Abstracts From the NCCN 23rd Annual Conference: Improving the Quality, Effectiveness, and Efficiency of Cancer Care™

The following abstracts were accepted for presentation at the NCCN 23rd Annual Conference: Improving the Quality, Effectiveness, and Efficiency of Cancer Care™ General Poster Session at the Rosen Shingle Creek resort in Orlando, Florida, on March 22 and 23, 2018. Additional abstracts were published in the print edition of JNCCN (2018;16(5.5):575–673) and are available at JNCCN.org.

Best Practices in Implementation and Use of Clinical Practice Guidelines

AB2018-22. Standardization of Pancreatic Cancer Guidelines at a Large Midwest Hospital System

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Introduction: We examined the care of patients with pancreatic cancer (PC) at a vertically integrated 15-hospital Midwest healthcare system to standardize guidelines for the evaluation and management of PC. Methods: In 2016, 174 patients with PC were diagnosed and treated with the following therapies: 25 with surgery, 107 with chemotherapy, 28 with radiation therapy (RT), 12 with surgery/chemotherapy, 19 with chemotherapy/RT, and 7 with surgery/chemotherapy/RT. In 2016–2017, our multidisciplinary oncology team met to standardize the evaluation and management of PC in our system. As a basis for our guidelines, we used the NCCN Guidelines and VIA Oncology pathways. Results: Following is a list of guidelines for management and evaluation that were implemented: all newly diagnosed patients with stage I–III PC are presented at a multidisciplinary gastrointestinal cancer conference (eg, duodenal, ampullary, periampullary, and distal common bile duct cancers). Patients with stage IV disease are presented at the conference at the discretion of the treating physician (114 patients presented in 2017). All patients are evaluated with a pancreas protocol CT (PPCT) of the chest/abdomen/pelvis (PET/CT performed for locally advanced/suspected metastases); endoscopic ultrasound and biopsy are performed in all cases; and endoscopic retrograde cholangiopancreatography and stenting are performed in jaundiced patients or those with impending biliary obstruction. Baseline CEA and CA 19-9 levels are measured. Those with advanced local disease undergo a diagnostic laparoscopy. Neoadjuvant chemotherapy (NAC; FOLFIRINOX or gemcitabine/Abxram [G/A]) is given for invasive PC with the intent to reduce positive margins, improve R0 resection rates, and identify early metastatic disease. Patients are classified by the surgical oncologist and radiologist as resectable, borderline, or locally advanced as per the American Hepato-Pancreato-Biliary Association guidelines. Patients with resectable PC receive NAC for 3 months followed by resection, and then an additional 3 months of chemotherapy. Those with borderline resectable PC receive 6 months of NAC followed by neoadjuvant RT prior to resection (5,040 cGy). Patients with locally advanced PC receive 6 months of G/A and are then considered for extended resection, NanoKnife, or CyberKnife. Surgical resection is the goal for all patients with nonmetastatic PC. All patients have a PPCT after completion of NAC and prior to resection. Those not receiving 6 months of chemotherapy before surgery will receive the additional chemotherapy after surgical recovery. Those with positive margins/positive lymph nodes will receive RT if not given preoperatively (4,500–5,040 cGy). Conclusions: All patients with PC are currently being evaluated and treated according to these guidelines instituted in 2017. We await comparison studies of resectability, survival, and recurrence rates.

AB2018-23. Facilitating Obstetrician-Gynecologist Awareness of NCCN Guidelines Through Genetic Counseling

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Background: The American College of Obstetricians and Gynecologists issued a Practice Bulletin (2017) that addressed the role of the obstetrician-gynecologist (OB/GYN) in identifying and managing women with hereditary breast and ovarian cancer (HBOC)
AB2018-24: Table 1. Comparison of Rating Methods by COP in NCCN Guidelines for CLL/SLL and MM

<table>
<thead>
<tr>
<th>NCCN CEC, n (%)</th>
<th>Preferred (N=44)</th>
<th>Other Recommended (N=85)</th>
<th>Useful in Certain Circumstances (N=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>19 (43)</td>
<td>6 (7)</td>
<td>3 (30)</td>
</tr>
<tr>
<td>2A</td>
<td>25 (57)</td>
<td>55 (65)</td>
<td>7 (70)</td>
</tr>
<tr>
<td>2B</td>
<td>–</td>
<td>17 (20)</td>
<td>–</td>
</tr>
<tr>
<td>3</td>
<td>–</td>
<td>7 (8)</td>
<td>–</td>
</tr>
<tr>
<td>NCCN EB, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficacy (score ≥4)</td>
<td>35 (80)</td>
<td>23 (27)</td>
<td>2 (20)</td>
</tr>
<tr>
<td>Quality (score ≥4)</td>
<td>32 (73)</td>
<td>17 (20)</td>
<td>4 (40)</td>
</tr>
<tr>
<td>Consistency (score ≥4)</td>
<td>36 (82)</td>
<td>30 (35)</td>
<td>4 (40)</td>
</tr>
</tbody>
</table>

NCCN Categories of Evidence and Consensus (CEC), and NCCN Evidence Blocks (EB) are determined by the respective NCCN Guidelines Panel. Our analysis assesses the consistency of COP with CEC and EB.

Conclusions: NCCN Guidelines are considered optimal. Interventions are categorized as “Preferred,” “Other recommended,” or “Useful in certain circumstances.” NCCN COP, NCCN Categories of Evidence and Consensus (CEC), and NCCN Evidence Blocks (EB) are determined by the respective NCCN Guidelines Panel. Our analysis assesses the consistency of COP with CEC and EB. Methods: NCCN Guidelines for Chronic Lymphocytic Leukemia/Small Lymphocytic Lymphoma (CLL/SLL) and Multiple Myeloma (MM) were reviewed. The following data were extracted for each intervention: category rating, COP, and EB scores. Interventions that did not have EB scores were excluded. Results: Across both guidelines, 139 interventions were included. All category 2B and 3 interventions were categorized as other recommended interventions. Category 1 and 2A recommendations were observed in all COP, but category 1 interventions accounted for 43% of preferred interventions versus 7% of other recommended interventions and 30% of interventions useful in certain circumstances. Preferred interventions had a higher average Efficacy and Quality EB score compared with other COP (4 vs 3, respectively). Interventions considered preferred or useful in certain circumstances had an average Consistency EB score higher than other recommended interventions (4 vs 3). Interventions with an Efficacy, Quality, and/or Consistency score ≥4 accounted for most preferred interventions (>70%) and approximately one-third of other recommended interventions. Conclusions: Interventions that were category 1 or had high EB scores for Efficacy, Quality, and/or Consistency were generally categorized as preferred; however, those interventions have also been categorized as other recommended. COP are consistent with CEC and EB but do not fully align, showing that panel considerations may not be consistently translated across COP, CEC, and EB.
AB2018-25. Changing Practice Patterns in Breast Cancer Treatment at the University of Cincinnati Barrett Cancer Center After Approval of Pertuzumab
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Background: HER2-positive breast cancer was traditionally treated with adjuvant trastuzumab, an anti-HER2 monoclonal antibody, and cytotoxic therapy. However, treatment resistance became a challenge. Pertuzumab, a novel anti-HER2 monoclonal agent, was developed and combined with trastuzumab to improve survival in metastatic and locally advanced disease. The purpose of this study was to determine whether treatment shifted to the neoadjuvant setting at the University of Cincinnati Barrett Cancer Center. We also investigated whether pertuzumab was used outside the practice guidelines and, if so, whether there was a clinical benefit. Methods: Data were collected via a retrospective chart review at the University of Cincinnati Barrett Cancer Center. The rate of pertuzumab adoption as a continuous variable was analyzed using a 2-sided t-test. Our predictor variables were whether the treatment was administered before or after the approval year (ie, 2013) and whether patients received pertuzumab outside the guidelines set by the FDA. We created a binary variable of whether patients had a response to treatment when used outside the guidelines. The effect of each predictor variable on the response rate was analyzed using a logistic regression and chi-square test of independence. Results: 87 patients treated with pertuzumab were analyzed from 2010–2017; 60 patients (68.9%) had locally advanced disease (tumor size >2 cm or node-positive) and 16 (18.3%) had metastatic disease. The mean number of patients treated with pertuzumab before 2013 was 1, and after 2013 was 19.25—a change in rate that was statistically significant (P = .01537). The remaining 11 patients (12.6%) were treated with pertuzumab outside accepted guidelines (tumor <2 cm and node-negative). 7 patients treated outside the guidelines responded to treatment. A simple logistic regression shows a significant difference in responses for these patients (odds ratio, 4.56; P = .0406). Conclusions: Pertuzumab adoption quickly shifted practice patterns to the neoadjuvant setting after its approval at our institution. A subset of patients received pertuzumab outside the guidelines with a statistically significant response to treatment. This response may indicate that the use of pertuzumab could be extended to node-negative tumors <2 cm. Larger prospective studies that evaluate progression-free and overall survival in this clinical context are needed.

AB2018-26. Pain Improvement After Healing Touch and Massage
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Background: As the opioid epidemic in the United States escalates, clinicians must help patients manage their pain without an increased risk of opioid misuse. The NCCN Guidelines for Adult Cancer Pain state clinicians should use nonpharmacologic interventions, including physical, cognitive, and spiritual pain management tools. Effective 2018, The Joint Commission will require nonpharmacologic pain treatment as a performance element for accredited healthcare facilities. Healing Touch (HT) and massage therapies meet these guidelines, yet there is little research comparing their efficacy in a population of patients at the same clinic. The goal of our study was to determine whether HT and massage therapies result in statistically significant reductions in patient-reported pain. Methods: Patients reported pretreatment and posttreatment pain based on a scale of 1–10 (0, no pain; 10, worst possible pain). Those reporting pain of <2 were excluded. Summary statistics of pretreatment and posttreatment pain scores and corresponding differences were calculated. Generalized linear models modeled posttreatment pain score as a function of modality, adjusting for pretreatment pain score. The frequency and proportion of patients experiencing ≥2-point pain improvement (considered clinically significant) was analyzed using the chi-square test. Results: 471 patients reported pretreatment and posttreatment pain; 219 (46.5%) were treated with HT and 252 (53.5%) with massage. Both HT (P < .01) and massage (P < .01) significantly reduced pain, but were not significantly different in terms of pain reduction (P = .64). The mean differences in pretreatment versus posttreatment pain were similar for both treatments (2.4 for HT vs 2.5 for massage), and 69.9% and 71.8% of patients, respectively, reported a clinically significant reduction in pain (defined as ≥2 score difference). Pretreatment pain was higher in those who underwent HT (mean, 5.1 [SD, 2.2]) than massage (mean, 4.4 [SD, 2.2]), and posttreatment pain remained higher with HT (mean, 2.7 [SD, 2.2]) versus massage (mean, 1.9 [SD, 1.8]). Adjusting for pretreatment pain, massage was more effective in pain reduction than HT (P = .028). Conclusions: Clinicians should recommend both HT and massage for effective, nonpharmacologic pain management. Patients who underwent HT presented with greater pretreatment pain, and were perhaps attracted to HT because it uses comfortable, light touch rather than the firmer contact used in massage. However, results suggest that massage is more effective.
when accounting for presenting pain. Future research should explore attitudes about HT versus massage, and how these may differ among patients with varied pain levels.

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Background: Colorectal cancer (CRC) is the second most deadly form of cancer, but is treatable if found at an early stage. Fewer than 6 of 10 Oregonians aged ≥50 years are screened, resulting in >50% of all CRC cases being found at a late stage. To improve screening rates, Oregon Health & Science University (OHSU) and their community partners launched a system-level guideline development process to adapt national guidelines for local implementation. This process follows evidence-based practice (EBP) methodology of integrating best research evidence with clinical expertise and patient values and preferences into clinical guidelines and practices. The goal of the newly created guideline is to ensure screening is delivered consistently across the system to improve screening adherence and prevent CRC. Methods: A multidisciplinary expert team was formed of representatives from primary care, radiology, gastroenterology, surgery, pathology, nursing, and informatics; EBP methodologists; and a patient representative. This expert team determined the guideline’s scope, as well as the clinical questions that informed the evidence summary. An exhaustive search of the literature was conducted and appraised using GRADE methodology. Synthesized evidence was then presented to the expert team to develop practice recommendations, consensus statements, and implementation plans. This process helped ensure the delivery of comprehensive, coordinated, evidence-based care across the system. Results: Content experts came to a consensus on system-level practice recommendations for screening in non–African American asymptomatic individuals aged ≥50 years at average risk; shared decision-making; patient acceptance; cost-effectiveness; and screening in high-risk patients. The implementation plan will include developing shared decision-making tools, identifying programmatic recommendations, integrating an automatic alert for test results, providing positive test result referrals, and establishing panel management for quality measurement. OHSU anticipates outcome data will demonstrate improvements in care as a result of guideline implementation (eg, CRC screening rates, positive test referral, and shared-decision support tool utilization). Conclusions: The hope is that OHSU’s EBP process of adapting national CRC guidelines for system-level needs will lead to an increase in CRC screening, and therefore a reduction in CRC cases and mortality.

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Sabine Siesling, PhD,d; and Xander Verbeek, PhD,e
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b Northwest Clinics, Alkmaar; c Catharina Hospital, Eindhoven; and d University of Twente, Enschede, the Netherlands

Background: Most guidelines are cumbersome, structured, large textual documents that impede implementation into clinical care paths. Further, cancer treatment is becoming increasingly personalized to the patient and tumor characteristics, thus increasing the complexity of decision-making. Methods: We developed a method to model guideline recommendations into data-driven (ie, patient and tumor characteristics) clinical decision trees (CDTs) that are both clinical and computer interpretable in an App format (Oncoguide). CDTs are represented by nodes, branches, and leaves that represent data items (eg, population characteristics, T stage), data item values (eg, ≤T2), and recommendations (eg, chemotherapy). The Dutch breast cancer guideline text was transformed into CDTs. Data item analysis was performed and included noting the data source and relation to classification systems (eg, TNM, BI-RADS). To express the guideline complexity, all unique patient routes through all CDTs were counted. Results: The Dutch breast cancer guideline data and recommendations was translated into 60 CDTs, driven by 99 independent and 16 dependent data items. 104 of 115 items reflected objective patient characteristics (or preferences), of which 56 independent and 27 dependant items originated from pathology and radiology reports. The source for 74 of 99 items could be derived from classification systems. There were 377 different treatment courses through all CDTs. For each unique CDT, the median number of routes was 4 (range, 1–24), for CDTs leading to a median of 3 (range, 1–18) diagnostic recommendations and to a median of 5 (range, 1–24) treatment recommendations. The CDTs were integrated into an interactive decision support tool (www.oncoguide.nl). In Oncoguide, each guideline recommendation can be selected with one click, resulting in the presentation of more detailed information to guide decision-making. Conclusions: Breast cancer care is already largely data-driven by patient and tumor characteristics. It is fea-
Possible to present complex breast cancer guideline data and recommendations into data-driven CDTs. This may improve decision-making during multidisciplinary team meetings and result in more unambiguous prospectively characterized patient populations, thus making specific comparisons for treatment outcomes strategies more valuable. Additionally, CDTs can be updated partially, facilitating quick guideline revisions.

AB2018-29. Utilization of NCCN Guidelines to Guide a Coordinated, Standardized High-Risk Breast Cancer Screening Program
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Background: A coordinated, standardized screening program was developed to decrease breast cancer (BC) risk and aid in its early detection in high-risk women.

Methods: A retrospective descriptive analysis was conducted to assess the process and impact of using NCCN Guidelines to guide the third year of a high-risk BC screening program. Results: Of 34,180 women screened, 1.7% (n=574) met Hoag Early Risk Assessment (HERA) program criteria for elevated risk and were invited for consultation, 44.4% of whom (n=289) completed a consultation. Of those, 57.8% (n=167) had elevated Gail and IBIS (International Breast Intervention Study) scores, 13.8% (n=40) had average Gail and elevated IBIS scores, 6.6% (n=19) had elevated Gail and average IBIS scores, and 4.5% (n=13) had average Gail and average IBIS scores. Among those invited to complete a consultation, lifestyle interventions were recommended for 100% (n=289) and yearly breast MRI was recommended for 36.1% (n=207), 66.2% of whom (n=137) were referred for MRI as part of the HERA program, although only 30.7% (n=42) completed it. Whether the remaining 33.8% (n=70) were referred for MRI by their primary clinician is unknown (although primary clinicians were notified of the recommendation for annual breast MRI). However, 33.3% (n=4) completed an MRI from this group, 29.4% (n=15) were eligible for chemoprevention, and 35.3% (n=18) were eligible for GC. Among all women who underwent consultation, 8.4% (n=48) had unique biopsies performed and 1.0% (n=5) had breast malignancies identified. Conclusions: Further research is needed to identify strategies that would increase alignment of provider recommendations with those of the NCCN Guidelines.

Shan Ho, MS; Jia-Lian Yang, PhD; and Chin-Chuan Hung, PhD

Methods: We performed a search of PubMed, Cochrane Central Register of Controlled Trials, and ClinicalTrials.gov from January 1979 to July 2017 for randomized controlled trials that compared second-line treatments for NSCLC. Regimens included were chemotherapeutic agents (docetaxel, pemetrexed, platinum) as a singlet or in combination with another targeted agent (afiblercept, nintedanib, ramucirumab, sunitinib, or vandetanib), and PD-1/PD-L1 inhibitors (atezolizumab, nivolumab, or pembrolizumab). 2 authors extracted the studies and data independently. Direct and indirect data for overall survival (OS) and progression-free survival (PFS) were combined using random-effects NMA. R Software and the GeMTC package were used to calculate combined hazard ratios (HRs) and 95% credible intervals (Crls). Results: 37 trials containing 16,810 patients were included. When comparing the FDA-approved subsequent therapy regimens for progressing NSCLC, none of the 3 PD-1/PD-L1 inhibitors were found to be superior to combination docetaxel/ramucirumab in terms of both OS and PFS. Additionally, combination docetaxel/nintedanib was found to be a potential option for second-line therapy. In terms of OS, our results showed that nivolumab demonstrated increased efficacy over docetaxel/ninten-
edanib (combined HR, 0.72; 95% CrI, 0.54–0.95), although no difference in efficacy was seen when compared with the other 2 immune checkpoint inhibitors and combination docetaxel/ramucirumab. **Conclusions:** Through combining direct and indirect effects, PD-1/PD-L1 inhibitors and combination docetaxel/ramucirumab were shown to be preferred options for subsequent therapy. Further, our results suggested that nivolumab may be the optimal treatment for patients with advanced NSCLC that failed to respond to first-line therapy.

**AB2018-32. Frequency of Fertility Preservation Discussions in Patients With Solid Organ Cancers Receiving Adjuvant Chemotherapy in South Western Sydney Local Health District**

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**Background:** Premature gonadal failure with subsequent infertility is a potential toxicity of chemotherapy. We sought to determine the proportion of patients of reproductive age commencing adjuvant chemotherapy for breast cancer (BC), colorectal cancer (CRC), testicular cancer, or cervical cancer who (1) had a documented discussion about fertility and (2) underwent fertility preservation (FP). **Methods:** The electronic medical record (EMR) was searched for patients aged 18–45 years with stage I–III BC, CRC, cervical cancer, or testicular cancer who received adjuvant chemotherapy between January 2010 and December 2016. The EMR and oncologists’ letters to referring doctors were reviewed for documentation of discussions about FP. **Results:** Of 312 eligible patients, 226 (72%) were female and the median age was 38 years (range, 18–45 years). Among all eligible patients, 192 (62%) had BC, 35 (11%) had CRC, 69 (22%) had testicular, and 16 (5%) had cervical cancer. For each cancer type, the proportion for whom FP was considered was: testicular, 90%; cervical, 60%; CRC, 60%; and BC, 52%. For 110 patients (35%), there was a documented discussion about fertility and (2) underwent fertility preservation (FP). **Conclusions:** Of these, 72 (65%) underwent FP (oocyte preservation, 7; sperm banking, 51; luteinizing hormone–releasing hormone agonist during chemotherapy, 5; embryo preservation, 4; ovarian transposition, 5), and 38 patients (35%) were documented as declining FP (15 with no reason documented, 18 had completed their family, 5 to avoid delaying chemotherapy). 84 patients (27%) had documentation indicating that fertility was considered (family completed, 60; permanent contraception, 18; known infertility, 5; or pregnant at diagnosis, 1). There was no documentation about fertility or FP in the remaining 118 patients (38%), of whom 46% were aged ≤40 years and 14% had no children. Median time between initial oncology consultation and cycle 1 of chemotherapy was 18 days (range, 4–77 days) for those undergoing FP, and 14 days (range, 1–71 days) for the remaining patients. **Conclusions:** For patients of reproductive age commencing adjuvant chemotherapy for solid organ cancers, 38% had no documentation that fertility implications were considered. All patients of reproductive age should have a discussion about the impact of chemotherapy on their fertility and the options for FP, and documentation of fertility preservation discussions will help ensure this.

**AB2018-34. Refining NCCN Framework for Resource Stratification: Lessons Learned From a Clinical Informatics System and Patient Service in Low- and Middle-Income Countries**

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*Navya Network, Cambridge, MA, and Tata Memorial Centre, Mumbai, India*

**Background:** Tata Memorial Centre and Navya, in collaboration with National Cancer Grid, created TMC NCG Navya Online (Navya), a clinical informatics system and online service with large-scale use among oncologists and patients in India and 22 low- and middle-income countries (LMICs). Navya considers evidence, resource constraints, and local expertise as input, and provides treatment recommendations highly concordant with the NCCN Frameworks for Resource Stratification of NCCN Guidelines (NCCN Frameworks; SABCS 2017). Discordant recommendations may identify areas of evidence-based, expert practice that are not currently in the NCCN Frameworks. **Methods:** We conducted a prospective cohort analysis of patients with nonmetastatic breast cancer who received an online opinion from Navya between July 1, 2014, and April 30, 2017. Navya recommendations that were not consistent with those from the NCCN Frameworks were analyzed. Navya inferred decision rules from analysis of the discordant cases. **Results:** Of the 1,203 Navya recommendations, 88.3% were consistent with those from the NCCN Frameworks. Nearly half of the 11.7% recommendations that did not map to the frameworks were due to a drug substitution (eg, epirubicin for doxorubicin) or schedule (3 times weekly vs weekly paclitaxel). For the remainder of the discordant recommendations, 3 underlying expert decision rules were inferred: (1)
the widely accessible diagnostic IHC4 assay (Ki-67/estrogen and progesterone receptors/HER2) was recommended instead of Oncotype DX to determine benefit of adjuvant chemotherapy (85% of patients with T2,N0,M0 HR+/HER2–); (2) for patients with resource constraints, shorter courses (≤6 months) of anti-HER2 therapy were recommended rather than 1 year of high-cost trastuzumab (25% of patients with HER2+); and (3) hypofractionated short-course radiation therapy (RT) was recommended for patients with node-positive disease or postmastectomy patients unable to undergo long-course RT (42% required adjuvant RT). All 3 decision rules were routinely practiced by clinicians at tertiary centers in LMICs based on clinical trial evidence and experiential learning. Navya dynamically learned these rules and refined its recommendations based on experiential learning. None of this learning is currently part of NCCN Framework recommendations. Conclusions: Patients in LMICs cannot afford expensive, evidence-based recommendations such as Oncotype DX, 1 year of trastuzumab, or long-course RT. The NCCN Frameworks are an attempt to address this practice gap. Through integration with clinical informatics systems such as Navya, which provides and learns from recommendations at tertiary centers, NCCN can learn from practice innovations in the field to refine and scale its consensus guidelines.

**AB2018-35. National Chemotherapy Prescribing Patterns for Multiple Myeloma Stratified by NCCN Categories of Preference**
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**Background:** eviCore healthcare uses the NCCN Guidelines to support its proprietary program for medical oncology drug management. NCCN recently added Categories of Preference (COP) to the NCCN Guidelines for Multiple Myeloma (MM) to more clearly indicate the proportion of patients that the panel believes should receive a given regimen. The purpose of this study was to evaluate the frequency with which practicing oncologists selected drug regimens within each COP for various cohorts of patients with MM. **Methods:** All authorizations for patients with MM who had ≥1 injectable drug between January 1, 2016 through September 30, 2017, and had complete data were included. 2,930 fully evaluable patients with MM were stratified by stage, stem cell transplant (SCT) candidacy, and line of treatment. Regimens for each patient cohort were stratified into NCCN COP. **Results:** 56% of 639 untreated patients who were identified as SCT candidates received a “preferred” regimen for first-line treatment; “useful in certain circumstances” regimens were prescribed for 26% of SCT candidates; and 10% were authorized for a regimen that is “other recommended.” 783 patients who were not SCT candidates had fewer authorizations for preferred regimens (47%) and other recommended nonpreferred regimens (3%) than authorizations for regimens categorized as useful in certain circumstances (44%). The 942 patients with MM with progressive disease were more likely to have other recommended regimens prescribed (40%) versus those with newly diagnosed disease. Most of the remaining authorizations in this cohort were for preferred regimens. **Conclusions:** Approximately half of the patients with MM treated received NCCN preferred regimens. There was a higher frequency of prescribing nonpreferred regimens in patients with progressive MM. Further study is warranted to demonstrate the impact the NCCN COP will have on prescribing patterns in other cancer types. Payers or providers who implement processes to direct more patients toward NCCN preferred regimens with superior efficacy, safety, and affordability may be able to demonstrate improved quality of care and lower total medical costs.

**AB2018-36. Gaps in Compliance With Current Antiemetic Guidelines for Highly Emetogenic Chemotherapy**
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**Background:** Chemotherapy-induced nausea and vomiting (CINV) remains an important concern for patients receiving cancer treatment. CINV in the first cycle of therapy leads to 4–5 times more likelihood of CINV in subsequent cycles. New US regulations track nausea and emesis among 10 potentially avoidable toxicities during outpatient chemotherapy. Evidence-based antiemetic guidelines endorse triplet prophylaxis regimens (ie, NK1+5HT3+dexmethasone [dex]) for highly emetogenic chemotherapy (HEC), such as cisplatin, anthracycline/doxorubicin (AC), and carboplatin. Prior studies have shown shortfalls in antiemetic guideline compliance, but current data are limited. This study assessed the recent compliance rate for US patients receiving HEC. **Methods:** Using
the MarketScan Commercial and Medicare claims database, chemotherapy-naive adult patients were assessed from July 2011 through June 2016 for receipt of HEC per the 2017 NCCN Guidelines for Antiemesis. Patients with <7 days between HEC administrations and/or with stem cell transplant were excluded. 4 cohorts of prophylaxis in cycle 1 were identified: (1) NK1+5HT3 (considered guideline-compliant), (2) NK1, (3) 5HT3, and (4) no NK1 or 5HT3. Dex was allowed but not required. Results: 111,497 chemotherapy-naive patients received HEC; 28% were aged <50 years, 18% were aged >65 years, and 72% were women. 35% of these patients received carboplatin ≥14 days apart, 24% AC, and 18% cisplatin. Overall guideline compliance was 44.8% (n=49,916). Rates were 26% for carboplatin, 71% for AC, and 72% for cisplatin. Overall compliance improved approximately 1.7% points annually from 2011–2016. Compliance declined with older age (P<.0001), and was lower for women versus men among those aged >60 years. Among patients initially receiving noncompliant prophylaxis of only 5HT3±dex, 11% received NK1 in subsequent cycles; rates were 22% for AC and 21% for cisplatin. Conclusions: Despite awareness of evidence-based CINV guidelines, compliance for HEC is still a major issue impacting patients’ quality of life, cancer treatment, and cost. Compliance for carboplatin was less than that for AC and cisplatin, likely due to its classification as moderately emetogenic chemotherapy before 2017. Clinicians and organizations should evaluate their own concordance with antiemetic guidelines and streamline clinical practices to improve compliance. Waiting for toxicity to occur before using triplet antiemetic prophylaxis in HEC is not supported by evidence.

