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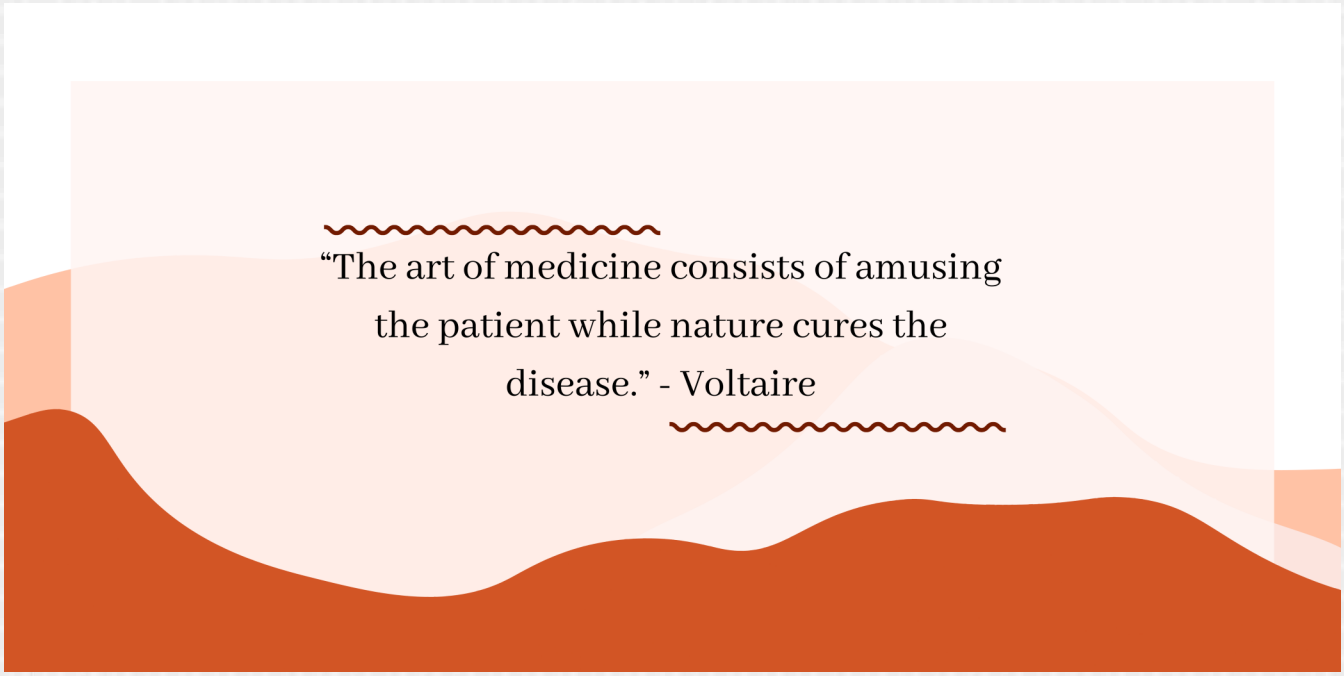
TABLE OF CONTENTS

QUOTE OF THE MONTH



Pharmaceutical Breakthrough for the Treatment of Duchenne Muscular Dystrophy

By: Rubab Hassan, PharmD Candidate c/o 2022

Duchenne muscular dystrophy (DMD) is a genetic disorder that causes muscle degeneration and weakness along with various other symptoms. It is predominantly caused by deletions of one or more exons, which lead to mutations of the dystrophin gene. Dystrophin stops muscle fibers from being degraded by proteases. Therefore, the loss of dystrophin in the body will allow muscle to be broken down, causing a multitude of health complications in patients who have DMD. [1] DMD is a rare disease, which is why viltolarsen (Viltepso™), one of the newest FDA approved treatments for DMD, is such a breakthrough. [2]

DMD affects 1 out of every 3,600 male infants worldwide and in very rare cases it can affect females. Patients with this disease usually only live until their twenties or thirties. It is an X-linked recessive allelic disorder that causes the deletion of exons resulting in unstable mRNA. This results in the production of extremely short dystrophin molecules that are degraded very quickly and lead to severe muscular dystrophy. The absence of dystrophin in patients with DMD leads to muscle membrane damage, leakage of creatinine kinase, and the replacement of muscle tissue with fat tissue. This can then lead to respiratory problems and cardiomyopathy, which has been the leading cause of the shortened lifespans of those who suffer from DMD. [2] Viltolarsen is an antisense phosphorodiamidate morpholino oligonucleotide that aims to bind to a region in exon 53 of the DMD gene pre-mRNA and prevent it from being included in the mature mRNA before translation. This technique is called exon skipping, where the goal is to mask the space where the deleted exon would be so that it is ignored during protein production. With the defective genetic material gone, the translation can carry on as normal and tell the body to produce more dystrophin. [3]

Viltolarsen was approved under the FDA's accelerated approval pathway, which looks at drugs that have great potential of providing clinical benefit for life-threatening disease states. [2] Even though the process is accelerated, the FDA takes into account the well-controlled studies that have verified the potential clinical benefits of the drugs. Further research is always needed to fully comprehend the magnitude of the potential and how beneficial the drug really is. This program allows drugs indicated for these diseases to be available to patients faster so that they can benefit from them as soon as possible. The significance of this is that since pharmaceutical breakthroughs are rare for diseases like DMD, it's crucial that patients get access to it as soon as possible to optimize the outcome. It is difficult to come across such breakthroughs due to a variety of reasons, such as the lack of understanding of rare diseases and the small population of patients that can participate in clinical trials that do aim to find treatments for these diseases. [4] The FDA's accelerated approval pathway is one way of overcoming these barriers and trying to do justice to all of patients out there who struggle with these diseases.

A study called "Safety and Dose Finding Study of NS-065/NCNP-01 in Boys with Duchenne Muscular Dystrophy" looked at the efficacy of viltolarsen in DMD patients with the mutation that can be altered with exon 53 skipping. This was a multicenter, 2-period, dose-finding study. In the first 4 weeks of this study, Period 1, the patients were randomly given either weekly IV infusions of viltolarsen 40mg/kg or the placebo. After the initial four weeks, Period 2 began and the patients were randomized once again and given weekly IV infusions of either 40 mg/kg or 80 mg/kg of viltolarsen once weekly from weeks 5 -24. [5] The primary efficacy endpoint was the change from baseline in dystrophin levels at week 25. The results of this study showed that in the patients who received viltolarsen 80 mg/kg once weekly, mean dystrophin levels had increased from a baseline of 0.6% of normal to 5.9% of normal (SD 4.5). The mean change in dystrophin levels was 5.3% ($p=0.01$). This analysis was done with a Western blot, which was normalized to myosin heavy chain. [6] Even though the numbers may seem small, any enhancement in the amount of dystrophin can improve the prognosis for patients with DMD.

The FDA approved dose of viltolarsen is 80 mg/kg once weekly given as a 60-minute IV infusion. Based on what was found in animal studies, kidney toxicity is a potential adverse event. The most common adverse events experienced by patients were upper respiratory tract infections, injection site reactions, and pyrexia. [6] There is not as much data on the safety of this drug because of the accelerated approval, but studies are being done to further evaluate the safety outcomes.

As advocates for quality pharmacotherapy and access to care, pharmacists should be aware of rare disease states and get more involved in their drug therapy. These patients should

Pharmaceutical Breakthrough for the Treatment of Duchenne Muscular Dystrophy

By: Rubab Hassan, PharmD Candidate c/o 2022

know that they are not forgotten and that their lives are just as valuable as anyone else's.

