reports 24 patients with FAP-associated dysplastic fundic gland polyps in addition to comparison cohorts of patients with FAP-associated non-dysplastic polyps, sporadic fundic gland polyps with dysplasia, and sporadic dysplasia not in a fundic gland polyp. One of the 24 patients developed high-grade dysplasia diagnosed 6 years after the initial low-grade dysplasia diagnosis, and after endoscopic resection and follow-up, had low-grade dysplasia in three

fundic gland polyps. Several FAP patients (34/39) had duodenal adenomas diagnosed during the study period.

The changing role of the pathologist in the management of Barrett's oesophagus

Hopcroft SA, Shepherd NA.

Histopathology 2014; 65(10):441-55.

http://www.ncbi.nlm.nih.gov/pubmed/24809428

Comprehensive review article by UK authors on the evaluation of columnar-lined esophagus, significance or lack thereof of intestinalization (goblet cells), utility of endoscopic mucosal resection, and approach to "indefinite for dysplasia."

TNFAIP8 overexpression is associated with lymph node metastasis and poor prognosis in intestinal-type gastric adenocarcinoma.

Yang M, Zhao Q, Wang X, Liu T, Yao G, Lou C, Zhang Y.

Histopathology 2014; 65(10):517-26.

http://www.ncbi.nlm.nih.gov/pubmed/24621012

Analysis of tumor necrosis factor alpha-induced protein 8 (TNFAIP8) expression in 138 cases of gastric adenocarcinoma by IHC and Western blot. High expression of TNFAIP8 was found to be associated with depth of invasion (P=0.024), presence of lymph node metastasis (P=0.038), and the Lauren classification (P=0.048), as well as poorer overall survival and disease-free survival.

Location, location, location! The reality of life for an intestinal stem cell in the crypt.

Walther V, Graham TA.

J Pathol 2014; 234:1-4.

http://www.ncbi.nlm.nih.gov/pubmed/24797291

This concise review discusses the recent landmark study published in Nature (Ristma L et al. Nature 2014; 507:362-5.) that identified the crucial role of position within the basal crypt niche in maintaining the intestinal stem cell population.

Interobserver variability in assessing dysplasia and architecture in colorectal adenomas: a multicentre Canadian study.

Osmond A, Li-Chang H, Kirsch R, Divaris D, Falck V, Liu D-F, Marginean C, Newell K, Parfitt J, Rudrick B, Sapp H, Smith S, Walsh J, Wasty F, Driman DK.

J Clin Pathol 2014; 67:781-6.

http://www.ncbi.nlm.nih.gov/pubmed/?term=Interobserver+variability+in+assessing+dysplasia+and+architecture+in+colorectal+adenomas%3A+a+multicentre+Canadian+study

This study determined the intraobserver reproducibility of the diagnosis of colonic adenoma architecture (tubular, tubulovillous or villous) and dysplasia grade (low grade or high grade) for a set of 40 whole slide images among 12 Canadian surgical pathologists (6 in community practice and 6 academic GI pathologists). Without any prior discussion of histologic criteria the Kappa statistic was 0.4700 (moderate agreement) for architecture and 0.5680 (moderate agreement) for dysplasia grade. National guidelines for the diagnosis of architecture and dysplasia grade were the circulated among the same pathologists and the 40 cases were re-reviewed after 30 days had elapsed. The Kappa statistic for architecture improved to 0.5803 but the Kappa score for dysplasia grade decreased significantly to 0.4833.

Comparison of KRAS mutation analysis of colorectal cancer samples by standard testing and next-generation sequencing.

Kothari N, Schell MJ, Teer JK, Yeatman T, Shibata D, Kim R.

J Clin Pathol 2014; 67:764-7.

http://www.ncbi.nlm.nih.gov/pubmed/25004944

This study determined the concordance rate for KRAS mutational status of colorectal cancers determined both by standard CLIA approved assays and next generation sequencing (NGS) utilizing the Illumina platform. There were discordant results in 8 of the 77 cases tested. NSG identified unusual KRAS mutation in 5 cases that were missed by standard testing (Q61 and A146 mutations). In one case a mutation was detected by standard testing but was wild type by NGS and investigation revealed that a low fraction of tumor cells in the NGS sample was likely responsible. In another case a low level of the mutation detected by stand testing was initially overlooked in the NGS result. In last discordant case different KRAS mutations were identified by the two testing modalities.

NOTE: The October 2014 issue of the Journal of Clinical Pathology (Volume 67, Issue 10) is entirely devoted to review articles on a variety of topics in gastrointestinal pathology (edited by Drs. R Chetty, EA Montgomery and CS Lee).

Journals Reviewed (September and October Issues)

Histopathology

Archives of Pathology and Lab Medicine

Modern Pathology

American Journal of Clinical Pathology

Journal of Pathology

Journal of Clinical Pathology

American Journal of Pathology

Human Pathology

Cancer Cytopathology

American Journal of Surgical Pathology

Advances in Anatomic Pathology

Journal of Molecular Diagnostics

Gastrointestinal Endoscopy

Gastroenterology Clinics of North America

Gastroenterology

Gut

American Journal of Gastroenterology

Clinical Gastroenterology Hepatology

Inflammatory Bowel Diseases

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Raga Ramachandran, MD, PhD; University of California San Francisco

Steven D Hart, MD; University of California Los Angeles

Ilyssa Gordon, MD, PhD; Cleveland Clinic

Nicole Panarelli, MD; Cornell University Medical Center

Cynthia D Guy, M.D.; Duke University Medical Center

John Hart, MD; University of Chicago Medical Center