AB2018-37. National Survey Highlights Practice Gaps in Cytogenetic and Molecular Testing Postinduction Therapy in Acute Myeloid Leukemia
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Background: Bone marrow (BM) analyses with cytogenetics, flow cytometry, and evaluation of molecular genetic markers contribute to risk assessment, inform treatment decisions, and have a prognostic impact for patients with acute myeloid leukemia (AML). These tests are also important for assessing minimal residual disease (MRD) after induction in patients achieving a complete remission. This study aimed to identify practice gaps in the diagnosis of AML and follow-up evaluation after initial therapy. Methods: A cross-sectional, web-based survey of health professionals from the American Society of Hematology, the American Society of Clinical Pathology, and the Oncology Nursing Society was conducted from April 7–June 1, 2017. The survey consisted of 78 questions, including those regarding practice and provider characteristics, diagnosis and evaluation, and AML-related practice concerns. Results: 1,246 individuals participated in part or all of the survey; complete survey data were collected from 92 hematology, oncology, and hematology/oncology physicians and advanced practice providers who had been in practice for a median of 12 years and saw a median of 16 newly diagnosed AML cases in the past 24 months. As summarized in Table 1, differences existed in the rate of immunophenotypic, cytogenetic, and molecular testing at diagnosis compared with during posttreatment follow-up for AML; significantly fewer clinicians ordered these tests at post–induction therapy follow-up. Conclusions: Although limited by sample size, these survey results highlight gaps in the use of cytogenetic, flow cytom-

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<tr>
<th>AB2018-37: Table 1. Testing at Diagnosis and at Posttreatment Follow-Up for AML</th>
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<tr>
<td><strong>Initial Diagnosis</strong></td>
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<tr>
<td>Conventional cytogenetics (karyotype) performed on BM</td>
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<tr>
<td>Immunophenotyping performed on BM</td>
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<td>FISH evaluation (&quot;AML Panel&quot;) performed on BM</td>
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<td>Molecular genetic testing for FLT3, NPM1, and CEBPA</td>
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<td>Molecular testing for additional individual markers, such as KIT, IDH1/2, RUNX1</td>
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<td>Next-generation sequencing panel (≥10 genes)</td>
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Abbreviation: FISH, fluorescence in situ hybridization.
*Identifies the most frequent cytogenetic abnormalities associated with favorable, intermediate, and poor risk.
Percent of respondents.
etry, and molecular studies after induction therapy in patients with AML. The lack of testing postinduction limits the ability to detect posttreatment prognostic variables, such as MRD status. Education to address these practice gaps is particularly important in light of an increasing number of approved therapies for patients with AML.

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Background: Myelodysplastic syndromes (MDS) are a heterogeneous group of clonal hematopoietic stem cell disorders characterized clinically by bone marrow failure and risk of progression to acute myeloid leukemia. Iron overload (IO) is common in patients with MDS due to chronic transfusions and disease-related alterations in iron metabolism. Despite a lack of prospective randomized trials demonstrating the survival benefits of iron chelation therapy (ICT), NCCN Guidelines for MDS recommend ICT for patients with International Prognostic Scoring System (IPSS) low- to intermediate-1–risk MDS and potential transplant candidates.

Methods: Best practices to optimize the treatment of patients with MDS and IO are described. Results: Initiation of ICT in IPSS low- to intermediate-1–risk patients with MDS should be individualized based on serum ferritin (SF) levels, number of RBC transfusions, and assessment of comorbidities and survival probability. NCCN Guidelines recommend considering ICT for patients with MDS with >20–30 RBC transfusions to decrease SF level from >2,500 ng/mL to <1,000 ng/mL. Deferasirox and deferoxamine are ICT agents that may be considered for patients with MDS and IO.

Deferiprone, another ICT agent, has been associated with risk of life-threatening agranulocytosis. Deferoxamine can be used in patients with higher-risk MDS or thrombocytopenia (platelets, <50 x 10^9/L) in whom deferasirox is contraindicated. Deferoxamine is associated with injection site reactions, including pain, swelling, and redness, which can be minimized through use of a subcutaneous port. An additional factor that may affect compliance with deferoxamine is the long infusion time, which may be obviated with overnight infusions in patients with indwelling lines. In the elderly (patients ≥ 65 years of age), after assessing baseline kidney function, ICT treatment should begin at the lower end of the dosing range to minimize adverse events. In patients with planned allogeneic bone marrow transplantation, managing IO prior to transplant should be considered. Conclusions: ICT in patients with MDS is supported both by preclinical data demonstrating effects of IO on iron homeostasis and hematopoiesis and by clinical studies showing improvements in SF levels and other IO parameters in lower-risk patients. ICT requires frequent monitoring of SF levels, kidney and liver functions, and potential visual/ocular sequelae to evaluate for toxicity. Implementation of NCCN Guidelines should occur in conjunction with clinical considerations to optimize patient outcomes.

Bioinformatics/Information Technology Sciences
AB2018-39. Natural Language Processing Allows for Accurate and Automated Extraction of Data From Prostate Biopsy Pathology Reports
Brant Chee, PhD; Gregory A. Joice, MD; and Michael H. Johnson, MD
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Background: Evaluation of prostate biopsy data is a
critical aspect of prostate cancer research. Nonstandardized formats and syntax in pathology reports make large-scale analyses challenging. Additionally, significant manpower and financial resources are needed to manually review electronic medical records. Natural language processing (NLP) allows for rapid and automated extraction of important data, but it is unclear how this compares to manual data extraction in terms of accuracy and recall. **Methods:** We randomly selected 1,000 systematic prostate biopsy reports from men diagnosed with prostate cancer at our institution. All reports were annotated for Gleason score, anatomic location, total number of cores, cancerous cores, percent cancer per core, and benign pathology. We used these annotations to train and develop the NLP engine to identify these variables from de novo pathology reports. Next, 2 independent reviewers annotated an additional 150 reports for use as a validation set. We evaluated inter-reviewer reliability by using Cohen’s kappa statistic. The NLP engine performance was assessed by calculating the precision, recall, and F₁ score (Table 1). **Results:** Inter-reviewer reliability was good between the 2 reviewers (κ=0.84). Overall, the NLP engine had excellent performance, with an aggregate precision of 0.978, recall of 0.998, and F₁ statistic of 0.987 (Table 2). NLP performed best at identifying benign cores (F₁=0.997), percent cancer per core (F₁=0.993), and Gleason score (F₁=0.991). The most challenging variables were location (F₁=0.984), total cores (F₁=0.982), and cancerous cores (F₁=0.978), but still demonstrated excellent overall precision and recall. **Conclusions:** There is good inter-reviewer reliability for manual data extraction from prostate biopsy pathology reports. We developed an NLP engine that can efficiently extract important data from biopsy reports with excellent precision and recall. NLP can be used to review and extract data from medical records to assist in performing large-scale population-based analyses.

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<th>AB2018-39: Table 2. Average Inter-Reviewer Reliability</th>
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<td>Location</td>
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<tr>
<td>Percent cancer</td>
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<td>Benign</td>
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<td>Total cores</td>
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<td>Cancerous cores</td>
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**AB2018-40. A Novel Natural Language Processing Pipeline Automates Unstructured Data Extraction Within Medical Reports**

Brant Chee, PhD; Gregory A. Joice, MD; and Michael H. Johnson, MD

*Johns Hopkins University Applied Physics Laboratory, Laurel, and Brady Urological Institute, Johns Hopkins University School of Medicine, Baltimore, MD*

**Background:** Natural language processing (NLP) is gaining increasing interest within urology and other medical fields as a way to efficiently identify and extract information from the electronic medical records (EMRs), specifically free-text clinical notes, pathology reports, and imaging reports. Extracted information is used to identify patient populations for research and can also be used in the clinical setting to identify potentially ambiguous or difficult to extract information requiring clarification. The increasing interest in NLP necessitates the ability to generate these tools. Each NLP tool depends on human annotated data and a model generated from these data. We have developed a reusable tool-chain and process flow to improve efficiency in this development process. **Methods:** We developed a container-based software suite that enables users to annotate entities using a graphical web-based user interface (Figure 1). Theses annotations are then used to train a model. Multiple model types are offered, including a maximum entropy–based and a linear perception model, which mimics the brain’s neurons. These models can then be used to aid the annotation of more text to refine the initial model. The user only needs to correct the model, which is potentially faster than annotating all information of interest. We assessed the performance characteristics of this model on a series of systematic prostate biopsy pathology reports. **Results:** 3 models are currently being developed using this software suite and are in varying stages of validation. The most mature model has been trained on more than a thousand pathology reports and is validated against 2 physicians. Inter-reviewer reliability was good between the 2 reviewers, with kappa statistic of 0.84. Overall, the NLP engine had excellent performance, with an aggregate F₁ statistic of 0.987.

Kees Ebben, MSc; Mathijs Hendriks, MD; Thijs van Vegchel, MSc; Jurrian van der Werf, PhD; Maurice van der Sangen, MD; Lotte Keikes, MD; and Xander Verbeek, PhD

*Comprehensive Cancer Organization the Netherlands (IKNL), Utrecht; 
\(^1\)Northwest Clinics, Alkmaar; \(^2\)Catharina Cancer Institute, Eindhoven, and \(^3\)Academic Medical Center, Amsterdam, the Netherlands

Introduction: Cancer care is becoming increasingly data-driven and personalized, putting a strain on development and application of clinical practice guidelines (CPGs). To address this problem, we developed a novel methodology to represent CPGs by data-driven, nonprobabilistic clinical decision trees (CDTs). We applied our method to the Dutch national CPGs for breast (BC), colorectal (CRC), and prostate (PC) cancers, and implemented the trees in an interactive decision support application. Methods: Each guideline was translated into nonprobabilistic CDTs. These CDTs are represented by nodes, branches, and leaves, representing data items (population characteristics; eg, T -stage), data-item values (eg, ≤T2), and recommendations (eg, chemotherapy), respectively. Accordingly, a path through a tree describes the population to which a recommendation applies. CDTs are developed for each step in the care pathway (eg, primary treatment, postoperative adjuvant treatment). Collection of all data items serves as a clinical vocabulary for implementation in electronic health records (EHRs), which is a requirement for computer-assisted guideline implementation in daily practice. Results: All 3 guidelines were successfully translated into nonprobabilistic CDTs and verified by multidisciplinary teams of care professionals responsible for the original guidelines. The guidelines could be represented by 60 (BC), 19 (CRC), and 12 (PC) separate CDTs. These trees were driven by 115, 29, and 54 unique data items, which composed the clinical vocabulary. Decision trees were integrated in an interactive decision support application (www.oncoguide.nl, in Dutch, accessible free of charge). With the vocabulary as a fundamental component, the application is ready for EHR connection by design. Conclusions: Oncologic guidelines can be represented by CDTs and used as a basis for clinical decision support systems. The clinical vocabulary associated with the CDTs facilitates guideline implementation in EHRs and serves as a requirement for a closed-loop learning cycle from clinical practice to guideline development.

AB2018-42. A Method for Structured Comparison of Oncologic Clinical Practice Guidelines

Kees Ebben, MSc; Peter Lamb, MSc; Jurrian van der Werf, PhD; Mathijs Hendriks, MD; Jack Skinner, PhD; Robin Vernooij, MSc; Lotte Keikes, MD; and Xander Verbeek, PhD

*Comprehensive Cancer Organization the Netherlands (IKNL), Utrecht, the Netherlands; \(^1\)NCCN, Fort Washington, PA; and \(^2\)Northwest Clinics, Alkmaar, and \(^3\)Academic Medical Center, Amsterdam, the Netherlands

Introduction: Clinical practice guidelines (CPGs) can differ significantly between countries, despite similarities in evidence-based recommendations or population characteristics. Based on clinical decision trees (CDTs), we developed a method to systematically compare and identify differences between CPGs. Methods: We created CDTs for recommendations in the NCCN and Dutch CPGs for prostate (PC) and colorectal (CRC) cancers. First, the CPGs were analyzed and parsed such that each step in the care pathway (eg, imaging or primary treatment) received its own decision tree. Second, we developed a uniform model and common vocabulary for representing CDTs. The schema consisted of decision nodes (data items corresponding to population characteristics; eg, T stage), branches (data-item values; eg, ≤T2), and recommendations (eg, chemotherapy). Last, using this model and the resulting CDTs, we compared care pathway steps, data items, and data-item values of the 2 CPGs. Results: Comparison of NCCN and Dutch CPGs revealed 7 mutual steps across the continuum of care. Overall population characteristics for the recommendations had 16 (PC) and 22 (CRC) corresponding data items between the 2 CPGs. NCCN CPGs, however, included 17 (PC) and 16 (CRC) data-items distinct from Dutch CPGs, whereas Dutch CPGs contained 13 (PC) and 32 (CRC) unique data items. A closer examination by care pathway step gave a more detailed characterization of the similarities and differences between the CPGs in terms of data items (eg, “Gleason score”; NCCN and Dutch CPGs; “prostate-specific antigen density”: NCCN CPGs only; “Nomogram not otherwise specified”: Dutch CPGs only), values, and recommendations. Conclusions: The decision tree model and common vocabulary facilitated a systematic comparison of CPGs, and clearly highlighted the similarities and differences. Despite some overlap in recommendations and population
characteristics, application of this method revealed compelling variations between NCCN and Dutch oncologic CPGs. Ultimately, these differences may be a factor in the divergence of disease outcomes between the respective countries.

Clinical Oncology

AB2018-43. Clinical Predictors of Resectability in Pancreatic Cancer
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\(^{a}\)Kymera Independent Physicians, Roswell/Carlsbad/Hobbs, NM; \(^{b}\)University of New Mexico, Albuquerque, NM; \(^{c}\)Division of Internal Medicine, Department of Hematology/Oncology, Texas Tech University Health Sciences Center School of Medicine, Lubbock, TX

**Background:** Stage at presentation and resectability are major factors associated with long-term survival after a pancreatic cancer (PaC) diagnosis. Biomarkers and clinical parameters may predict resectability and help guide clinical management. **Methods:** This retrospective study evaluated patients with PaC from January 1998 until December 2016 from 3 cancer clinics in southeast New Mexico. Patients were included if they had a PaC diagnosis without metastases. Characteristics assessed were CA19-9 level; mass size; a high CA19-9 level, arbitrarily defined as ≥10,000 U/mL (based on mean values obtained); a large mass, defined as ≥3 cm; and symptoms at presentation and their relationship to survival. Analyses performed used descriptive statistics, test, chi-square, and survival analysis using STATA software. **Results:** 75 patients were identified for inclusion; 55% were men (41/75), and the mean CA19-9 level was 16.22±6.08. Mean CA19-9 level among patients with resectable disease (RD) was 2,085±6,473 versus 20,336±57,545 for unresectable disease (URD) (P=.11). Similarly, mean tumor size was 2.27±1.09 versus 4.17±1.99 in resectable and unresectable cases, respectively (P=.003). PaC was unresectable in 93% (14/15) of patients with high CA19-9 level (≥10,000 U/mL) versus 75% (41/55) of those with low CA19-9 level (P=.16). Median CA19-9 for URD was 1,473 versus 162 for RD (P=.0124). PaC was unresectable in 44% (7/16) of patients with tumors <3 cm versus 90% (51/57) of those with tumors ≥3 cm (P≤.001). Abdominal pain (94%; 31/33) and weight loss (84%; 16/19) were associated with unresectable status (P=.002). Tumors in the head of the pancreas (76%; 35/46) and the body (95%; 18/19) were more often resectable but not statistically significant (P=.78). ECOG 2 in 94% (34/36) and ECOG 3 in 100% (16/16) of patients were associated with URD (P≤.001). Survival was 12 months in patients with high CA19-9 levels versus 3 months in those with low levels (hazard ratio [HR], 2.6; 95% CI, 1.4–4.7), and was 21 months in patients with small tumors (<3 cm) versus 7 months in those with large tumors (HR, 1.8; 95% CI, 0.9–3.3). **Conclusions:** Clinical parameters suggestive of unresectable status were large tumor size (≥3 cm), ECOG ≥2, abdominal pain, and weight loss. CA19-9 ≥10,000 and large tumor size tended to be associated with decreased survival, but this was not statistically significant. Patients presenting with high CA19-9 levels (≥10,000 U/mL) are likely to have unresectable PaC. Accurate selection of patients can avoid overtreatment and unnecessary surgery.

AB2018-44. Cholangiocarcinoma With Humoral Hypercalcemia of Malignancy and Paradoxical Calcitriol Excess: A Discussion of Malignancy-Associated Hypercalcemia Through an Extremely Rare Case Report
Shukaib Arslan, MD; Leo Reap, DO; and Lyle Goldman, MD

Michigan State University, Providence – Providence Park Hospital, Southfield, MI

**Background:** Cholangiocarcinoma (CC) is a relatively uncommon malignancy, representing only 3% of all gastrointestinal tract cancers. The prognosis for metastatic CC is very poor, with few treatment options currently available. Hypercalcemia is a metabolic complication of malignancy and is most commonly attributed to the excess production of parathyroid hormone–related peptide (PTHrP), known as humoral hypercalcemia of malignancy (HHM). Presence of HHM in any malignancy confers a poor prognosis, with median survival of approximately 1 month. Although HHM typically occurs in cancers of squamous cell origin, there are rare case reports of CC-associated HHM. Excess 1,25-dihydroxyvitamin D has been seen in lymphoma but has never been documented before in a solid tumor malignancy. **Methods:** We present a case of a 46-year-old man found to have metastatic CC and resultant hypercalcemia from both excess PTHrP production and paradoxical excess 1,25-dihydroxyvitamin D (calcitriol). Despite aggressive resuscitative measures, multiple lines of antihypercalcemic therapy, and chemotherapy, he responded poorly and succumbed to his illness. His hypercalcemia was corrected with cinacalcet, making this the second case report in the literature demonstrating successful treatment of HHM with cinacalcet. **Results:** Cinacalcet is a calcimimetic agent shown to help correct hypercalcemia in treatment-refractory HHM and suppress PTHrP production. Our case represents only the second report of treatment-resistant HHM corrected by cinacalcet administration. Cinacalcet appears to show promise in the treatment of HHM through the antagonism of PTHrP production. **Conclusions:** This is the first case of HHM with cal-
91% of patients reached nadir T≤20 ng/dL, ≤10 ng/dL, and 6–24. Pooled analysis (n=437) showed 99%, 97%, and 90%–97% maintained T≤20 ng/dL from weeks (n=438), 90%–95% achieved T≤20 ng/dL by week 6, and 90%–97% maintained T≤20 ng/dL from weeks 6–24. Pooled analysis (n=437) showed 99%, 97%, and 91% of patients reached nadir T≤20 ng/dL, ≤10 ng/dL, and ≤5 ng/dL, respectively, with a median nadir T≤3 ng/dL. When comparing across all doses, >88% of patients reached nadir T≤5 ng/dL. **Conclusions:** SC-LA achieves consistent and prolonged LA drug delivery >0.1 ng/mL and provides favorable T suppression <20 ng/dL, which may be attributed to the copolymer in-situ delivery technology. Multiple T measurements confirmed that 90% of PCa patients achieved low nadir T≤5 ng/dL, which may have implications for extending progression-free survival and duration of response.

**AB2018-45. Nadir Testosterone Following In Situ–Forming, Polymer-Delivered, Subcutaneously Administered Leuprolide Acetate in Prostate Cancer**

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**Background:** Effective testosterone (T) suppression is the cornerstone of androgen deprivation therapy (ADT) for advanced prostate cancer (PCa). Modern assay methodology found median T level after surgical castration to be 15 ng/dL, and the 2016 European Association of Urology guidelines define castration as T≤20 ng/dL. Additionally, reaching nadir T<20 ng/dL may be correlated with improved duration of response to ADT, time to progression or disease-specific survival, and prognosis for overall survival. **Objectives:** To examine the effectiveness of in-situ–forming, polymer-delivered, subcutaneously administered leuprolide acetate (SC-LA) on T suppression, nadir T was evaluated in 4 pivotal trials spanning 4 dose intervals that last up to 6 months from a single injection. **Methods:** Eugonadal patients with PCa received either 7.5- (6 doses), 22.5-, 30-, or 45-mg (2 doses each) administrations of SC-LA lasting 1, 3, 4, or 6 months, respectively, in 4 open-label, fixed-dose, pivotal trials. Data were pooled and serum T levels were evaluated by radioimmunoassay. T was measured 2–4 times on day 0 and once on days 1, 2, 3, 7, and every week until the next dose through the end of the studies; the 45-mg group had an additional measurement taken on day 2. Nadir T was the lowest laboratory value obtained throughout the entire trial. **Results:** Across the 1-, 3-, 4-, and 6-month SC-LA formulations, median LA levels were consistently between 0.1 and 1 ng/mL from week 2 until end of the study. In the pooled analysis (n=438), 90%–95% achieved T≤20 ng/dL by week 6, and 90%–97% maintained T≤20 ng/dL from weeks 6–24. Pooled analysis (n=437) showed 99%, 97%, and 91% of patients reached nadir T≤20 ng/dL, ≤10 ng/dL, and ≤5 ng/dL, respectively, with a median nadir T≤3 ng/dL. When comparing across all doses, >88% of patients reached nadir T≤5 ng/dL. **Conclusions:** SC-LA achieves consistent and prolonged LA drug delivery >0.1 ng/mL and provides favorable T suppression <20 ng/dL, which may be attributed to the copolymer in-situ delivery technology. Multiple T measurements confirmed that 90% of PCa patients achieved low nadir T≤5 ng/dL, which may have implications for extending progression-free survival and duration of response.

**AB2018-46. Effect of Bortezomib on Renal Dysfunction in African American Patients With Multiple Myeloma**

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**Background:** Renal dysfunction (RD) is a major negative prognostic factor in multiple myeloma (MM). Bortezomib has shown significant anti-MM activity and is known to have a protective renal effect. It is established that African Americans (AAs) are twice as likely to be diagnosed with MM and tend to have worse outcomes. To date, there has been no study specifically looking at the reversibility of RD in AAs. We evaluated the effectiveness of bortezomib for RD in AA patients with MM in a large urban hospital. **Methods:** We evaluated 51 AA patients diagnosed with MM and RD from 2004–2015. Patients were required to have had at least 3–6 months of continuous treatment with a bortezomib-based regimen to be eligible for analysis. Patients who were newly diagnosed and those with relapsed or refractory (R/R) disease were included. **Results:** Approximately 75% of patients were aged >65 years, with an equal distribution of men and women. At presentation, 80% had anemia (hemoglobin level, <10 g/dL), 14% had hypercalcemia (calcium level, >11 mg/dL), 37% had elevated LDH levels, and 61% had elevated β2-microglobulin levels. Most patients had normal-risk cytogenetics and 33% had International Scoring System stage III disease. The distribution of myeloma subtypes was IgG: 65%, IgA: 16%, IgM: 2%, and light chain–only: 16%, and 60% were kappa light chain subtype. The median serum M spike was 2.54 g/dL (range, 0.5–16 g/dL), creatinine level was 2.41 mg/dL (range, 0.5–16 g/dL), and glomerular filtration rate (GFR) was 38 mL/min/1.732 (range, 6–60 mL/min/1.732). Treatment was bortezomib-based in all patients: 6% received bortezomib, 45% received bortezomib/dexamethasone (VD), 22% received VD/cyclophosphamide, 12% received VD/melphalan, 12% received VD/thalidomide, and 2% received VD/doxorubicin. A par-
AB2018-47. Duration of Therapy Prior to Progression on Nivolumab in Non–Small Cell Lung Cancer

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**Background:** Treatment options are limited for patients with non–small cell lung cancer (NSCLC). Reported 5-year survival rates for patients with stage IV metastatic NSCLC can be as low as 4.5%. Anti–PD-1 monoclonal antibodies, such as nivolumab, have dramatically changed the management of patients with key tumor types. The purpose of this study was to determine the duration of nivolumab treatment in patients with NSCLC in the community care setting and what characteristics potentially contribute to shorter or longer duration of therapy prior to progression. **Methods:** Treatment plans were examined from October 1, 2015 through December 31, 2016. The study included all patients diagnosed with metastatic NSCLC who were ALK- and ROS1-negative and received nivolumab but later switched to a different treatment due to disease progression (N=110). Descriptive statistics and Mann-Whitney U tests were performed to evaluate differences in treatment duration prior to progression. **Results:** Findings suggested that the median duration to progression on nivolumab was 90 days (mean [SD], 125.15 [87.66]). No significant differences in duration to progression were found in relation to patient age (U=1,435.00; P=.819), weight (U=1,467.00; P=.819), ECOG performance status (U=1,769.50; P=.689), line of therapy (U=447.50; P=.453), or fixed/weight-based dosing (U=1,266.50; P=.979). However, differences between men and women approached significance (U=1,194.50; P=.062), with men experiencing a longer duration to progression (median, 92.40; mean, 134.46 [88.57]) versus women (median, 90.00; mean, 113.97 [86.10]). On progression, patients were switched to either chemotherapy (89%), immunotherapy (9%), or targeted therapy (2%). No significant differences in duration to progression were found for patients who switched to chemotherapy versus those who switched to immunotherapy or targeted therapy (U=489.50; P=.337). **Conclusions:** These real-world data are consistent with pivotal studies for nivolumab in which median progression-free survival was approximately 90 days. Clinical characteristics showed no differences in treatment duration. Further analysis is planned for a larger population.


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**Background:** Lung cancer is the most common cause of cancer mortality in developed countries. Despite developing technology, 5-year survival rates have not improved significantly in the past 50 years. Some researchers believe that incomplete fissures may have a negative effect on survival rates, suggesting that there may be a lymphatic spread through the visceral pleura. The literature contains contradicting information. Although studies exist demonstrating that incomplete fissures are a negative prognostic factor in non–small cell lung cancer (NSCLC), other studies suggest they have improved significantly in the past 50 years. Some researchers believe that incomplete fissures may have a negative effect on survival rates, suggesting that there may be a lymphatic spread through the visceral pleura. The literature contains contradicting information. Although studies exist demonstrating that incomplete fissures are a negative prognostic factor in non–small cell lung cancer (NSCLC), other studies suggest they have improved significantly in the past 50 years. Some researchers believe that incomplete fissures may have a negative effect on survival rates, suggesting that there may be a lymphatic spread through the visceral pleura. The literature contains contradicting information. Although studies exist demonstrating that incomplete fissures are a negative prognostic factor in non–small cell lung cancer (NSCLC), other studies suggest they have

**AB2018-48. Table 1. Group Characteristics**

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<th>Complete Fissure (n=21)</th>
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<td>5-year survival rate</td>
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<td>71.4%</td>
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<sup>a</sup>Mann-Whitney U test.
<sup>b</sup>Chi-square test.
<sup>c</sup>Fisher exact test.
no effect on survival rates. The aim of our study was to determine whether incomplete fissures in stage I and II NSCLC have any effect on 5-year survival rates. Methods: 128 patients who had undergone a lobectomy between 2009 and 2012 in our hospital were examined retrospectively. Patients who underwent a lobectomy for benign reasons, were diagnosed with mesenchymal tumors or small cell lung cancer, had N1 and N2-positive disease, or had stage III and IV NSCLC according to TNM-8 were excluded from this study. Thus, 74 patients diagnosed with stage I or II NSCLC were included. The study population was divided in 2 groups: patients with incomplete fissures and those with complete fissures. 5-year survival rates were compared between the groups. Results: The patient sample consisted of 57 men and 17 women, with an average age of 63.1 years (range, 44–77 years). 53 patients had stage I disease and 21 had stage II, and 53 patients had an incomplete fissure and 21 had a complete fissure. No significant differences were seen between the complete fissure and incomplete fissure groups regarding age, sex, and TNM-8 stages. The 5-year survival rate was 71.4% in the complete fissure group versus 75.5% in the incomplete fissure group. No significant difference in 5-year survival rates was found between the groups (P=0.720). Conclusions: It is debated whether incomplete fissures have a negative effect on survival in patients with NSCLC. There are currently no prospective studies on this subject. This retrospective study showed that incomplete fissures have no significant effect on 5-year mortality rates.

AB2018-49. Increasing Folate Receptor Alpha Expression With Chemotherapy and Hormonal Agents Improves Activity of Mirvetuximab Soravtansine (IMGN853) in Endometrial Cancer

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Introduction: Folate receptor alpha (FR-α) is a cell surface protein that internalizes upon binding with the folate ligand during active cell growth and proliferation. IMGN853 is an antibody-drug conjugate (ADC) that consists of a humanized anti-FR-α monoclonal antibody, M9346A, attached via a cleavable disulfide linker to a cytotoxic maytansinoid derivative, DM4. Previous clinical data with IMGN853 in epithelial ovarian cancer has shown increased response rates compared with conventional chemotherapy in patients with increased levels of FR-α expression. Endometrial adenocarcinomas overexpress FR-α to varying degrees compared with normal adult tissues. Given the lack of effective therapies for recurrent endometrial cancer, we hypothesized that cytotoxic and hormonal agents would increase expression of FR-α, thereby sensitizing them to IMGN853. Methods: We evaluated a panel of endometrial cell lines (HEC1A, HEC1B, RL95-2, AN3CA, and Ishikawa) with high (HEC1A, Ishikawa), moderate (AN3CA), and low (HEC1B, RL95-2) basal expression of FR-α. Results: Paclitaxel-induced increased expression of FR-α protein was observed in all cell lines except AN3CA. Carboplatin and doxorubicin modulated FR-α protein expression in cell line–specific patterns. Fulvestrant significantly increased FR-α expression in HEC1B and Ishikawa cell lines, although it decreased FR-α expression in HEC1A cells. All 5 endometrial cell lines at baseline were sensitive to IMGN853 in the nanomolar range, with IC50 values ranging from 8.8 to 114 nM. When HEC1B cells were pretreated with doxorubicin to induce FR-α expression, sensitivity to IMGN853 increased by 64%, as measured by a colorimetric cell proliferation assay (XTT). Similarly, induction of FR-α in RL95-2 by paclitaxel also increased sensitivity (>63%) to IMGN853. Conclusions: We are currently analyzing proteomic, genomic, and transcriptomic data to identify a signature predictive of FR-α response to cytotoxic and hormonal agents.