Figure 1: Viltolarsen (Viltepso ™) for injection[7]

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Emerging Frontiers in Multiple Myeloma Pharmacotherapy

By: Nishanth Viswanath, PharmD Candidate c/o 2022

Multiple myeloma (MM) is a hematological malignancy characterized by an accumulation and proliferation of monoclonal plasma cells in the bone marrow. [1] Throughout the course of the disease, malignant plasma cells induce an overproduction of non-functional immunoglobulin (paraproteins), which is evident during urine and blood screenings. [2] The production of excess immunoglobulin results in various symptomatic markers during disease progression, most notably being osteolytic lesions, bone pain and fractures resulting from abnormal production of cytokines such as IL-1, IL-16, TNF-a. [2] The net effect of this cytokine overproduction is subsequent activation of osteoclasts, and inhibition of osteoblasts resulting in bone resorption. [2] MM patients are also susceptible to renal disease induced by overload from monoclonal protein secretion, and hypercalcemia resulting from increased bone resorption.[2] Additionally, patients are frequently anemic due to the infiltration of the MM clone in the bone marrow and poor response to erythropoietin. [2] As of today, MM is incurable, as therapy is centered upon disease remission and maintaining quality of life.

The treatment of MM has advanced greatly in recent years, providing patients with novel immunomodulating and targeted agents as front-line therapy. Current treatment formulas are centered around patients' eligibility for autologous stem-cell transplantation (ASCL) , and subsequent maintenance therapy. [3] ASCL is a procedure which involves extraction of patients' stem-cells followed by pharmacological induction-lymphodepletion, and re-infusion of stem cells to allow for hematopoiesis which is free of cancer. [2] High dose induction therapy with melphalan (Alkeren) followed by ASCL was the first regimen to provide pronounced clinical efficacy in MM.[4] Though still incorporated into some regimens, melphalan has been widely replaced by induction therapy with a triple combination of a proteasome inhibitor (PI), an immune-modulatory drug (IMiD), and a corticosteriod. [3] The most common induction regimen used currently involves the PI bortezomib (Velcade®), the IMiD lenalidomide (Revlimid®), and dexamethasone (Decadron®), followed by a further maintenance regimen of lenalidomide and/or bortezomib.[3]

Consequently, in recent years additional small molecule inhibitors, monoclonal antibodies, and other targeted agents have become widely available and possess the potential to redefine current treatment standards and increase survival in patients. Novel agents have widely replaced cytotoxic chemotherapy regimens, and frequently cause clinicians to question the necessity of stem-cell transplantation to induce remission. [3] Today, clinical research continues to elucidate innovative modes of MM remission and afford patients multiple lines of therapy.

Immunomodulators:

Thalidomide (Thalomid®) was the first IMiD to be introduced to clinical practice in 1999, displaying remarkable anti-angiogenic and anti-proliferative properties along with durable response rates. [5] Though notorious for its teratogenic effects through inhibition of cereblon , which is a protein essential for embryonic morphogenesis, thalidomide exhibited unique efficacy in extending overall survival (OS) in MM patients through the same inhibitory mechanism. [5] Introduced in 2005, the second generation IMiD lenalidomide displayed more potent anti -MM action through its ability to induce cell-cycle arrest and apoptosis directly in MM cells. [5] Additionally, lenalidomide possesses multiple downstream pharmacological pathways which affect the microenvironment of MM cells including inactivation of nuclear factor-kB (NF-kB), down-regulation of C/EBPB and activation of caspase 8. [5] Through these mechanisms, lenalidomide has been established as the backbone of the majority of induction and maintenance regimens in MM pharmacotherapy. [3]

Despite the pronounced efficacy of lenalidomide in both front-line and maintenance therapy, many patients experience disease progression and seek further management. In this population, pomalidomide (Pomalyst®) is clinically effective, and has been the standard of care in the relapsed/refractory setting in recent years. [6] Pomalidomide is a novel IMiD that is constitutionally similar to lenalidomide; certain structural modifications allow pomalidomide to maintain a longer duration of action through dampened renal clearance. [6] Further research of IMiDs focuses on the clinical development of iberdomide, a novel cereblon E3 ligase modulator that has displayed antiproliferative effects on B-lymphocyte-derived tumor cell lines in vitro. [7] Though only introduced in phase 1 studies thus far, iberdomide has displayed significant immunomodulatory effects by reducing CD19+ B-lymphocyte and CD3+ lymphocyte counts

Emerging Frontiers in Multiple Myeloma Pharmacotherapy

By: Nishanth Viswanath, PharmD Candidate c/o 2022

in peripheral blood and reductions in IL-1B with high potency, causing it to be effective at strengths as low as 0.3mg. [7] Through its increased binding affinity for cereblon, iberdomide shows early potential to overcome lenalidomide and pomalidomide resistance, and be efficacious in the heavily pre-treated population. [7] Further research will elucidate the potential synergistic effects of iberdomide in combination with other anti-MM agents in the front-line and refractory setting.

Proteasome inhibitors:

Since the approval of bortezomib in 2003, PIs have become a therapeutic mainstay for both the initial and refractory treatment of MM. [8] PIs exert their pharmacological activity by inhibition of the 26s proteasome unit, which intrinsically degrades misfolded/mismatched proteins targeted by ubiquitin. [8] Recycling of damaged and unrepaired proteins is essential for the natural function of MM cell lines, and results in their proliferation and survival. [8] Inhibition of proteasomes disrupts this cycle, and results in subsequent degradation of the MM cell. [8] Early clinical research of PIs revealed that malignant cells require an increased amount of protein recycling and production due to their rapid rate of division, making proteasomes a suitable target to maintain efficacy and diminish adverse reactions. [8] Though efficacious, bortezomib resistance frequently occurs and results in treatment failure. Carfilzomib (Kyprolis®) is an epoxyketone PI that has displayed inhibitory properties of bortezomib-resistant MM cell lines, and is reserved for patient populations that are refractory to bortezomib. [8] As bortezomib inhibits proteasomes via a reversible mode of substrate binding, carfilzomib acts in an irreversible fashion further increasing efficacy. [8] Additional advancements in the clinical research of PIs resulted in ixazomib (Ninlaro®), which was the first orally administered PI to be incorporated into practice. [8] Initial confirmatory trials of ixazomib displayed remarkable efficacy in combination with lenalidomide and dexamethasone vs. lenalidomide and placebo, displaying an overall response rate (ORR) of 78.3% and 71.5% respectively (P = 0.03). [8]

Bortezomib, carfilzomib and ixazomib all act pharmacologically on the B5 subunit of intracellular proteasomes. [8] The investigational PI marizomib enhances this degree of action by irreversibly binding to the B5 subunit, along with the B1 and B2, the other major catalytic sites of enzymatic activity. [8] In a phase two study, marizomib was administered to 68 patients who were refractory to prior carfilzomib and a partial response (PR) was observed in five patients (7.4%). Additionally, another notable attribute of marizomib is the potential to act on intracranial myeloma lesions and display clinical characteristics in brain metastases, rendering it one of the few agents to have efficacy in metastatic disease. [8] Further work will need to be done to evaluate the utilization of marizomib in doublet and triplet-based regimens, as well as the clinical efficacy of other investigational PIs such as oprozomib and delanzomib. [8]

Monoclonal Antibodies:

