New Drugs 2015 PART 3

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THIS ARTICLE reviews nine drugs recently approved by the FDA, including:

> a drug for relapsing forms of multiple sclerosis that's administered just once every 14 days.

> a combination product approved to treat certain serious intra-abdominal and urinary tract infections.

> an I.V. drug indicated to treat acute uncomplicated seasonal influenza in adults.

Unless otherwise specified, the information in the following summaries applies to adults, not children. Consult a pharmacist or the package insert for information on drug safety during pregnancy and breastfeeding. Consult a pharmacist, the package insert, or a current and comprehensive drug reference for more details on precautions, drug interactions, and adverse reactions for all these drugs.

SELECTED REFERENCES

Drug Facts and Comparisons. St. Louis, MO: Facts and Comparisons, Inc.; 2015.

Nursing2015 Drug Handbook. Philadelphia, PA: Lippincott Williams & Wilkins; 2015.

Physician's Desk Reference. 69th ed. Montvale, NJ: Medical Economics; 2015.

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ANTIDIABETIC DRUG

Dulaglutide

Another treatment option for type 2 diabetes

Dulaglutide (*Trulicity, Lilly*) is the fourth glucagon-like peptide-1 (GLP-1) receptor agonist to be approved in the United States, joining exenatide and exenatide extended-release, liraglutide, and albiglutide. These drugs augment glucose-dependent insulin secretion, decrease glucagon secretion, and slow gastric emptying, resulting in lower fasting glucose levels and reduced postprandial glucose excursions in adults with type 2 diabetes.

Metformin is the usual initial treatment of choice in patients with type 2 diabetes who have no risk factors that preclude its use. However, many patients don't achieve adequate glycemic control with metformin alone, and a GLP-1 agonist is among the options that can be added to the regimen.

Like the other GLP-1 agonists, dulaglutide is administered subcutaneously and is used as an adjunct to diet and exercise to improve glycemic control in adults with type 2 diabetes mellitus. It's administered once a week.

The effectiveness of dulaglutide was demonstrated in six clinical trials that included more than 3,300 patients with type 2 diabetes. It's been studied as both a stand-alone therapy and in combination with other antidiabetic agents, such as metformin and prandial insulin, but not basal insulin. In studies comparing dulaglutide with sitagliptin and exenatide, the new drug provided greater reductions in A1c and fasting plasma glucose levels than either of the other two drugs.

Many patients with type 2 diabetes are overweight. Dulaglutide and other GLP-1 agonists are associated with weight loss in some patients.

Dulaglutide, like the other GLP-1 agonists, isn't likely to cause hypoglycemia. However, the risk increases if it's used in combination with insulin or an insulin secretagogue such as a sulfonylurea. The dosage of the latter drugs may need to be reduced.

Precautions: (1) Not indicated for patients with type 1 diabetes or patients with diabetic ketoacidosis. (2) Not recommended as first-line therapy for patients who are inadequately controlled with diet and exercise. (3) Not recommended in patients with preexisting severe gastrointestinal disease, including severe gastroparesis. (4) Acute pancreatitis has been infrequently experienced with the use of the GLP-1 agonists, including dulaglutide. Treatment should be promptly discontinued if pancreatitis is suspected. Dulaglutide hasn't been studied in patients with a history of pancreatitis, so other antidiabetic agents should be considered for these patients. (5) Thyroid C-cell tumors, including medullary thyroid carcinoma (MTC), have developed in rodents used to study GLP-1 agonists. Although it's not known whether dulaglutide causes these tumors in humans, its use is contraindicated in patients with a personal or family history of MTC and in patients with multiple endocrine neoplasia syndrome type 2. These risks are included in a boxed warning in its labeling. (6) Severe hypersensitivity reactions have been infrequently experienced and treatment should be discontinued if such a reaction occurs. (7) Because dulaglutide slows gastric emptying, it may affect the absorption and action of other concurrently administered drugs. (8) Use caution when initiating treatment or increasing the dosage of dulaglutide in patients with renal impairment. Gastrointestinal adverse reactions, such as vomiting and diarrhea, can lead to dehydration, which may further compromise renal function.