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Background: Studies indicate that chemotherapy administration may reduce vitamin B12 levels in certain patients, which may predispose them to develop or experience increased severity of peripheral neuropathy (PN). Development of PN would be caused by the neurotoxicity of chemotherapy administration and concomitant vitamin B12 deficiency. Additionally, vitamin B12 deficiency plays a role in DNA synthesis. The objective of this study was to evaluate vitamin B12 levels in US patients with cancer. Methods: Our study included 3,314 patients (mean age [SE], 58.8 years [0.21]) diagnosed from 2011 to 2014 using the National Health and Nutrition Examination Survey (NHANES), a CDC-operated program designed to assess the health and nutritional status of the US civilian population. The population consisted of a control group of 2,910 individuals (mean age, 57.7 years [0.22]) and 2 groups of patients with cancer: those without vitamin B12 supplementation (n=378; mean age, 66.4
AB2018-51. Day 5 Peripheral Blood Leukocyte Count Predicts In-Hospital Mortality in Patients With Acute Myeloid Leukemia Undergoing Induction Chemotherapy

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**Background:** The mainstay of initial therapy for acute myeloid leukemia (AML) is chemotherapy using cytarabine plus an anthracycline, aiming at maximal and rapid destruction of tumor cells. The goal of our study is to correlate the efficiency of chemotherapy-induced leukopenia with in-hospital mortality. **Methods:** Data were compiled from MIMIC-III, a database of admissions to intensive care units at Beth Israel Deaconess Medical Center between 2001–2012. ICD-9 codes were used to select for admissions with a diagnosis of AML, which were filtered for patients undergoing chemotherapy with cytarabine plus an anthracycline. The Mann-Whitney U test compared median peripheral WBC counts on days 1–5 of chemotherapy for admissions with or without in-hospital mortality. A logistic regression model related in-hospital mortality to age, sex, insurance, day 1 WBC count, and day 5 WBC count. A receiver operating characteristic (ROC) curve identified a specific cutoff value with corresponding sensitivity and specificity values for day 5 WBC count to predict in-hospital mortality. **Results:** 78 patients were included in the study. Median WBC counts between patients with or without in-hospital mortality were statistically significant on day 5 (1.3 vs 0.7 K/mm³; W=472.5; P=.011); corresponding values for days 1–4 were nonsignificant. Multiple logistic regression model, which controlled for day 1 WBC count, age, sex, and insurance status, affirmed that day 5 WBC count correlated with in-hospital mortality (odds ratio, 1.23; 95% CI, 1.02–1.47). An ROC curve developed from a simple logistic regression using only day 5 WBC count showed an area under the curve of 0.67. The optimal cutoff value to predict in-hospital mortality was 0.33 K/mm³ (sensitivity, 63.3%; specificity, 64.6%). **Conclusions:** Higher day 5 WBC count correlated with in-hospital mortality. This is in accordance with the current understanding that suboptimal response to chemotherapy is associated with poorer prognosis. However, clinicians may use information specifically on day 5 to facilitate earlier goals-of-care conversations or to escalate the level of nursing care if clinically indicated.

AB2018-52. 3D Quantification of the Liver and Spleen as a Hepatosplenic Toxicity Marker in Patients Undergoing Systemic Chemotherapy: Novel 3D Advanced Imaging to Monitor End-Organ Damage

Charity Huang, MD†; Marvan Fakih, MD†; Rajesh Gulati, MD‡; William Boswell, MD†; Ammar Chaudhry MD†; Jacob Sosna, MD†; and Syed Rahmanuddin, MD†

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**Background:** Cytotoxic chemotherapy continues to be the mainstay of treatment for patients with surgically unresectable metastatic cancer. Numerous effective chemotherapeutic and targeted options exist, as reflected by recent reviews and NCCN Guidelines. Although treatment selection has been largely focused on likelihood of response, no significant considerations have been given to treatment effect on hepatosplenic function. Combination and mono chemotherapy have been well-documented to be associated with hepatic sinusoidal damage, steatohepatitis, and splenomegaly. Furthermore, these findings may not be fully reversible on discontinuation of chemotherapy. The significance of end-organ damage lies in those patients who become suitable for surgical resection after chemotherapy. **Methods:** We retrospectively sought to measure the effect of chemotherapy on the liver and spleen using a novel 3D CT scan using 3D volume quantification criteria. Patients were imaged at the City of Hope Helford Hospital at 2, 4, and 6 months prechemotherapy and postchemotherapy using a standardized multiphasic CT scan, and analyzed in the 3D center. The primary end point was the functional hepatic volume calculated using post–contrast CT imaging, which allows for assessment of organ abnormality after systemic chemotherapy. The secondary end point was the calculated splenic volume, to allow for assessment of splenomegaly as a consequence of portal hypertension. **Results:** 14 patients were included in this study. Preliminary data showed that primary damage occurs in the liver, which progressively damages the spleen. Functional liver volume decreases over time in patients
with extensive liver metastases, with resultant change in splenic volumetric response. **Conclusions:** Signs of chemotherapy-induced hepatosplenic toxicity should be monitored due to its association with perioperative morbidity and mortality; however, there are currently no effective means to measure it. Monitoring liver enzymes can help predict hepatotoxicity, but a significant number of chemotherapy-damaged livers continue to be discovered during laparotomy. Through using novel 3D imaging, we can predict hepatosplenic injury in patients who undergo cytotoxic chemotherapy.

**AB2018-53. Clinical Analysis of a Case Series of Patients With a Confirmed Diagnosis of Pancreatic Cystic Neoplasm**

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*Universidad del Rosario, *Mederi Hospital Universitario Mayor, Universidad Javeriana, and *Clinica Colanitas, Bogotá, Colombia

**Background:** Due to increasing access to diagnostic tools such as MRI, CT, and ultrasonography, pancreatic cystic neoplasms (PCNs) are being detected more frequently. PCNs are classified as mucinous (mucinous cystic neoplasm [MCN] and intraductal papillary mucinous neoplasm [IPMN]) or nonmucinous neoplasms (serous cystic neoplasm [SCN], solid pseudopapillary neoplasm, and others). Despite increased detection, evidence is lacking regarding diagnosis, assessment, and treatment of PCNs. Clinical analysis and description through observational studies is a necessary step to understanding PCNs, and to our knowledge no case series has been performed in Colombia. **Methods:** A cross-sectional retrospective study was performed involving all patients with a diagnosis of PCN confirmed through histopathologic or imaging studies from 2010–2015 at the Hospital Universitario Mayor in Bogotá. Databases from the departments of radiology and hepatobiliary surgery were also assessed to identify records. Data on demographics, clinical presentation, comorbidities, lesion characteristics, final diagnosis, surgical treatment, and carcinogenic biomarkers were collected and analyzed using SPSS version 24. **Results:** 34 patients with a mean age of 68.5 years were included; 24 were women. Causes for consultation included abdominal pain (70.6%) and jaundice (23.2%), and diagnosis was incidental in 14.7% of cases. All cases were diagnosed with imaging, 8 required surgery, and there was a 50% agreement in histology studies. IPMN (n=19) presented similarly in both sexes, with the main complaint being abdominal pain (84.2%). MCN (n=9) was more common in women (88.8%) and was associated with pain (55.5%) and jaundice (44.4%). SCN (n=5) was also more common in women (80%), and also presented equally with pain and jaundice. Lesion size was largest in SCN (24 mm), followed by MCN (20 mm) and IPMN (15.5 mm). **Conclusions:** Results from our series are similar to those described in the literature. Endoscopic ultrasound was not used in our study, but CT and MRI were able to identify and diagnose PCN, although with poor accuracy (50% agreement with histopathology studies). IPMN was the only type evenly distributed in both sexes, and appeared smallest on images. Larger series and controlled environments are needed to identify statistical differences and draw stronger conclusions.

**AB2018-54. Malignancy Hiding in a Lung Abscess**

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Florida Hospital, Orlando, FL

**Introduction:** A pulmonary abscess is defined as necrosis of the lung parenchyma, usually caused by microbial infections, most commonly anaerobic bacteria. Lung abscess associated with malignancy was first described by Amiuelle in 1923. We present a case of pulmonary adenocarcinoma presenting as a lung abscess. **Case Report:** A 79-year-old man presented with right-sided pleuritic chest pain associated with night sweats and weight loss. He denied any history of travel or contact with sick individuals. He had a 75-pack-year smoking history but quit 20 years ago. He was afebrile, and chest examination was unremarkable. Laboratory test results revealed a WBC count of 5.02 x 10^9/L, hemoglobin level of 12.7 g/dL, platelet count of 345 x 10^9/L, sodium level of 134 mEq/L, LDH level of 4.30 U/L, erythrocyte sedimentation rate of 59 mm/h, and C-reactive protein concentration of 31.8%. Chest radiograph revealed a cavitary lesion and nodular opacity in the right lung. Chest CT confirmed a cavitating 6.6 x 5.7 x 6.0 cm thick-walled, ill-defined right upper lobe pulmonary mass that contained an air-fluid level and was surrounded by an irregular infiltrate with a solid component that extended anteriorly. Differential diagnoses included primary lung abscess, pulmonary tuberculosis, or a postobstructive lung abscess due to lung cancer. The patient was empirically started on vancomycin and piperacillin-tazobactam. On bronchoscopy, there was severe narrowing of the right upper lobe anterior segmental bronchus. Bronchoscopic biopsy showed PD-L1–positive high-grade pulmonary adenocarcinoma. Bronchoalveolar lavage culture grew multiple organisms, including *Serratia marcescens* and viridans streptococci. Further imaging revealed widely metastatic disease with multiple hepatic, peritoneal...
soft tissue metastasis, and a destructive skull base mass, leading to a diagnosis of stage IV (T3N3M1b) lung cancer. The patient opted for palliative radiotherapy followed by hospice. He was discharged on amoxicillin with a radiation oncology follow-up. Conclusions: In cases of malignancy, bronchial obstruction with vascular involvement leads to ischemia, resulting in tumor necrosis and presents as a lung abscess–like cavitary lesion with or without an air fluid level. Although the diagnosis of cancer was considered early in this case, clinicians could easily have been misled by the air-fluid level and apparent abscess, elucidating the importance of considering malignancy when a lung abscess is encountered in clinical practice.

AB2018-55. Factors Associated With Functional Decline in Elderly Patients With Breast Cancer in Appalachia

Heather Katz, DO; Hassaan Jafri, MD; Raj Singh, MS IV; Hayden Ansinnelli, MS IV; and Maria Tirona, MD

Background: The goal of this study was to determine whether certain groups of Appalachian women with breast cancer (BC) have a likelihood of developing functional decline. Functional status predicts outcomes in the elderly, including mortality and treatment tolerance. We hypothesized that higher disease stage, receipt of chemotherapy, and complaints of weakness prior to receiving chemotherapy would be associated with worsening ECOG performance status (PS) and thus functional decline.

Methods: 314 patient charts were reviewed from the Edwards Comprehensive Cancer Center from January 2006–January 2016. Participants were aged >65 years and diagnosed with stage I–III BC. Functional decline was determined by an increase of at least 1 point in ECOG PS within 1 year of diagnosis; ECOG PS was subjectively determined by the physician. Analysis was performed to determine whether different factors, such as age at diagnosis, pathologic diagnosis, histologic grade, disease stage, hormone receptor status, HER2 status, type of surgery received, radiation treatment, chemotherapy status, comorbidities, body mass index, complaints of weakness at diagnosis, ambulatory status, or tobacco abuse, were associated with worsening ECOG PS score and thus worsening functional status.

Results: The primary outcome was to determine factors associated with functional decline, measured by an increase in ECOG score. Among 314 elderly Appalachian women with nonmetastatic breast cancer, 45 (14.3%) experienced a worsening ECOG PS score and thus functional decline. Factors associated with functional decline included stage III disease (P = .002), ambulatory status (P = .03), and complaints of weakness at diagnosis (P = .004). Receiving chemotherapy was close to statistical significance (P = .07); however, all other factors were not statistically significant (P ≥ .05).

Conclusions: Women who were diagnosed with stage III breast cancer, used devices to assist with ambulation at time of diagnosis, and complained of weakness at time of diagnosis were more likely to have a worsening ECOG PS score within a year of diagnosis and a decline in functional status. Awareness of factors associated with functional decline in the elderly Appalachian population with stage I–III breast cancer will be useful during discussions about patient expectations, treatments, and goals of care.

AB2018-56. Mixed-Type Autoimmune Hemolytic Anemia With Liposarcoma

Matthew Keating, MD

Roger Williams Medical Center, Providence, RI

Case Report: A 78-year-old man with known iron deficiency anemia presented in July 2017 with jaundice and a hemoglobin (Hb) level of 4 g/dL. Direct Coombs test was positive, and both warm and cold autoantibodies were present. He was diagnosed with mixed-type autoimmune hemolytic anemia (AIHA). Infectious and rheumatologic workups were negative. Throughout his 2-week hospital stay, levels of total and indirect bilirubin downtrended, haptoglobin normalized, and LDH remained normal, and a markedly elevated reticulocyte count could not be trended due to agglutination. During hospitalization, high-dose intravenous methylprednisolone was initiated; his Hb level remained <6 g/dL. Having demonstrated steroid-refractory disease, the patient was started on weekly rituximab infusions (375 mg/m²) and his Hb level responded appropriately; steroids were continued. During hospitalization he remained asymptomatic. Contrast CT scan of the chest/abdomen/pelvis showed a large infiltrative retroperitoneal fatty mass highly suspicious for retroperitoneal liposarcoma. Interventional radiology was consulted for biopsy. He received 3 weekly rituximab infusions, with the fourth infusion held due to readmission for fever and peripherally inserted central catheter–associated bacteremia. An attempt to fully taper off steroids caused recurrence of hemolysis. Discussion: To our knowledge, this is the first association of liposarcoma with AIHA. Lymphoproliferative disorders have long been tied to AIHA, but more recently solid tumors have also been recognized as a secondary cause. Although the pathophysiology of AIHA in cancer remains elusive, secondary causes of AIHA and proposed immunologic mechanisms continue to accumulate. Current treat-
ment relies on experience rather than evidence-based medicine, because the limited AIHA population makes it difficult to conduct randomized clinical trials. Nonetheless, current research has revealed some fascinating trends: resolution of AIHA with early-stage tumor resection, variable treatment response based on presence of warm/cold/mixed autoantibodies, and a preponderance of AIHA in uncommon solid tumors versus more mainstream solid tumors. **Conclusions:** Several predisposing risk factors for AIHA also warrant further study, including immunocompromised states, viral infections, bone marrow transplants, and solid organ transplants. Understanding AIHA as a heterogeneous disease and as a paraneoplastic syndrome will help treat the associated cancers by providing a window into how the immune system and malignancy are linked.

**AB2018-59. Efficiency of the Coordination of Techniques for Collecting Lung Tumor Samples via Flexible Bronchoscopy**

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**Background:** The purpose of this study was to assess the efficiency of coordinating 2 or 3 sample collecting techniques (eg, washing, brushing, biopsy) through flexible bronchoscopy in the diagnosis of lung tumors. **Methods:** We conducted a prospective study with the main outcome measures as sensitivity and specificity of the coordination of 2 or 3 lung tumor sampling techniques. **Results:** 115 patients were included; 112 cases were performed using at least 2 of the 3 techniques, and all 3 techniques were applied in 89 of these cases. For malignant lesions, the sensitivity and specificity of 2 combined techniques was 76.5% and 81.6% for brushing/biopsy, 63.9% and 100% for washing/biopsy, and 63.6% and 82.9% for washing/brushing, and was 76.5% and 81.6% for the combination of 3 techniques. If comparing the coordination of techniques by AUC, the most effective combination was washing/biopsy, and the least effective was washing/brushing. The combination of 3 techniques did not increase the efficiency of diagnosis (Table 1, Figure 1). For benign lesions, the sensitivity and specificity of 2 combined techniques was 63.2% and 76.5% for brushing/biopsy, 68.2% and 72.1% for washing/biopsy, and 17.1% and 87.3% for washing/brushing, and was 65.8% and 68.6% for the combination of 3 techniques. If comparing the coordination of techniques by AUC, the most effective combination was brushing/biopsy, and the least effective was washing/brushing. The combination of 3 techniques did not increase the efficiency of diagnosis (Table 2, Figure 2). **Conclusions:** The combination of 3 lung tumor sampling techniques did not increase the diagnostic

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sensitivity nor the efficiency of diagnosis compared with the combination of 2 techniques. The most effective combination was washing/biopsy for malignant lesions and brushing/biopsy for benign lesions.

AB2018-60. Effect of Obesity and Diabetes on Remission and Survival in Veterans With Acute Myeloid Leukemia
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**Background:** Limited and conflicting information is available about the prognostic effect of obesity and diabetes on patients with acute myeloid leukemia (AML). **Methods:** Medical records of patients with AML at the Oklahoma City VA Health Care System between 2005 and 2017 were reviewed for age (young: aged <60 years), performance status (PS; good: 0–1; poor: ≥2), obesity (body mass index [BMI] ≥30 kg/m²), diabetes, hemoglobin A1c (HbA1c) level, cytogenetic and molecular studies, treatment, and outcomes (Table 1). Fisher exact test was used for differences in remission rates, Kaplan-Meier analysis was used to estimate survival, and log-rank test was used to determine differences among groups. **Results:** The study cohort consisted of 60 patients, with a median age of 68 years and median BMI of 27.4 kg/m² (range, 19.4–41.8 kg/m²). 23 patients (38%) had diabetes, with a median HbA1c level of 7.1%. We assessed complete remission (CR) rates after first-line systemic therapy. The CR rate was 75% in obese patients versus 57% in nonobese patients (P=.46). Patients with diabetes had a CR rate of 73% versus 59% in those without (P=.70). Among patients with diabetes, CR rates were similar for those with HbA1c levels <7% versus ≥7%. Median survival for obese versus nonobese patients in the overall population was 5.4 versus 3.5 months (P=.81) and, when limited to treated patients, was 7.0 versus 7.6 months (P=.53). Median survival for patients with diabetes versus those without was 2.2 versus 4.8 months (P=.47) and, when limited to treated patients, was 7.0 versus 7.6 months (P=.93). Among those with diabetes, there was no statistically significant difference in median survival based on HbA1c level. Among all patients, median survival was significantly different between age groups (young vs old: 8.4 vs 2.3 months, respectively; P=.01), cytogenetic risk group (good vs intermediate vs poor: 7.6 vs 1.6 months, respectively; P<.0001), cytogenetic risk group (good vs intermediate vs poor: 26.1 vs 8.4 vs 2.6 months, respectively; P=.0002), and remission status (CR vs no CR: 27.5 vs 2.5 months, respectively; P<.0001). When limiting analysis to treated patients, statistically significant differences were maintained for PS (good vs poor: 9.3 vs 3.5 months, respectively; P=.01), cytogenetic risk group (good vs intermediate vs poor: not reached vs 27.5 vs 4.6 months, respectively; P=.003), and remission status (CR vs no CR: 27.5 vs 4.8 months, respectively; P<.0001), but not age group (young vs old: 8.4 vs 5.4 months, respectively; P=.44). **Conclusions:** In our study, neither obesity, diabetes, nor HbA1c level were associated with statistically significant differences in CR rate or survival among patients with AML. Age <60 years, good PS, good- and intermediate-risk cytogenetics, and CR were all associated with a statistically significant longer survival.
AB2018-62. Role of Radiotherapy Among Patients With Prostatic Infiltrating Ductal Carcinoma
Mausam Patel, MD; Moises Harari, MD; Harliv Singh Hans, MD; Shalil Mehta, BA; Amit Agarwal, BA; and Aaron Pederson, MD
*Memorial Health University Medical Center, Savannah, GA; +University of Miami/JFK Medical Center Palm Beach Regional Graduate Medical Education Consortium, Atlantis, FL; and †Loma Linda University, Loma Linda, CA

**Background:** Prostatic infiltrating ductal carcinoma (IDC) is a rare histologic subtype of prostate carcinoma. Due to its low incidence, the role of radiotherapy (RT) has not been well characterized among patients with prostatic IDC. The effect of RT on overall survival (OS) and disease-specific survival (DSS) was analyzed in a retrospective, population-based analysis. **Methods:** A population-based search was performed using the SEER database. A case listing session was performed to extract all cases of IDC of the prostate diagnosed between 2004 and 2013. Only patients with known T stage and who were N0,M0 were included in the final analysis. Patients with multiple primaries, diagnosis on autopsy/death certificate, and unknown RT status were excluded from analysis. Univariable analysis to assess for differences in survival with respect to covariates (age, marital status, race, year of diagnosis, histology, tumor grade, Gleason score, prostate-specific antigen level, T stage, and surgery) was performed using the log-rank test. Multivariable analysis was performed with Cox proportional hazards regression models to determine the predictive performance of covariates with respect to OS and DSS. Comparisons were considered statistically significant at P<.05. All statistical analyses were performed using SPSS version 24 (IBM Corporation).

**Results:** 450 patients met the inclusion criteria. On univariable analysis, the following covariates were significant predictors of OS (P<.05; log-rank test): age, race, histology, grade, Gleason score, prostate-specific antigen level, T stage, and surgery. Age, T stage, and surgery were also significant predictors of DSS (P<.05; log-rank test). Although univariable analysis showed no improvement in survival after RT, multivariable cox regression analysis showed that RT significantly improved both OS and DSS (adjusted hazard ratio, 0.525 [95% CI, 0.282–0.976] and 0.275 [95% CI, 0.107–0.705], respectively) compared with no RT. Surgery was also a significant predictor of OS and DSS on multivariable analysis (P<.05), whereas age, race, and T stage were predictors of OS (P<.05). **Conclusions:** RT improves both OS and DSS in patients with node-negative, nonmetastatic IDC of the prostate on multivariable analysis.

AB2018-63. Nomogram to Predict Adjuvant Chemotherapy Recommendation in Patients With Breast Cancer With Intermediate Recurrence Score
Feilin Qu, MD; Xiaosong Chen, MD, PhD; Lin Lin, MD; and Kunwei Shen, MD
†Ruijin Hospital, and ‡Shanghai Ninth People’s Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai, China

**Background:** The 21-gene recurrence score (RS) assay has been routinely used to guide systemic chemotherapy in patients with estrogen receptor–positive, HER2-negative, early-stage breast cancer (EBC). However, there is less clarity in adjuvant chemotherapy recommendations (ACR) for patients with intermediate RS. A statistical model that incorporates relevant factors to evaluate an individual’s probability of ACR would be useful to adapt cancer management in this subset of patients. **Methods:** Data for EBC patients with intermediate RS from January 2014 to December 2016 was retrospectively selected. Significant predictive factors for ACR were identified and integrated to construct the nomogram by using multivariable logistic regression model. The performance of this model was assessed with respect to discrimination and calibration via internal validation. **Results:** The entire cohort compromised 504 consecutive patients, and chemotherapy was recommended to 255 cases (50.6%) with intermediate RS. Age, histological grade, tumor size, lymph node (LN) status, molecular subtype, and RS were identified in the multivariate logistic regression analysis (all P<.05). The nomogram based on these predictors performed well with good discrimination [area under the curve (AUC) = 0.905]. The calibration curve showed optimal agreement between the predicted and observed probabilities. **Conclusions:** We developed a novel nomogram that can accurately predict ACR in EBC patients with intermediate RS. This predictive tool might aid clinicians in making appropriate decisions at an individualized level.

AB2018-64. A Prospective Comparative Study to Evaluate the Effect of Hypofractionation and Conventional Fractionation on Brachial Plexus After Modified Radical Mastectomy
Pakanati Vaishnavi Reddy, MBBS, DNB; Ramakrishna Prasad Bolla, MBBS, MD; and Teneti Sravanthi Reddy, MBBS
Yashoda Hospital, Telangana, India

**Background:** Breast cancer is the most common cancer in women, with surgery the main treatment modality, and chemotherapy and radiotherapy (RT) given as adjuvant treatments. RT is indicated to reduce local recurrence, which increases progression-free and overall survival. The duration of RT after
AB2018-65. Pepsinogen I/II as a Screening Biomarker of Chronic Atrophic Gastritis: A Systematic Review
Andres Isaza-Restrepo, MD, PhD; Viviana Marcela Hidalgo-Mora, MD, PhD; Joon Kyung Whang, MD; Ana Maria Barragán-González, MD, PhD; and Juan Sebastián Martín-Saavedra, MD
1Universidad del Rosario, 2Mederi Hospital Universitario Mayor, and 3Hospital Universitario Fundación Santa Fe De Bogotá, Bogotá, Colombia

Background: In 2012, gastric cancer (GC) was the fifth most frequent cancer worldwide. In Colombia in 2014, GC was the third and seventh for men and women, respectively. Helicobacter pylori is a carcinogenic pathogen highly associated with GC and chronic atrophic gastritis (CAG). CAG is considered a pre-malignant stage for GC, and studies have found that the presence of both H. pylori (CagA+) and CAG constitutes the highest risk for GC. The gold standard for CAG is upper gastrointestinal endoscopy with biopsy (UGIEB), but in recent years pepsinogen (PEP) has been used for gastric mucosal evaluation. 2 types of PEP are produced: type I is secreted by chief cells, and type II is produced by the pyloric and other glands. As a result of chronic inflammation, chief cells become pyloric glands, and therefore PEP I decreases while PEP II increases. PEP I/II ratio has been associated with H. pylori infection and may be used as a less invasive screening tool for CAG.

Methods: A search of the EBSCO, LILACS, PubMed, Embase, Ovid, OpenGrey, and Dialnet databases was performed using the MeSH terms “gastric, atrophic”; “metaplasia”; “sensitivity and specificity”; and “predictive value of tests”; and the non-MeSH terms “gastric dysplasia” and “intestinal”. The search included articles in English, Spanish, Portuguese, or Korean comparing PEP I/II ratio to UGIEB, and meeting ≥14 of the Standards for Reporting Studies of Diagnostic Accuracy (STARD) criteria. The main outcomes were sensitivity, specificity, and predictive value analysis of the PEP I/II ratio for CAG.

Results: 21 articles published between 1989 and 2016 were included, resulting in 20,601 patients (50.66% female) with a mean age of 61.45 years. 15 papers studied PEP I/II performance for CAG with a sensitivity of 13.7%;91.2%, specificity of 38.5%–100%, positive predictive value (PPV) of 11.2%–100%, and negative predictive value (NPV) of 33.3%–98.1%. 10 studies measured PEP I/II with ELISA and cut points ranging from 2.8–8.1; 3 studies used LTIA with cut points of 3.2, 2.3, and 4.9; and 2 used RIA with cut points of 2.5 and <3.0. Conclusions: Preliminary results for CAG are highly heterogeneous. The lowest sensitivity was seen when RIA with a cut point of 2.5 was used, and the highest was seen when ELISA with a 3.4 cut point was used. The lowest specificity was seen with ELISA using a 3.4 cut point, and highest with ELISA using a 3.0 cut point; the lowest PPV was seen with ELISA using a 3.4 cut point, and highest with ELISA using a 3.0 cut point; the lowest NPV was seen with RIA using a 2.5 cut point, and highest with ELISA using a 3.4 cut point. Subgroup analysis, comparisons between measurement techniques, and more homogenous studies may be required for drawing better conclusions.
AB2018-66. Oral Selinexor in Combination With Backbone Treatments for Relapsed/Refractory Multiple Myeloma
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*Emory University, Atlanta, GA; Dalhousie University and QEII Health Sciences Center, Halifax, Nova Scotia, Canada; Princess Margaret Cancer Center, Toronto, Ontario, Canada; Duke University Cancer Center, Durham, NC; Karyopharm Therapeutics, Newton, MA; and Southern Alberta Cancer Research Institute, Calgary, Alberta, Canada

Background: Selinexor is an oral, first-in-class selective inhibitor of nuclear export (XLPO1). XLPO1 inhibits the nuclear retention and reactivation of tumor suppressor proteins (p53, p21, IkB, FOXO) and the glucocorticoid receptor and, through nuclear sequestration of eIF4E-bound mRNAs, causes the reduction of several oncoproteins (MDM2, MYC, cyclin). Selinexor has shown broad single-agent antitumor activity and synergy with many existing therapies. Selinexor with low-dose dexamethasone (Sd) demonstrated a 27% overall response rate (ORR) in a phase I study in multiple myeloma (MM). Based on this finding, a phase Iib/II study (STOMP) was initiated with Sd in combination with bortezomib (SVd), lenalidomide (SRd), pomalidomide (SPd), or daratumumab (SDd).