The initial use of antibody-based therapies in MM began with the introduction of elotuzumab (Empliciti®). Elotuzumab is an IgG1 monoclonal antibody that targets the signaling lymphocyte activation molecule member family 7 (SLAMF7) protein. [9] By binding to SLAMF7, elotuzumab exerts antibody-dependent cellular cytotoxicity by facilitating the interaction between natural killer cells and malignant MM cells. [9] Though found to be non-efficacious as a single agent, elotuzumab has demonstrated objective clinical efficacy in combination with lenalidomide, dexamethasone, and/or bortezomib in the refractory setting with minimal increments in toxicity. [10] Another early antibody-based agent in the treatment of MM is daratumumab (Darzalex®), which is a first in class anti-CD38 modulator with antitumor activity. [10] CD38 is a transmembrane glycoprotein which facilitates communication with certain cell surface receptors, causes an influx of intracellular calcium, and mediates signal transduction in lymphoid and myeloid cells. [10] By inhibiting CD38, daratumumab induces cellular toxicity, apoptotic effects caused by inhibition of cellular signaling pathways, and immunotherapeutic effects by generating a greater expansion of clonal T-effector cells. [10] The clinical efficacy of daratumumab has been well established, causing it to be indicated in front line and refractory settings, and in combination with a variety of IMiDs, PIs, and cytotoxic agents. [10]

Isatuximab (Sarclisa®) is a second-generation anti-CD38 antibody that displays similar in-vitro anti-MM activity to daratumumab, with certain pharmacological modifications rendering it more potent. [10] Having slightly more affinity to the

Emerging Frontiers in Multiple Myeloma Pharmacotherapy

By: Nishanth Viswanath, PharmD Candidate c/o 2022

CD38 epitope than daratumumab, isatuximab has stronger activity in inhibiting intracellular calcium influx and cross-cell communication. [10] Additionally, isatuximab induces direct apoptosis without cross linking of receptors, leading to more efficient pharmacodynamic activity. [10] This biological activity translates into clinical efficacy in the refractory population, as isatuximab has demonstrated notable activity in improving progression-free survival (PFS) in MM patients who have relapsed after therapy with lenalidomide and a PI. [10] In the ICARIA-MM trial, 307 patients who were refractory to at least two therapies including lenalidomide and a PI were randomized in a 1:1 ratio to receive either pomalidomide + dexamethasone (Pd) or isatuximab + pomalidomide + dexamethasone (Isa-Pd). [11] Both groups received therapy in 28 day treatment cycles until progression or unacceptable toxicity. [11] At follow up, the median duration of treatment was 41 weeks for Isa-Pd group compared to 24 weeks for Pd group, and the average PFS was 11.53 months (95% confidence interval: 8.94 - 13.9) in the Isa-Pd group and 6.47 (95% confidence interval: 4.47 - 8.28) in the Pd group. [11] This improvement in average PFS translated into a 40% reduction in the risk of disease progression in a heavily pre-treated population. [11] Future studies of isatuximab will be needed to elucidate its efficacy in combination with PIs and other chemotherapeutic regimens. [10]

In spite of the availability of targeted agents with multiple pharmacological pathways and modes of action, many patients are refractory to all established lines of therapy. Since many patients who progress on all available agents maintain durable performance statuses and present with further treatable malignancies, this population represents a significant unmet need in the treatment of MM. [12] The capacity of belantamab mafodotin (Blenrep®) to serve such patients indicates an important line of therapy in refractory MM. [12] Belantamab mafodotin is an anti B-cell maturation agent (BCMA), and is the first antibody-drug conjugate (ADC) to be used in MM therapy. [12] ADC-based therapy involves the use of a targeted monoclonal-antibody (mAB), tethered to a cytotoxic agent adjoined by a linking structure. [12] This mode of pharmacological activity allows for the use of a highly effective cytotoxic molecule, augmented by the targeted effects of a mAB causing the therapy to become more directed and lead to less off-target adverse events. [12] ADCs have been broadly explored in clinical trials for many years, but have only been implicated in clinical practice recently with agents such as belantamab mafodotin. [12] BCMA, also known as CD269, is a tumor necrosis factor transmembrane receptor which plays a critical role in B-cell maturation of both malignant, and natural cells. [12] Additionally, BCMA enhances the survival of plasmablasts and plasma cells but is not critical for the homeostatic mechanisms of B-cell stability. [12] This makes BCMA an ideal target for the cytotoxic effects of monomethyl-auristatin F (MMAF), which is a small molecule agent that is adjoined to the linker within belantamab mafodotin and becomes internalized and released once BCMA is targeted. MMAF is a microtubule inhibitor that induces apoptosis of B-cells through antibody-dependent cellular toxicity and antibody-dependent cellular phagocytosis. [13] In phase III studies, 30% [21%, 43% (97.5% CI)] of patients who received belanatamab mafodotin and received at least 3 prior lines of therapy experienced an objective response to therapy, and 2% of patients were complete responders. [13] An interesting toxicity associated with belantamab mafodotin however is frequent corneal and ocular events resulting in microcystic epithelial damage. [12] The role of belantamab mafodotin in this toxicity profile is unclear, but it is known that other targeted agents that incorporate MMAF host a similar degree of adverse events. [12] As BCMA is not expressed in the cornea, it is thought that non-specific uptake of MMAF in the cornea contributes to the destruction of actively dividing cells in the basal layer of the cornea. [12] Certain degrees of this toxicity can result in vision loss, dry eyes, and corneal ulceration as denoted by a black box warning. [13] Because of this, it is imperative that patients undergoing therapy with belanatamab mafodotin are monitored by both oncologists and ophthalmologists to assess toxicity levels. [12,13]

Novel nuclear transport regulation:

The intermembrane domains of both hematological and solid tumor cells maintain a mechanism that mediates the transfer of exportin 1 (XPO1) between the nucleus and cytoplasm. [14] This transport mechanism facilitates the export of tumor suppressor proteins that may potentially induce apoptosis of malignant cells when retained. [14] Normal homeostatic activity within malignant cells prefers the export of these tumor suppressor proteins out of the cell, where they are rendered unusable. [14] The discovery of selinexor (Xpovio®) caused this mechanism to be one of

Emerging Frontiers in Multiple Myeloma Pharmacotherapy

By: Nishanth Viswanath, PharmD Candidate c/o 2022

particular interest in MM therapy, as selinexor works by inhibiting nuclear export action in cancer cells. [14] Such agents are considered selective inhibitors of nuclear export (SINE), and play a major role in the treatment of refractory MM due to their favorable toxicity profile, ease of administration, and synergistic effects with other common agents. [14] Additive administration of selinexor with dexamethasone results in coactive inhibition of MM proliferation through further phosphorylation of glucocorticoid receptors, notably in dexamethasone resistant cell lines. [14] Additionally, selinexor in combination with PIs reduce Akt and Bcl-2, activates various caspases and their association with autophagy-inducing p62 and LC3II, and increases nuclear retention of inactivating IkB-NFkB complexes, even in MM cells previously resistant to PIs. [14] Moreover, selinexor also diminishes osteoclast formation via both, inhibition of IL-2, IL-10, VEGF, and MIP1B secretion, and blockade of RANKL-induced NFATc1 induction in osteoclast precursors. [14] These pharmacological characteristics cause selinexor to be a favorable agent in combination therapy, as it is indicated in combination with bortezomib and dexamethasone for the treatment of MM in patients who have received at least one prior therapy. [15]

Therapeutic peptide vaccination:

