VOLUME XII . FALL 2023. UNIVERSITY OF GEORGIA, COLLEGE OF PHARMACY

THE ONCOLOGY BULLETIN

STUDENT ONCOLOGICAL ADVOCATES IN PHARMACY

Halloween Game Night!

THIS ISSUE

OUR MISSION

Student Oncological Advocates in Pharmacy (SOAP) is committed to elevating awareness for all different types of cancer. As a part of the University of Georgia, College of Pharmacy, we deepen our understanding through education and involvement to continue to provide support to our community, focusing on those affected by cancer.

ACKNOWLEDGEMENTS

A heartfelt thank you to our remarkable members for contributions to this newsletter. Special appreciation goes to Dr. Clemmons and the entire NCODA team for their help with editing. I am so grateful and excited to see what we do next semester!

SEMESTER RECAP

This semester had many fun and informational events! We kicked off the semester with guest speakers from University Cancer & Blood Center who spoke on their operations and how they support the local Athens community. Additionally, other guest speakers from UGA's COP and UGA's Nutritional Sciences gave us insight on current cancer research projects. Lastly, our semester meetings also included journal clubs from our own members covering recent cancer trials and novel drug therapies.

In addition to our semester meetings, we had our annual breast cancer awareness panel where we listened to members of the COP give their testimonies. From there, we had a blast at Pharmtoberfest spreading awareness about breast cancer and collecting potential donors for DKMS! Lastly, we put on our first Halloween game night and battled Dr. Seagraves in a Halo tournament.

To end the semester, we had some of our members attend NCODA's 2023 International Fall Summit in Orlando, FL where they had the opportunity to learn about many novel treatments and gain profound insight into the integral role of pharmacy in patient-centered care!

NCODA SPOTLIGHT

By Renee Manning, Pharm.D Candidate, 2026

We reached out to current member of our national organization NCODA (National Community Oncology Dispensing Association), Austin Starkey, PharmD, MBA to get an inside scoop on his role in the organization and what NCODA offers pharmacy students like us or students interested in the oncology field.

Q:What is your official title as well as a little about yourself?
A: "I currently serve as Manager of Operations. I grew up in a small town in Nebraska so of course I am a Husker fan. I completed my undergraduate education with Concordia University of Nebraska where I double majored in Microbiology and Chemistry.

Q: Where did you go for pharmacy school and what general career path led you to where you are now?
A: "I went to pharmacy school at Concordia University of Wisconsin. During my pharmacy education I also had the opportunity to receive my MBA at the same time. After graduating, I had the great opportunity to complete NCODA's Association Management Fellowship. Since completing the fellowship, I obtained experience as an Associate Manager of Stakeholder Engagement and Operations, then a Manager of Clinical Initiatives, and now in my current role as a Manager of Operations. I currently live in upstate New York with my wife and 2 dogs where our International World Headquarters is located."

Q: What responsibilities do you hold with said role?
A: "As part of the operations team, I help everyone else to make sure initiatives and general day to day operations are moving efficiently and effectively. I also get to use my clinical knowledge in managing our Cost Avoidance and Waste Tracker Tool and our Financial Assistance Tool. I also help manage our Treatment Support Kits by ensuring every practice receives them on time. I make sure we are following cGMP (current Good Manufacturing Practices) in order to maintain an excellent final product for the patients who utilize them."

Q: What events or activities does NCODA hold for pharmacy students or prospective pharmacy students to participate in?
A: Many of our NCODA events are held through our Professional Student Organizations. Our student chapters host Be the Match drives and get the chance to be published through our PQI competition. We also provide a variety of different educational resources for our students through our monthly Student Educational Talks, NAPLEX reviews, and we have many students submit articles to our student-centered publication Inspire.