Methods: This phase Iib/II dose-escalation study used a standard 3 + 3 design to determine the recommended phase II dose (RP2D) for SVd, SRd, SPd, and SDd. Selinexor was administered in once weekly (qw) or twice weekly cohorts. Backbone treatments were given at their standard prescribed dose. Results: 42 patients with a median of 3 prior treatment regimens (PTRs) were enrolled in the SVd arm; 18 patients with a median of 1 PTR were enrolled in the SRd arm; 29 patients with a median of 4 PTRs were enrolled in SPd arm; and 6 patients with a median of 3 PTRs were enrolled in the SDd arm. Common grade 1/2 adverse events (AEs) across all arms were fatigue, nausea, anorexia, and vomiting; grade 3/4 AEs included thrombocytopenia, anemia, and neutropenia. Table 1 shows the ORRs and clinical benefit rates (CBRs) for evaluable patients in all arms. Conclusions: Oral qw Sd in combination with other anti-MM agents is generally well tolerated and highly active in refractory MM. Based on tolerability and efficacy, the RP2D of SVd is selinexor, 100 mg qw + bortezomib 1.3 mg/m² qw for 4 of every 5 weeks, and dexamethasone, 40 mg qw; this is being evaluated in the ongoing phase III BOSTON study. The RP2D of SRd is selinexor, 60 mg qw + lenalidomide, 25 mg once daily + dexamethasone, 40 mg qw. The RP2Ds for SDd and SPd are pending. These combinations show that selinexor can be combined safely with backbone treatments for MM and provide clinical benefit.

<table>
<thead>
<tr>
<th>Arm – Subcategory</th>
<th>N</th>
<th>ORR (%)</th>
<th>CBR (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVd – PI relapsed/naive</td>
<td>21</td>
<td>81%</td>
<td>90%</td>
</tr>
<tr>
<td>SVd – PI refractory</td>
<td>19</td>
<td>42%</td>
<td>68%</td>
</tr>
<tr>
<td>SRd – Lenalidomide-naive</td>
<td>11</td>
<td>91%</td>
<td>100%</td>
</tr>
<tr>
<td>SRd – Lenalidomide-refractory</td>
<td>4</td>
<td>25%</td>
<td>50%</td>
</tr>
<tr>
<td>SPd – PomalidomideLenalidomide-refractory</td>
<td>7</td>
<td>29%</td>
<td>43%</td>
</tr>
<tr>
<td>SPd – PomalidomideLenalidomide-refractory</td>
<td>17</td>
<td>65%</td>
<td>76%</td>
</tr>
<tr>
<td>SDd</td>
<td>3</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Abbreviation: PI, proteasome inhibitor.
*Complete response + very good partial response + partial response.
*ORR = minor response.

AB2018-67. Influence of Primary Tumor Location in Patients With Metastatic Colorectal Cancer: A Single-Institution Experience
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Background: Recent data highlighted that primary tumor location in patients with metastatic colorectal cancer (mCRC) may have a prognostic impact and a predictive value for the outcomes of first-line therapy with monoclonal antibodies and cytotoxic agents. Methods: We retrospectively reviewed the records of patients with mCRC who underwent first-line therapy from 2011 to 2016 at Belcolle Hospital. Progression-free survival (PFS), overall survival (OS), and objective response rate (ORR) according to the primary tumor location were investigated. Primary tumors located at the rectum, sigma, descending colon, and left flexure were defined as left-sided (L-mCRC), whereas those located from the cecum to the distal part of the transverse colon were categorized as right-sided (R-mCRC). Results: 103 patients were considered eligible: 73 with L-mCRC (43 RAS-wild type [wt], 24 RAS-mutant [mut], 6 not tested) and 30 with R-mCRC (12 RAS-wt, 11 RAS-mut, 7 not tested). Among these patients, 68 were male and 35 were female, and the median age was 63.15 years (range, 39–82 years). Metastatic sites included liver (60%), lung (28%), and lymph nodes (31%). Median duration of follow-up was 16.3 months. The 2-year OS rate for all patients was 83%, and no difference was observed between L-mCRC and R-mCRC regardless of treatment performed (P=.66). OS of patients with L-mCRC treated with anti-VEGF (93.7%)
was longer than the OS of those with L-mCRC treated with anti-EGFR (64.8%; P=.01). No difference was observed for R-mCRC treated with anti-EGFR or anti-VEGF (P=.47). The median PFS (mPFS) was longer in patients treated with anti-VEGF versus anti-EGFR for mCRC of both sides: 14 months (95% CI, 11–7) versus 8 months (95% CI, 6–9) in L-mCRC (P=.03), and 7 months (95% CI, 2–11) versus 5 months (95% CI, 2–8) in R-mCRC (P=.60). However, the mPFS was statistically longer in L-mCRC versus R-mCRC (44.5% vs 18.4%; P=.0002), regardless of therapy. The ORRs (complete responses [CRs] + partial responses) were 50% in L-mCRC and 24% in R-mCRC (P=.02). In R-mCRC, the ORR was higher in patients treated with anti-EGFR versus anti-VEGF (42.9% vs 18.8%, respectively; P=.32). 10 CRs (13.7%) were observed, all in L-mCRC, regardless of the therapy performed (P=.06). Conclusions: With the limit of the sample size, our data confirm that tumor location has a prognostic impact and might influence outcomes of patients with mCRC. CRs with a significantly better mPFS were seen only patients with L-mCRC regardless of the therapy performed. Anti-VEGF seems to prolong OS and PFS in L-mCRC.

AB2018-69. Local Control in Nonmelanoma Skin Cancer: Superficial versus Electron Therapy at the National Cancer Institute of Mexico

Luisa-Maria-Catalina Tenorio-Téllez, MD; Dolores De La Mata, MD, PhD, MPH; Evangelina Figueroa-Medina, PhD; Abelardo Meneses-Garcia, MD, MPH; and Angel Herrera-Gómez, MD

Background: Studies have shown that radiotherapy (RT) for nonmelanoma skin cancer (NMSC) is not inferior to surgery, with no difference in 5-year locoregional-recurrence-free survival (LRFS). However, there is lack of information comparing these modalities. This study compared local control and toxicity of 2 RT modalities (superficial versus electron therapy) in patients with NMSC at the National Cancer Institute of Mexico (INCan). Methods: A retrospective chart review was performed of 1,217 patients with biopsy-confirmed NMSC between 2000 and 2013 at INCan. Of 712 cases treated with radical RT (612 cases with kilovoltage RT [kV] or electron therapy [E]), 591 (83.0%) were basal cell skin cancer (BCSC) and 121 (17.0%) were squamous cell skin cancer (SCSC). Follow-up was ≥12 weeks. Kaplan-Meier curves were used to estimate LRFS and cancer-specific survival (CSS). Results: Mean follow-up was 53 months, the median age was 73 years (19–101 years), and 60.2% of the patients were women. 601 lesions (84.4%) were located in area H, 108 (15.2%) were located in area M, and 3 (0.4%) were located in area L. Regarding RT modalities, 541 patients were treated with kV and 171 with E, well balanced between the groups (P=not significant). Mean total dose was 45 Gy in 15 fractions for BCSC and 51 Gy in 17 fractions for SCSC. Grade 2 acute radiation dermatitis was higher in the kV group (76.9% vs 40.4%; P<.05), as were grade 1–2 late skin effects (21.4% vs 13.5%;
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P<.005). A statistically significant better outcome was seen with kV over E (5-year CSS: 99.6% vs 95.4%, respectively; P=.05, and 5-year LRFS: 98.3% vs 89.5%, respectively; P=.02). **Conclusions:** Superficial therapy (kV) offers statistically significant higher local control than E. Acute and late grade 2 toxicities are more frequent with kV, without any impact on functional or cosmetic results. This study shows clinical benefit for kV therapy; we would recommend keeping superficial equipment in developing countries’ facilities, as it would avoid linear accelerators overbooking, with lower costs in NMSC radiotherapy treatment.

**AB2018-71. Systematic Review and Meta-Analysis of Lapatinib Monotherapy in Patients With Brain Metastases From HER2-Positive Metastatic Breast Cancer**

Kyaw Z. Thein, MD;* Myo H. Zaw, MD;* Rachana Yendala, MD;* Henry P. Igid, MD;* Chatteer Chai-Adisaksopha, MD, MSc;† Fred Hardwicke, MD;‡ Saba Radhi, MD;‡ Catherine Jones, MD;‡ and Sanjay Awasthi, MD*

*Texas Tech University Health Sciences Center, Lubbock, TX; †The Brooklyn Hospital Center, Brooklyn, NY; and ‡McMaster University, Hamilton, Ontario, Canada

**Background:** Lapatinib is a small tyrosine kinase inhibitor of the human epidermal growth factor receptors HER1 and HER2. Approximately half of all brain metastases arise from HER2-positive breast cancer (BC), thereby contributing significant morbidity and mortality. No standard therapies are currently approved in this patient population, and brain metastasis in BC is an area of urgent unmet need. We performed a systematic review and pooled analysis of trials to determine the efficacy of lapatinib monotherapy in brain metastases from HER2-positive metastatic BC (MBC). **Methods:** A comprehensive literature search was performed using MEDLINE and Embase databases and meeting abstracts through December 31, 2016. Trials that used lapatinib monotherapy in brain metastases from HER2-positive MBC were included. Pooled estimated rates were calculated using random effects model. Heterogeneity was assessed using I² statistic. **Results:** 312 patients with brain metastases from HER2-positive MBC from 3 trials and a subgroup of another 2 trials were included in our analysis. Lapatinib was used as second-line treatment in all studies. The central nervous system objective response rate (ORR) was 5% (95% CI, 2–9; I², 13.6%), complete response rate was 0% (95% CI, 0–0; I², 0.0%), and partial response rate was noted in 5% (95% CI, 2–9; I², 13.6%). Stable disease (SD) occurred in 39% of patients (95% CI, 20–57; I², 82.4%) and progressive disease in 49% (95% CI, 29–68; I², 87.1%). **Conclusions:** As a small molecule, lapatinib may cross the blood–brain barrier and was used to treat brain metastases from HER2-positive MBC. Our meta-analysis showed that lapatinib monotherapy contributed to a 5% ORR and 39% with SD. Further randomized controlled trials and treatment options are critically needed in this patient population.

**AB2018-72. Neutropenic Fever in Adult Patients With Malignancies: Experience of the National Cancer Institute of Mexico**

Víctor I. Urbaileo-Ceneceros, MD, MSc; Angel Apodaca-Cruz, MD; Dana A. Pérez-Camargo, MSc; Mónica M. Rivera-Fraco, MD, MSc; Bosco M. McNally-Guillen, MD; Jorge Torres-Jiménez, MD; and Ángel Herrera-Gómez, MD*

*Instituto Nacional de Cancerología Mexico (INCAN), and Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubiran (INCMNSZ), Mexico City, Mexico

**Background:** Neutropenic fever (NF) remains one of the main complications of cancer chemotherapy and is a major cause of morbidity, health expenditures, and compromised efficacy as a result of delays and dose reductions in chemotherapy. Mortality from NF remains significant, with overall mortality rates of approximately 5% in patients with solid tumors and up to 11% in some with hematologic malignancies. This study evaluated NF episodes in patients with malignancies, identifying microorganisms and other factors affecting mortality. **Patients and Methods:** A prospective analysis was performed in patients with cancer who attended the emergency department (ED) of the National Cancer Institute of Mexico from December 2013 through April 2017. Statistical analyses were performed using SPSS Statistics, version 21 (SPSS Inc.). **Results:** 100 patients were included, with a median age of 43 years (range, 17–87 years); most were men (54%). 71% of the underlying diseases were hematologic malignancies, specifically leukemias (43%) and lymphomas (28%). Median patient temperature was 39° (range, 36°–39.8°), and the median absolute neutrophil count was 0.2 x 10⁹/L (range, 0–0.7 x 10⁹/L). The performance status (PS) in most patients was good (80% had a Karnofsky PS of 80–100; 55% had an ECOG PS of 0–1). 96 patients had received any chemotherapy a month prior to their NF episode. Hyper-CVAD was the chemotherapy regimen associated most with NF. No evident site of infection was found in 30% of patients, followed by gastrointestinal (26%), lung (20%), catheter (10%), urinary (7%), and other sites (9%). Pathogens were isolated in 33% and gram-negative bacteria were isolated in 19%, followed by other types of bacteria (14%). Prevalence of antibiotic-resistant bacteria was 4%. The most frequently used antibiotics were amikacin, ceftazidime, and pipercillin-tazobactam. The sequential organ failure assessment (SOFA) score was <10 in 88 patients, and the quick-SOFA score was 0 in 90%. 30-day mortality was 7% and 13% for patients with hematologic malignancies and solid tumors, respectively. **Conclusions:** The
AB2018-73. Primary Exteruterine Endometrial Stromal Sarcoma: Analysis of 12 Cases
You Wu, MD; Nan Li, MD; and LingYing Wu, MD
National Cancer Center/Cancer Hospital, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing, China

Objective: This study analyzed the clinical and pathologic features of extrauterine endometrial stromal sarcoma (ESSS) and explored the high-risk factors associated with recurrence. Methods: Medical records of 12 patients who underwent surgery for EESS at our institution from December 2007 to December 2016 were collected and analyzed. Results: The most common complaint among the 12 patients was abdominal pain (6/12; 50%), followed by vaginal bleeding (n=2; 16.67%), tenesmus (n=2; 16.67%), change in bowel habits (n=1;8.33%), and pruritus vulvae (n=1;8.33%). All patients were treated with surgical resection as the cornerstone of treatment. In 6 patients who had previously undergone hysterectomy for benign gynecologic conditions, bilateral adnexectomy was performed. In 5 of the other 6 people, hysterectomy and bilateral adnexectomy were performed; only one person with fertility requirements maintained the uterus and the normal adnexa, whereas the remainder had no abnormalities on imaging. Additional procedures including omentectomy, peritoneal biopsies, colonic resection, lymph node dissection, or vulvectomy were performed in all 12 patients. 6 patients underwent optimal surgery, with no residual viable tumor. All 12 patients received adjuvant chemotherapy, 5 received hormonal therapy, and 2 were treated with radiotherapy. Primary tumor sites were the rectosigmoid in 5 patients, the ovaries in 2, the pelvis in 3, the vagina in 2, and the vulva in 1. 8 patients presented with disseminated disease. Associated foci of endometriosis was found in proximity to the tumor in 7 patients, and the mean presurgical CA 125 level was 73.14±2.15 U/L. On immunohistochemical staining, tumor cells of all patients showed patchy and intense immunoreactivity for CD10, estrogen receptor (ER), and progesterone receptor (PR), and negative expression of CD34 and desmin. Mean follow-up time was 63.11±7.18 months. To date, none of the patients have died during the follow-up period. 5 patients experienced disease relapse after surgery without hormone therapy. The mean disease-free interval was 21.32±6.88 months (range, 3–48 months). There was a statistically significant difference in recurrence rates between patients who received postoperative oral hormonal therapy and no oral steroids (P=.03; P<.05).

Conclusions: EESS is an uncommon tumor arising in women of any age. Positive labeling for CD10, PR, and ER with no reactivity for desmin and CD34 could help with diagnosis. Surgical resection is the most frequent treatment option, and hormone therapy may reduce the recurrence rate. Because EESS is likely to recur late after initial treatment, long-term clinical follow-up should be planned.

AB2018-76. Clinical Prediction Rule for Cancer-Associated Venous Thromboembolism in Patients Presenting to the Emergency Department
Sai-Ching Jim Yeung, MD, PhD
The University of Texas MD Anderson Cancer Center, Houston, TX

Background: Early and accurate prediction of cancer-related venous thromboembolisms (VTEs) can avoid unnecessary diagnostic imaging, laboratory tests, or both, and influence intervention and management plans. Methods: To create a prediction model for cancer-associated VTE, we retrospectively analyzed all consecutive patients who visited the emergency department of The University of Texas MD Anderson Cancer Center (MDACC) between January 1, 2009, and December 31, 2012, and underwent D-dimer testing. A VTE prediction model was developed based on multiple logistic regression for various clinical and cancer-related factors using the coefficients to generate a prediction score. To validate this score, we analyzed data from a second cohort of patients who presented to the King Hussein Cancer Center (KHCC) for emergency care between January 1, 2009, and December 31, 2013. Results: Of 4,432 eligible patients from MDACC, 4,145 were included in the analysis, 958 of whom had VTE (23.1%). A prediction scoring system was generated combining the significant clinical and cancer-related variables, with assigned points for each. This score outperformed 2 well-known scoring systems for predicting VTE—the Wells score and revised Geneva score (P<.001)—and was externally validated using the KHCC cohort. Of significance, combining the clinical prediction model and D-dimer level yielded a 100% negative prediction value in 113 patients with low risk based on prediction score and normal D-dimer results. Conclusions: The proposed score for predicting VTE, which can be used in all patients with cancer regardless of their treatment or cancer status, can safely exclude patients at low risk for VTE, avoiding unnecessary diagnostic tests or images.
Correlative/Genetics

**AB2018-77. Mutation Analysis of a Prospective Phase II Trial of Carboplatin and Nab-Paclitaxel for Metastatic Non–Small Cell Lung Cancer**
Dwight H. Owen, MD, MS5; Erin M. Bertino, MD6; Terence M. Williams, MD, PhD5; Xiaokui Mo, MD, PhD6; Cynthia D. Timmers, PhD5; Amy Webb, PhD5; Sameek Roychowdhury, MD, PhD6; Miguel A. Villalona-Calero, MD6; and Gregory A. Otterson, MD6

*Ohio State University Comprehensive Cancer Center, Columbus, OH; Medical University of South Carolina, Charleston, SC; and Miami Cancer Institute, Miami, FL*

**Background:** Chemotherapy remains a standard-of-care treatment for patients with advanced non–small cell lung cancer (NSCLC), along with checkpoint inhibitor immunotherapy and targeted agents for select patients. Identifying predictors of response optimizes patient selection and may identify mechanisms of intrinsic resistance. We performed a genomic analysis on tumor samples of patients treated with carboplatin and nab-paclitaxel (CP) as part of an NCCN-funded phase II trial to identify predictors of response or survival.

**Methods:** DNA was purified from archival tumor tissue collected from patients who consented to participate in the trial (ClinicalTrials.gov identifier: NCT00729612). Next-generation sequencing libraries were produced using a capture-based targeted panel covering the coding exons of 278 genes. Libraries were sequenced to a 215x average depth of coverage. Raw sequence was aligned to hg19 with Bowtie local and processed following GATK’s best practices for exome analysis. Variants were called with VarScan and filtered after annotation with the Ensembl Variant Effect Predictor. Overall survival (OS) and progression-free survival (PFS) were assessed as part of the study and correlated with mutation analysis.

**Results:** Most of the 63 patients accrued (n=48) had squamous cell NSCLC, and sufficient DNA data were available for 35. At the time of submission, molecular analysis was available for 23. 2 patients (8.7%) had no known pathogenic mutations detected. There was a median of 3 mutations (range, 1–12) among the 21 patients with mutations detected. The most represented pathways included the DNA repair (DR) pathway, including Fanconi anemia and homologous recombination pathways; JAK-STAT signaling pathway; IGF-1 pathway; mTOR pathway; and MAPK-ERK pathway. No statistically significant difference in OS or PFS was observed in patients with mutations in DR pathways. Fewer partial responses were observed in patients with DR pathway mutations than in those without (11.1% vs 47.8%; P=.059, Fisher exact test). Patients with mutations in the IGF-1 pathway had a shorter PFS (P=.035, log-rank test), but this did not translate into an OS benefit (P=.318).

**Conclusions:** In this correlative analysis of a phase II trial, patients with mutations in the IGF-1 pathway had shorter PFS when treated with CP. Research on IGF-1 has focused on its prognostic role and resistance to EGFR-directed therapy. Given the relatively small number of patients in this study, the impact of these genetic mutations on response to chemotherapy should be assessed in larger prospective trials.

**Epidemiology/Risks**

**AB2018-78. Patients With Renal Cancer and a Second Primary Tumor: Pathogenic Findings on Panel Testing**
Natalie J. Carter, MS, LCGC; Ravin N.W. Williams, MS, CGC; Darrow Speyer, MGC, CGC; Maegan E. Roberts, MS, CGC; Megan L. Marshall, MS, LCGC; Ying Yang, MD, PhD; Rachel T. Klein, MS, LCGC; and Kathleen S. Hruska, PhD

*GeneDx, Gaithersburg, MD*

**Background:** Multigene hereditary cancer panel testing has allowed for concurrent evaluation of genes and is useful for patients with complex histories. However, data on renal cancer cohorts and the utility of panels are limited. We describe the features of probands with renal cancer and another primary tumor with a pathogenic or likely pathogenic variant (collectively, PV) identified on panel testing.

**Methods:** We performed a retrospective review of data for probands with renal cancer and at least 1 other primary tumor. Fisher exact test with a significance level of 0.05 was used to compare yields. **Results:** 574 individuals with renal cancer and an additional primary tumor underwent panel testing, and 10.3% (59/574) were found to have ≥1 PV. Yield was not statistically different between probands with renal cancer only and those with a second primary (P=.30). Renal pathology was available for 56% (319/574) of those with an additional primary, with...
clear cell (44%) and papillary (41%) the most prevalent. Yield was greatest for those with renal/ovarian cancer and renal/endometrial cancer (Table 1). Of those with a PV, 32 had a PV in a gene with published diagnostic and/or testing criteria, and 84% (27/32) met these criteria regardless of the renal diagnosis. **Conclusions:** In our cohort, 10.3% of probands with renal cancer and another primary had a PV identified on panel testing. In all but one case (TSC1), the other primary was a better predictor of the result than the renal tumor, and probands met criteria for testing independent of their renal cancer diagnosis. These data suggest that patients with multiple primaries, including renal, may benefit from a thorough assessment of personal cancer history prior to selecting an appropriate genetic test. Further data are needed to define whether renal cancer is a part of many of these genetic syndromes.

**AB2018-79. HPV and Esophageal Squamous Cell Carcinoma: Increasing Evidence for an Epidemiologic Link and an Opportunity for Prevention**

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**Objectives:** The objective of this retrospective study was to evaluate the prevalence of human papilloma virus (HPV) DNA in diagnostic material from patients with esophageal squamous cell carcinoma (ESCC) diagnosed over a 10-year period at Baptist MD Anderson Cancer Center (BMDACC), with reference to the role HPV may play in the etiology of this malignancy, thereby highlighting potential implications for developing new prevention strategies. **Background:** It is recognized that almost all cervical epithelial malignancies are caused by HPV infection. HPV has also been associated with squamous malignancies of the vulva, vagina, penis, anus, oropharynx, base of tongue, and tonsils. Smoking and heavy alcohol use have been long recognized as being linked with increased risk of ESCC. Increasingly, the role of HPV etiology has also been recognized. With the development of a high-efficacy HPV vaccine, a significant avenue of prevention may be available for a large percentage of ESCC cases, which is recognized as the sixth most common cancer in the world. **Methods:** In this retrospective study, all cases of biopsy-proven ESCC diagnosed between 2007 and 2017 at BMDACC were reexamined. In cases for which sufficient material was available, HPV testing by in situ hybridization (ISH) and the surrogate HPV marker p16 by immunohistochemistry (IHC) were performed. Formalin-fixed, paraffin-embedded tumor specimens were evaluated for high-risk HPV subtypes 16 and 18 using the ISH-catalyzed signal-amplification method for biotinylated probes (chromogenic ISH [CISH]) and p16 IHC performed using the CINtec E6H4 clone (Roche-Ventana). **Results:** 56 cases of ESCC were diagnosed through biopsy between 2007 and 2017. Insufficient tissue was available for testing in 5 cases. HPV high-risk CISH and p16 staining were performed on replicate tissue sections obtained from the tissue blocks of the remaining 51 cases. HPV was identified in 15 cases (29%). **Conclusions:** These data indicate that HPV may be an important etiologic factor or cofactor in the development of ESCC. With the development of increasingly effective HPV vaccines, new avenues of ESCC prevention may be available.

**AB2018-80. Global Changes in Patient/Graft Survivals and Causes of Death in Solid Organ Transplantation Over Time According to Age, Sex, and Geographic Region**
Yao Lu, MD; Zhiyong Guo, MD, PhD; and Xiaoshun He, MD, PhD*  
*The First Affiliated Hospital, Sun Yat-sen University, Guangzhou, China; and MOH Holdings, Singapore

**Background:** For >60 years, solid organ transplantation has been performed worldwide with improving clinical successes over time. We aimed to assess the patient/graft survivals and causes of death in transplant recipients in relation to age, sex, geographic region, and time period from published literature since 1980. **Methods:** A search of PubMed and Embase with predefined inclusion criteria identified prospective studies published between January 1980 and March 2013. Patient/graft survivals were pooled in a random-effects binomial meta-analysis. Trends in patient/graft survivals and causes of death over time, and the effect of age, sex, and geographic region on these trends were assessed with weighted linear regression analyses. **Results:** Long-term patient/graft survivals in both liver and heart transplantation had increasing trends per year over time, with yearly increases by 0.4% (–0.4 to 1.2) and 0.5% (–0.8 to 1.9), respectively, at 3 and 5 years after liver transplantation; and by 1.3% (–1.7 to 4.4) and 1.1% (–0.8 to 3.1), respectively, at 3 and 5 years after heart transplantation. The same trend was found in 3-year patient survival in kidney transplantation, which increased by 0.3% (–0.1 to 0.7). **Conclusion:** Graft survival rates showed similar trends in all 3 types of transplantation. No significant regional survival disparities were found, except that patients in Asia had higher 3-year survival rates than those in North America after liver transplantation. In terms of the causes of death, the incidence of infection/sepsis has decreased year-
ly, whereas the incidence of malignancies has been on the rise. **Conclusions:** Long-term posttransplant patient/graft survivals have shown improving trends in the past 3 decades. However, the leading causes of death are all associated with long-term immunosuppression. It is necessary to constantly reevaluate immunosuppression protocols to minimize their adverse effects and attempt to improve recipient survival in the next decades.

**AB2018-81. Correlation Between Primary Tumor Site and Carcinoembryonic Antigen Levels in Colorectal Adenocarcinoma**

Ayman Qasrawi, MD; Omar Abu Ghazaleh, MD; Mouhanna Abu Ghanimeh, MD; John Foxworth, PharmD; Muhammad Toor, MD; and Sheshadri Madhusudhana, MD

*University of Missouri-Kansas City School of Medicine, Kansas City, MO; and* Gastroenterology Department, Henry Ford Hospital, Detroit, MI

**Background:** The colon derives from different embryologic origins—the proximal colon from the midgut and distal colon and rectum from the hindgut. Multiple studies have demonstrated differences in the incidence, presentation, pathogenesis, and outcome of colorectal cancer (CRC) per the anatomic site. Serial carcinoembryonic antigen (CEA) level monitoring has been advocated as a measure to detect early recurrence. However, 30%-40% of all CRC recurrences are not associated with elevated serum CEA levels. We aimed to determine if CEA levels correlate with the CRC location (right vs left). **Methods:** We retrospectively reviewed charts of patients diagnosed with stage II or III CRC from January 1, 2000, to December 31, 2014. All subjects had biopsy-proven adenocarcinoma, underwent definitive surgical resection, and had at least 3-years follow-up. Patients with stage I or IV CRC at diagnosis were excluded. Patients were classified as having right colon cancer (RC) if the primary tumor was located in the cecum, ascending colon, hepatic flexure, or transverse colon, and left colon cancer (LC) if it was within the splenic flexure, sigmoid colon, or rectum. Chi-square and Student t tests were used for analysis. Elevated CEA level was defined as >5 mcg/L. **Results:** 628 charts were reviewed, and 101 met the inclusion criteria. Subjects were divided into either RC (n=34) or LC (n=67). Both groups were similar with regard to age, sex, ethnicity, smoking status, tumor grade, and disease stage. Mean preoperative and postoperative CEA levels were similar in both groups (8.9 vs 13.7 mcg/L [RC vs LC, respectively; P=.4]; preoperatively, and 3.4 vs 3.35 mcg/L [RC vs LC, respectively; P=.9]; postoperatively). Moreover, the percentage of subjects who had an elevated CEA level was similar in both groups preoperatively and postoperatively. Among the RC group, 9 patients experienced disease recurrence during follow-up compared with 27 in the LC group (26% vs 40%; P=.17). As a whole group and without correction to multiple analyses, elevated preoperative CEA level was correlated with tumor recurrence (P=.012). No differences in CEA levels were seen at the time of recurrence based on tumor location. Recurrence sites and mean time to recurrence were also similar between both groups. **Conclusions:** In our small cohort of patients with CRC, we did not find differences in CEA levels at various time points based on tumor location. However, our study is compromised by the small number of subjects, and therefore, a larger study is needed before ultimate conclusions can be made.