Adverse reactions: nausea, diarrhea, vomiting, abdominal pain, anorexia

Supplied as: 0.75 mg and 1.5 mg doses in single-dose pens and single-dose prefilled syringes

Dosage: Initially, 0.75 mg once a week via subcutaneous injection. Dosage may be increased to 1.5 mg once a week if indicated for additional glycemic control. Maximum recommended dosage: 1.5 mg once a week.

Nursing considerations: (1) Teach the patient to administer the subcutaneous injection in the abdomen, thigh, or upper arm. (2) If the patient misses a dose, the patient should administer it as soon as possible if at least 3 days (72 hours) remain until the next scheduled dose. If less than 3 days remain before the next scheduled dose, the patient should skip the missed dose and administer the next dose on the regularly scheduled day. (3) Tell the patient to store the medication, which is premixed and ready for administration in a pen or syringe, in a refrigerator, although a syringe or pen can be kept at room temperature for up to 14 days. (4) Teach the patient about the signs and symptoms of hypoglycemia and hyperglycemia and what to do should they occur. Reinforce the importance of adherence to dietary instructions, regular physical activity, periodic blood glucose monitoring, and A1c testing.

REFERENCE

Prescribing information. Trulicity (dulaglutide) Injection, for subcutaneous use. http://pi.lilly.com/us/trulicity-uspi.pdf.

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BRONCHODILATOR

Olodaterol hydrochloride

Long lasting, once-daily treatment for patients with COPD

Olodaterol hydrochloride (*Striverdi Respimat*, Boehringer Ingelheim) is a long-acting beta$_2$-adrenergic agonist (LABA) administered by oral inhalation to cause bronchodilation. Its properties are similar to those of the other LABAs, such as salmeterol, indacaterol, and vilanterol.

Olodaterol is indicated for long-term, once-daily maintenance bronchodilator treatment of airflow obstruction in patients with chronic obstructive pulmonary disease (COPD), including chronic bronchitis and emphysema. It's not indicated to treat asthma or acute COPD exacerbations.

The new drug's effectiveness was demonstrated in studies that included more than 3,000 patients diagnosed with COPD. Lung function improved in patients treated with olodaterol compared with patients treated with placebo. For example, treated patients experienced improvements in forced expiratory volume in one second (FEV_1). These patients also used less rescue medication (albuterol) compared with those receiving placebo.

The LABAs provide a long duration of clinical benefit, which permits once-daily administration of olodaterol, indacaterol, and vilanterol; however, these drugs have a slow onset of action compared with inhaled short-acting beta$_2$-adrenergic agonists such as albuterol. Consequently, they're not indicated for use as rescue medications.

Precautions: (1) Treatment with olodaterol shouldn't be initiated in patients with acutely deteriorating COPD. (2) Not indicated for relief of acute symptoms (that is, as rescue therapy for acute episodes of bronchospasm). (3) Not indicated to treat asthma. The LABAs may increase the risk of asthma-related death, as noted in a boxed warning in olodaterol's labeling. (4) Use caution in patients with cardiovascular disorders, especially coronary insufficiency, cardiac dysrhythmias, hypertrophic obstructive cardiomyopathy, and hypertension. Like other beta$_2$-agonists, olodaterol may cause clinically significant cardiovascular effects, including tachycardia, hypertension, and QTc prolongation. (5) Use extreme caution if olodaterol is used concurrently with a monoamine oxidase inhibitor, tricyclic antidepressant, or another drug that prolongs the QTc interval because of the risk of ventricular dysrhythmias. In addition, concurrent use with xanthine derivatives, steroids, diuretics, or nonpotassium sparing diuretics may potentiate hypokalemia or ECG changes. (6) Use caution in patients with seizure disorders, diabetes, and thyrotoxicosis. Beta$_2$-agonists may exacerbate these conditions. (7) Monitor patients for paradoxical bronchospasm, which may be life-threatening, and immediate hypersensitivity reactions, including angioedema. Immediately discontinue treatment in patients who experience these responses. (8) Don't use olodaterol concurrently with another LABA, which could lead to an overdose. (9) Use with caution in patients being treated with another adrenergic agent (by any route) because sympathomimetic effects may be potentiated. (10) The concomitant use of a beta-blocker such as metoprolol may reduce the effects of both drugs. Because beta-blockers may cause bronchospasm, their use should generally be avoided in patients with COPD.