Q: Are there any residency or fellowship programs offered by NCODA?
A: NCODA is proud to offer a one-of-a-kind residency program focused in the medically integrated oncology pharmacy space. The MIOP program currently has 2 practices participating in this one-of-a-kind residency program, Texas Oncology and Florida Cancer Specialists. Dr. Cooper Bailey helps to oversee this program. We also have an extensive fellowship program focused on Advocacy, Oncology, Health Equity, and Policy. This program has been developed and expanded upon the Association Management Fellowship that I completed. Currently, we have 3 fellows all getting to experience a variety of different initiatives. They get the opportunity to shadow at a member practice and provide a Continuing Education presentation to our members. Applications for both NCODA's residency & fellowship program open 11/1/2023

Q: Do you have any advice for a student that is interested in going the oncology pharmacy route?
A: The one advice I would tell students is get out of your comfort zones and see what is out there. Oncology can be a scary disease state but with all the resources and organizations out there it becomes more manageable. There are also so many opportunities out there ranging from different industry positions to all the different clinical careers and practice settings. So, for students I say take a risk and apply for anything you have any sort of interest in. APPEs are the perfect time for you to experience different settings so take full advantage of them!

OCE PROJECT CONFIRM

By Jamie Le, Pharm.D Candidate, 2026

Accelerated approval was initially a response to the HIV/AIDS crisis, developed in 1992.[1] It is a crucial program that allows for expedited biologic and drug approvals based on initial evidence of efficacy and safety with continual confirmatory clinical studies to verify the clinical benefit is ongoing.[1] Companies that receive accelerated approval are required to verify clinical benefit by conducting confirmatory trials - those that successfully confirm the benefit may have their indications granted traditional FDA approval.[1]

Accelerated approval was integrated into law under the Food and Drug Safety and Innovation Act (FDASIA) in 2012.[1] The FDA's Oncology Center of Excellence (OCE) later launched Project Confirm in October 2021 to promote the transparency of accelerated approval of potentially life-saving oncology therapies.[1,2] Project Confirm aims to facilitate discussion, research, and innovation through publishing comprehensive summary information on the FDA's website. The data is categorized into accelerated approvals undergoing confirmatory studies, those that have complete confirmatory studies verifying clinical benefit, and those that have been withdrawn.[1] The public database seeks to provide a framework for clearer understanding and monitoring of the outcomes of accelerated approval oncology therapies among key stakeholders, including patients, healthcare providers, and researchers.[2]

The accelerated approval program faces scrutiny despite its overall intentional benefit, due to the number of therapies withdrawn by the FDA because of their failure to confirm clinical benefit from their studies as well as delays in the completion of confirmatory studies. Since 2020, the FDA has withdrawn the accelerated approvals of at least 16 oncology indications due to a lack of benefit over the standard of care.[2,3] Ibrutinib by AbbVie was voluntarily withdrawn in April 2023 from the U.S. market for 2 indications, mantle cell lymphoma (MCL), and marginal zone lymphoma (MZL) due to concerns about efficacy and safety.[3] The accelerated approval of Ibrutinib was based on the surrogate endpoint, objective response rate (ORR), which measures whether tumors shrink or are eradicated after treatment during confirmatory trials.[2,3] However, the validity of ORR as a predictor of clinical benefit proved to be uncertain. One of the predominant criticisms is the lack of correlation between surrogate endpoints and meaningful clinical outcomes including improved survival or quality of life.[3] As a result, an improvement in ORR does not translate definitively into longer life expectancy or improved well-being.[3] Like other withdrawn accelerated approvals, drug sponsors of Ibrutinib also delayed conducting their confirmatory clinical trials and additionally failed to demonstrate clinical benefit.[3,4]

The FDA addressed these criticisms and improved the use of surrogate endpoints in clinical trials by passing new legislation under the Food and Drug Omnibus Reform Act (FDORA) of 2022. This issued a new draft guidance emphasizing the use of randomized controlled trials (RCTs), and recommended the use of Blinded Independent Central Review (BICR).[3] In December 2022, congress passed FDORA to modernize the accelerated approval program, allowing the FDA to have more authority to define the boundaries of confirmatory trials - including the imposing of fines for delays and expedition of withdrawal upon trial failure.[3,4] A few months later in March 2023, the FDA released a new draft guidance titled "Clinical Trial Considerations to Support Accelerated Approval of Oncology Therapeutics," which called for a shift from single-arm trials to RCTs with measures aimed at reducing risks by raising the standards for stronger evidence of clinical efficacy and safety.[2,3] In addition, the FDA encouraged the implementation of BICR to reduce the variable overestimation of treatment effects in surrogate endpoints and ensure that clinical data is sufficiently significant.[3] Overall, Project Confirm and the recent FDA calls for improvement to represent efforts to address the shortcomings of the accelerated approval framework and ensure that drugs granted accelerated approval provide true meaningful clinical benefit to patients.