**AB2018-82. Prevalence of EML4-ALK Fusion Gene in Patients With Lung Adenocarcinoma Using Immunohistochemistry: A Pilot Study From a Cancer Center in Northern India**

Vineet Talwar, MD, and Anurag Mehta, MD

*Rajiv Gandhi Cancer Institute and Research Center, New Delhi, India

This manuscript is available at Respir Med 2017;132:270–271.

**AB2018-84. Improved Prognosis of Patients With Lung Cancer in Xuanwei and Fuyuan Counties, a High-Incidence Region of Yunnan Province in China, Compared With the Remainder of Yunnan Province**

Runxiang Yang, MD

Yunnan Tumor Hospital, Kunming, Yunnan, People’s Republic of China

**Background:** In the Xuanwei and Fuyuan (XF) counties of Yunnan Province, China, coal burning is ubiquitous. This region had a high lung cancer mortality rate from 1990–2013. In recent years, public awareness of the high risk of lung cancer and efforts focused on cancer screening has increased. This retrospective analysis of lung cancer cases from Yunnan Tumor Hospital (YTH) examined the clinical outcomes of patients from this region. **Methods:** Consecutive cases of newly diagnosed lung cancer admitted to YTH between January 1, 2012, to July 10, 2015, were reviewed. Patient demographics, pathology, clinical characteristics, comorbidities, and cancer therapy were abstracted from clinical records by physician reviewers. Performance status was based on the Karnofsky performance score (KPS). Co-morbidity was evaluated using the Charlson comorbidity index (CCI). Survival outcome was obtained by telephone follow-up and analyzed using the Kaplan-Meier method and multivariate Cox-proportional hazards
regression model. **Results:** 3,907 cases were reviewed, and after removing patients with missing data, 3,415 (87.4%) were analyzed. Of these, 698 patients (20.4%) were from XF. Cancer stage distribution for XF cases was 24.5%, 13.0%, 25.8%, and 36.7% for stage I, II, III and IV, respectively, which was different from non-XF cases (8.9%, 7.1%, 30.5%, and 53.4%; P <.001). Cox regression analysis of overall survival (OS) showed that XF residence (vs non-XF; hazard ratio [HR], 0.81; P =.003) and cancer discovered by screening physical (vs no; HR, 0.63; P =.002) were predictors of improved survival while controlling for age, sex, ethnicity, cancer type, body mass index, KPS, surgery, radiotherapy, age-unadjusted CCI >3, and smoking. **Conclusions:** First diagnosis by screening physical and living in XF were associated with improved survival for patients with lung cancer treated at YTH. These results suggest that focused efforts in cancer screening and increased lung cancer awareness in the XF population may have resulted in earlier diagnosis and improved OS compared with the remainder of Yunnan.

**Outcomes and Health Services Research**

**AB2018-85. Real-World Effectiveness and Safety Outcomes Among Treated Patients With Chronic Lymphocytic Leukemia in the United States**

John M. Burke, MD; Namita Joshi, PhD, MS, BPharm; Shelby Corman, PharmD, MS, BCPS; Courtney Johnson, MPH; Cynthia Macahilig, MA; Dina Gifkins, PhD, MPH; Brad Schenkkel, MSc; Song Wang, PhD; and Mekré Senbetta, PharmD, MPH*

*US Oncology Research, The Woodlands, TX; **Pharmerit International, Bethesda, MD; ***Medical Data Analytics, Parsippany, NJ; and ****Janssen Scientific Affairs, Horsham, PA

**Background:** Limited real-world evidence has been published regarding treatment of chronic lymphocytic leukemia (CLL) since the approval of ibrutinib for this indication in 2014. **Methods:** An observational, retrospective chart review was conducted at 59 geographically dispersed US clinical sites. The study included randomly selected adults (aged ≥18 years) newly diagnosed with CLL who had received ≥1 pharmacotherapeutic agent between January 1, 2011, to January 31, 2015. Treatments received by line of therapy (LoT) were categorized as chemotherapy monotherapy (CT), single-agent ibrutinib, CD20 antibody monotherapy, chemotherapy ± corticosteroids, and other novel targeted therapies. Treatment discontinuations due to adverse events (AEs) were examined. Disease progression was defined at the discretion of the treating oncologist. Overall response rate (ORR), duration of response (DoR), progression-free survival (PFS), and overall survival (OS) were described. AEs were also characterized. **Results:** 246 patients received first-line therapy (LoT1), 139 of whom also received second-line therapy (LoT2). The median time from treatment initiation to end of follow-up was 20.2 months for LoT1 and 3.5 months for LoT2. In LoT1, ORR was 91.9% across all treatments, median DoR was 32.7 months, median PFS was 37.0 months (95% CI, 28.1–42.1), and OS was not estimable. At 3 years from initiation of LoT1, 95% of patients in LoT1 were alive. Among those receiving CIT in any LoT (n=197), 33 (16.8%) had ≥1 AE. These 33 patients experienced a total of 57 AEs, including 47 grade 1–2 (82.5%), 9 grade 3 (15.8%), and 1 grade 5 (peripheral edema; 1.8%), with 3 AEs resulting in treatment discontinuation. 2 events of atrial fibrillation (a grade 1 and a grade 2) and one hemorrhage (grade 1) were documented. Among patients receiving single-agent ibrutinib in any LoT (n=119), 14 (11.8%) had ≥1 AE. These 14 patients experienced a total of 27 AEs, including 25 grade 1–2 (92.6%) and 2 grade 3 (7.4%), but no grade 4 or 5. A grade 2 atrial fibrillation and a grade 1 hemorrhage were reported. No AEs resulted in discontinuation of single-agent ibrutinib. **Conclusions:** In this real-world study, median PFS was ≥3 years in LoT1. Most AEs were grade 1 or 2 in both ibrutinib- and CIT-treated patients. Grade 3 AEs accounted for 7.4% of ibrutinib-related AEs, with no grade 4 or 5 AEs. 15.8% of CIT-related AEs were grade 3 and 1.8% were grade 5. No patients discontinued single-agent ibrutinib due to AEs.

**AB2018-86. Willingness to Pay to Avoid Treatment-Related Fatigue in Patients With Metastatic Castration-Resistant Prostate Cancer**

Ann Cameron, PhD; Brian Macomson, PharmD; Stewart Kaufman, MBA; Ajay Behl, PhD; and Neeraj Agarwal, MD

*Xcenda, LLC, Palm Harbor, FL; **Janssen Scientific Affairs, LLC, Horsham, PA; and ***Huntsman Cancer Institute, University of Utah, Salt Lake City, UT

**Background:** Many men with castration-sensitive prostate cancer will eventually develop metastatic castration-resistant prostate cancer (mCRPC) that requires additional therapies. The oral therapies abiraterone acetate + prednisone (AAP) and enzalutamide (ENZ) have demonstrated improved outcomes in patients with mCRPC. The main objective of this study was to assess willingness to pay (WTP) among patients with mCRPC to avoid adverse events (AEs) associated with AAP and ENZ. **Methods:** A Web-based survey and conjoint methodology was used to assess patients’ treatment preferences based on AE profiles and WTP. The 6 most common AEs reported in AAP and ENZ package inserts were used as the AE-related attributes (hypertension, shortness of breath, fatigue, joint pain, back pain, and...
muscle discomfort). Monthly out-of-pocket (OOP) cost was included as an attribute to calculate WTP. Each attribute had 3 levels reflecting AE severity or OOP costs. Men with physician-confirmed mCRPC were recruited from a market research firm’s existing physician network and invited to participate in the survey. For the conjoint task, respondents saw 15 scenarios for 2 hypothetical treatments based on the 7 attributes and were asked to choose the preferred therapy. The conjoint task was programmed and analyzed using Sawtooth Software. A random effects hierarchical Bayes model was used to estimate part-worth conjoint utilities that describe attribute-level preferences. Conjoint analysis was used to estimate the relative value of avoiding each side-effect level relative to no/minimal side effect, which was then rescaled in monetary terms (WTP calculation). Results: 150 men with mCRPC completed the survey; the median age was 67 years and 73% were white. All respondents had health insurance that covered prescription medications. Two-thirds of respondents had prostate cancer for ≥3 years and 81% had taken AAP or ENZ. In the conjoint analyses, the difference in preference weights between the best and worst levels of each attribute showed that a reduction in fatigue was the most important attribute. Rescaled in monetary terms (ie, WTP), avoiding fatigue that caused major interference in daily activities was associated with the highest relative monetary value ($119 in monthly OOP cost). Avoiding joint pain requiring an opioid prescription was relatively less important ($50 monthly OOP). Conclusions: Study results are consistent with clinical literature that suggests severe fatigue is a debilitating AE, and avoiding fatigue is highly valued by men with mCRPC.

AB2018-87. Real-World Treatment Patterns, Effectiveness, and Safety Among Patients With Mantle Cell Lymphoma
John M. Burke, MD; Namita Joshi, PhD; MS, BPharm; Shelby Corman, PharmD, MS, BCPS; Cynthia Macahilig, MA; Dina Gifkins, PhD, MPH; and Mekré Senbetta, PharmD, MPH
*US Oncology Research, The Woodlands, TX; *Pharmerit International, Bethesda, MD; *Medical Data Analytics, Parsippany, NJ; and *Jansen Scientific Affairs, Horsham, PA

Background: Limited real-world evidence has been published regarding treatment of mantle cell lymphoma (MCL) since the approval of ibrutinib for this indication in late 2013. Methods: A retrospective medical chart review was performed at 59 geographically diverse US clinical sites. The study included randomly selected adults (aged ≥18 years) newly diagnosed with MCL who had received ≥1 pharmacotherapeutic agent between January 1, 2011, to January 31, 2015. Treatments received by line of therapy (LoT) were classified as chemotherapy (CIT), single-agent ibrutinib, CD20 antibody monotherapy, and chemotherapy ± corticosteroids. Disease progression was defined at the discretion of the treating oncologist. Treatment discontinuations due to adverse events (AEs) were examined. Clinical outcomes included overall response rate (ORR), duration of response (DoR), progression-free survival (PFS), and overall survival (OS). AEs were also characterized. Results: 191 patients with MCL received first-line therapy (LoT1), 131 of whom also received second-line therapy (LoT2). CIT was the most common treatment in LoT1 (83.8%), whereas the most common treatment in LoT2 was single-agent ibrutinib (57.3%). Median duration of follow-up was 22.5 months from the start of LoT1 and 3.3 months from the start of LoT2. In LoT1, ORR was 93.2% across all treatments, median DoR was 31.5 months (95% CI 22.9–35.3), median PFS was 33.0 months (95% CI, 26.3–38.2), and median OS was not estimable. At 3 years from initiation of LoT1, 88% of patients were alive. Among those receiving CIT in any LoT (n=189), 40 (21.2%) had ≥1 AE. 12 patients (6.3%) had grade 3 AEs, 2 (1.1%) had grade 4, and 2 (1.1%) had grade 5. 79 AEs were reported among the CIT-treated patients, including 14 grade 3 (17.7%), 3 grade 4 (3.8%), and 2 grade 5 (2.5%). 4 AEs resulted in therapy discontinuation. Among patients receiving single-agent ibrutinib across all LoTs (n=82), 10 (12.2%) experienced ≥1 AE; these 10 patients experienced 24 AEs in total. 4 patients (4.9%) experienced a grade 3 AE, and there were no grade 4 or 5 AEs. None of the AEs resulted in discontinuation of single-agent ibrutinib. No cases of atrial fibrillation or hemorrhage were reported. Conclusions: In this retrospective chart review study, most AEs were grade 1 or 2 in both ibrutinib- and CIT-treated patients. Grade 4 or 5 AEs were not reported with single-agent ibrutinib. No patients discontinued single-agent ibrutinib due to AEs.

AB2018-88. Preoperative Chemotherapy Management of Resectable Gastric Signet Ring Cell Carcinoma Versus Non–Signet Ring Cell Carcinoma in a Single-Center Experience
Liliania Maria Suarez Olarte, MD; Raul Enrique Guevara Castro, MD; Cesar Augusto Villegas Bonilla, MD; and Rodrigo Antonio Burgos Sanchez, MD
*Clinica Universitaria Colombia, Clinica Reina Sofia, and *Fundacion Universitaria Sanitas, Bogota, Colombia

Background: Preoperative chemotherapy (PCT) is a standard treatment for advanced resectable gastric adenocarcinoma (GA) included in different management protocols worldwide. Signet ring cell
carcinoma (SRCC) has a worse prognosis than non-SRCC, and its chemosensitivity remains uncertain. One proposed advantage is the usually better general health condition of patients in the neoadjuvant setting. The aim of this retrospective study was to compare general outcomes and characteristics of patients with SRCC versus those without who were treated with PCT in a university hospital in Colombia to determine differences in treatment response. Methods: A retrospective review was conducted of patients diagnosed with advanced GA who received PCT and underwent surgical resection with curative intent between January 2010 to December 2016. 94 patients with locally advanced GA were diagnosed and managed according to PCT protocol. Results: Of the 94 patients managed with PCT, 24 (25.5%) were found to have SRCC histology and 70 (74.5%) did not. The groups were comparable regarding age, sex, American Society of Anesthesiologists (ASA) score, and tumor location. The preoperative TNM stage in the SRCC cohort was more advanced than that of the non-SRCC cohort. In total 48 patients had tumor progression without differences between the two groups, but the recurrence rate was higher in the SRCC cohort (25% vs 18.5%). However, response to chemotherapy was lower in the SRCC cohort (25.7% vs 33%). Conclusions: Baseline characteristics of the 2 groups were similar and there was no significance difference in complication or resection rates, but rates of the recurrence and response to chemotherapy were higher in the SRCC cohort although there was no impact on survival. These findings suggest that gastric SRCC has an inadequate response to PCT. Given the limitations of our research, more studies are needed, ideally prospective and randomized, to obtain higher quality results.

AB2018-89. Survival Time and Duration of Immunotherapy in Patients With Stage IV Non–Small Cell Lung Cancer in a Community-Based Practice
Heather Brody, MD; Achilia Morrow, MD; Pete Yunyongying, MD; and Petros Nikolianakos MD
*Augusta University-University of Georgia Medical Partnership, and
+University Cancer and Blood Center, Athens, GA

Background: Non–small cell lung cancer (NSCLC) is the most common type of lung cancer. 40% of patients are diagnosed with stage IV disease, which has a 1-year survival rate of 23%. New therapies, including immunotherapy, are included in guideline recommendations for the treatment of stage IV NSCLC. Methods: Using a retrospective registry survey study design, we evaluated all patients with stage IV NSCLC receiving immunotherapy in a community practice to estimate survival time based on duration of therapy. Patients were identified through electronic medical records using ICD-10 codes for NSCLC and J-codes for immunotherapy from January 1, 2012, through December 31, 2016. No patients were excluded. 47 patients were identified, and data including patient characteristics, functional status, NSCLC subtype, prior therapies, and length of therapy were collected. Median survival based on duration of immunotherapy was calculated from the patient’s date of death or final day of data collection. If a death certificate was not available, date of final hospice note or final nurse follow-up was used as an estimated date of death, because the practice closely follows patients who have transitioned to hospice. Deceased patient median survival was analyzed separately from overall median survival. Results: 21 of 47 patients (45%) died, 8 of whom (38%) did not have death certificates. 11 patients (23%) discontinued immunotherapy for treatment-related adverse events, 0 patients had complete response by RECIST 1.1 criteria, 24 (51%) had partial response or stable disease, and 10 (21%) were still on therapy at the end of data collection. 16 of 29 patients (55%) had some level of PD-L1 expression; 18 patients (38%) did not undergo analysis for PD-L1 expression. The median survival times for overall, >90-day, and >180-day therapy durations were 296, 373, and 444.5 days, respectively. Maximum survival was ≥998 days. Of deceased patients, the median survival times for overall and >90 day therapy durations were 110 and 320 days, respectively. One patient in the deceased group received therapy for >180 days. A general trend of longer treatment duration and longer survival time was observed. Conclusions: Based on our median survival estimates, therapy should continue as long as the patient maintains clinical response. Longer therapy duration was associated with longer survival times, especially among patients who were able to receive therapy for >180 days.

AB2018-90. Characteristics and Treatment Patterns of Patients With Relapsed and/or Refractory Multiple Myeloma Who Received Elotuzumab or Daratumumab in a Real-World Setting
Clara Chen, PhD; Christopher Yasenchak, MD; Ravi Potluri, BTech, PGDM; Luke Schmerold, BS; Hemanth Kanakamedala, BS; and Catherine Davis, PharmD
*Bristol-Myers Squibb Company, Princeton, NJ; *Willamette Valley Cancer Institute and Research Center/US Oncology Research, Eugene, OR; and *SmartAnalyst, Inc., New York, NY

Background: Patients with relapsed and/or refractory multiple myeloma (RRMM) have poor prognosis and may benefit from newer treatment strategies.
The immuno-oncology (I-O) agents elotuzumab (E) and daratumumab (D) received FDA approval for RRMM in 2015. We explored real-world use of E and D. Methods: Using the Explorys electronic medical record database (IBM), patients aged ≥18 years with ≥1 record with a MM diagnosis after January 1, 2010 (index date), preceded by ≥12 months without an MM diagnosis (baseline), were followed-up. First-line treatment included all MM treatment received after the index date. The end of a line of treatment (LoT) was the first day of a treatment gap ≥90 days or initiation of new treatment. Patients receiving E and/or D in second-line or later treatment were analyzed. Descriptive treatment pattern analyses were undertaken. Kaplan-Meier methods were used to examine duration of treatment (DoT) and time to next treatment (TTNT) from start of current treatment to start of next treatment. Results: Of 3,524 patients with RRMM with ≥1 prior LoT, 274 (8%) received E (n=49) or D (n=225) (median age, 65 years; 49% male), largely in later LoT. Pa-

tient characteristics, treatment patterns, and TTNT are reported (Table 1). Conclusions: A small percentage of patients with RRMM received E or D. Significantly longer DoT was observed with E versus D, which has been linked to improved outcomes and may suggest improved tolerability. TTNT was statistically significantly longer with E versus D, which may translate into better progression-free survival. Few patients received E after failure of D; 45% of patients who received treatment after D received non-I-O treatment, indicating a potential unmet need in this patient population.

**AB2018-90: Table 1. Baseline Demographics and Clinical Characteristics at Index Date**

<table>
<thead>
<tr>
<th></th>
<th>E (n=49)</th>
<th>D (n=225)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median age at diagnosis (Q1–Q3), y</td>
<td>65 (59–72)</td>
<td>65 (59–72)</td>
<td>.820</td>
</tr>
<tr>
<td>Baseline comorbidity, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male, n (%)</td>
<td>21 (43)</td>
<td>112 (50)</td>
<td>.380</td>
</tr>
<tr>
<td>Diabetes</td>
<td>9 (18)</td>
<td>32 (14)</td>
<td>.461</td>
</tr>
<tr>
<td>Renal failure</td>
<td>7 (14)</td>
<td>24 (11)</td>
<td>.469</td>
</tr>
<tr>
<td>Cardiac arrhythmias</td>
<td>4 (8)</td>
<td>24 (11)</td>
<td>.600</td>
</tr>
<tr>
<td>Chronic pulmonary disease</td>
<td>2 (4)</td>
<td>21 (9)</td>
<td>.391</td>
</tr>
<tr>
<td>Congestive heart failure 2</td>
<td>2 (4)</td>
<td>8 (4)</td>
<td>.695</td>
</tr>
<tr>
<td>Median follow-up (range), mo</td>
<td>33.9 (23.0–43.3)</td>
<td>41.0 (25.8–61.8)</td>
<td>.104</td>
</tr>
<tr>
<td>Prior treatments, n (%)</td>
<td></td>
<td></td>
<td>.557</td>
</tr>
<tr>
<td>Median (range)</td>
<td>3 (2–4)</td>
<td>3 (2–5)</td>
<td></td>
</tr>
<tr>
<td>≥4</td>
<td>14 (29)</td>
<td>11 (22)</td>
<td></td>
</tr>
<tr>
<td>Index E/D treatment, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monotherapy or chemotherapy</td>
<td>11 (22)</td>
<td>137 (61)</td>
<td></td>
</tr>
<tr>
<td>+ IMiD</td>
<td>24 (49)</td>
<td>56 (25)</td>
<td></td>
</tr>
<tr>
<td>+ PI</td>
<td>4 (8)</td>
<td>21 (9)</td>
<td></td>
</tr>
<tr>
<td>+ IMiD+PI</td>
<td>10 (20)</td>
<td>11 (5)</td>
<td></td>
</tr>
<tr>
<td>Treatment prior to index regimen, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PI only</td>
<td>11 (22)</td>
<td>36 (16)</td>
<td></td>
</tr>
<tr>
<td>IMiD only</td>
<td>11 (22)</td>
<td>23 (10)</td>
<td></td>
</tr>
<tr>
<td>PI, IMiD, or PI + IMiD</td>
<td>27 (55)</td>
<td>154 (68)</td>
<td></td>
</tr>
<tr>
<td>Non-novel only</td>
<td>0 (0)</td>
<td>12 (5)</td>
<td></td>
</tr>
<tr>
<td>Patients receiving treatment post-E/D, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retreated with E/D</td>
<td>6 (21)</td>
<td>49 (51)</td>
<td></td>
</tr>
<tr>
<td>Switched to E/D</td>
<td>16 (55)</td>
<td>4 (4)</td>
<td></td>
</tr>
<tr>
<td>Median DoT, d (95% CI)</td>
<td>139 (85–171)</td>
<td>91 (75–117)</td>
<td>.033</td>
</tr>
<tr>
<td>Median TTNT, d (95% CI)</td>
<td>187 (140–356)</td>
<td>169 (146–202)</td>
<td>.043</td>
</tr>
</tbody>
</table>

Abbreviations: IMiD, immunomodulatory drug; PI, proteasome inhibitor.

**AB2018-91. Impact of Population Characteristics on Recall Rates: Initial Findings From a Learning Health System**

Nila Alsheik, MD; Firas Dabbous, MD; Gregory Donadio, MA; Zhaohui Su, PhD; Rich Gliklich, MD; Scott Pohlman, MS; Kathleen Troeger, MPH; Vandana Menon, MD; and Emily Conant, MD

*Advocate Lutheran General Hospital, Park Ridge, IL; aOM1 Inc., Boston, MA; bHologic Inc., Marlborough, MA; and cPerelman School of Medicine, University of Pennsylvania, Philadelphia, PA

Background: Recall rates are used as benchmarks for performance metrics in breast cancer screening. Recent advances in mammography screening demonstrate dual benefits of decreased recall rates and increased cancer detection. We describe the relationship between underlying population characteristics and variations in recall rates in a large and diverse population. Methods: A cloud-based, big data platform and robust technology infrastructure are being used to integrate and transform data in electronic medical records, radiology management systems, and tumor registries to create a learning health system. This analysis includes data from 260,074 women (343,172 screening examinations) who underwent screening between June 2015 to September 2017, at 39 imaging facilities within 2 large healthcare organizations. Patients with breast cancer history or implants were excluded. Results: The racially diverse study cohort was 60% Caucasian and 24% African American, with a median age of 58 years, and included 204,043 3D screening mammograms and 139,129 2D screens. The median (interquartile range) number of screening examinations per woman was 1 (interquartile range, 1–2) over the study period. Recall rates were lower overall for 3D versus 2D screens (8.8% vs 10.9%) and among women with dense breasts (10.6% vs 13.2%) and those with extremely dense breasts (10.2% vs 13.9%). Recall rates were higher among African Americans versus Caucasians and women of other races (10.2% vs 9.4% vs 9.0%, respectively), in younger women (aged 40–50 years, 13.0%; aged 50–60, 9.5%; aged 60–74, 8.0%;
aged ≥74, 6.8%), those with higher breast density (11.5% in heterogeneously or extremely dense vs 8.1% in other categories), and those with higher risk (Tyrer-Cuzick or Gail) scores (11.7% vs 9.7%). Recall rates were lower at facilities that had fully or predominantly (>90%) transitioned to 3D screens (8.0%) versus those that had 2D only (11.1%) or a mix of 2D and 3D (10.7%).

Conclusions: This data-driven platform enables large-scale assessment (outcomes by pathway, variation in care) of screening mammography in a real-world population. We demonstrate significant variations in recall rates based on the underlying population’s demographic characteristics, risk profile, choice of screening modality, and provider factors. Future analyses will focus on optimizing diagnostic pathways based on risk profiles with the goal of improving outcomes in breast cancer screening.

### AB2018-92. Noninferior Outcomes Achieved Through a 2-Day Course of Low-Dose Filgrastim: A Retrospective Experience

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Marshall University, Huntington, WV

**Background:** Filgrastim is used in the setting of chemotherapy-induced neutropenia (CIN) to stimulate recovery of bone marrow and reduce chances of infection, which allows for further chemotherapy administration without delay. The recommended dose is 5 mcg/kg. Commercially available vials of filgrastim are offered in 2 strengths: 300 and 480 mcg. Frequently, lower doses are administered to patients weighing <60 kg, and hence receiving the optimal dose. This represents a significant cost savings due to the ability to round the dose to the commercially available 300 mcg vial.

#### Methods:
We identified 91 patients with chronic neutropenia-related complication rates to those weighing less than 60 kg and hence receiving the optimal dose. This study included its retrospective design, low sample size, and heterogeneous cancer sites, which limit the generalizability of its findings.

#### Conclusions:
Patients weighing 60 kg to <85 kg who received a sub-optimal dose of 300 mcg of filgrastim daily for 2 consecutive days had similar neutropenia-related complication rates to those weighing less than 60 kg and hence receiving the optimal dose.

### AB2018-93. Treatment and Monitoring Patterns Among Premenopausal Women With HR-Positive/HER2-Negative Metastatic Breast Cancer

Annie Guerin, MSc; Anand A. Dalal, PhD, MBA, BSPharm; Patrick Gagnon-Sanschagrin, MSc; Rebecca Burne, PhD; Genevieve Gauthier, MSc; Tania Small, MD; and Polly Niravath, MD
*Analysis Group, Inc., Montréal, Québec, Canada; *Novartis Pharmaceuticals Corporation, East Hanover, NJ; and *Houston Methodist Hospital, Houston, TX

#### Objective:
To assess treatment and monitoring patterns in premenopausal women with hormone receptor-positive and HER2-negative (HR+/HER2−) metastatic breast cancer (mBC) in real-world practice.

#### Methods:

#### Treatment Sequences (N=3,203)

<table>
<thead>
<tr>
<th>Treatment Sequence</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tamoxifen</td>
<td>781 (24.4%)</td>
</tr>
<tr>
<td>Anthracycline + cyclophosphamide → taxane → tamoxifen</td>
<td>469 (14.6%)</td>
</tr>
<tr>
<td>Anthracycline + cyclophosphamide → taxane</td>
<td>358 (11.2%)</td>
</tr>
<tr>
<td>Cyclophosphamide + taxane → tamoxifen</td>
<td>161 (5.0%)</td>
</tr>
<tr>
<td>Cyclophosphamide + taxane</td>
<td>152 (4.7%)</td>
</tr>
<tr>
<td>Taxane</td>
<td>57 (1.8%)</td>
</tr>
<tr>
<td>Anthracycline + cyclophosphamide + taxane → tamoxifen</td>
<td>55 (1.7%)</td>
</tr>
<tr>
<td>Aromatase inhibitor + GnRH</td>
<td>55 (1.7%)</td>
</tr>
<tr>
<td>Anthracycline + cyclophosphamide + taxane</td>
<td>51 (1.6%)</td>
</tr>
<tr>
<td>Anthracycline + cyclophosphamide</td>
<td>36 (1.1%)</td>
</tr>
</tbody>
</table>

Arrow denotes next line of therapy. Abbreviation: GnRH, gonadotropin-releasing hormone.
This retrospective study used data from a large commercial claims database (2006–2015). Premenopausal women with HR+/HER2– mBC who received first-line through third-line treatment between January 2013 and December 2015 were evaluated. Frequencies of CBC counts, liver function tests (LFTs), and electrocardiograms (EKGs) during therapy were analyzed.

Results: 3,203 patients received first-line therapy for mBC; 2,194 and 1,242 patients received second-line and third-line therapy, respectively. Mean age at mBC diagnosis was 47 years. Chemotherapy was common in first-line (63.6%) and second-line (66.9%) therapy, followed by endocrine therapy (ET; first-line: 34.4%; second-line: 30.1%). During third-line, ET (73.6%) was more common than chemotherapy (20.9%). Across all lines, 14% of patients received an ovarian suppression agent. The 10 most common treatment sequences are summarized in Table 1. For patients receiving chemotherapy, CBC frequency was 2.6 tests per-patient-month (PPPM) in first-line, 2.8 in second-line, and 2.4 in third-line; LFT frequency was 1.8 tests PPPM in first-line, 1.9 in second-line, and 1.6 in third-line. For patients receiving ET, frequency of CBC was 0.4 tests PPPM in first-line, 0.5 tests in second-line, and 0.4 tests in third-line; LFT frequency was 0.4 tests PPPM across all lines. EKG monitoring was performed in approximately 20% of all patients, 25%–26% of those receiving ET (mean follow-up of 9 months), and 15%–21% of those receiving chemotherapy (mean follow-up of 3 months).