Therapeutic vaccination of neoplasms and malignancies has remained a concept explored in a variety of tumor types, since the introduction of early agents such as sipuleucel-T (Provenge®) and talimogene laherparepvec (Imlygic®) in prostate cancer and melanoma respectively. [16] Vaccination efforts in MM have been partially explored, with a primary limitation being discovering an antigen that is widely expressed on malignant cells in MM for an immune response to be mounted. [16] Mucin 1 (MUC1) is an antigen that is present on 90% of malignant MM cells, and is a re-engineerable glycoprotein that is found on many other cancer cells as well. [16] Initial vaccines using MUC1 as an antigen have displayed inconsistent efficacy due to the variability of antibodies produced, which are unable to differentiate between endogenous and synthetic MUC1. [16] Additionally, previous modulations of MUC1 to create a therapeutic vaccine candidate have failed in causing all relevant major histocompatibility complexes (MHC) to recognize the epitope and generate an adequate immune response to malignant cells. [17] VXL-100, or ImMucin, is a novel therapeutic vaccine that mimics MUC1 and contains the entire MUC1 signal peptide (SP) domain, and is proposed to mount more efficacious anti-cancer immunotherapy effects. [17] The clinical efficacy of ImMucin thus far is limited but compelling, as evidenced in an early phase 1 study seven of nine patients who possessed stable disease maintained their disease status for at least 60 weeks. [17] Proper dosing regimens and further studies may elucidate the use of ImMucin in induction of minimal residual disease (MRD) and possibly complete disease remission. [17]

Conclusion:

The treatment paradigm of MM has revolutionized over the past few decades and has significantly improved clinical responses and overall survival in patients. The multitude of possible regimens and lines of therapy has afforded patients many options in front line and refractory disease, causing patients to maintain stable disease and live longer. Lenalidomide and or PI use post ASCL transplant has remarkably furthered disease control and remission, and has set a standard for early pharmacotherapy and management. [5] Novel agents in MM therapy may augment this efficacy, and lead to the possibility of minimal residual disease statuses. Further research is still needed to further elucidate the utility of such agents used in combination, as well as the potential therapeutic benefit of ImMucin.

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Desmopressin Challenge for Von Willebrand's Disease in the Setting of Myasthenia Gravis

By: Oluwafemi Popoola, PharmD Candidate c/o 2021, SUNY Binghamton School of Pharmacy & Pharmaceutical Sciences

A patient with past medical history of von Willebrand's disease (VWD) and myasthenia gravis on chronic prednisone therapy, presented for follow-up for VWD at the hematology/oncology clinic. The provider considered having the patient undergo a "desmopressin challenge" with desmopressin sublingual (Nocdurna®). The provider's goal was to assess the efficacy of desmopressin for future use in minimizing bleeding during an active bleed or peri-procedurally.

Von Willebrand's Disease is a bleeding disorder in which the body does not produce adequate von Willebrand's factor, a clotting protein. [1] Desmopressin is an antidiuretic hormone (ADH) analog that increases cyclic adenosine monophosphate (cAMP) in renal tubular cells. This results in decreased urine volume and increased urine osmolality, as well as increased plasma levels of von Willebrand factor (VWF). [2] As such, desmopressin can be used in VWD. Specifically, desmopressin leads to the release of endogenous VWF from storage sites in endothelial cells. [5] One of the adverse effects of desmopressin is hyponatremia, for which there is a black box warning. Of note, there is a contraindication with the concurrent use of prednisone and both the sublingual and intranasal formulations of desmopressin as it also causes severe hyponatremia.[2] That being said, the risk of severe hyponatremia may exist with other desmopressin formulations.

The New Drug Application of desmopressin sublingual acknowledged that systemic or inhaled corticosteroids may lead to fluid retention and hyponatremia. This contraindication was based on severe cases of hyponatremia reported with intransal desmopressin spray (Noctiva®) for the treatment of nocturia due to nocturnal polyuria. The reason being that concomitant administration of desmopressin and systemic corticosteroids may synergistically decrease serum sodium levels. However, looking at the two dosing studies conducted in phase 3 trials for sublingual desmopressin (CS40—women & CS41—men), no patients with concomitant corticosteroid use had a serum sodium level ≤125 mmol/L at the proposed doses (25 mcg in females and 50 mcg in males): 4 of 8 patients in the treatment group had a decreased serum sodium level to <135 mmol/L versus 0 of 5 patients in the placebo group. [3] However, given the higher incidence of patients who had decreased serum sodium compared to placebo, the contraindication was introduced for sublingual desmopressin, implicating the same contraindication for intranasal desmopressin as well.

Table 1: The Number of Cases with Hyponatremia at any Post-Baseline Visit in Relation to the Concomitant use of Corticosteroids by Sex and Age at the Proposed Doses (25 mcg for Women and 50 mcg for Men) in Studies CS 40 and CS 41 (Captured from Summary of Clinical Safety) [3]

Serum Sodium (mmol/L)	Females				Males			
	Placebo		25 mcg sublingual		Placebo		25 mcg sublingual	
	<65 years	≥65 years	<65 years	≥65 years	<65 years	≥65 years	<65 years	≥65 years
Inhaled Glucocorticoid								
Observed (N)	3	1	1	1	0	1	3	3
<135	0	0	0	1	0	0	1	2
130-134	0	0	0	1	0	0	1	2
126-129	0	0	0	0	0	0	0	0
≤125	0	0	0	0	0	0	0	0
Systemic Glucocorticoid								
Observed (N)	2	0	0	0	0	4	1	1
<135	0	0	0	0	0	0	0	0
Observed (N) = number of subjects reporting concomitant use of inhaled or systemic glucocorticoid								

That being said, it is worth noting that both studies only looked at the long-term use of desmopressin for nocturia and chronic corticosteroid use. Additionally, another study found that in patients taking desmopressin, the mean time to the majority of clinically significant hyponatremia events occurred within 2–3 weeks of treatment initiation. [4] Given that our patient will be receiving desmopressin at the hematology/oncology infusion clinic for an intermittent period, it may be reasonable to administer desmopressin with concomitant corticosteroid with close monitoring of serum sodium levels. Per the package insert recommendation for hyponatremia concerns, the patient should have normal baseline sodium levels obtained prior to starting or continuing desmopressin. [2] Additionally, sodium levels should be monitored within a week to a month after starting desmopressin, modifying the dose, and while receiving desmopressin intermittently to ensure the sodium level are within normal range. [2] If the patient is > 65 years old or at an increased risk for hyponatremia, more frequent monitoring is required. [2] More importantly, if the patient does have hyponatremia, desmopressin should be held and re-evaluated for modification or potential discontinuation. [2]

Desmopressin Challenge for Von Willebrand's Disease in the Setting of Myasthenia Gravis

By: Oluwafemi Popoola, PharmD Candidate c/o 2021, SUNY Binghamton School of Pharmacy & Pharmaceutical Sciences

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Correlation of Salt-Intake and Hypertension

By: Jordan Plair, PharmD Candidate c/o 2022 and Marina Beshara, PharmD Candidate c/o 2022

While the focus over the last year has been fixated on the deadly coronavirus, the importance of a long-standing health pandemic exacerbated by salt intake cannot be overlooked. Hypertension, more commonly referred to as high blood pressure, is a medical condition that affects nearly 50 percent of adults in America. [1] That number has been gradually increasing but because the effects of chronic hypertension are not seen acutely, it can be considered a "quiet pandemic." [2] One of the major factors contributing to hypertension in America is diet, specifically the exorbitant amount of salt present in the diet. Diets heavy in salt not only increase blood pressure, but can also increase the risk of heart attacks and strokes. The magnitude of this harm places salt among the list of major killers in America. [2]