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UTILIZING METFORMIN TO MITIGATE CHEMOTHERAPY TOXICITIES

By Monica Ngo, Pharm.D Candidate, 2026

Breast cancer therapy is a dynamic and evolving field, as it is the second leading cause of cancer among women.[1] Continuous innovative strategies are being developed to improve the effectiveness of chemotherapy while adopting palliative measures to mediate toxicities. Among these strategies is metformin, a widely prescribed first-line medication for type 2 diabetes mellitus. Metformin has been acknowledged for remedial aspects in controlling chemotherapy side effects before surgery. The goal of neoadjuvant chemotherapy within breast cancer is to reduce tumor size to facilitate surgery, helping to preserve as much healthy breast tissue as possible.[2]

Breast cancer patients are typically treated with adriamycin-cyclophosphamide plus paclitaxel (AC-T) as adjuvant therapy to minimize cancer recurrence risk after surgery. However, AC-T therapy is associated with severe side effects, including peripheral neuropathy and oral mucositis. These side effects significantly impact a patient's quality of life and potentially limit treatment efficacy.[3] Additionally, patients on adriamycin may develop cardiotoxicity, a life-threatening condition that can lead to irreversible congestive heart failure.[3] These severe chemotherapy-induced toxicities have posed a challenge, and no effective therapies are available to counteract them. While there is an FDA-approved drug, dexrazoxane, it has been associated with an increased risk of secondary malignancies and reduced antitumor effectiveness.[3]

This patient study encompassed individuals aged 18 to 65 who met the criteria for neoadjuvant therapy, had no history of prior chemotherapy, and demonstrated normal liver function. Exclusion criteria involved patients who had a history of diabetes, had used antidiabetic medications previously, were pregnant, were breastfeeding, had metastatic or recurrent breast cancer, or had an elevated risk of metformin-induced lactic acidosis. Once metformin was initiated, there was a reduction in the severity of fatigue, oral mucositis, and peripheral neuropathy.[3] Specifically, the chances of experiencing peripheral neuropathy or oral mucositis were considerably reduced with metformin.[3] The neuropathy associated with the paclitaxel component of the AC-T therapy is often connected to disruptions in neuron microtubule assembly, resulting in impaired axonal transport and neuronal function. Metformin's ability to alleviate neuropathy is distinct from its antidiabetic effects and exhibits anti-neuroinflammatory properties in spinal cord-injured rats.[3]

In breast cancer therapy, metformin has also been explored for its potential role with the mammalian target of the rapamycin (mTOR) pathway. The mTOR pathway is a cellular signaling pathway that plays a role in regulating cell growth, proliferation, and survival. Dysregulation in the mTOR pathway has been implicated in cancer development and progression.[4] Metformin can exert direct inhibitory actions on cancer cells by impeding the signaling of the mTOR pathway and synthesis of proteins.[5] To do this, metformin activates an enzyme called AMP-activated protein kinase (AMPK), and with this activation, there is a decrease in mTOR activity.

Metformin also indirectly affects insulin levels through AMPK, which inhibits gluconeogenesis genes in the liver and enhances muscle glucose uptake, lowering fasting blood glucose and insulin. Lower insulin levels are essential for metformin's anticancer activity because insulin can promote tumor growth, especially in cancers with high insulin receptor expression, such as breast cancer.

Overall, metformin is a potential neoadjuvant chemotherapy option for breast cancer and represents a promising therapy. Metformin has multifaceted actions, with its potential in mTOR pathway inhibition being one of them, suggesting an opportunity to improve treatment outcomes while mitigating side effects. As the field of oncology continues to advance, metformin's role in cancer therapy represents a new way to use pleiotropic medications to face the challenges of breast cancer therapy.