Adverse reactions: nasopharyngitis, upper respiratory tract infection, bronchitis, urinary tract infection, cough, dizziness, rash, diarrhea, back pain, arthralgia

Supplied as: an aqueous solution in an aluminum cylinder (cartridge) for use with the Striverdi Respimat inhaler as an oral inhalation spray. Each actuation from the mouthpiece contains 2.7 mcg of olodaterol hydrochloride, equivalent to 2.5 mcg of olodaterol.

Dosage: 5 mcg (two actuations) once a day at the same time of day.

Nursing considerations: (1) Teach the patient how to administer the medication correctly. When using the unit for inhalation for the first time, the patient inserts the cartridge containing the medication into the inhaler and primes the unit. The patient should actuate the unit toward the ground until a spray is visible, then repeat the process three more times. At this point, the unit is primed and ready for use. If the unit hasn't been used for more than 3 days, the patient should actuate the inhaler once to prepare it for use. If it hasn't been used for more than 21 days, the patient should repeat the priming procedure. (2) Tell the patient to use the inhaler once a day at the same time of day as prescribed. Remind the patient not to use this inhaler to treat acute symptoms. (3) Tell the patient to call 911 if breathing problems worsen quickly and/or the prescribed rescue medication doesn't relieve symptoms. Patients should call the healthcare provider or seek emergency help if they need to use the rescue medication more frequently or find that it doesn't work as well. (4) If patients miss a dose, they should take it as soon as possible, but they shouldn't take more than 1 dose in 24 hours. (5) Warn patients not to stop taking any medication for COPD abruptly or their condition may worsen.

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REFERENCE

Prescribing information. Striverdi Respimat (olodaterol) Inhalation Spray. www.accessdata.fda.gov/drugsatfda_docs/label/2014/203108s000lbl.pdf.

DRUG FOR MULTIPLE SCLEROSIS

Peginterferon beta-1a

Longer duration of action, less-frequent administration

For many years, treatment options available for patients with multiple sclerosis (MS) were limited to interferon beta-1b, interferon beta-1a, and glatiramer acetate, all of which are administered parenterally. Within the last 5 years, however, the number of therapeutic agents approved for MS has more than doubled.

Peginterferon beta-1a (*Plegridy*, Biogen Idec) is formed by the attachment of a polyethylene glycol (PEG) chain to interferon beta-1a. This increases the drug's mass and reduces its clearance, thereby increasing its duration of action and permitting administration just once every 14 days. The longer duration of action and less frequent administration are advantages over other formulations containing interferon beta-1a.

Administered subcutaneously, peginterferon beta-1a is indicated for patients with relapsing forms of MS. Its effectiveness was demonstrated in a placebo-controlled study in which the primary outcome was the annualized relapse rate over 1 year. The annualized relapse rate in patients treated with the new drug was 0.26, compared with 0.4 of those receiving placebo, representing a relative reduction of 36%. Brain MRI evaluations also demonstrated a reduction in new or newly enlarging lesions. The new drug hasn't been directly compared with other drugs in clinical studies.

Most patients treated with an interferon experience adverse reactions. Prophylactic and concurrent use of an analgesic and/or antipyretic may prevent or lessen flulike symptoms.

Although rare, serious allergic reactions including anaphylaxis can occur as a complication of treatment with an interferon. Other risks include hepatic injury, depression and suicide, seizures, heart failure, and autoimmune disorders.

Precautions: (1) Contraindicated in patients with a history of hypersensitivity to interferon beta, peginterferon, or any other component of the formulation. (2) Monitor liver function tests during treatment. (3) Monitor for and immediately report signs and symptoms of depression, including suicidal ideation. (4) Discontinuing treatment should be considered if a patient develops a new autoimmune disorder during therapy. (5) Monitor complete blood cell counts, differential white blood cell counts, and platelet counts during therapy.

Adverse reactions: injection site erythema, injection site pain, injection site pruritus, influenza-like illness, pyrexia, headache, myalgia chills, asthenia, arthralgia

Supplied as: single-dose prefilled pens and syringes containing 125 mcg of the drug in 0.5 mL. Starter Packs are also supplied with pens and syringes containing 63 mcg and 94 mcg.