Salt increases blood pressure due to its sodium content. When too much sodium is in the body, the body holds on to extra water to wash the salt from the body. This excess water puts stress on the heart and body, ultimately causing blood pressure to rise in some people. [3] Over time, the excess salt will continue to elevate blood pressure and the risk of cardiac problems, such as a heart attack. Evidently, by lowering sodium intake, there is a reduction in blood pressure and a decreased risk of experiencing complications from uncontrolled cardiovascular disease. [4] Foods that are high in sodium and should be limited include processed and canned foods, deli meats, condiments, chips and frozen items. [5] Exercising daily is another means of combating excess salt. When exercising, sodium is lost through sweat, thus helping to reduce sodium levels in the body. [3]

Based on the most recent guidelines published by the American Heart Association (AHA) in 2017, blood pressure can be categorized in four different ways: normal, elevated, stage 1 hypertension, and stage 2 hypertension. Quantitatively speaking, elevated blood pressure refers to a blood pressure reading of 120-129 mmHg/<80 mmHg. Stage 1 of hypertension is defined as 130-139 mmHg systolic blood pressure or 80-89 mmHg diastolic blood pressure. Stage 2 hypertension is defined as ≥ 140 mmHg systolic blood pressure or ≥ 90 mmHg diastolic blood pressure. A diagnosis cannot be made based on only one elevated BP measurement. An elevated value from the average of two or more measurements, present during two or more clinical encounters, is needed to diagnose hypertension. [6] A normal blood pressure is < 120 mmHg/ <80 mmHg. When there is an elevated blood pressure then lifestyle modifications are strongly recommended to prevent or delay progression to hypertension, which would warrant pharmacologic treatment. [6]

The sodium intake of both males and females in America exceeds the recommended daily limit. According to the updated 2020-2025 dietary guidelines, it is recommended that an average adult American should consume less than 2300 mg of sodium per day. [7] The sodium intake is much higher than recommended due to consumption of foods that are high in sodium such as pizza, burgers, meat, rice, etc. [7] The Dietary Approach to Stop Hypertension (DASH) is a diet initiative that is used as part of lifestyle modifications to help individuals control their sodium intake. The DASH eating plan includes vegetables, fruits, low-fat dairy products, whole grains, poultry, fish, beans and nuts. [7] This eating plan includes many food options that are not high in sodium.

There are many ways to manage dietary intake while consuming moderate amounts of sodium. Consuming fruits and vegetables, foods rich in omega-3 fatty acids such as salmon, low-fat dairy products, etc. can play a huge role in lowering blood pressure and losing weight. [6] Salt is a major staple in many recipes so avoiding it entirely may not be feasible, however, limiting salt in the diet based on the dietary recommendations is crucial to promoting heart health.

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FDA approves Vibegron (Gemtesa®) for the Treatment of Patients with Symptoms of Overactive Bladder

By: Arya Firoozan, PharmD Candidate c/o 2023

Overactive bladder (OAB) is a condition that causes a sudden and frequent urge to urinate. It is also associated with incontinence and nocturia. Nocturia refers to waking up at night due to the urge to urinate. OAB is diagnosed if there is no other current infection or pathological reason for increased urination. [1] Patients diagnosed with OAB oftentimes complain that they have to urinate too frequently during the daytime. Males have a higher prevalence of OAB without incontinence (overactive bladder syndrome dry), while females have a higher prevalence of OAB with incontinence (overactive bladder syndrome wet). The prevalence of OAB in women gets significantly higher with age. OAB affects many patients in the United States and has a national cost of 66 billion dollars annually. [1] In December 2020, the Food and Drug Administration (FDA) approved vibegron (Gemtesa ®) as a new treatment for the symptoms of OAB. This novel drug is manufactured by Urovant Sciences. [2]

Initial treatment of OAB primarily involves lifestyle modification. Patient education regarding adjustment of fluid intake and dietary adjustments plays a major role in managing OAB. Bladder training and pelvic muscle training may also have some use to regain control over the bladder. [1] Drug treatments are only initiated after these initial lifestyle modifications are tried.

Antimuscarinic/anticholinergic medications are the main drug class that are used for the treatment of OAB. These include medications such as oxybutynin and tolterodine. Medications with anticholinergic properties have side effects that can be potentially harmful to the elderly. These include an increased risk of falls, fractures, confusion, blurred vision, and sedation. In addition, a study performed in the UK showed an association between anticholinergic medications and an increased risk of dementia. [3] These potentially severe side effects should be kept in mind by physicians and pharmacists when dealing with OAB in elderly patients.

Vibegron works as a selective beta-3 adrenergic agonist. This class has been more recently used as an alternative to anticholinergics. One of the first members of this class, mirabegron (Myrbetriq®), has been used to treat OAB since 2013. One of the unique features that distinguishes vibegron from mirabegron is that vibegron is unlikely to be metabolized by the CYP3A4 or CYP2D6 enzymes, which makes for lower risk of drug interactions. [3] Mirabegron is a minor substrate and inhibitor of CYP2D6. Thus, if it is co-administered with another CYP2D6 substrate, mirabegron can increase the concentration of the other agent. [4]

The FDA approved vibegron based on evidence from one clinical trial conducted in April 2018. In this phase 3, randomized, double-blind, placebo and active (tolterodine) controlled multicenter trial, patients received once daily treatments with either vibegron, placebo or tolterodine. Patients receiving vibegron received a 75mg oral dose per day for twelve weeks and were asked to record the number of urgency episodes over the twelve weeks, along with the frequency of incontinence episodes. The participants also filled out questionnaires about their quality of life regarding OAB. [5] The patients that completed the trial reported a decrease of 1.8 micturition episodes per day vs. a 1.6 episode decrease for tolterodine. There was an average decrease of 2 incontinence episodes per day for vibegron vs. a 1.8 episode decrease for tolterodine. The adverse effects were all similar between the placebo, vibegron and tolterodine. [6] However, concomitant use of vibegron with digoxin raises some concerns. Vibegron can increase the maximum concentration levels of digoxin in the body, so serum digoxin levels should be monitored before initiating and during therapy with vibegron. There is no available data on vibegron use in pregnant women, however vibegron had no effects on development during animal studies. [7]

Overactive bladder syndrome is a common issue that has a potentially large impact on a patient's quality of life. Looking to the future, vibegron could be efficacious in improving OAB symptoms as either a first or second-line option. Current assessment and diagnosis of the disease usually lead to antimuscarinics or mirabegron being prescribed. Vibegron presents itself as an option that has fewer drug interactions, but more research comparing it to its beta-3 adrenergic agonist family members, namely mirabegron, must be completed for it to cement itself as a viable alternative.