Conclusions: Chemotherapy was prescribed to most patients in first-line and second-line therapy. Overall, CBCs, LFTs, and EKGs were frequent; however, blood test monitoring was less frequent in the ET group than in the chemotherapy group.

AB2018-94: Table 1. Treatment Sequences

<table>
<thead>
<tr>
<th>Treatment Sequence</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AI → palbociclib + fulvestrant</td>
<td>20 (13.6%)</td>
</tr>
<tr>
<td>AI → fulvestrant</td>
<td>7 (4.8%)</td>
</tr>
<tr>
<td>AI → palbociclib + AI</td>
<td>5 (3.4%)</td>
</tr>
<tr>
<td>Chemotherapy → palbociclib + AI</td>
<td>15 (10.3%)</td>
</tr>
<tr>
<td>Chemotherapy → chemotherapy</td>
<td>9 (6.3%)</td>
</tr>
<tr>
<td>Chemotherapy → palbociclib + fulvestrant</td>
<td>6 (4.2%)</td>
</tr>
<tr>
<td>Chemotherapy → fulvestrant</td>
<td>3 (2.1%)</td>
</tr>
<tr>
<td>Chemotherapy → AI</td>
<td>3 (2.0%)</td>
</tr>
<tr>
<td>Palbociclib + AI → everolimus + AI</td>
<td>13 (8.8%)</td>
</tr>
<tr>
<td>Palbociclib + AI → chemotherapy</td>
<td>8 (5.4%)</td>
</tr>
<tr>
<td>Palbociclib + AI → fulvestrant</td>
<td>4 (2.7%)</td>
</tr>
<tr>
<td>Fulvestrant → chemotherapy</td>
<td>5 (3.5%)</td>
</tr>
<tr>
<td>Fulvestrant → palbociclib + AI</td>
<td>4 (2.7%)</td>
</tr>
<tr>
<td>Everolimus + AI → palbociclib + fulvestrant</td>
<td>5 (3.4%)</td>
</tr>
</tbody>
</table>

Arrow denotes next line of therapy.

AB2018-94: Treatment Patterns Among Postmenopausal Women With HR-Positive/HER2-Negative Metastatic Breast Cancer: A Chart Review Study

Anand A. Dalal, PhD, MBA, BSPharm; Debbie Goldschmidt, PhD; Hela Romdhani, PhD; Sneha Kelkar, MPH; Annie Guerin, MSc; Genevieve Gauthier, MSc; Tania Small, MD; and Polly Niravath, MD

Objective: To investigate contemporary treatment patterns for postmenopausal women with hormone receptor–positive and HER2-negative (HR+/HER2–) metastatic breast cancer (mBC) in US clinical practice post–CDK4/6 approval era. Methods: Patient-level data were collected from patient charts between March and September 2017 from 64 US oncologists. Treatment sequences and patterns were assessed for postmenopausal women diagnosed with HR+/HER2– mBC between March 2015 (first CDK4/6 FDA approval date) and January 2016 (for ≥1 year of potential follow-up). Kaplan-Meier (KM) analysis was used to assess discontinuation rates, adjusting for censoring.

Results: Data were collected on 401 patients. In first-line therapy for mBC, 52.4% of patients received a palbociclib-based regimen. Other common first-line regimens included aromatase inhibitor (AI; 21.4%) or fulvestrant (5.2%) in monotherapy. Chemotherapy was used by 15.0% of patients in first-line treatment. The 18-month discontinuation rate from KM analysis for first-line therapy was 34.5% for palbociclib-based regimens and 45.8% for endocrine monotherapy. The most common treatment sequences for the 147 patients who received a second-line therapy are presented in Table 1. Conclusions: After the introduction of CDK4/6 inhibitors in the mBC setting, we observed that most patients received a palbociclib-based regimen. We observed a variety of treatment sequences, with no single standard of care for postmenopausal women newly diagnosed with HR+/HER2– mBC.

AB2018-95: Hematologic, Cardiac, and Hepatic Function Monitoring Among Postmenopausal Women With HR-Positive/HER2-Negative Metastatic Breast Cancer

Anand A. Dalal, PhD, MBA, BSPharm; Debbie Goldschmidt, PhD; Hela Romdhani, PhD; Sneha Kelkar, MPH; Annie Guerin, MSc; Genevieve Gauthier, MSc; Tania Small, MD; and Polly Niravath, MD

Objective: To investigate monitoring frequency and detection of abnormalities in postmenopausal women with hormone receptor–positive/HER2-negative
(HR+/HER2–) metastatic breast cancer (mBC) stratified by first-line treatment regimens. **Methods:** Patient-level data of postmenopausal women diagnosed with HR+/HER2– mBC between March 2015 and January 2016 were collected from 64 US oncologists between March 2017 and September 2017. First-line treatment groups included palbociclib-based regimens, endocrine monotherapy, and chemotherapy-based regimens. Frequency of monitoring (CBC count, electrocardiogram [EKG], and liver function test [LFT]) and laboratory abnormalities, defined based on the participating physician’s clinical assessment, were analyzed. Abnormalities included anemia, leukopenia, neutropenia, abnormal EKG reading, and abnormal liver function. **Results:** Data were collected on 401 patients, with 210 patients receiving palbociclib, 121 receiving endocrine monotherapy, 51 receiving chemotherapy-based, and 19 receiving other regimens in first-line therapy. All patients had at least one CBC test, with an average of 1.3 tests per month, with abnormalities detected in 64.6%. The most common abnormalities were anemia (39.9%), leukopenia (27.4%), and neutropenia (26.7%). EKG was performed in 28.9% of patients, with 6.9% having an abnormal reading. Almost all patients had at least one LFT (98.3%), with an average of 0.9 tests per month, with abnormal liver function reported in 18.3%. Results are stratified by treatment group in Table 1. **Conclusions:** Postmenopausal women with HR+/HER2– mBC receiving first-line therapy with a palbociclib-based regimen, endocrine monotherapy, or a chemotherapy-based regimen received regular monitoring in current clinical practice, including CBC, EKG, and LFT.


Min Huang, PhD; Hannah Kilvert, MSc; Neil Roskell, MSc; and Yiduo Zhang, PhD

**Background:** Multiple algorithms are available to derive utility values from the EQ-5D-5L questionnaire. However, the consistency of different approaches is not well studied in patients with non–small cell lung cancer (NSCLC). This study used 2 different algorithms to evaluate health state utility in patients with locally advanced nonresectable NSCLC who had completed chemoradiation therapy (CRT). **Methods:** This study examined the EQ-5D-5L data collected from patients enrolled in the PACIFIC trial, a multicenter, international, double-blind, randomized phase III trial comparing durvalumab versus placebo in patients with stage III nonresectable NSCLC who had not experienced disease progression after completing concurrent CRT. 2 algorithms were compared: an English valuation set of EQ-5D-5L developed by Devlin et al (Technical Report 16.02, Health Economics & Decision Science, University of Sheffield, 2016) and a crosswalk from 5L to 3L by van Hout et al (Value in Health, 2012), along with an English value set that converted 3L to utility values. The health states were defined by disease progression based on blinded independent central review. Differences between utility estimates for each algorithm by health state were calculated. The utility scores from the pooled treatment groups are reported. **Results:** 4,588 preprogression and 612 postprogression utility observations from 713 patients who had at least one evaluable EQ-5D record were used. Applying the Devlin algorithm, estimated mean utility scores for patients with progression-free and progressive disease were 0.871 (95% CI, 0.866–0.875) and 0.842 (95% CI, 0.828–0.855), respectively. Mean utility scores estimated using the van Hout algorithm were 0.813 (95% CI, 0.808–0.819) for patients with progression-free disease and 0.781 (95% CI, 0.764–0.797) for those with progressive disease. The within-patient mean difference in utilities (van Hout score – Devlin score) is –0.058 (95% CI, –0.059 to –0.056) in the overall population, and –0.057 (–0.059 to –0.056) for those with progression-free disease and –0.061 (–0.065 to –0.056) for those with progressive disease. **Conclusions:** These results show a health utility deterioration in patients with locally advanced NSCLC after disease progression, consistently for both algorithms. For this population, the mean utility values are higher when estimated using the Devlin algorithm than the van Hout algorithm.
AB2018-97. Estimating Travel Burden Among Patients With Merkel Cell Carcinoma: Findings From a Cancer Registry

Rahul Jain, PhD\(^a\); Joseph Menzin, PhD\(^b\); Kristina Lachance, MS\(^b\); Patrick McBee, BS\(^b\); Hemant Phatak, PhD\(^b\); and Paul T. Nghiem, MD, PhD\(^b\)

*Boston Health Economics, Waltham, MA; *UW Medical Center at South Lake Union, Seattle, WA; and *EMD Serono, Inc., Rockland, MA

**Background:** Patients with rare tumor types, such as Merkel cell carcinoma (MCC), often must travel to expert cancer centers for diagnosis and treatment. However, limited data are available on the travel burden for patients with MCC. This study sought to understand the travel burden of patients with MCC enrolled in a cancer registry at a large cancer center.

**Methods:** This descriptive study used data from an MCC registry at Seattle Cancer Care Alliance (SCCA). All patients with MCC enrolled at SCCA with valid 3-digit ZIP code were included, and were followed from January 1, 2012, until their last follow-up, death, or end of data (January 1, 2017). We evaluated patient demographics, tumor characteristics, and dates of each follow-up visit. Travel burden was measured by one-way travel distance to SCCA from each patient’s 3-digit ZIP code, and calculated as the population weighted average of driving distance between the centroid of all 5-digit ZIP codes within each patient’s 3-digit ZIP code and SCCA. Study measures were stratified by one-way driving distance of ≤300 and >300 miles. Patients were assumed to drive if the distance was ≤300 miles (travel cost $0.54/mile), otherwise assumed to fly ($0.15/mile). **Results:** 391 patients with MCC met the study eligibility criteria (68% men; mean age [SD], 67 [11] years; 67% residing in the West; and 70% white). At diagnosis, approximately 53% of patients had stage III or IV MCC. Mean one-way distance traveled by patients was 1,137 miles (median, 813 miles; interquartile range, 61–2,177 miles) and 57% of patients traveled >300 miles. Compared with patients who traveled ≤300 miles, those who traveled >300 miles were more likely to be <70 years of age (46% vs 65%; \(P<.001\)), diagnosed with stage III or IV MCC (46% vs 59%; \(P=.01\)), have shorter follow-up (mean, 5.2 vs 2.5; \(P<.001\)). The total mean travel cost for the entire follow-up was estimated to be $1,448 for patients traveling >300 miles and $416 for those travelling ≤300 miles.

**Conclusions:** In this single-center study, most patients with MCC traveled long distances to receive expert care. Moreover, longer travel distances appeared to be associated with younger age, a more advanced stage of cancer at study entry, and fewer in-clinic visits, suggesting that travel burden may impact timely and adequate patient care for this rare disease.

AB2018-98. Real-World Treatment Duration of Pembrolizumab for Patients With Advanced Melanoma

Frank Xiaojing Liu, PhD\(^b\); Xiting Cao, PhD\(^b\); Scott J. Diede, MD\(^b\); Kendall Stevinson, MD\(^b\); and Eric D. Whitman, MD\(^b\)

*Merck & Co., Inc., Kenilworth, NJ; and *Carol G. Simon Cancer Centers and Atlantic Melanoma Center, Atlantic Health System, Morristown, NJ

**Background:** Pembrolizumab (PEM), the first FDA-approved PD-1 antibody, has been available for the treatment of patients with advanced melanoma (AM) in the United States for >3 years. However, the treatment duration of PEM for patients with AM in the real-world setting remains a critical question. **Methods:** Adult patients with AM who received ≥1 dose of PEM between September 4, 2014, to August 31, 2016, were identified using the Flatiron Health longitudinal database containing electronic health record data from 265 US cancer clinics, and followed up to August 31, 2017. Patients in clinical trials were excluded. Patient demographic, treatment, and clinical characteristics were described. PEM treatment duration was summarized by median and mean (restricted, assuming 2-year maximum PEM exposure for those still on treatment at data cutoff) using the Kaplan-Meier (KM) method, with the first dose of PEM as the starting point. KM estimates of the percentage of patients on PEM therapy at 1 and 2 years were also reported. Subgroup analyses were conducted to explore the variability of PEM treatment duration. **Results:** 434 patients treated with PEM (first-line [1L], 57.1%; second-line [2L], 30.4%; and third-line or later [3L+], 12.4%) were included in the analysis. Overall, median age at PEM initiation was 68 years (range, 18–84); most were male (66.4%) and Caucasian (93.1%). 93.8% of patients (407) were tested for BRAF mutation, of which 35.4% were BRAF+, 59.2% were BRAF–, and 5.4% were indeterminate; 17.7% had brain metastases. Among those for whom data were available, 21.9% had elevated lactate dehydrogenase levels (LDH; >upper limit of normal), and 22.0% had an ECOG performance status (PS) of >1. Patients were followed for a median of 8.3 months (range, 0.03–35.2). Using KM method, the median treatment duration for PEM was 5.2 months (95% CI, 4.4–6.0; 1L, 5.5 months; 2L, 5.2 months; 3L+, 4.7 months). The mean at 2 years was estimated at 8.6 months (95% CI, 7.8–9.4; 1L, 9.0 months; 2L, 8.4 months; 3L+, 7.2 months). The 1- and 2-year percentages of patients on treatment were estimated at 26.7% (95% CI, 22.5–31.1; 1L, 28.2%; 2L, 26.7%; 3L+, 19.6%) and 16.0% (95% CI, 12.2–20.2; 1L, 17.5%; 2L, 14.8%; 3L+, 13.1%), respectively. Univariate analysis showed that worse ECOG PS and high Charlson comorbidity index were associated with a significant shortening of treatment duration (\(P<.05\)), whereas age, sex, BRAF status, LDH level, and later line

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of therapy were not. **Conclusions:** This retrospective observational study reports PEM treatment duration in patients with AM in real-world US clinical practices with a heterogeneous population. Further research is needed to compare treatment duration in the real-world setting versus registration trials.

**AB2018-99. Qualitative Evaluation of Patient-Reported Symptoms of Hepatocellular Carcinoma**

J. Jason Lundy, PhD; Vivek Pawar, PhD; Sarah Bobiak, PhD; Vijay Kasturi, MD; and Cheryl D. Coon, PhD

1Outcometrix Boston, MA, and 2EMD Serono, Billerica, MA

**Background:** Patient-reported outcomes have been recognized in oncology to characterize treatment benefit beyond survival (Kluetz et al, J Clin Oncol 2016). To assess the impact of new hepatocellular carcinoma (HCC) therapies on disease symptoms, items were selected from the EORTC QLQ-C30 and QLQ-HCC18 module to create a brief, symptom-focused instrument. A cognitive interview study was conducted with the following objectives: (1) to spontaneously elicit HCC symptoms, (2) to confirm the completeness of the content covered in the selected items, and (3) to evaluate the usability and understanding of the items and response set. **Methods:** To ensure representation of the HCC symptom experience of patients most likely to be enrolled in a clinical trial, a convenience sample of adult patients with a confirmed clinical diagnosis of stage B or C HCC based on Barcelona Clinic Liver Cancer (BCLC) staging, with Child-Pugh class A or B cirrhosis, and performance status (PS) 0–2 were recruited from the UMass Memorial Medical Center to participate in a 60-minute, one-on-one interview. Patients completed a demographic questionnaire and HCC symptom items before the interview. All interviews were recorded and transcribed, and the interview data were thematically summarized according to the study objectives. **Results:** 21 patients with HCC participated in the cognitive interviews. The sample was 76% male, had a median age of 65 years, and was in good/very good health (71%). Many patients reported multiple comorbidities, including hepatitis C (48%) and cirrhosis (38%). Across the interviews, patients were able to distinguish between symptoms due to disease versus symptoms due to treatment. Although the symptom experience was variable across subjects, patients felt the content was reflective of their experience with HCC. No problems were identified with the instrument instructions, recall period, response scale, or item wording. A one-category improvement on the 4-point response scale was generally considered meaningful by the patients in this qualitative study. **Conclusions:** These qualitative data provide evidence that the selected HCC symptom items were relevant, easy to understand, and comprehensive. Study limitations include the small sample size and the exclusion of patients with PS 3–4. As a next step, the symptom items will undergo preliminary psychometric analysis to assess validity, reliability, responsiveness, and to establish thresholds for score interpretation.

**AB2018-100. Cost Consequences of Maintenance Therapies for Patients With Recurrent Ovarian, Fallopian Tube, or Primary Peritoneal Cancer in Complete or Partial Response to Platinum-Based Chemotherapy**

Kurt Neeser, MPH; William O’Neil, PhD; and Lee Stern, MS

Analytica Laser International, Inc., New York, NY

**Objective:** To compare the total per patient cost of 3 PARP inhibitors (niraparib, olaparib, rucaparib) for maintenance treatment in BRCA-mutated and non-BRCA–mutated patients with recurrent ovarian cancer. **Methods:** This cost comparison was based on the drug-specific median progression-free survival (PFS) of the 3 treatment options. PFS estimates were obtained from published clinical trials. Because PFS data were not available for the non–BRCA-mutated subgroup in the rucaparib trial, PFS was estimated based on the weighted average of the genomic loss of heterozygosity (LOH)–high (≥16%) and LOH-low cohorts in the BRCA wild-type population. Median costs included in this analysis were those associated with the average dosage used for each drug in the clinical trial, physician visits, routine monitoring, and treatment-related adverse

![](https://i.imgur.com/e38.png)

**AB2018-100: Table 1. Cost Consequence Model Results**

<table>
<thead>
<tr>
<th>Drug</th>
<th>PFS, (mo)</th>
<th>Drug Costsa</th>
<th>Other Costsa</th>
<th>Total Cost Per Patientc</th>
<th>Difference (Compared With Niraparib)</th>
<th>PFS (mo)</th>
<th>Drug Costsa</th>
<th>Other Costsa</th>
<th>Total Cost Per Patientc</th>
<th>Difference (Compared With Niraparib)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Niraparib</td>
<td>21.0</td>
<td>$206,500</td>
<td>$11,173</td>
<td>$217,673</td>
<td>–</td>
<td>9.3</td>
<td>$91,450</td>
<td>$5,414</td>
<td>$96,864</td>
<td>–</td>
</tr>
<tr>
<td>Olaparib</td>
<td>19.1</td>
<td>$257,506</td>
<td>$9,418</td>
<td>$266,924</td>
<td>$49,251</td>
<td>7.4</td>
<td>$99,767</td>
<td>$3,703</td>
<td>$103,470</td>
<td>$6,606</td>
</tr>
<tr>
<td>Rucaparib</td>
<td>16.6</td>
<td>$228,084</td>
<td>$8,450</td>
<td>$236,534</td>
<td>$18,861</td>
<td>8.2</td>
<td>$112,571</td>
<td>$4,347</td>
<td>$116,919</td>
<td>$20,054</td>
</tr>
</tbody>
</table>

*aAll costs in US dollars.

bBRCA-mutated and non–BRCA-mutated designation based on germline mutation.
events (AEs). Results: The model included monthly drug costs of $9,833, $13,482, and $13,740 for niraparib, olaparib, and rucaparib, respectively, based on the average dose in the respective clinical trials, and use of other resources (office visits, laboratory tests, CT scans). The model results showed that niraparib had the lowest per patient cost of all the available PARPs in both subgroups (Table 1). Conclusions: Results suggest that when factoring in monitoring, AEs, and the average dose of each drug, use of niraparib, compared with other PARP inhibitors, could result in significant cost savings.

AB2018-101. Risk of Health-Related Quality of Life Events From Fatigue, Anorexia, Pyrexia, Electrolyte Imbalance, and Dermatological Toxicities in Patients With Chronic Lymphocytic Leukemia Treated With Idelalisib

Ei M. Phyu, MD; Kyaw Z. Thein, MD; Myint A. Win, MD; Lukman Tijani, MD; Donald Quick, MD; Psorero Cortorreal, MD; and Nicholas D’Cunha, MDb

*Richmond University Medical Center, Staten Island, NY; †Texas Tech University Health Sciences Center, Lubbock, TX; ‡LewisGale Medical Center, Salem, VA; and ¶Joe Arrington Cancer Research and Treatment Center, Lubbock, TX

Background: Idelalisib (I), a potent, oral, small molecule inhibitor of the δ isoform of phosphatidylinositol 3-kinase (PI3K-δ), has been shown to have promising activity in B-cell malignancies, especially chronic lymphocytic leukemia (CLL). We performed a systematic review and meta-analysis of randomized controlled trials (RCTs) to determine the risk of health-related quality-of-life events from fatigue, anorexia, pyrexia, electrolyte imbalance, and dermatologic toxicities. Methods: MEDLINE, Embase, and meeting abstracts from inception through September 2017 were searched. Phase III RCTs that mentioned fatigue, asthenia, anorexia, pyrexia, electrolyte imbalance, and rash as adverse effects were incorporated in the analysis. Mantel-Haenszel method was used to calculate the estimated pooled risk ratio (RR) with 95% CI. Random effects model was applied. Results: 3 phase III RCTs with a total of 892 patients with relapsed or refractory CLL were eligible for analysis. Studies compared ofatumumab (O) vs I+O, rituximab (R) vs I+R, and bendamustine (B) +R vs I+B+R. The RR for all-grade side effects was: fatigue, 0.94 (95% CI, 0.75–1.19; P = .63); asthenia, 1.16 (95% CI, 0.74–1.80; P = .50); anorexia, 1.60 (95% CI, 1.05–2.44; P = .02); pyrexia, 1.48 (95% CI, 1.20–1.82; P < .0001); hyponatremia, 1.42 (95% CI, 1.03–1.96; P = .03); hypokalemia, 1.94 (95% CI, 1.35–2.79; P < .0001); hypophosphatemia, 2.38 (95% CI, 1.58–3.76; P = .22); hyperuricemia, 0.94 (95% CI, 0.32–2.75; P = .92); and rash, 1.61 (95% CI, 1.02–2.55; P = .03). The RR for high-grade side effects was: fatigue, 1.29 (95% CI, 0.62–2.69; P = .49); asthenia, 0.64 (95% CI, 0.04–9.04; P = .74); anorexia, 1.57 (95% CI, 0.21–11.36; P = .65); pyrexia, 2.30 (95% CI, 1.12–4.72; P = .02); hyponatremia, 2.53 (95% CI, 1.04–6.16; P = .041); hypokalemia, 1.96 (95% CI, 0.90–4.26; P = .08); hypophosphatemia, 2.86 (95% CI, 0.74–10.99; P = .12); hyperuricemia, 0.74 (95% CI, 0.03–18.58; P = .85); and rash, 4.16 (95% CI, 0.92–18.75; P = .06). Conclusions: Our meta-analysis demonstrated that the risk of all-grade and high-grade pyrexia and hyponatremia with I is high. Moreover, it is associated with all-grade asthenia, anorexia, hypokalemia, and rash.

AB2018-102. Progression-Free Survival and Overall Survival in Advanced Squamous Cell Carcinoma of Head and Neck: Retrospective Analysis of a Community Oncology Database

Rajeshwari S. Punekar, MPH, PhD; Himani Aggarwal, MPhil, PhD; Li Li, PhD; Gebra Cuyun Carter, PhD; Steve Chin, MD; Katherine Bryant, RN, BSN; Paul J. Miller, PhD; and Mark S. Walker, PhD

*Vector Oncology, Memphis, TN; and †Eli Lilly and Company, Indianapolis, IN

This study was sponsored by Eli Lilly and Company.

Background: Evaluation of progression-free survival (PFS) and overall survival (OS) among real-world patients with advanced squamous cell carcinoma of the head and neck (SCCHN) is limited. This study describes PFS and OS outcomes for patients with advanced SCCHN in the community oncology setting. Methods: This was a retrospective, observational, descriptive study. Medical record data for adults diagnosed with advanced SCCHN (stage III, IVa, IVb) from January 1, 2007 through January 1, 2017, who received erbitux ± radiation therapy (RT), cisplatin ± RT, or RT only (no systemic therapy) in the advanced setting were extracted from a network of US community oncology practices. PFS and OS from treatment initiation in the advanced setting were analyzed using Kaplan-Meier and Cox regression analyses. Results: Among 676 patients included in the study, the average age [SD] at the start of treatment in the advanced setting was 60.7 [11.5] years; 81% were men, and 77% were Caucasian. The most common tumor locations at initial diagnosis of advanced disease were oropharynx (35%), larynx (22%), and oral cavity (14%). Approximately 80% of those with oropharyngeal cancer (183/234) had positive human papilloma virus (HPV) and/or p16 test results. Overall, 80% were smokers and 49% were alcohol users. <10% had impaired performance status (ECOG score ≥2). Most (83%) had a comorbidity index score of 0 or 1 (range, 0–7). The average [SD] duration of follow-up was 35.8 [28.7]
months. Median PFS was 33.9 months (95% CI, 20.7–51.0). Cox regression analysis of PFS showed risk of progression or death was lower among patients with a positive test result for HPV or p16 (hazard ratio [HR], 0.677; \( P = .027 \)), lower among those with higher body mass index (BMI) (HR per BMI unit, 0.978; \( P = .025 \)), and higher among those with higher comorbidity index scores (HR, 1.226; \( P < .001 \)). Median OS was 58.2 months (95% CI, 44.9–74.0). Cox regression analysis of OS showed that risk of death was higher among older patients (HR per year, 1.016; \( P = .016 \)), those with higher comorbidity index scores (HR, 1.279; \( P < .001 \)), alcohol users (HR, 1.348; \( P = .047 \)), and those who used a feeding tube (HR, 1.323; \( P = .039 \)). However, risk of death was lower among patients with higher BMI (HR per BMI unit, 0.969; \( P = .007 \)) and patients with positive test results for HPV or p16 (HR, 0.634; \( P = .024 \)).

**Conclusions:** Our findings suggest that positive HPV test results and absence of comorbid conditions are associated with a lower risk of disease progression or death among patients with advanced SCCHN.

**AB2018-103. Case Series of Patients With Confirmed Diagnosis of Gastric Cancer in a Hospital From Bogotá, Colombia (2011–2017)**

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**Background:** Gastric cancer (GC) is one of the more frequent neoplasms, with a higher incidence in countries such as Japan and Colombia. GC is usually diagnosed at a later stage, and currently little literature exists that describes the clinical characteristics and treatment for GC in Colombia. **Methods:** A cross-sectional retrospective study was performed. All clinical records from patients with a diagnosis of GC confirmed through histopathologic and/or imaging studies, diagnosed between January 2011 to August 2017 at Méderi Hospital Universitario Mayor (HUM), Bogotá, Colombia, were included. Demographic data, clinical presentation, and diagnostic and surgical early approach were included in the analysis. **Results:** A total of 334 records were included; 194 patients (58.1%) were men, and the mean patient age 66.1±13.5 years old. The most common symptoms were pain (31.1%) and upper gastrointestinal bleeding (27.2%). Mean time between symptom presentation and diagnosis was 3.26±4.25 months. History of dyspepsia was reported in 96 patients (28.7%) and a family history of cancer in 99 (29.6%). Nutritionally, 36.9% had moderate to severe malnutrition. Endoscopically, tumors were located in the antpyloric region (52%), body (32.4%), and gastroesophageal union (13.08%); 44.4% of tumors were Borrmann type IV. Histologically, 257 (76.95%) were adenocarcinomas (34.7% intestinal-type, and 25.5% were diffuse), 14 (4.19%) were lymphomas, and 11 (3.29%) were gastrointestinal stromal tumors. Most patients were diagnosed at a later stage (stage IIIA, 11.5%; IIIB, 6.3%; IIIC, 13.9%; IV, 44.8%). 224 patients underwent surgery (41.4% total open gastrectomy and 25.9% open subtotal gastrectomy) with an early mortality rate of 10.78% and a postoperative moderate to severe morbidity rate of 17.9% (Clavien-Dindo classification). A mean of 23.09 [SD, 12.9] lymphatic nodes were removed in 153 patients. Negative surgical margins were found in 67.7%. **Conclusions:** These results show that GC is still diagnosed at advanced stages. Demographic characteristics, clinical presentation, and endoscopic and histologic characteristics were similar to those described in literature in similar countries, especially the rising percentage of diffuse-type GC. Results from this series proves that screening strategies are urgently required in Colombia.