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THE NUTS & BOLTS OF WILMS TUMOR

By Grace Zeineddine, Pharm.D Candidate, 2026

Did you know that Wilms tumor is the most common cause of kidney cancer in children? It stems from early cells of the kidney not developing properly into glomeruli in nephrons (unit cells of the kidney); these immature cells can aggregate and grow uncontrollably by the time a child is the age of three to five.[3] At this point, the tumor has formed. Due to the etiology of this kidney disease, another name for the cancer is nephroblastoma. Wilms tumor most frequently occurs in only one of the body's two kidneys. This is known as unilateral Wilms tumor. It can, however, present bilaterally as well; this occurs in about 5% of cases and is more commonly in females. There are approximately 650 new cases of Wilms in the United States every year.[3] Additionally it affects 1 in 10,000 children with the median age of onset being 3.5 years.[5] Overall 5-year survival in the US is 92% but in poor parts of the world with fewer resources, the survival rate is only 78%.[3]

The cancer usually presents as a large mass on the belly/abdomen. Typically, parents or pediatricians discover this mass which probes the cancer investigation. The most common initial symptom is abdominal pain which occurs in 30-40% of patients.[3] Other common symptoms include hypertension (25%) and hematuria also known as blood in the urine (12-25%).[3] The disease can also present in five stages. Stage 1 is where the tumor is contained in the kidney and accounts for roughly 42% of Wilms tumors. Stage 2 is where the cancer has grown outside the kidney but can usually still be completely removed with surgery. Stage 3 is where the cancer has spread in a way that can't completely be removed with surgery. Stage 4 is where the cancer has spread through the valvular system to distant organs (lungs, liver, brain) or to distant lymph nodes. Stage 5 is when both kidneys are involved.[3]

Treatment of Wilms tumor takes a multidisciplinary approach. Because it often presents unilaterally, surgical removal of the affected kidney is the standard. This is called nephrectomy.[3] According to the National Kidney Foundation, "most people with one kidney live healthy, normal lives with few problems",[4] thus enabling the procedure. This is then followed by chemotherapy. Some protocols allow for chemotherapy first and then the surgery.[3] It's important to understand that cancer cells can move through the bloodstream and settle in other areas of the body: most commonly into the other kidney or in the lungs. The medical team keeps vigilant attention to ensure the cancer has not made these migrations in which case additional treatment is required. Finally, some patients may qualify for radiation in addition to the treatments mentioned above.[3]

For patients with a bilateral version of the disease, removal of the kidney is not preferred in order to avoid the dialysis it will mandate.[3] In these cases, "Some experts attempt high-dose chemotherapy to kill the tumor cells and hopefully salvage the kidney."[3] Chemotherapy drugs used most often for its treatment include Actinomycin D (dactinomycin) and Vincristine.[1] For Wilms that are in more advanced stages, aggressive, and/or recurrent, consider treating with other chemo agents like Doxorubicin, Cyclophosphamide, and Etopside.[1] required to ensure the tumor is responding to chemotherapy. Some patients may qualify for surgery involving partial removal of kidney tissues that are malignant. This is called nephron sparing surgery.[3]

In conclusion, Wilms disease is a frightening tumor of the kidney in children but has a good prognosis with well-established treatment options. In addition to the chemotherapy radiation combination, Dr. Jeffrey Dome, senior vice president of the Center for Cancer and Blood Disorders and division chief of Oncology at Children's National, foresees treatment expanding to include immunotherapy, especially in patients with high risk of relapse.[2] He is involved with several early-phase clinical trials involving T-cells engineered to target WT1. This is an altered protein expressed in most Wilms tumors. According to Dome, "Based on early successes, [they] are continuing this line of research and trying to improve the technology in the current generation of studies".[2] It is exciting to see how this new treatment will unfold and what the future holds for Wilms disease.