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FDA approves Vibegron (Gemtesa®) for the Treatment of Patients with Symptoms of Overactive Bladder

By: Arya Firoozan, PharmD Candidate c/o 2023

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Connecting the Dots: Ankylosing Spondylitis and Heart Disease

By: Jennifer Galvet, PharmD Candidate c/o 2024

Ankylosing spondylitis (AS) is a systemic inflammatory condition that primarily affects a person's back.[1] It is a form of arthritis that affects the spine and causes inflammation of the spinal joints, leading to severe, chronic pain and discomfort.[2] Ankylosing spondylitis can also impact other areas of the body, including the shoulders, ribs, heels, and the small joints of the hands and feet.[2] Most importantly, the condition is linked to cardiovascular disease.[1]

The connection between ankylosing spondylitis and heart disease

The Spondylitis Association of America (SAA) has concluded that AS places patients at increased risk for numerous cardiovascular diseases. Ischemic heart disease, for example, is defined by inadequate blood supply to a local area due to blockage of the blood vessels supplying the area. Blood flow, and therefore oxygen, is restricted to the heart and can ultimately lead to heart attack.[3] The risk of conduction disturbances; the heart beating either too slow or too fast, is increased in those with AS. In a healthy heart, electrical impulses travel down the left and right branches of the ventricles at the same speed, allowing both ventricles to contract simultaneously. When these conduction disturbances occur, electrical signals take an alternative path through the ventricles, resulting in arrhythmia. [4] Cardiomyopathy, classified by the enlargement and weakening of the heart, and aortitis, inflammation of the aorta, are both linked to AS as well. [1]

Chronic inflammation associated with AS can strain the heart over time, according to the Arthritis Foundation, and this inflammation can increase the risk of heart attack, stroke, atrial fibrillation (irregular heartbeat), atherosclerosis (buildup of plaque in arteries), high blood pressure, and heart failure.[1] Inflammation can potentially promote the growth of plaques, loosen plaque in the arteries, and trigger blood clots, the primary cause of heart attacks and strokes.[5] A 2015 meta-analysis determined that those living with AS had a substantial increased risk of coronary heart disease in comparison with the general population. [9]A 2018 study looking at medical and pharmacy claims determined that genetic factors could also play a role in the connection between AS and cardiovascular disease.[10] An additional study researched the prevalence of comorbidities associated with AS in 6,679 people aged 18 and older. In comparison with a control group, those with AS had higher rates of angina, myocardial heart attack, atherosclerosis, cerebrovascular disease or stroke, venous thromboembolism, coronary artery disease, and hypertension.[1] However, researchers did not specifically look at potential causes. They determined that genetic factors are potentially responsible for the higher rates of cardiovascular disease in people with AS and that these commonalities between both diseases might make AS a marker for cardiovascular disease. [1] A 2006 meta-analysis of published scans confirmed sites on chromosomes 3q, 6p (the major histocompatibility complex), 10q, 16q and 19q in AS susceptibility. Non-major histocompatibility complex candidate gene analyses have confirmed that the IL-1 gene complex is also responsible for nearly half of the susceptibility to AS and comorbidities such as heart disease. [11] The use of genotyping chips, derived from the International Hapmap resource, which provides an extensive genomic coverage of large disease cohorts, made it possible to conduct these successful genome-wide association studies. This led to the identification and validation of the IL-1 gene complex.

Treating Ankylosing spondylitis while maintaining heart health

Nonsteroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen (Advil® and Motrin®) and naproxen (Aleve®) are the primary treatment for AS. The mechanism of action of NSAIDs involves the inhibition of the enzyme cyclooxygenase (COX). Cyclooxygenase is required to convert arachidonic acid into thromboxanes, prostaglandins, and prostacyclins. The therapeutic effect of NSAIDs is the result of the lack of these eicosasnoids. Through the inhibition of this enzyme, thromboxanes are inhibited from their role in platelet adhesion, and prostaglandins are unable to cause vasodilation, increase temperature set point in the hypothalamus, or play a role in nociception.[6]

Nonsteroidal anti-inflammatory drugs are associated with an increased risk of cardiovascular incidents, diclofenac (Voltaren®) appearing to have the highest.[1],[6] However, a 2015 study involving more than 400 participants living with AS determined that infrequent use of NSAIDs actually presented a higher risk of a cardiac event compared to long term use.[1] Prednisone, a steroid used to treat many diseases associated with inflammation, is another medication used for the treatment

Connecting the Dots: Ankylosing Spondylitis and Heart Disease

By: Jennifer Galvet, PharmD Candidate c/o 2024

of AS1. Prednisone decreases inflammation by suppressing the migration of polymorphonuclear leukocytes and reversing increased capillary permeability. [7] However, prednisone can complicate heart health because of its associated risk of hypertension, hyperlipidemia, and atherosclerosis. To combat this, many disease-modifying medications and biological drugs for AS are used to help reduce inflammation in the body while protecting the heart.[1] Such agents include TNF alpha inhibitors such as etanercept (Enbrel®), Infliximab (Remicade®) , Adalimumab (Humira®), Golimumab (Simponi®), and Certolizumab pegol (Cimzia®) or IL-17 inhibitors such as secukinumab (Cosentyx®) and ixekizumab (Taltz®) when the response to TNF alpha inhibitors is inadequate. [8]

Lifestyle changes that prevent cardiovascular disease

Although there is an increased risk of heart disease associated with AS, lifestyle changes may decrease this risk. Quitting or avoiding smoking, eating a healthy diet, maintaining a moderate weight, engaging in regular exercise, and adhering to AS treatment(s) help protect heart health. Controlling blood pressure, limiting alcohol consumption, managing stress and any other chronic illnesses, such as diabetes, will lower the risk of heart disease substantially. Regular doctor visits are imperative to the management of AS as well. [1]

An individual living with Ankylosing spondylitis is already at increased risk of heart disease due to chronic inflammation and potential genetic factors. Continuing to maintain a healthy lifestyle and adhering to all medical advice from your health care providers, while being aware of the associated risks, is essential in taking control of one's health and preventing heart disease.

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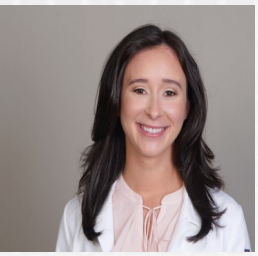
RHO CHI POST: TEAM MEMBERS

@ Jason Ifeanyi

6th Year, STJ; Editor-In-Chief

Last year I had the pleasure of serving as Social Media Manager and Staff Editor for the Rho Chi Post. It was amazing to see the growth we had as an organization , and the many students, faculty, and pharmacists we were able to connect our content with. I aim to continue and expand upon this growth as the new Editor-In-Chief this academic year. I look forward to working alongside this group of talented and driven students to effectively deliver newsletter publications that keep readers up to date on advancements made within the field of pharmacy .



@ Katharine Russo, PharmD

Graduate Copy Editor [Content-Focused]

The Rho Chi Post as been a forum for students, faculty, and staff to advance their knowledge in the field of pharmacy since 2011. The platform allows for students to practice their written communication skills while offering an innovative and creative workspace to bring together various aspects of the pharmacy profession. My involvement with the RCP during my years of study greatly impacted my education and I look forward to continuing my contributions as I start my career as a clinical pharmacist

@ Lexie Villariasa

6th Year, STJ; Copy Editor [Graphics-Focused]

With the world of pharmacy changing day by day, it can be challenging to keep up with all the updates. The Rho Chi Post provides an excellent platform for students to share their insights and thoughts on the happenings within the field. I'm excited to join the Rho Chi Post and a team that is passionate about the profession. With a passion in graphic design, I hope to continue the vision the newsletter has and am grateful for the opportunity to do so!

@ Nancy Yousry

5th Year, STJ; Finance & Outreach Manager

Beyond grateful and excited to embark on carrying Rho Chi's Mission of providing an invaluable literature medium to the Student Community in an empowering and influential way. In these ever changing times, it is crucial now more than ever to take on the invaluable active role of listening, learning and understanding the change of dynamics within our communities and what that means towards the future of Healthcare and the Pharmaceutical Field in its constant interdisciplinary evolvement. As Finance and Outreach Manager of the Rho Chi Post, I aim to ensure inclusivity in sharing diverse perspectives and raise awareness of just how capable we are as future Pharmacists in being able to innovate revolutionary solutions while advocating for our Passions, Profession and the sustainable wellbeing of our Patients.