**AB2018-104. Health Resource Utilization Among Patients With Metastatic Melanoma Treated With Pembrolizumab Monotherapy or Combination Ipilimumab/Nivolumab in a Commercially Insured US Population**

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**Background:** Pembrolizumab (PEM), an anti–PD-1 antibody, is known to improve overall survival compared with ipilimumab (IPI) in patients with metastatic melanoma. The strategy of combining anti–PD-1 antibodies with IPI is being explored, but high rates of treatment-related toxicity requiring hospitalization and emergency department (ED) visits with IPI + nivolumab (NIVO) therapy have been reported. This study compared real-world hospitalization and healthcare resource use (HRU) in patients with metastatic melanoma treated with first-line PEM and IPI + NIVO. **Methods:** A retrospective cohort analysis was conducted using the IQVIA’s Real-World Adjudicated Claims US database from 2010–2016. Patients aged ≥18 years with ≥2 diagnoses of metastatic melanoma and ≥1 claim for PEM or IPI + NIVO (J-codes for PEM and NIVO assigned January 2016) from December 1, 2014 to September 30, 2016, were identified. Index date was defined as the first medication claim. Hospitalization and HRU were measured during “time at risk” from...
index date until the first occurrence of change in regimen, 90 days after the last infusion, end of continuous enrollment (minimum of 90 days), or end of study period. A logistic regression model adjusting for baseline patient characteristics was used to compare hospitalizations between the cohorts. Results: 49 PEM and 77 IPI + NIVO patients were identified. Patients in the PEM cohort were older than those in the IPI + NIVO cohort (mean age, 60.9 vs 52.7 years; \( P < .001 \)). Baseline comorbidities were similar between the cohorts. Over time at risk for first-line treatment, those in the PEM cohort were less likely to have ≥1 hospitalization (24.5% vs 62.3%; \( P < .001 \)) and had fewer hospitalizations per patient per month (PPPM) (mean, 0.1 vs 0.4; \( P = .017 \)) compared with IPI + NIVO; ED visits PPPM were similar (mean, 0.12 vs 0.20; \( P = .14 \)). Overall, the PEM cohort had significantly lower HRU PPPM, including office visits (mean, 2.6 vs 3.6; \( P = .005 \)). After adjusting for age, sex, payer type, comorbidities, and evidence of metastases beyond lymph nodes, lower odds of hospitalization were observed for the PEM cohort (odds ratio, 0.14; 95% CI, 0.05–0.37). Conclusions: Patients treated with PEM experienced significantly lower odds of hospitalization compared with IPI + NIVO. These results are consistent with reports of high HRU reported in early real-world experience with IPI + NIVO, and can help inform the management of patients with metastatic melanoma using cancer immunotherapy treatments. Studies with longer follow-up and larger samples are required to confirm these findings.

AB2018-105. Systematic Review and Meta-Analysis of Randomized Controlled Trials to Evaluate the Risk of Hematological Toxicities in Patients With Myelofibrosis Treated With JAK Inhibitors

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Background: Dysregulation in the JAK pathway with cytokine and growth factor signal transduction has been shown to be the characteristic abnormality in myelofibrosis (MF). Multiple JAK inhibitors have been used in trials with some success, but ruxolitinib is currently approved for use in MF. Nevertheless, hematologic toxicities remain a safety concern. We undertook a systematic review and meta-analysis of randomized controlled trials (RCTs) to determine the risk of hematologic toxicities among patients with MF treated with JAK inhibitors. Methods: We systematically performed a comprehensive literature search using MEDLINE, Embase, and meeting abstracts through July 31, 2017. References of all potential studies were evaluated for any additional relevant studies. Phase III RCTs that mentioned anemia, neutropenia, and thrombocytopenia as adverse effects (AEs) were incorporated in the analysis. Mantel-Haenszel method was used to calculate the estimated pooled risk ratio with 95% CI. Random effects model was applied. Results: 1,139 patients with primary or secondary MF from 4 phase III RCTs were included. Those in the study arm were given either ruxolitinib, pacritinib, or fedratinib compared with the control arm, which was either best available therapy or placebo. The relative risk (RR) for all-grade anemia was 1.088 (95% CI, 1.044–1.134; \( P < .001 \)), all-grade neutropenia was 1.257 (95% CI, 0.312–5.073; \( P = .748 \)), and all-grade was thrombocytopenia, 1.723 (95% CI, 1.134–2.616; \( P = .011 \)). The relative risk for high-grade anemia was 1.713 (95% CI, 1.254–2.342; \( P = .001 \)), high-grade neutropenia was 1.248 (95% CI, 0.230–6.780; \( P = .797 \)) and high-grade thrombocytopenia was 2.017 (95% CI, 0.964–4.221; \( P = .063 \)). Conclusions: Our meta-analysis demonstrated that ruxolitinib contributed to a significant increase in the risk for all-grade anemia, with a relative risk of 1.71 for high-grade. Moreover, JAK inhibitors increased the risk of all-grade thrombocytopenia. Recognizing these AEs may aid providers in delivering proper supportive care, reducing drug dosing inconsistencies, and ultimately enhancing patients’ quality of life.

AB2018-106. Risk of Hematological Toxicities in Patients With Myeloproliferative Neoplasms Treated With Ruxolitinib: A Systematic Review and Meta-Analysis of Randomized Controlled Trials

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Background: The JAK2 V617F mutation is the most common molecular abnormality in myeloproliferative neoplasms (MPNs), and is present in >95% of patients with polycythemia vera (PV) and 50% of those with myelofibrosis (MF). Ruxolitinib is an oral potent selective inhibitor of JAK1 and JAK2 and has been shown effective in multiple studies. Yet, the impact of ruxolitinib on hematologic toxicities is a considerable safety concern. We performed a systematic review and meta-analysis of randomized controlled trials (RCTs) to determine the risk of hematologic toxicities among
patients with MPN treated with ruxolitinib. **Methods:** We systematically conducted a comprehensive literature search using MEDLINE, Embase, and meeting abstracts through July 31, 2017. References of all potential studies were evaluated for additional relevant studies. Phase III RCTs that mentioned anemia, neutropenia, and thrombocytopenia as adverse effects were incorporated in the analysis. Mantel-Haenszel method was used to calculate the estimated pooled risk ratio with 95% CI. Random effects model was applied. **Results:** 5 phase III RCTs with a total of 1,005 patients with primary or secondary MF (n=525) and PV (n=480) were eligible for analysis. The study arm consisted of ruxolitinib and the control arm consisted of best available therapy, placebo, or hydroxyurea. Relative risks (RR) of all-grade side effects were: anemia, 1.180 (95% CI, 1.003–1.389; P=.046); neutropenia, 0.446 (95% CI, 0.312–0.638; P<.0001); and thrombocytopenia, 1.264 (95% CI, 0.708–2.258; P=.428). The RR for all-grade side effects was: anemia, 1.755 (95% CI, 1.123–2.741; P=.013); neutropenia, 0.441 (95% CI, 0.242–0.803; P=.007); and thrombocytopenia, 1.467 (95% CI, 0.455–4.729; P=.521). **Conclusions:** Our meta-analysis demonstrated that patients on ruxolitinib experienced a significant increase in all grades of anemia, with an RR of 1.75 for high-grade anemia. Nevertheless, the risk of all-grade and high-grade neutropenia decreased by half, favoring ruxolitinib.

**AB2018-107. Risk of Gastrointestinal and Hepatic Toxicities in Patients With Chronic Lymphocytic Leukemia Treated With Idealalisib: A Systematic Review and Meta-Analysis of Randomized Controlled Trials**

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**Background:** The δ isoform of phosphatidylinositol 3-kinase (PI3K-δ) is involved in the signaling of B-cell receptor pathways and has been implicated in the pathogenesis of chronic lymphocytic leukemia (CLL). Idealalisib (I) is an oral small molecule inhibitor of PI3K-δ and has been used in patients with CLL with noteworthy safety concerns. We performed a systematic review and meta-analysis of randomized controlled trials (RCTs) to determine the risk of gastrointestinal and hepatic toxicities. **Methods:** MEDLINE, Embase, and meeting abstracts from inception through September 2017 were queried. Phase III RCTs that mention gastrointestinal and hepatic toxicities as adverse effects (AEs) were incorporated in the analysis. Mantel-Haenszel method was used to calculate the estimated pooled risk ratio (RR) with 95% CI. Random effects model was applied. **Results:** 3 phase III RCTs with a total of 892 patients with relapsed and refractory CLL were eligible for analysis. Studies compared ofatumumab (O) versus I+O, rituximab (R) versus I+R, and bendamustine (B) +R versus I+B+R. The RR for all-grade side effects was: nausea, 0.96 (95% CI, 0.72–1.28; P=.79); diarrhea, 1.80 (95% CI, 1.44–2.25; P<.001); vomiting, 1.21 (95% CI, 0.86–1.68; P=.26); elevated gamma-glutamyl transferase (GGT), 1.93 (95% CI, 1.55–2.42; P<.001); elevated aspartate aminotransferase (AST), 1.84 (95% CI, 1.51–2.24; P<.001); elevated alanine aminotransferase (ALT), 2.01 (95% CI, 1.67–2.42; P<.001); elevated alkaline phosphatase (AP), 1.80 (95% CI, 1.36–2.38; P<.001); and hyperbilirubinemia, 1.40 (95% CI, 1.03–1.98; P=.04). The RR for high-grade AEs was: nausea, 0.79 (95% CI, 0.16–3.92; P=.78); diarrhea, 6.55 (95% CI, 2.69–15.95; P<.001); vomiting, 0.79 (95% CI, 0.16–3.92; P=.78); elevated GGT, 2.25 (95% CI, 1.02–4.99; P=.04); elevated AST, 4.97 (95% CI, 2.47–9.99; P<.001); elevated ALT, 7.48 (95% CI, 3.64–15.37; P<.001); elevated AP, 2.63 (95% CI, 0.44–15.79; P=.28); and hyperbilirubinemia, 0.93 (95% CI, 0.14–6.10; P=.94). **Conclusions:** Patients on I-based regimens experienced a significant increase in all-grade and high-grade diarrhea; elevated AST, ALT, and GGT; and all-grade elevated AP and hyperbilirubinemia.

**AB2018-108. A Systematic Review and Meta-Analysis of Randomized Controlled Trials to Evaluate the Risk of Pulmonary Toxicities in Patients With Chronic Lymphocytic Leukemia Treated With Idealalisib**

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**Background:** The B-cell receptor signaling pathway involved in the pathogenesis of chronic lymphocytic leukemia (CLL) by activating the delta isoform of phosphatidylinositol 3-kinase (PI3K-δ), 1 of 4 catalytic isoforms of PI3K. Hence, idealalisib (I), a potent oral small molecule inhibitor of PI3K-δ, has been used in patients with CLL. Nevertheless, there are notable pulmonary complications. We undertook a systematic review and meta-analysis of randomized controlled trials (RCTs) to determine the risk of pulmonary toxicities among patients with CLL treated with I. **Methods:** We systematically conducted a comprehensive literature search using MED-
LINE, Embase, and meeting abstracts from inception through September 2017. Phase III RCTs that mentioned pulmonary toxicities as adverse effects were incorporated in the analysis. Mantel-Haenszel method was used to calculate the estimated pooled risk ratio (RR) with 95% CI. Random effects model was applied. **Results:** 3 phase III RCTs with a total of 892 patients with relapsed and refractory CLL were eligible for analysis. Studies compared ofatumumab (O) versus I+O, rituximab (R) versus I+R, and bendamustine (B) +R versus I+B+R. The RR for all-grade side effects was: cough, 0.984 (95% CI, 0.611–1.585; P=.947); dyspnea, 0.887 (95% CI, 0.545–1.446; P=.631); upper respiratory infection (URI), 1.377 (95% CI, 1.004–1.889; P=.047) and pneumonia, 1.383 (95% CI, 0.975–1.961; P=.069). The RR for high-grade side effects was: cough, 0.679 (95% CI, 0.139–3.307; P=.631); dyspnea, 1.102 (95% CI, 0.366–3.319; P=.863); URI, 0.661 (95% CI, 0.188–2.316; P=.517); and pneumonia, 1.605 (95% CI, 0.992–2.595; P=.054). The pooled risk of pneumonitis was statistically significant at 5.630 (95% CI, 1.005–31.550; P=.049). **Conclusions:** Our study showed that patients on I-based regimens experienced a significant increase in pneumonitis (relative risk, 5.63) and also contributed to all-grade URI. Pneumonitis has a significant impact on morbidity, mortality, drug dosing inconsistencies, and financial burden among patients undergoing chemotherapy. Timely recognition may aid physicians in providing proper supportive care and will enhance patients’ quality of life.

**AB2018-109. Risk of Fatigue and Hematologic Toxicities in Patients With Cancer Treated With PARP Inhibitors: A Systematic Review and Meta-Analysis of Randomized Controlled Trials**

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**Background:** PARP enzymes play an essential role in the repair of DNA single-strand breaks. PARP inhibitors have shown synthetic lethality in cancer cells and are used in the treatment of many solid tumors. We undertook a systematic review and meta-analysis of randomized controlled trials (RCTs) to determine the risk of fatigue and hematologic toxicities in patients with cancer treated with PARP inhibitors.

**Methods:** We conducted a comprehensive literature search using MEDLINE, Embase, and meeting abstracts from inception through August 2017. Phase III RCTs that mentioned fatigue, anemia, thrombocytopenia, leukopenia, and neutropenia as adverse effects (AEs) were incorporated in the analysis. The estimated pooled risk ratio (RR) with 95% CI was obtained using a random effects model. **Results:** 5 phase III RCTs with a total of 2,196 patients with breast and ovarian cancer were eligible for analysis. Studies compared olaparib versus placebo, olaparib versus single-agent chemotherapy of the physician’s choice, niraparib versus placebo, rucaparib versus placebo, and iniparib + gemcitabine/carboplatin (GC) versus GC. The RR for all-grade side effects was: anemia, 3.222 (95% CI, 1.356–7.653; P=.008); thrombocytopenia, 4.214 (95% CI, 1.040–17.067; P=.044); leukopenia, 1.429 (95% CI, 0.466–4.382; P=.532); and neutropenia, 1.918 (95% CI, 0.973–3.781; P=.060). The RR for high-grade AEs was: anemia, 7.441 (95% CI, 1.531–36.167; P=.013); thrombocytopenia, 4.467 (95% CI, 0.855–23.329; P=.076); leukopenia, 1.054 (95% CI, 0.714–1.554; P=.792); and neutropenia, 1.791 (95% CI, 0.697–4.603; P=.226). The RR for all-grade fatigue was 1.395 (95% CI, 1.174–1.657; P<.001) and for high-grade fatigue was 2.242 (95% CI, 1.225–4.105; P=.009). **Conclusions:** In our study, patients taking PARP inhibitors experienced a significant increase in all grades of anemia with a RR of 7.44 for grade 3 and 4 anemia. Moreover, PARP inhibitors were shown to be associated with all-grade thrombocytopenia and all-grade fatigue. These toxicities affect patients’ quality of life, add financial burden, and may lead to drug dosing inconsistencies.
We performed a comprehensive literature search using MEDLINE, Embase, and meeting abstracts from inception through August 2017. Phase III RCTs that mentioned gastrointestinal and elevation of liver function tests (LFT) either aspartate aminotransferase (AST) or alanine aminotransferase (ALT) as adverse effects were incorporated in the analysis. The estimated pooled risk ratio (RR) with 95% CI was obtained using a random effects model. Results: 2,196 patients with breast and ovarian cancer from 5 phase III RCTs were included in the analysis. Studies compared olaparib versus placebo, olaparib versus single-agent chemotherapy of the physician’s choice, niraparib versus placebo,rucaparib versus placebo, and iniparib + gemcitabine/carboplatin (GC) versus GC. The randomization ratio was 1:1 in the olaparib study and 2:1 in the other studies. Olaparib studies were only performed in patients with cancer with a BRCA mutation. The RR for all-grade side effects was: diarrhea, 1.225 (95% CI, 0.992–1.512; P = .060); nausea, 1.780 (95% CI, 1.309–2.420; P < .0001); vomiting, 1.828 (95% CI, 1.308–2.554; P < .0001); and elevated LFT, 1.580 (95% CI, 0.670–3.729; P = .296). The RR for high-grade side effects was: diarrhea, 1.126 (95% CI, 0.422–3.004; P = .812); nausea, 1.696 (95% CI, 0.534–5.391; P = .370); vomiting, 2.393 (95% CI, 1.077–5.316; P = .032); and elevated LFT, 2.180 (95% CI, 0.422–11.252; P = .352). Conclusions: The risk of developing all-grade and high-grade vomiting and all-grade nausea with PARP inhibitors is high. Timely recognition and providing good supportive care will enhance patients’ quality of life.

AB2018-112. A Systematic Review and Meta-Analysis of Randomized Controlled Trials to Evaluate the Risk of Hematologic Toxicities in Patients With Chronic Lymphocytic Leukemia Treated With Idealisib

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Background: Idealisib (I) is a first-in-class oral selective inhibitor of the δ isoform of phosphatidylinositol 3-kinase (PI3K-δ), which has shown to be involved in the pathogenesis of chronic lymphocytic leukemia (CLL) through activation of downstream serine threonine kinases AKT and mTOR. Nevertheless, the impact of this agent on hematologic toxicities, including febrile neutropenia (FN), is substantial. We undertook a systematic review and meta-analysis of randomized controlled trials (RCTs) to determine the risk of hematologic toxicities. Methods: We systematically performed a comprehensive literature search using MEDLINE, Embase, and meeting abstracts from inception through September 2017. Phase III RCTs that mentioned anemia, neutropenia, thrombocytopenia, and FN as adverse effects were incorporated in the analysis. Mantel-Haenszel method was used to calculate the estimated pooled risk ratio (RR) with 95% CI. Random effects model was applied. Results: 3 phase III RCTs with a total of 892 patients with relapsed and refractory CLL were eligible for analysis. Studies compared ofatumumab (O) versus I+O, rituximab (R) versus I+R, and bendamustine (B)+R versus I+B+R. The RR for all-grade side effects was: anemia, 1.180 (95% CI, 0.767–1.816; P = .450); neutropenia, 1.261 (95% CI, 0.984–1.617; P = .067); thrombocytopenia, 0.969 (95% CI, 0.589–1.592; P = .90); and FN, 2.424 (95% CI, 0.964–6.093; P = .06). The RR for high-grade side effects was: anemia, 1.035 (95% CI, 0.434–2.468; P = .938); neutropenia, 1.466 (95% CI, 1.105–1.946; P = .008); thrombocytopenia, 0.963 (95% CI, 0.621–1.492; P = .865); and FN, 3.678 (95% CI, 2.182–6.199; P < .0001). Conclusions: Our meta-analysis demonstrated that I-based regimens contributed to a significant increase in high-grade FN (relative risk, 3.678), along with high-grade neutropenia. FN remains a major cause of morbidity, mortality, drug dosing inconsistencies, and cost among patients with cancer, and proper supportive care is required.

AB2018-113. Psychometric Properties of a 4-Item Depression and Anxiety Risk Screening Tool for Cancer Survivors

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Background: Screening for depression and anxiety, which can have serious negative effects if left untreated, is recommended for cancer survivors. CancerSupportSource (CSS) is a distress screening and referral program used at community-based cancer organizations and hospitals nationwide. We examined the psychometric performance of 2 depression (CSS-D) and 2 anxiety (CSS-A) items in identifying the risk for clinically significant levels of depression and anxiety among cancer survivors. Methods: 1,435 survivors enrolled in the Cancer Support Community’s online Cancer Experience Registry and completed the 25-item CSS and PROMIS-29, a quality-of-life measure that includes depression and anxiety scales. We calculated Spearman’s rank correlations (p), area under the curve (AUC),
AB2018-114. Factor Structure and Validity of CancerSupportSource: A Revised 25-Item Distress Screening Tool for Cancer Survivors
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Background: In response to consensus from NCCN, the National Academy of Medicine, and the American College of Surgeons about the importance of cancer-related distress screening, Cancer Support Community developed CancerSupportSource (CSS), a distress screening, referral, and follow-up program used at community-based cancer support organizations and hospitals nationwide. CSS assesses distress across multiple domains, including emotional, physical, social, and practical concerns. This study examined the psychometric properties and multidimensionality of a revised 25-item version of CSS. Methods: 1,435 cancer survivors enrolled in the Cancer Support Community's online Cancer Experience Registry, provided demographic and disease history, and completed the 25-item CSS plus 1 item assessing thinking concerns, and PROMIS-29, a measure of quality of life. Pearson correlations and exploratory factor analysis were conducted to examine scale psychometric properties and dimensionality. Results: Total distress was associated with all PROMIS subscales (rs, −.67 to .70; ps<.001); internal consistency reliability was excellent (α=.94). 20% of participants reported serious to very serious concerns about thinking clearly, which was selected to replace an infrequently endorsed (9%) item assessing interest in complementary/alternative treatments. For the revised 25-item scale, 5 factors were suggested with eigenvalues >1.0: (1) emotional concerns (α=.91); (2) symptom burden and impact (α=.87); (3) body and healthy lifestyle concerns (α=.77); (4) relationship concerns (α=.68); and (5) healthcare team communication (α=.63). Tobacco/substance use did not load >.30 on any factor but was retained due to clinical significance for risk assessment. The model explained 52% of the variance and demonstrated good fit (RMSEA=0.06; 90% CI, 0.057–0.063; SRMR=0.03; χ²(185)=1137.79; ps<.001). All factors were associated with PROMIS subscales, with stronger associations exhibited between similar domains (eg, emotional concerns was most highly correlated with anxiety and depression subscales [rs=.76–.77; ps<.001]; symptom burden and impact was most highly correlated with fatigue, pain interference, and physical and social function [rs=−.74 to −.64; ps<.001]). Conclusions: CSS is a reliable and valid multidimensional measure of distress. The study results support the multidimensional assessment of distress, which allows for meaningful referral to providers and support services that are most relevant to patients’ concerns.

Quality Improvement
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Background: The oncology nurse navigator (ONN) program is designed to educate patients, increase efficiency in coordination of care, and support timeliness of treatment plans. Shorter time from breast cancer diagnosis to surgery has been shown to increase survival. Patients must adhere to prescribed timeframes for adju-
vant radiation therapy (RT) in order to achieve beneficial outcomes. **Methods:** Time elapsed between steps in the breast cancer treatment plan was measured and compared between patients who did and did not have contact with the ONN. Time from diagnosis to surgery was measured, and time from breast cancer surgery to adjuvant RT was analyzed. Using the difference between the data sets—those with and without ONN contact—a t-test was used to evaluate the independence of the data, using parameters for 2-tailed unpaired unequal variance samples. P value was evaluated to 95% CI. For patient survey results, each of the categories surveyed was summed and averaged to elucidate satisfaction with each. In addition, each category was ranked by relative percentages. **Results:** Mean number of days from breast cancer diagnosis to surgery was 4.3 days less for patients who had contact with the ONN (24.6 vs 28.9 days without navigator intervention). However, this result was not statistically significant (P=.93; N=51). Variability in number of days from surgery to start of RT was reduced for patients with ONN contact (SD 19.4 vs 25.6 without the navigator; N=30). **Qualitative Results:** Patient feedback was highly favorable regarding the ONN program overall, and patients also deemed the services provided to be very helpful. The respective rankings of services will be used to prioritize services provided. **Conclusions:** This study was intended for a single institution quality improvement project, and the data can be compared against subsequent years. We also attempted to identify quantitative metrics, in terms of time elapsed between steps in the treatment plan, to measure the impact of the ONN program. Although we noted a favorable difference between patients with ONN contact versus those without, more research is needed to conclude that these are indeed useful metrics for this purpose. Data collection and analysis will continue to reach statistical significance by increasing the population size. Additionally, additional qualitative surveys with open-ended questions will be conducted to allow for theme work.


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**Background:** *Clostridium difficile* infection (CDI) is a leading cause of hospital-acquired infection and is increasingly recognized as a community-acquired infection. Once affected, patients are at high risk for relapse despite treatment. Among patients who contract CDI, hematopoietic stem cell transplant (HSCT) recipients represent an especially vulnerable population due to prolonged hospital stays, frequent readmissions, and immunosuppression. The risk of CDI in HSCT recipients is well described and the estimated incidence ranges from 7.5%–17%. Less is known about risk factors for development of recurrent CDI in the HSCT population. To date, several studies have identified potential risk factors, but with inconsistent results. The goal of our study was to characterize the risk of CDI affecting HSCT recipients.

**Methods:** The study took place over 20 months in a single, tertiary-care, academic, adult hematopoietic stem cell transplant center. All adult patients undergoing HSCT were included in the study. CDI was defined as a positive stool culture for *Clostridium difficile* (CD). Patients with recurrent CDI were defined as those with a prior positive stool culture who had a positive stool culture while on antibiotic therapy. **Results:** Of 304 patients included in the study, 24 (7.9%) developed CDI. The median time from HSCT to CDI was 25 days (IQR 6–100). The median time from CDI to subsequent CDI was 20 days (IQR 4–97). Of the 10 patients with recurrent CDI, 6 had a single prior CDI episode. The CDI episodes in these patients occurred 7 days (IQR 2–118) and 17 days (IQR 15–36) later, respectively. CDI episodes occurred 16 days (IQR 8–50) after starting the initial antibiotic therapy. 8 patients (26.7%) had recurrent CDI, and there was no significant difference in the incidence of CDI between those with and without recurrent CDI (26.7% vs 13.6%, P=0.19). **Conclusions:** *Clostridium difficile* infection is a common infection in adult HSCT recipients and is also increasingly recognized as a community-acquired infection. Future studies are needed to identify risk factors associated with recurrent CDI to provide strategies to prevent and treat this infection.
recurrence and associated risk factors to inform future infection prevention strategies and promote antibiotic stewardship. Methods: We conducted a single-institution retrospective analysis of autologous and allogeneic HSCT recipients with documented CDI in the 6 months before transplant and up to 2 years after. CDI was detected using stool PCR for toxin A/B. “Recurrent CDI” was defined as CDI that occurred after the first appropriately treated episode (after 14 days) with oral vancomycin or metronidazole and within 1 year of the index CDI. Rates of CDI recurrence were compared with chi-square or Fisher exact tests as appropriate. Results: CDI affected 11% of HSCT recipients from 2012–2017 (n=974). We report data on 103 patients with documented CDI. Of these, 44 (43%) developed first CDI within 100 days of HSCT. Recurrent CDI occurred in 24 patients (23%), with 21 (88%) of these recurrences occurring within the first 3 months of index CDI. 7 of the patients who experienced recurrence were treated for >2 CDI episodes in <6 months after their first documented recurrence. Type of HSCT, conditioning regimen, or use of prior therapeutic antibiotics did not demonstrate a significant impact on CDI recurrence. A trend toward higher rates of recurrent CDI was seen in patients who had prior carbapenem use (P=.070) in the first 100 days after SCT; CDI treatment duration >2 weeks (P=.065), and gastrointestinal graft-versus-host disease (GVHD; P=.074). Conclusions: Our findings show the rate of CDI recurrence to be 23%, with antecedent antibiotic use or transplant type having no impact on risk. A trend toward increased CDI recurrence was seen in patients with prior carbapenem exposure, longer CDI treatment duration, and gastrointestinal GVHD. Further investigations are warranted in this population.

AB2018-119. Patterns of Care, Toxicity, and Response to Immunotherapy in Patients With Poor Performance Status
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Background: Immunotherapy with antibodies against PD-1, PD-L1, and CTLA-4 has therapeutic efficacy in various malignancies. Whether there is benefit in using these treatments in patients with performance status (PS) >1 is unknown, because most immunotherapy trials only included ECOG PS 0–1. The learning curve of immunotoxicity management in community practice is also unclear. Methods: 55 patients treated with immunotherapy, including some with PS ≥2, were retrospectively evaluated across 3 rural oncology practices in southeast New Mexico. Toxicity as an outcome was assessed based on immunotherapy type, duration, toxicity management, and out-of-pocket (OoP) costs. Analyses used descriptive statistics; associations were determined with chi-square statistics in STATA version 14.0 software. Results: Mean age was 67.6 ±12 years; 42% of patients (23/55) had PS 0–1 and 58% (32/55) had PS 2–3. PD-1/PD-L1 antibody therapy was used in 95% of patients (n=52) and anti-CTLA-4 in 5% (n=3). The discontinuation rate (DR) was 16% (9/55) due to toxicity (all in PS ≥2 patients), 33% (18/55) due to disease progression, 16% (9/55) due to complete or partial response, and 12.7% (7/55) due to cost/travel issues. Grade 2 (38%; 12/32) and grade 3 (28%; 9/32) toxicities were more common in patients with PS ≥2 versus PS 0–1 (P=.001). Grade 2/3 toxicity was seen in 100% (3/3) receiving anti–CTLA-4 antibody therapy and 39% (20/52) receiving anti–PD-L1/PD-1 therapy (P=.14). Grade 2/3 toxicities were present in 48% (20/42) of those receiving immunotherapy for <6 months and in 23% (3/13) of those receiving it for >6 months (P=.36). When grade 2/3 toxicity occurred, 30% (7/23) continued with therapy and 57% (13/23) discontinued completely (without steroid treatment); 13% (3/23) discontinued immunotherapy and were treated with additional steroids as per guidelines. OoP costs >$1,000 were noted in 17% (7/42) of those receiving immunotherapy for <6 months and 39% (5/13) of those receiving it for >6 months (P=.006).