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A REVIEW OF MUCOSAL MELANOMA AND PROMISING TREATMENT OPTIONS

By Gisele Beaubien, Pharm.D Candidate, 2026

Melanoma is most often recognized as a cutaneous tumor originating in the melanocytes that give skin its pigment. While this is the more common subtype of melanoma, melanoma can originate in the mucosal tissues that line cavities and organs within the body; this is known as mucosal melanoma (MM). MM is an aggressive and rare cancer that makes up about 1.2% of all melanomas; it has a five-year survival prognosis of less than 25% and an average survival of 9 months.[1] This poor prognosis is most likely a result of there not being well-defined or understood risk factors as well as the low mutational burden associated with MM's molecular characteristics. MM tumors have a mutation rate that is more than 10 times less than the mutation rate of cutaneous melanoma tumors.[2] A low mutation rate sounds like a good thing, but it is deceiving in that the lower the mutation rate of the tumor, the less responsive it will be to treatment.

Yan et al. performed a recent study in China that yielded results showing that treatment of MM with an anti-vascular endothelial growth factor receptors (VEGFR) drug in combination with chemotherapy improved progression-free survival (PFS) as well as overall survival (OS) in comparison with using chemotherapy alone.[3] To piggy-back off this discovery, Li et al. conducted the first study to assess the effectiveness in combining VEGFR-targeted therapy with immunotherapy in treating patients with advanced and treatment-naive MM. They combined Axitinib (VEGFR) and Toripalimab (monoclonal antibody) and they discovered promising safety and efficacy. Axitinib works by inhibiting VEGFR to block the formation of new blood vessels, thereby blocking tumor growth. Toripalimab, on the other hand, is a humanized IgG4 monoclonal antibody against PD-1 to promote the patient's immune response.[4] Based on the study's results, the combination therapy of Axitinib and Toripalimab was granted the orphan-drug and fast-track designation by the US Food and Drug Administration (FDA) due the promising efficacy and safety found so early on. The use of immunotherapy alone yielded an OS range of 10.3 to 11.3 months in comparison to immunotherapy and antiangiogenic dual therapy resulting in an OS of 20.7 months in this study. Ipilimumab combined with Nivolumab is the current first line therapy for treatment of melanoma with an overall survival of 22.7 months, which is comparable to the OS with the use of Toripalimab with Axitinib.[5] So what makes this new dual therapy possibly a more promising treatment?

While mucosal melanoma is extremely rare, constituting 1% of melanomas in Caucasians, it is the second most common subtype of melanoma among the Asian population. Moreover, Asians have lower response rates to current treatment than Caucasian patients.[2] Larkin et al. performed the study responsible for the previously mentioned first line treatment of Ipilimumab with Nivolumab where the majority of the patients treated were Caucasian.[6] Li et al. study participants were all Asian. With that being said, it is difficult to make a conclusion on which treatment option is better with the current data. Researchers admit that a major limitation of the study is the use of a single-arm trial design.[5] This trial design is intended to analyze the safety and efficacy of the new therapy; however, its limitations prevent a proper comparison to the standard treatment. Investigators have yet to analyze data from their phase III clinical trial, where Toripalimab and Axitinib will be compared to Pembrolizumab. This will provide more clinical evidence in support of the efficacy of this treatment option in comparison with current therapies.

The results of this study yielded promising evidence of anti-tumor activity and better outcomes with the combination of antiangiogenic therapy with immunotherapy and chemotherapy in the treatment of MM. Because of how rare and poorly understood MM is, further research is encouraged to improve upon current treatment options and focus on differences in disease progression and treatment responses in different racial/ethnic groups.

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NEW DRUG UPDATE: POLIVY® + R-CHP

By Molly Studebaker,

Pharm.D Candidate, Class of 2026

Polivy®, otherwise known as polatuzumab vedotin-piiq, is a CD79b-directed antibody drug conjugate (ADC) used in the treatment of diffuse large B-cell lymphoma.[1] CD79b is a protein expressed on the surface of B-cells throughout the body. Polatuzumab vedotin binds to the surface antigen (CD79b) to initiate the destruction of cancerous B-cells via monomethyl auristatin E (MMAE).[2] The small antineoplastic molecule, MMAE, is a mitosis-inhibiting agent covalently linked to polatuzumab vedotin with a cleavable link. Once the monoclonal antibody binds to CD79b, it is internalized to enable delivery of MMAE, which attaches onto microtubules and kills dividing cells by halting cell division. This co-mechanism is essential for therapeutic use as MMAE produces significant toxicity when used on its own.[3]