Dosage: Initially, 63 mcg administered subcutaneously on day 1, 94 mcg on day 15 (14 days later), and 125 mcg on day 29. The full dose, 125 mcg, is administered every 14 days thereafter.

Nursing considerations: (1) Teach patients how to prepare and self-inject the medication in the abdomen, back of the upper arm, or thigh. Instruct them to avoid injection sites that are reddened, bruised, or irritated in any way, and to rotate sites. (2) Tell patients not to reuse needles or syringes, and educate them about safe disposal practices. (3) Review adverse reactions with patients and urge them to immediately report any troubling or potentially serious reactions, including worsening cardiac symptoms and suicidal ideation, to the healthcare provider. (4) Tell patients to store peginterferon beta-1a in a refrigerator.

REFERENCE

Prescribing information. Plegridy (peginterferon beta-1a) injection, for subcutaneous injection. https://www.plegridy.com/pdfs/plegridy-prescribing-information.pdf.

ANTIEMETIC

Netupitant/ palonosetron hydrochloride

Effective for preventing nausea and vomiting from chemotherapy

Netupitant/palonosetron hydrochloride (*Akynzeo*, Eisai) is a fixed combination of netupitant, a substance P/neurokinin 1 (NK1) receptor antagonist, and palonosetron, a serotonin-3 (5-HT_3) receptor antagonist. It's indicated to prevent acute and delayed nausea and vomiting associated with initial and repeat courses of cancer chemotherapy, including highly emetogenic chemotherapy such as cisplatin-based regimens.

In two clinical trials, a regimen of netupitant/palonosetron plus dexamethasone was compared with a palonosetron plus dexamethasone regimen. The results of the first study showed that nearly all patients treated with netupitant/palonosetron plus dexamethasone experienced no vomiting and required no rescue medication for nausea during the acute, delayed, and overall phases (99%, 90%, and 90%, respectively). For patients receiving palonosetron plus dexamethasone, the corresponding

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results were 90%, 80%, and 77%. Results of the second clinical study were similar.

Precautions: (1) Hypersensitivity reactions and serotonin syndrome have infrequently occurred with the use of palonosetron and other 5-HT_3 receptor antagonists; patients also being treated with serotonergic agents (such as selective serotonin reuptake inhibitors) are at increased risk. (2) Avoid concurrent use with a strong CYP3A4 inducer such as rifampin. Netupitant is primarily metabolized via the CYP3A4 pathway, and concurrent use with a strong CYP3A4 inducer may reduce its concentration and action. (3) A reduced dosage of dexamethasone is recommended for patients receiving netupitant/palonosetron. Netupitant is a moderate inhibitor of CYP3A4 and may increase the action of a CYP3A4 substrate (such as dexamethasone, midazolam, alprazolam) administered concurrently. The CYP3A4 inhibitory effect can last for multiple days; in trials, a twofold increase in the systemic exposure of dexamethasone was observed 4 days after a single dose of netupitant. (4) Not recommended for patients with severe hepatic impairment and patients with severe renal impairment or end-stage renal disease. However, netupitant/palonosetron may be used without dosage adjustment in patients with mild to moderate hepatic impairment or mild to moderate renal impairment.

Adverse reactions: headache, asthenia, dyspepsia, fatigue, constipation, erythema

Supplied as: oral capsules containing 300 mg of netupitant and 0.5 mg of palonosetron

Dosage: *In patients receiving highly emetogenic chemotherapy, including cisplatin-based chemotherapy*: one capsule (300 mg/0.5 mg) orally approximately 1 hour before the start of chemotherapy, with dexamethasone 12 mg administered orally 30 minutes prior to chemotherapy on day 1 and 8 mg orally once daily on days 2 and 4. *In patients receiving anthracyclines and cyclophosphamide-based chemotherapy and chemotherapy not considered highly emetogenic:* the same regimen is recommended but administration of dexamethasone on days 2 and 4 isn't necessary.