@ Anna Diyamandoglu, PharmD

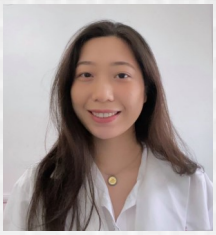
Graduate Copy Editor [Content-Focused]

Throughout my time in the PharmD program, my understanding of pharmacy as a profession has evolved and deepened as much as my desire to create awareness, particularly to non-science students, about the diverse role pharmacy plays in various healthcare and non-healthcare settings. I have always had an affinity for writing and look forward to combining my interests in literary composition, editing and pharmacy to produce relevant issues which both pharmacy students and non-pharmacy students alike will find relatable and take an interest in.

@ Daniela Farzadfar, PharmD

Graduate Staff Writer

Pharmacy is a constantly evolving profession. Writing for the Rho Chi Post gives me the opportunity to enlighten my peers and myself on changes occurring in the field that we are often not taught in the classroom. The Rho Chi Post serves as a creative outlet where students can express their opinions and share new information by combining their passion for writing and the pharmacy profession. I hope that my contribution to this newsletter inspires others to improve patient outcomes by staying up to date on recent changes.



@Mandy Zheng

4th Year, STJ; Copy Editor [Graphics-Focused]

I am excited to be a part of Rho Chi Post, a place for pharmacy students to share insights, opinions, and new discoveries. As future pharmacists, the issues that exist in the US healthcare system will have to be addressed and improved by us. Rho Chi Post informs students on all aspects of pharmacy and serves as an example and inspiration for others. Pharmacy is an ever-changing and dynamic field, and there are vast career opportunities and pathways for pharmacy students. I look forward to working, listening, and learning from my fellow students and future colleagues; and I hope to serve as a guidance to others as others have done for me.

@ Aiša Mrkulić

6th year, STJ; Social Media Manager & Staff Writer

"I am excited to have the honor of serving on the 2021-2022 Executive Board as Social Media Manager, eager to showcase the award-winning work of our editorial team, staff and contributing writers alike. Since joining the Rho Chi Post as a Staff Writer, I have been a frequent contributor to the newsletter—sought out by prospective staff writers interested in using cowriting as a springboard for their own involvement with the Post. If this tells us anything, it's that the potential for expansion over the coming year is promising! Those interested in applying for the Staff Writer position always have the option to collaborate with our published authors. Certainly, all are free to contribute independently at any point; however, those who may be hesitant to do so might benefit more from a firsthand account of newsletter writing, with the added bonus of guidance from one of our own—a polished writer familiar with the process.

RHO CHI POST: TEAM MEMBERS

@ Ashley Dao

4th Year, STJ; Website Liaison

The Rho Chi Post offers a place for students, alumni, and faculty to collaborate and share their experiences. Each bringing their own perspectives and opinions. I am very excited to be part of the Rho Chi Post team. As someone who has always had a love for writing, I am grateful for the voice that the Rho Chi Post has given me. I have also had the opportunity to learn from the articles published by my peers. I hope that I can encourage more students to contribute to the Rho Chi Post. After all, without conversations, there can be no change

@Rubab Hassan

6th Year, STJ; Staff Writer

The Rho Chi Post gives pharmacy students the opportunity to explore their interests, whether it be editing, writing, or graphics, while also enhancing their skills and knowledge as student pharmacists. I am excited to be a part of the Rho Chi Post because it is a great way to expand on what I have learned during my time in pharmacy school and also keep developing my writing skills. Being a writer gives me an outlet to raise awareness on the advancements that are constantly happening in the field of pharmacy and allows me to be part of an amazing team in hopes of providing other students with our best work.

@ Zarnab Jillani

6th Year; STJ; Staff Writer

The Rho Chi Post is a great platform for students to not only apply what they have been learning in school, but to break norms and report on pharmacy related events that are not always addressed in an academic setting. I look forward to writing for the Rho Chi Post because it will give me a way to delve deeper into what I'm studying at the moment and give me a chance to share that with my peers. Moreover, with the constantly changing world of pharmacy it is important to stay up to date and present the information in a creative way.

@ Natalia Loomis

6th Year STJ; Staff Writer

The profession of pharmacy and what a pharmacist entails is an ever evolving journey. Rho Chi Post becomes an excellent resource in tracking these advances. It provides student pharmacists to not only read and become educated on what other paths might be in store for them, but to become part of the team and create their path. I am so thankful and excited for the opportunity to become a staff writer for the RCP; allowing myself to use my creative ability to not only create my path, but write content to shed a light on all the amazing opportunities that of being a pharmacist entails.

@ Mah Noor

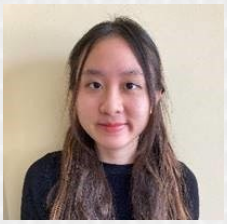
Graduate, STJ; Staff Writer

Rho Chi Post is an amazing student-operated newsletter publication that is doing an astonishing job delivering updated news as well as giving students the opportunity to give back to the pharmacy community. As a staff writer, I hope to play a key role in educating students on the different aspects of pharmacy and how much growth takes place in this field. Reading the Post since freshman year has helped me gain a better understanding of what it means to be a pharmacist and I hope to achieve that same understanding in students who read my articles.

@ Bisma Sekhery, PharmD

Graduate STJ; Staff Writer

There are two things I am passionate about one which is pharmacy and the second which is writing. The Rho Chi Post is a professional newsletter, which allows students to educate as well as learn more about the field of pharmacy as it evolves. I am beyond excited to contribute to this newsletter and provide my fellow classmates and peers interesting news about pharmacy. I have always enjoyed reading The Rho Chi Post articles throughout pharmacy school. The articles were interesting and educational. This allows me to make an important contribution to society and spread awareness not only of new drugs and advancements in the field, but current issues in the pharmacy world. Having a voice is very important and writing for this newsletter allows me to have one.



@ Holly Nguyen

4th Year, STJ; Staff Editor

I am actively involved with the IPhO and St. John's Wellness Peer Educators. Through the Rho Chi Post, I look forward to helping review and share the latest pharmaceutical news.

@ Richa Tamakuwala

6th Year, STJ; Staff Editor

Growing up, reading was always my favorite hobby. The way the authors were able to create such vivid images, the way they could make you feel what the characters were feeling, the way they captured their readers' attention so tightly that nothing else mattered in the moment all motivated me to start writing. Since starting pharmacy school, my writing has unfortunately been placed on hold, but after learning about Rho Chi Post, I'm excited to start writing again. Writing for Rho Chi Post will allow me, along with many other students, to do something I enjoy while updating fellow future pharmacists on the ever-changing field of pharmacy.

RHO CHI POST: TEAM MEMBERS

@ Jeremy Mesias

6th Year, STJ; Staff Editor

The field of pharmacy is constantly growing and improving with every coming day. Today's headlines become tomorrow's history. As healthcare leaders in a dynamic field, it is important to stay up to date. The Rho Chi Post serves as an excellent tool to help students become more informed about our profession, as well as providing them with the opportunity to contribute their own two cents to the conversation. I am excited to join the team and look forward to contributing to keeping students on top of current pharmacy advancements.