The use of polatuzumab vedotin in of itself is not novel, as it initially gained FDA approval for the treatment of relapsed or refractory diffuse large B-cell lymphoma in combination with bendamustine and a rituximab product back in June 2019.[1] However, polatuzumab vedotin has recently proven to be particularly groundbreaking in combination with a rituximab, cyclophosphamide, doxorubicin, and prednisone (R-CHP) product, earning this most recent FDA approval April 19, 2023. This polatuzumab vedotin/R-CHP combination is now indicated in the treatment of adult patients who have previously untreated DLBCL, not otherwise specified (NOS) or high-grade B-cell lymphoma (HGBL) all having an International Prognosis Index (IPI) score of 2 or more.[2]

The effectiveness of the combination therapy of polatuzumab vedotin with R-CHP was evaluated in a randomized double-blind, placebo-controlled, multicenter study known as POLARIX. The major efficacy outcome measure evaluated was based on investigator-assessed progression-free survival (IFS). This trial enrolled 873 patients with previously untreated diffuse large B-cell lymphoma, 435 of which received polatuzumab vedotin plus R-CHP. The results found polatuzumab vedotin/R-CHP to have no statistical difference from the standard therapy of R-CHOP alone, confirming polatuzumab vedotin/R-CHP combination as appropriate for use in previously untreated DLBCL.

Polatuzumab vedotin does not have directly outlined contraindications for any specific patient population. However, it is to be used with caution as the most common adverse effect in combination therapy of R-CHP is peripheral neuropathy, with a median onset of 2-3 months after initiation. The FDA drug monograph with its recent approval updates include dosage modification to mitigate any experienced neuropathy as well as metrics to grade the symptoms (dosing chart included below). The associated neuropathy is predominantly sensory in nature, however motor and sensorimotor peripheral neuropathy is still possible. Because of this possibility, patients should be routinely evaluated as it might require a delay, reduced dose, or discontinuation of polatuzumab vedotin. In addition to this, infusion reactions are possible with administration of polatuzumab vedotin/R-CHP. To reduce reaction incidence, it is recommended that patients not already on a rituximab product be administered an antihistamine and antipyretic at least 30 to 60 minutes prior to polatuzumab vedotin with R-CHP. Lastly, it is important to note that polatuzumab vedotin with R-CHP presents significant hepatotoxicity risk in patients with pre-existing liver disease and embryo-fetal toxicity with use during pregnancy.[2]

Overall, the unique combination of polatuzumab vedotin with R-CHP proves itself as an effective therapy option for patients having newly diagnosed diffuse large B-cell lymphoma. This recent FDA approval is especially exciting as it allows for expansion in use for various forms of DLBCL and increases options for patients facing this very aggressive lymphoma.

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Table 1 Management of Peripheral Neuropathy in Patients Receiving POLIVY Plus R-CHP

Adverse reaction	Grade	Dose modification*
Peripheral sensory neuropathy	Grade 1	None
	Grade 2	If resolves to Grade 1 or lower before the next scheduled dose, resume at the same dose level. If Gr 2 persists at the next scheduled dose, reduce one dose level.
	Grade 3	Withhold until Grade 2 or lower and reduce one dose level.
	Grade 4	Permanently discontinue.
Peripheral motor neuropathy	Grade 1	None
	Grade 2 or 3	Withhold until Grade 1 or lower and reduce one dose level.
	Grade 4	Permanently discontinue.
R-CHP should be continued if POLIVY is withheld. If there is concurrent sensory and motor neuropathy, follow the guidance for the most severe neuropathy. If the grade of sensory and motor neuropathy are the same, follow the guidance for motor neuropathy.		

* Starting dose for POLIVY is 1.8 mg/kg. First dose reduction level is 1.4 mg/kg. Second dose reduction level is 1 mg/kg. No further dose reduction is recommended beyond 1 mg/kg. If further reduction needed discontinue POLIVY.

*Obtained from FDA Prescribing Information on Polivy®