Nursing considerations: (1) Doses may be taken without regard to food. (2) Educate patients about the signs and symptoms of hypersensitivity reactions and tell them to seek immediate medical care if any occur. (3) Also teach patients about the risk of serotonin syndrome and warn them not to use other serotonergic drugs, such as medications for depression and migraines. Tell them to seek immediate emergency care if they experience agitation, hallucinations, or other changes in mental status, dizziness, muscle twitching (overactive reflexes), or seizures.

REFERENCE

Prescribing information. Akynzeo (netupitant/palonosetron) capsules, for oral use. https://www.akynzeo.com/media/Prescribing_Information.pdf.

ANTIBACTERIAL DRUG

Ceftolozane sulfate/tazobactam sodium

New treatment option for certain complicated infections

A combination of a new cephalosporin antibacterial drug with a beta-lactamase inhibitor, ceftolozane sulfate/tazobactam sodium (*Zerbaxa*, Cubist) is primarily active against Gram-negative bacteria. Like the other cephalosporins, ceftolozane inhibits bacterial cell wall synthesis and exhibits a bactericidal action. Its properties and spectrum of action are most similar to those of ceftazidime. Tazobactam is an irreversible inhibitor of some beta-lactamase enzymes. By inhibiting beta-lactamase enzymes, tazobactam protects ceftolozane against inactivation by these enzymes.

Administered by I.V. infusion, ceftolozane/tazobactam has been approved to treat two types of serious infections. It's indicated in a regimen that also includes metronidazole for treatment of complicated intra-abdominal infections (cIAI) caused by *Enterobacter cloacae*, *Escherichia coli*, *Klebsiella oxytoca*, *Klebsiella pneumoniae*, *Proteus mirabilis*, *Pseudomonas aeruginosa*, *Bacteroides fragilis*, *Streptococcus anginosus*, *Streptococcus constellatus*, and *Streptococcus salivarius*. It's also indicated for complicated urinary tract infections (cUTI), including pyelonephritis, caused by *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus mirabilis*, and *Pseudomonas aeruginosa*.

As with the other cephalosporins and the other classes of beta-lactam antibacterial agents (penicillins and carbapenems), ceftolozane is associated with a risk of hypersensitivity/anaphylactic reactions.

Precautions: (1) Contraindicated in patients with known serious hypersensitivity to ceftolozane/tazobactam, piperacillin/tazobactam, or another beta-lactam antibacterial drug. Because of the potential for cross-sensitivity with other beta-lactam antibacterial agents, use caution if ceftolozane is considered for use in any patient known to be allergic to any beta-lactam. (2) Almost all systemic antibacterial drugs are associated with *Clostridium difficile*-associated diarrhea (CDAD) ranging in severity from mild diarrhea to fatal colitis. Because CDAD has been reported to occur more than 2 months after treatment, any patient who experiences diarrhea following use of an antibacterial drug should be evaluated for CDAD. (3) Dosage adjustment is recommended in patients with moderate or severe renal

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impairment. Consult the product insert for guidelines.

Adverse reactions: nausea, diarrhea, headache, pyrexia

Supplied as: single-use vials in quantities equivalent to 1 g of ceftolozane and 500 mg of tazobactam

Dosage: 1 g/500 mg every 8 hours I.V. over 1 hour. The duration of therapy depends on the severity and site of the infection and the patient's response to treatment. To treat cIAI in clinical trials, ceftolozane/tazobactam was continued for 4 to 14 days (in conjunction with metronidazole 500 mg I.V. every 8 hours). To treat cUTI, it was continued for 7 days.

Nursing considerations: (1) Store vials in the refrigerator. (2) To prepare the required dose, withdraw the appropriate volume from the reconstituted vial and add the withdrawn volume to an infusion bag containing 100 mL of 0.9% sodium chloride for injection or 5% dextrose injection. The diluted solution is stable for 24 hours when stored at room temperature or 7 days when refrigerated. (3) Educate patients about the risk of CDAD following treatment and tell them to contact the healthcare provider immediately if they experience severe watery or bloody diarrhea.

REFERENCE

Prescribing information. Zerbaxa (ceftolozane and tazobactam) injection, for intravenous use. www.merck.com/product/usa/pi_circulars/z/zerbaxa/zerbaxa_pi.pdf.