AB2018-120. Leveraging Technology to Optimize Operations: Strategies With a Multidisciplinary Approach in a Research Oncology Unit
Katie Hauck Perez, PhD∗; Angela Oliver Pino, MBA, FNP-BC, DNP∗; and Gloria G. Campos, MSIE, CSSGB∗
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Background: As an academic cancer center, research is key to our mission of reducing the human burden from cancer; therefore, improving the processes for delivery of research patient care is paramount. The existing processes historically yielded multiple versions of orders, delays in protocol initiation and patient treatment, repetitive physician orders, and incongruent pharmacy, provider, and nursing feedback that delayed...
AB2018-121. Use of the NCCN Distress Screening Tool in Cigna’s Oncology Case Management Program

Alysia Jean Swanson, RN, BSOM, CCM; Patricia A. McKenna, RN, BSN; Liana DesHarnais Castel, PhD, MSPH; and Yuming Albert Shen, PhD

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Background: Distress is the unpleasant experience of a mental, physical, social, or spiritual nature. Although distress is an expected part of receiving a cancer diagnosis, untreated distress is a problem identified in clinical practice that affects coping, functioning, health decisions, and overall health. NCCN has developed clinical practice guidelines to support distress screening. Within Cigna’s Oncology Case Management population, an opportunity was identified to conduct distress screening and provide direct case management interventions and integrated referrals to address problems associated with distress. The goal of this study was to quantify improvements in oncology case management quality as a result of case managers implementing telephonic distress screening in this population.

Methods: From September 2016–April 2017, Cigna conducted a matched case-control study to measure outcomes among 599 pilot and 10,768 control (standard case management protocol) customers. Outcomes included number of oncology customers screened, distress severity ranging from 0–10 (1–3=mild, 4–7=moderate, and 8–10=severe), identification and number of biopsychosocial health problems, and number and percentage of direct resource referrals by case managers to supportive services.

Results: Of 599 customers who underwent screening, 317 were matched with 2,176 comparable controls from among the eligible population of 10,768. Screened customers had a 16% higher referral rate compared with those in the control group (66% vs 50%; χ² P<.001). Of the 599 screened, 241 (40%) had no distress, 227 (38%) had mild distress, 80 (13%) had moderate distress, and 14 (2%) had severe distress; 37 (6%) had no score. Individuals with moderate or greater distress severity (94 [16%]) were more likely to endorse one or more emotional, practical, or physical problems and to receive referrals to resources, including approved operations websites, case management education/support, behavioral health, community support, disability, employee assistance programs, job aids, social workers, and pharmacy.

Conclusions: These findings show that the NCCN distress screening tool is effective for Cigna Case Management to facilitate distress screening, streamline evidence-based assessment to more quickly focus on and prioritize pertinent problems, and develop resource job aids (referrals for information/education/programs/services) as a tool to improve outcomes in oncology.

AB2018-123. Evaluation of Proper Follow-up of Screening Colonoscopies After Curative Resection in Patients With Stage II and III Colorectal Cancer: A Single Institutional Retrospective Review and Quality Improvement Project

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Introduction: Colorectal cancer (CRC) is the third most common cause of cancer in the United States and the second most common cause of cancer-related death. Early-stage CRC can be cured by resection but is associated with a high risk of recurrence. Unfortunately, 30%–50% of survivors of CRC will experience relapse.

...
and many will die of cancer. Data also show that adherence to follow-up is not optimal. Follow-up and surveillance programs after curative resection have the purpose of early detection and improving survival. NCCN Guidelines discussing surveillance are directed at stage II and III CRC and recommend colonoscopy within 1 year of diagnosis. In this retrospective single-institution study, we reviewed our institution's adherence to guidelines for patients with stage II and III CRC for quality purposes and to assess the potential impact on mortality.

**Methods:** Data were obtained through retrospective chart review on 91 patients with stage II and III CRC treated at our institution from 2011–2016. This chart review allowed us to determine whether patients underwent a follow-up screening colonoscopy within 1 year of diagnosis (+3 months).

**Results:** Among the 91 patients in our study, only 66% (n=60) underwent colonoscopy within 1 year of surgery compared with 34% (n=31) who did not. Additionally, we compared all-cause mortality between the 2 groups. Of 91 patients, we looked at those still alive at analysis, and found that 76% of those who had proper follow-up colonoscopy were still alive at analysis versus 54% of those who did not. **Conclusions:** This retrospective single-institution study showed that there is much room for improvement regarding follow-up of patients with CRC and that, overall, compliance has varied over the years. This is consistent with national data showing lack of compliance with follow-up guidelines, and we hope that awareness of this issue will ignite discussion. Interestingly, although our institution's adherence to this particular guideline varied, likely from a multitude of factors, it did not seem to adversely impact all-cause mortality. We would like to investigate further whether death from CRC and recurrence was impacted by lack of adherence to the guidelines regarding follow-up colonoscopies in this subset of patients.


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**Background:** The Ohio State University Wexner Medical Center Abercrombie and Fitch Emergency Department (ED) saw approximately 80,000 patients in fiscal year 2017. The ED is composed of multiple treatment spaces, including an Emergency Services Unit dedicated to patients with cancer with urgent or life-threatening issues. The Enterprise Performance Scorecard initiative began in July 2016 and was established to focus the hospital on key result areas. The ED scorecard initiatives focused on median time patients spend in the ED before they are admitted to the hospital as an inpatient. Bed Ready to Out is a subset of this initiative focused on decreasing the amount of time patients spend in the ED once a bed has been assigned. Patients in the ED wait for extended periods after a decision to admit to the hospital has been made. Median Bed Ready to Out time (from when the bed is assigned, cleaned, and the patient is transferred to the inpatient nursing unit) is approximately 75 minutes. This time allows for the report to be provided to the inpatient nurse, the gathering of personal belongings, and the transfer to the inpatient nursing unit. The goal of this project is to reduce median Bed Ready to Out time to 45 minutes by July 2017.

**Methods:** Using the DMAIC (define, measure, analyze, improve, and control) process improvement methodology, a multidepartment team, including representation from the ED, inpatient nursing, and process improvement, developed a streamlined approach to nursing handoff by eliminating a full verbal report. The team focused on using standardized reports available in the Epic system, establishing time expectations and defining roles and responsibilities within the handoff process.

**Results:** Initial baseline data gathered from fiscal year 2016 indicates the median Bed Ready to Out time was 75 minutes. Pilot data from December 19, 2016 to January 8, 2017 indicated a median time of 58 minutes. As of September 2017, the median Bed Ready to Out time was 50 minutes. Over the course of implementation, the ED Bed Ready to Out time metric has ranged from a median of 47 minutes (July 2017) to 60 minutes (March 2017). **Conclusions:** The team is continuing to monitor the Bed Ready to Out process and develop additional tools to assist as needed. Some inpatient nursing units adopted the process quicker than others. Process improvement continues to meet one-on-one with individual nursing units as needed to review the standardized process flow.

**AB2018-125. Developing a Standardized, Multidimensional Chemotherapy Education Process Across the Cancer Service Line**

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*Cowell Family Cancer Center and *Michigan State University, Traverse City, MI

**Background:** A lack of standardization in chemotherapy patient education practices can lead to decreased efficiency and satisfaction for educators and uncertainty and anxiety for patients. The goal of this study was to...
determine whether implementation of a standardized chemotherapy education process at a regional cancer center improved nurse and patient satisfaction. 

Methods: A multidisciplinary team was formed to standardize the chemotherapy education process using checklists, video tools, simplified educational materials, and a group education class to reduce variation in teaching and improve nurse and patient satisfaction scores. We used anonymous, self-administered questionnaires to assess satisfaction in chemotherapy education constructs (based on a scale of 1 = strongly disagree to 5 = strongly agree) among nurses and patients pre- and postimplementation of the standardized chemotherapy education process, and tested for differences in satisfaction constructs using student t tests. We examined whether nursing satisfaction differed by nursing specialty and whether patient satisfaction in chemotherapy education differed according to age, sex, or cancer site using student t and ANOVA tests. 

Results: We observed significant improvement in nursing staff satisfaction after implementation, with the average overall score increasing from 3.4 to 4.3 (P < .001) after implementation of the standardized process. Significant improvements for nurses were observed for all individual constructs measures, including educational comprehensiveness (3.9–4.4; P = .03), efficiency (3.5–4.4; P < .001), consistency (3.0–4.3; P < .001), preparation (3.5–4.4; P < .001), adequate tools (3.6–4.4; P = .002), educational resources (3.2–4.4; P < .001), time spent on education (3.3–4.2; P < .001), and job satisfaction (3.5–4.2; P = .006). Patient satisfaction scores were high in both the pre- and postimplementation phases as expected (average overall score, 4.3 and 4.1, respectively; P = .07). 

Conclusions: Our findings suggest that assembling a multidisciplinary team across the cancer service line to investigate current job satisfaction among nurses. 

AB2018-126. Implementing and Evaluating the Malnutrition Screening Tool in Electronic Health Records for Outpatient Cancer Centers

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HealthPartners Cancer Centers, Minneapolis, MN; HealthPartners Cancer Centers, St. Paul, MN; Ohio State University Wexner Medical Center, Columbus, OH; Norris Cotton Cancer Center, Dartmouth-Hitchcock Medical Center, Lebanon, NH; Division of Cancer Prevention National Cancer Institute, Rockville, MD; and The Ohio State University College of Medicine, Columbus, OH

Background: Screening for malnutrition risk, Registered Dietitian Nutritionist (RDN) staffing, and financial models for outpatient nutrition care access vary across cancer centers (CCs) nationwide. Leveraging electronic health records (EHRs), this quality assurance performance improvement (QAPI) project seeks to systematically evaluate malnutrition risk by implementing a validated malnutrition screening tool (MST) nationwide. 

Methods: 3 CCs—James (Ohio State University [OSU]), HealthPartners Fraenumshuh Cancer Center and Regions Hospital Cancer Care Center (Minnesota [HP]), and the Norris Cotton Cancer Center North (Dartmouth-Hitchcock St. Johnsbury, Vermont [StJ])—implemented standards to incorporate the MST into an EPIC flowsheet, thus providing ongoing discreet variable data reports. MST, validated in outpatient oncology, has 2 questions (unintentional weight loss and eating poorly secondary to decreased appetite) and autogenerates total scores (range 0–5). A score of ≥2 indicates malnutrition risk. Data collection is ongoing, and phase I data from April–July 2017 are presented within. 

Identified data were analyzed to determine (1) MST use (percent of MSTs completed per clinic visit); and (2) percent of of patients with malnutrition risk (≥2). 

Results: During the initial 4 months of EHR MST implementation, ≥58% of CCs visits had MST use documented (63% OSU; 61% HP; 58% StJ). Of patients with MST scores ≥2, malnutrition risk was identified in 10% of patients at OSU, 5% at HP, and 1% at StJ. 

Conclusions: The MST can be successfully implemented in the EHR and can provide a valid assessment of malnutrition risk in outpatient oncology. Collecting data on MST use and malnutrition risk will inform RDN staffing needs, cost/benefit analysis, and health outcomes for oncology patients.

AB2018-127. Towards Outpatient Hyper-CVAD

Timothy Kubal, MD, MBA, and Christopher Salamanca, PA

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Background: Acute lymphoblastic leukemia (ALL) is an aggressive hematologic malignancy. Our current treatment for newly diagnosed patients is hyper-CVAD, which consists of an “A” arm (cyclophosphamide, vincristine, doxorubicin, and dexamethasone) and a “B” arm (methotrexate and cytarabine). In the presence of cerebrospinal fluid involvement, patients receive intrathecal methotrexate and cytarabine, further intensifying the regimen and its logistic challenges. Traditionally, chemotherapy for ALL is delivered in the inpatient setting, and although this may mitigate some of the logistic and clinical challenges, outpatient delivery could lower the cost of care and improve the patient experience. We report on our institutional
Experience of shifting hyper-CVAD arm-A into the outpatient setting. **Methods:** Over 40 months, hyper-CVAD arm-A was delivered to 95 patients, aged 19–67 years; 65 had ALL, 26 had high-grade lymphoma, and 4 had blastic plasmacytoid dendritic cell neoplasm. A total of 179 cycles of hyper-CVAD arm-A were delivered, with an average of 1.9 cycles per patient. Modifications to the regimen to facilitate outpatient administration included the delivery of cyclophosphamide over 1 hour for AM and PM doses (reduced from 3 hours) with a 10-hour interval between doses. Daily urinalysis was performed before delivery of cyclophosphamide, with no incidence of hemorrhagic cystitis. On days 1–3, patients received mesna via a 24-hour ambulatory pump, with a pump change performed each morning. **Results:** The duration of hyper-CVAD arm-A delivery was approximately 4 days. We estimated that 716 hospital days were saved over the examined period. No mortality was associated with the period of outpatient hyper-CVAD administration, and although there were predictable complications, including infections that required hospitalization, these occurred after completion of outpatient chemotherapy during the period of chemotherapy-related neutropenia. Financial savings were calculated based on expected gross charges, with a 13% reduction in charges for each cycle ($2,541). Over the examined time period, administration of outpatient arm-A of hyper-CVAD was accompanied by an estimated reduction in gross charges of $454,839. **Conclusions:** Based on multiple years’ experience, outpatient administration of hyper-CVAD arm-A appears to be safe and well tolerated, potentially improving the patient experience while reducing the overall cost of care associated with its delivery.

**AB2018-128. Pressure Injury Identification and Prevention in an Oncology Emergency Department**

Michelle Kuhn, BS, BSN, RN, OCN; Miranda Naegele, MSN, RN, LMT, CEN; Heather Less, MSN, RN, CEN; Mallory Dye, MS, RN, OCN; Danielle Crow, BSN, RN; and Molly Pierce, MSN, RN, CWOCN

The Ohio State University Comprehensive Cancer Center – James Cancer Hospital and Solove Research Institute, Columbus, OH

**Background:** Emergency departments (EDs) are experiencing higher patient volumes and greater acuity, leading to increased boarded hours. The patient with cancer often experiences malnourishment and corresponding nutrition deficits, increasing the chance for skin breakdown and infection. Due to these factors, oncologic emergency patients are at an increased risk for developing hospital-acquired pressure injuries. The Nursing Quality Manager recognized the need to investigate ED nursing practice and created a nursing workgroup, which was charged with identifying opportunities for nursing intervention to mitigate the risk of developing pressure injuries while in an ED. The oncology ED is part of an academic, urban, level 1 trauma adult medical center in the Midwest, and includes 15 specialized oncology ED beds with approximately 12,000 visits annually and an admission rate of 60%. **Methods:** Using the DMAIC (define, measure, analyze, improve, and control) process improvement methodology, numerous strategies were developed. These included the identification of a unit skin champion, an educational PowerPoint presentation, and an

![ED Boarder Hours](image1)

![Pressure Injuries](image2)

**AB2018-128: Figure 1.** ED boarding hours and pressure injury data.
AB2018-129. Improving Oncology Clinical Trials With a Centralized Tumor Metrics Service
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Background: Managing oncology clinical trials can be very challenging, especially with the increasing complexity of protocols and modifications to tumor response criteria. Maintaining protocol compliance and keeping up with criteria changes can be difficult. Furthermore, all trial data must be assessed accurately and be available for data locks, monitoring visits, and audits. These challenges can be addressed through a centralized service that provides quality reviews, adequate training, and consistent tumor metrics data.

Methods: The Tumor Imaging Metrics Core (TIMC) was established in 2004 to provide a centralized image review service for patients enrolled in oncology clinical trials at the Dana-Farber/Harvard Cancer Center. Using a custom web-based workflow and data management system developed by TIMC, named Precision Imaging Metrics (PIM), TIMC provides online tumor metrics assessments with standardized, printable reports including annotated images in a longitudinal record. All changes are captured in audit trails throughout the system. To ensure protocol compliance, the system has built-in conformance checks for different imaging response criteria. Each protocol is thoroughly reviewed by trained TIMC staff prior to trial activation in the website. All TIMC image analysts and the radiologists overseeing the measurements are required to complete online trainings with certification for each imaging tumor response criteria, which improves reliability, accuracy, and reproducibility of tumor metrics.

Results: Between September 2016 and September 2017, 246 new protocols were activated in the TIMC website. A total of 13,264 time points were assessed. Clinical investigators requested a re-review of 178 of these scans (1.3%), on which 65 assessments were changed by a second reader. An in-house study of interrater reliability among image analysts resulted in a reliability coefficient of 0.94. Before the establishment of TIMC, it was reported that clinical trial staff took 1–2 weeks to prepare for audits. With the TIMC system, minimal preparation is now required due to the standardized reports and annotated images.

Conclusions: The TIMC improves the efficiency of managing oncology clinical trials with protocol-compliant assessments and reliable tumor metrics. Our PIM platform has now been adopted to address these needs at 7 NCI-designated Cancer Centers.

AB2018-130. Adenocarcinoma Masquerading as Rheumatoid Pulmonary Disease
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Background: False-negative biopsy results can be troubling for both patients and clinicians. Although many commonly used tests and diagnostic procedures are developed to have the highest sensitivity and specificity, a study seldom can achieve 100% accuracy in both respects. False-positive results in the presence of another disease process can lead to delayed treatment of the actual disease.

Methods: A 69-year-old man presented after a routine chest radiograph revealed a 6-cm mass in the left upper lobe of the lung. He was scheduled for a whole-body PET scan, mediastinoscopy, and bronchoscopy to better assess the lung mass. Following these studies, a core-needle biopsy and subsequent fine-needle aspiration were performed, both revealing a non-specific diagnosis of malignancy. The patient also had a suspicious lung mass, with a large necrotic core, along with a positive antineutrophilic cytoplasmic antibody (ANCA) test. Results: The patient continued to be followed up and was offered lobectomy but was uninterested in surgery because the pathology was negative for malignancy. He ultimately underwent another FNA and bronchoalveolar lavage approximately 2 months later, which were once again negative for malignant cells. Due to the presence of multinucle-
ated giant cells and a strongly positive ANCA test, the patient was referred to a rheumatologist for workup. Nevertheless, patient was strongly advised to undergo lobectomy for a definitive diagnosis. A follow-up CT scan several months later had features consistent with a bronchogenic carcinoma and the patient finally agreed to an open thoracotomy and lobectomy of the left upper lobe. Pathology showed moderate to poorly differentiated adenocarcinoma of the lung. **Conclusions:** What started as an unknown mass on a chest x-ray led us to believe that it could be something other than a malignant tumor. Only when the mass was excised did the diagnosis of adenocarcinoma become evident. Unfortunately, the series of nondiagnostic studies dissuaded the patient from pursuing more aggressive therapy. In conclusion, it is important to pay particular attention to the specificity and sensitivity of one’s examinations especially when those results do not correlate clinically.

**AB2018-131. The Ohio State University Comprehensive Cancer Center (OSUCCC) – James Thoracic Surgery Oncology Unit: Improving Provider-Nurse Communication Through Joint-Rounding**

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**Background:** Provider–nurse communication (PNC) is a leading cause of dissatisfaction and concern in many healthcare institutions. The James Patient Experience Committee reviewed stakeholder feedback and identified a gap in PNC as one of the key contributors to patient and clinical staff satisfaction and safety. After reviewing data and analyzing opportunity for improvement, the James Thoracic Surgery Oncology Unit (JTSOU) was selected as a pilot site for this process improvement (PI) project. Favorable Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) Survey responses for both the 18th floor of The James and the JTSOU pod of the 18th floor of The James proved that PNC dissatisfaction was not stemming from patients. Therefore, the team decided to survey clinical staff regarding PNC satisfaction. Preimplementation responses clearly defined where we needed to focus our efforts. Of those surveyed, only 58.82% agreed that “PNC regarding the daily plan of care is occurring routinely for thoracic surgery patients” (Table 1 and Figure 1). Furthermore, only 47.06% agreed that they were satisfied with communication between providers and nurses caring for thoracic surgery patients. These results made it clear that we needed to develop and implement an improvement process for PNC on the JTSOU.

**Methods:** A multidisciplinary team was formed consisting of members representing all clinical roles on the JTSOU (medical doctor [MD], certified nurse specialist [CNS], certified nurse practitioner [CNP], registered nurse [RN], Nurse Manager [NM], patient care resource manager [PCR], and social work [SW]). Once the problem statement was determined and the charter established, the group decided the best approach for PI would be a Rapid Cycle project consisting of the PDSA (plan, do, study, act) method. As a group we conducted literature reviews and researched best practices (both internally and externally) to improve PNC.

**Results:** The team discovered that when the bedside RN was not present during rounds, the RN was not involved in the patient’s plan of care. This disconnect between MDs delivering one message to the patient and the bedside RN delivering another was causing dissatisfaction on the unit. The group decided that including the bedside RN delivering the daily plan of care can improve PNC satisfaction. Preimplementation responses indicated that only 58.82% agreed that “PNC regarding the daily plan of care is occurring routinely for thoracic surgery patients” (Table 1 and Figure 1).

<table>
<thead>
<tr>
<th>Statement</th>
<th>Pre-Project Survey 1/17/2017 (N=34)</th>
<th>Post-Project Survey 9/17/2017 (N=35)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily PNC is IMPORTANT to patient care</td>
<td>100.00%</td>
<td>88.57%</td>
</tr>
<tr>
<td>PNC regarding the daily plan of care is OCCURRING ROUTINELY for thoracic surgery patients</td>
<td>58.82%</td>
<td>77.14%</td>
</tr>
<tr>
<td>My input is USED to develop or adjust the patient’s daily plan of care</td>
<td>79.40%</td>
<td>82.86%</td>
</tr>
<tr>
<td>My professional opinions about patient care are VALUED</td>
<td>66.79%</td>
<td>74.29%</td>
</tr>
<tr>
<td>I am SATISFIED with communication between providers and nurses caring for thoracic surgery patients</td>
<td>47.06%</td>
<td>74.28%</td>
</tr>
</tbody>
</table>

**AB2018-131: Table 1. Pre and Post Survey Results**

![AB2018-131: Figure 1. Pre and Post Survey Results.](image-url)
RN in morning multidisciplinary rounds would be the best approach. This rounding team would consist of the bedside RN, MD, CNP, SW, PCRM, and pharmacist. Logistically, this proved to be much more difficult than anticipated. Current state process maps were created to identify opportunities for improvement. Through numerous cycles of refinement using the PDSA method, we were able to successfully insert the bedside RN into our multidisciplinary rounding efforts. Conclusions: Our post-project survey results demonstrated success, with 77.14% reported satisfaction with routine PNC regarding the daily plan of care for thoracic surgery patients and 74.28% reported satisfaction with communication between providers and nurses caring for thoracic surgery patients.

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Background: Precision medicine aims to personalize treatment for patients based on genetic biomarkers and other personal characteristics. Accurately measuring the quality of precision medicine is vital for informing patient decision-making, improving the quality of care, and holding providers accountable through value-based payment (VBP) arrangements. However, quality measurement of precision medicine presents challenges compared with conventional medicine. This study reviewed existing oncology quality measures to identify challenges with measurement in precision medicine and recommend new approaches to address these challenges. Methods: First, we inventoried existing oncology measures that include genetic biomarker testing or status in the measure denominator and/or numerator. We then reviewed the measures’ specifications, testing results, and use in VBP programs. Finally, we critically assessed these measures and the incentives established by their use against the goals of precision medicine and VBP. Results: We identified 37 existing oncology measures based on our criteria. After assessing these measures, we found that they have at least 4 major challenges. First, clinical guidelines often recommend that patient preferences be considered in concert with test results. However, none of the measure numerators take patient preference into account, meaning that providing care based on patient preference can negatively affect measure results and payment. Second, existing measures are binary and do not capture nuances based on genetic subtypes. Third, existing measures do not fully recognize the existing clinical recommendations for biomarker testing and targeted therapy. Finally, some measures have small numerators when used at the individual provider level, resulting in poor measure reliability and the potential for provider penalties based on chance rather than performance. Conclusions: Based on these findings, we recommend that oncology measures include broader groups of patients with cancer based on whether they received appropriate testing and treatment, rather than narrow denominators based on individual biomarkers. Measures should also include a greater focus on patient preference and concordance with patient care plans. Finally, measurement systems should be more dynamic and responsive to rapid changes in biomedical science.

AB2018-133. Outcome Analysis of Time From Diagnosis to Treatment in Patients With Breast Cancer
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Background: According to ASCO, NCCN, and Commission on Cancer (CoC) guidelines, chemotherapy should be administered within 120 days of diagnosis for women aged <70 years with AJCC stage IB–III hormone receptor–negative breast cancer. There is no consensus on ideal time from diagnosis to upfront surgery (ie, how early is early and how late is late). Large studies assessing overall survival as a function of time from diagnosis to surgery concluded that an additional delay of 60 days beyond the first 4 weeks since diagnosis increases the risk of cancer-related death by 9%–10%. Methods: A quality improvement study was performed to assess the time from diagnosis to treatment and determine its impact on clinical outcome in patients with breast cancer treated at Edwards Comprehensive Cancer Center (ECCC) from 2006–2016 (cohort 1). 721 charts were retrospectively reviewed. The interval between diagnosis and initial treatment modality—upfront surgery (TTS) or adjuvant chemotherapy (TTC)—was set at 30-day increments (0–30 days, 31–60 days, 61–90 days, and >90 days). Similar data were calculated for patients (cohort 2) diagnosed at ECCC in 2015–2016 to assess whether in-house diagnosis reduced the treatment delay. Statistical analysis was performed and Kaplan-Meier curves generated. Results: In cohort 1 (all patients), 35% patients were started on treatment within 30 days of diagnosis, 46.7% within 31–60 days, and 17.9% in >60 days. TTS was <30 days in 32% of patients and >60 days in 16.8% of patients. When adjusted for age, stage, and hormone status, numerical decline in overall survival was noted when TTS was >60 days. Survival was significantly worse (hazard ratio, 2.5;
95% CI, 1.315–4.91; \( P=.005 \)) when treatment (any modality) was delayed beyond 90 days from diagnosis. Numerical decline in survival was noted when TTC was >60 days. Median time to first consult (40 days in cohort 1) was the major cause of treatment delay. In-hospital diagnosis and the aid of a breast cancer navigator decreased the median time to first consult to 30 days. In cohort 2, TTS was <30 days in 38.2% of patients and >60 days in 15.9%. **Conclusions:** After adjusting for age, tumor, and hormone status, treatment delay independently correlates with lower survival. More quality improvement studies should be performed to define the optimal time to upfront surgery after breast cancer diagnosis.

**AB2018-134. Impact of a Palliative/Supportive Care Team on Inpatient Pain Scores at an NCI-Designated Comprehensive Cancer Center**

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**Background:** Despite an improved focus on assessment and management, pain continues to be a frequent symptom reported by patients with cancer. The NCCN Guidelines for Adult Cancer Pain emphasize a multidisciplinary team approach to pain management, including specialty consultation for moderate to severe pain. In addition, the NCCN Guidelines for Palliative Care specify that consultation with a palliative care specialist is appropriate for any patient with uncontrolled symptoms. At our NCI-designated comprehensive cancer center, the palliative/supportive care (PSC) team places attention on comprehensive symptom management to maintain well-being and fosters treatments aligned with patient goals. Given the prevalence of cancer-related pain, there is a prominent focus on interdisciplinary pain care. **Methods:** This quality improvement project evaluated the impact of PSC team consultation and interventions on patient-reported pain intensity scores. A retrospective chart review was conducted for 100 patients with solid-organ tumors admitted to the Internal Hospital Medicine Service who received consultation from the PSC team for a 4-month period. Pain intensity scores as measured on a scale of 0–10 and documented by the bedside nurse were compared pre- and post-PSC consultation at 24 and 48 hours, and on discharge/end of consultation services. Those discharged within 24 hours of consultation were excluded. **Results:** Of 100 patients, the mean age was 56.9 years, 52% were men, cancers of the gastrointestinal tract were most highly represented at 33% of the sample, and 78% had metastases. A paired \( t \) test demonstrated that there was a statistically significant improvement in average pain intensity scores from baseline to 24 hours after PSC consult (5.7–4.4; \( P<.05 \); 95% CI), baseline to 48 hours after consult (5.7–4.3; \( P<.05 \); 95% CI), and baseline to final pain intensity score at discharge (5.7–3.6; \( P<.05 \); 95% CI). The frequency of patients with severe pain (pain intensity score, 7–10) decreased from 27% to 8% within 48 hours after consult. **Conclusions:** PSC team consultation and interventions had a statistically significant impact on reducing pain intensity scores for hospitalized patients with cancer, consistent with the team’s intent to enhance patient comfort throughout the continuum of cancer care.