@ Anjali Rana

3rd Year, STJ; Staff Writer

My desire to learn about medicine and its effect on the human body began with a nebulizer. I had asthma as a young girl. At the age of ten, the vaporous gases from the pump never ceased to amaze me. My sickness, although unfortunate, fueled my interest in the functions, limitations, and exploitations of drugs. I have always had a passion for advocating for change and believe the Rho Chi Post adds great value to the community. As the world grows and develops each individual has an opportunity to express their thoughts on its development. Having the chance to become a Staff Writer provides me an opportunity to learn information about my peers to better assess the nature of their situation. When people begin discussing concepts at a younger age, they are able to influence people of their generation to care more about their own health. Combining concepts learned from pharmacy school with the mission to help those in need will create a stronger foundation for future healthcare pro-

@Erica Tonti

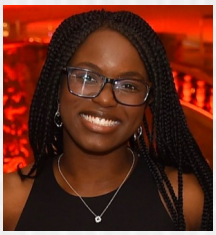
6th Year, STJ; Staff Writer

The profession of pharmacy is constantly evolving and adapting to the ever-changing field of healthcare. The Rho Chi Post serves as an amazing outlet for students to be informed, as well as to inform others, on the most up to date and relevant information. I could not be more excited to join the Rho Chi Post. This opportunity allows myself and my peers to take initiative and raise awareness of the advancements in the field of pharmacy. As a staff writer, I look forward to contributing to the Rho Chi Post and am grateful for the opportunity to educate students

@ Arya Firoozan

5th Year, STJ; Staff Writer

Joining the Rho Chi Post is an opportunity to remain updated with new advancements in the science of pharmacy. The Post provides students with a platform to present the rest of the student body with interesting articles regarding new medications and important changes in the field. Keeping up with new developments and innovations is key to becoming a capable pharmacist. I am quite excited to join a team that is a voice of research and knowledge and look forward to contributing in a way that will benefit the pharmacy community.



@ Tolulope Omisakin

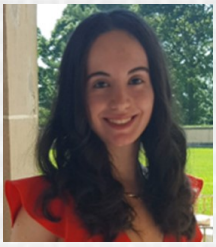
6th Year, STJ; Staff Editor

As an avid reader, I have always taken an interest in how things were written. Whether it be novels, journal articles, or magazine columns, there is always a peculiar way in which a writer tells a story. The real story is only 50% of what is written and the rest is in how the writer decides to disseminate that information. The Rho Chi Post serves as an amazing outlet for student pharmacists, allowing us to delve into the intricacies of different perspectives and ideas in the world of pharmacy. It also gives us the opportunity to decide how we want to detail these new found perspectives and ideas to our audience. As an incoming editor for The Rho Chi Post, I hope to enhance and curate the way each writer tells their stories and help them reach their audience at new levels.

@ Preethi Samuel

Graduate, STJ; Staff Writer

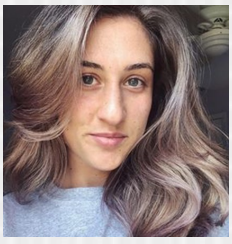
As future drug experts, we student pharmacists have a responsibility to take initiative and educate ourselves on advancements in healthcare, so as to improve the quality of patient care. The Rho Chi Post serves as a great platform for students to get information that is both accessible and accurate. To be a voice for my future, fellow pharmacists is to be heard and my patients cared for---as pharmacists are their best, sometimes their only, advocates. I hope that my contributions to the RCP spark readers' curiosity, and inspire conversations of how we may become better pharmacists.



@ Lyana Sayilar

6th Year, STJ; Staff Writer

I am thankful for the opportunity Rho Chi Post provides by engaging students, pharmacists, and faculty to learn from each other and spark new ideas, thoughts, and interests. The pharmacy profession is an ongoing and lifelong learning path and Rho Chi Post emphasizes and mirrors the importance of learning to provide pharmacists at our current jobs and patients in the future with recent information to improve patient care and outcomes. With the help of Rho Chi Post we can practice analyzing the literature that we read to improve our decision-making skills and communicate our findings with other members of the healthcare team.



@ Dana Weinstein

6th Year, STJ; Staff Writer

I am so excited to be a part of the Rho Chi Post team. This opportunity allows both myself and my peers to be well informed about the ever-changing profession of pharmacy and the vital developments in science and healthcare. Beyond the classroom setting, this newsletter fills in the gaps for the most up-to-date and current advancements for students and faculty. As a staff writer, I look forward to acting as an educator, a motivator, and an executor to further the mission and goals of the Rho Chi Post.

RHO CHI POST: TEAM MEMBERS

@ Nishanth Viswanath

6th Year, STJ; Staff Writer

The profession of pharmacy is continuously expanding to meet new demands and offer novel platforms for innovation in healthcare. With an abundance of new information and guidance being published everyday, it can become difficult for students and professionals to stay updated with relevant information and find new outlets to learn. The Rho Chi Post not only allows us to be informed about the current state of our profession, but also allows students to voice their opinions and connect with each other through literature. I am excited to be part of its team, and hope to provide meaningful and resourceful contributions.

@ Tiffany Dominic

6th Year, STJ; Staff Writer

My name is Tiffany Dominic and I am currently a fifth year pharmacy student. After being a dedicated reader of Rho Chi Post for years, I wanted to give back and be a part of this amazing community of writers and editors who work tirelessly to publish quality pieces of knowledge, news, and opinions. Being part of Rho Chi Post allows me to shed light on issues that aren't touched upon in our didactic courses and helps me connect students to real-world applications and approaches in pharmacy. I am beyond grateful that Rho Chi Post has given me the opportunity to continue my love for writing while also promoting patient advocacy and public health. I look forward towards writing about current events and essential healthcare issues while being part of this incredible team!

@ Edwin Gruda

6th Year, STJ; Staff Writer

My name is Edwin and I am a Doctor of Pharmacy student at St. John's University. My favorite aspect of pharmacy school is learning about the clinical and therapeutic components of drugs and diseases. As a kid, I was interested in both the math and sciences. The reason I chose pharmacy over other health care professions is because a lot of people rely on their medications to make them feel better. Pharmacists are the most accessible healthcare providers and are able to help patients optimize their drug therapy in order to improve their health. Throughout the beginning of pharmacy school, I volunteered at Columbia University Medical Center on the oncology department for one year. After that, I have been working as a pharmacy intern at Sandcastle Pharmacy, which is primarily an HIV specialty pharmacy. As a staff writer, I want to highlight the critical role of clinical pharmacists within an interdisciplinary team, in improving and en-

MISSION

The Rho Chi Post is an award-winning, monthly, electronic, student-operated, faculty-approved publication that aims to promote the pharmacy profession through creativity and effective communication. Our publication is a profound platform for integrating ideas, opinions, and innovations from students, faculty, and administrators.

VISION

The Rho Chi Post aims to become the most exciting and creative student-operated newsletter within St. John's University College of Pharmacy and Health Sciences

Our newsletter continues to be known for its relatable and useful content

Our editorial team continues to be known for its excellence and professionalism

The Rho Chi Post essentially sets the stage for the future of student-operated publications in pharmacy

VALUES

Opportunity

Teamwork

Respect

Excellence

GOALS

To provide the highest quality student-operated newsletter with accurate information

To maintain a healthy, respectful, challenging, and rewarding environment for student editors

To cultivate sound relationships with other organizations and individuals who are like-minded and involved in like pursuits

To have a strong, positive impact on fellow students, faculty, and administrators

To contribute ideas and innovations to the Pharmacy profession