ANTIFUNGAL DRUGS

Luliconazole

Prescription-only treatment for athlete's foot and certain other skin infections

An imidazole antifungal agent, luliconazole (*Luzu*, Valeant) is indicated for the topical treatment of interdigital tinea pedis (athlete's foot), tinea cruris (jock itch), and tinea corporis (ringworm) caused by *Trichophyton rubrum* and *Epidermophyton floccosum* in adults age 18 and older. The labeled indications don't include tinea pedis on the bottom or sides of the foot.

The new drug's effectiveness was demonstrated in vehicle-controlled studies. It hasn't been directly compared with other antifungal agents.

As with the other topically applied antifungal medications, luliconazole is well tolerated; the incidence of application site reactions is less than 1%, which is similar to that of the vehicle.

The recommended duration of treatment for luliconazole is shorter than that for the other topically applied imidazole derivatives, most of which are applied twice a day for 4 weeks for tinea pedis, and once or twice a day for 2 weeks for tinea cruris and tinea corporis. However, butenafine and terbinafine are available without a prescription and at a considerably lower cost. Luliconazole is available by prescription only.

Adverse reactions: application site reactions (less than 1%)

Supplied as: a cream containing the drug in a 1% concentration

Dosage: apply to the affected area and approximately 1 inch of the immediate surrounding area once a day for 2 weeks to treat interdigital tinea pedis, or once a day for 1 week to treat tinea cruris and tinea corporis.

Nursing considerations: (1) Teach patients how to apply the medication properly and instruct them to follow the entire course of treatment as prescribed by the healthcare provider. (2) Tell patients that the medication is for topical use only and to keep it away from the eyes and mouth.

REFERENCE

Luzu (luliconazole) Cream, 1% for topical use. www.accessdata.fda.gov/drugsatfda_docs/label/2013/204153s000lbl.pdf.

Efinaconazole

Topical treatment for fungal infections of the nails

Fungal infections of the nails (onychomycosis) are most often caused by dermatophytes such as *Trichophyton rubrum*. The oral use of terbinafine or itraconazole for 12 weeks is the most effective treatment of onychomycosis of the toenails and fingernails; griseofulvin has also been used orally for these infections. However, relapse rates are high and patients are at risk for adverse reactions and drug interactions. Ciclopirox, the first drug to be approved for topical treatment (in a nail lacquer formulation) of onychomycosis of the nails, is used for 48 weeks. It's less effective than the orally administered antifungal agents but poses little risk of adverse reactions.

Efinaconazole (*Jublia*, Valeant) is a topically applied imidazole antifungal agent that inhibits the biosynthesis of ergosterol, a constituent of fungal cell membranes. It's indicated for the topical treatment of onychomycosis of the toenails due to *Trichophyton rubrum* and *Trichophyton mentagrophytes*. Its effectiveness was demonstrated in two vehicle-controlled studies in which a significantly larger number of patients treated with efinaconazole achieved a complete cure (18% and 15% respectively), compared with 3% and 6% of those treated with vehicle. A mycologic cure (defined as both a negative fungal culture and a negative potassium hydroxide [KOH] exam) was achieved in 55% and 53% of the patients treated with the drug in the two studies, compared with 17% and 17% of those treated with the vehicle.

Efinaconazole hasn't been directly compared with ciclopirox in clinical studies. However, the labeled indication for efinaconazole is for the treatment of the toenails only; ciclopirox nail lacquer is indicated

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for onychomycosis of both the toenails and fingernails. Both drugs are well tolerated by patients.

Adverse reactions: rarely, ingrown toenail, application site dermatitis, application site vesicles, application site pain

Supplied as: a topical solution in a 10% concentration

Dosage: apply one drop of solution onto the affected toenail once a day for 48 weeks. To treat the big toenail, apply a second drop to the end of the toenail.

Nursing considerations: (1) This medication is flammable. Tell patients to keep it away from flame and heat. (2) Teach patients about the medication and how to apply it. Toenails should be clean and dry before application, so patients should wait for at least 10 minutes after showering, bathing, or washing before applying the solution. The brush applicator supplied with the product is used to spread the solution around the entire toenail, ensuring that the toenail, toenail folds, toenail bed, hyponychium, and the undersurface of the toenail plate are completely covered.

REFERENCE

Prescribing information. Julia (efinaconazole) topical solution, 10%. www.valeant.com/Portals/25/Pdf/PI/Julia-PI.pdf.

Tavaborole

Another topical option for onychomycosis of the toenails

Tavaborole (*Kerydin*, PharmaDerm) is an oxaborole antifungal agent that inhibits fungal protein synthesis. It's indicated for the topical treatment of onychomycosis of the toenails due to *Trichophyton rubrum* or *Trichophyton mentagrophytes*. Like efinaconazole, it's indicated for the treatment of onychomycosis of the toenails, whereas ciclopirox nail lacquer is indicated for the treatment of onychomycosis of the toenails and fingernails.

Tavaborole's effectiveness has been demonstrated in two vehicle-controlled studies in which more patients treated with tavaborole achieved a complete cure: 7% and 9%, respectively, compared with 0.5% and 2% of those treated with the vehicle. A mycologic cure was achieved in 31% and 36% of the patients treated with the drug in the two studies, compared with 7% and 12% of those treated with the vehicle.

Tavaborole hasn't been directly compared with other antifungal agents in clinical studies.

Adverse reactions: application site exfoliation, ingrown toenail, application site erythema, application site dermatitis

Supplied as: a clear topical solution in a 5% concentration

Nursing considerations: (1) Tell patients that the product is flammable and should be kept away from flame and heat. (2) Teach patients how to apply the medication properly. The toenails should be clean and dry before application. Patients should apply enough solution to completely cover the toenail; more than one drop may be needed. Patients should use the dropper tip to spread the solution over the entire toenail up to the edges of the toenail and under the entire tip of the toenail. The solution should be allowed to dry and not be wiped off the toenails. (3) Tell patients to prevent the drug from contacting the eyes, mouth, or vagina. If the solution comes in contact with the surrounding skin during application, they should use a tissue to remove it from the skin. (4) Instruct patients to continue using the medication as prescribed, once a day for 48 weeks. If they experience persistent signs of application site irritation, they should contact the healthcare provider.

REFERENCE

Prescribing information. Kerydin (tavaborole) topical solution, 10%. www.kerydin.com.

ANTIVIRAL DRUG

Peramivir

I.V. treatment option for acute uncomplicated influenza

Worldwide, 5% to 10% of adults and 20% to 30% of children experience influenza infection during a typical flu season. In the United States and other industrialized nations, older adults are most at risk for death from influenza-related complications.[1] Influenza A viruses are the cause of most influenza infections, although some are caused by influenza B viruses.

Influenza virus neuraminidase is an enzyme that releases viral particles from the plasma membrane of infected cells. Peramivir (*Rapivab*, BioCryst) inhibits this enzyme.[2] It's the third neuraminidase inhibitor approved for treatment of influenza, joining oseltamivir and zanamivir.

Administered by I.V. infusion, peramivir is indicated to treat acute uncomplicated influenza in patients age 18 and older who've been symptomatic for no more than 2 days.[2] In contrast, oseltamivir is administered orally and zanamivir by oral inhalation for treatment and prophylaxis of influenza infection in both adults and children.

The effectiveness of peramivir was demonstrated in a placebo-controlled study in which patients treated with a dose of 600 mg of peramivir experienced alleviation of their combined influenza symptoms 21 hours sooner (on average) than those receiving placebo. The median time to recovery to normal temperature was approximately 12 hours sooner compared with placebo. Almost all patients in the study (99%) were infected with influenza A virus; the number of patients

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infected with influenza B virus was insufficient to determine the drug's effectiveness for treating influenza B infection.

In a study of patients with serious influenza requiring hospitalization, peramivir plus standard of care didn't improve the median time to clinical resolution compared with standard of care alone. Therefore, efficacy hasn't been established in the most seriously ill patients for whom I.V. therapy might ordinarily be considered.

The most common adverse reaction reported in clinical studies was diarrhea. Rarely, serious skin/hypersensitivity reactions, including erythema multiforme and Stevens-Johnson syndrome, have been reported in the postmarketing period.

Inactivated influenza vaccine can be administered at any time relative to the use of peramivir. However, because antiviral drugs may inhibit viral replication, peramivir may reduce the efficacy of live attenuated influenza vaccine (LAIV) intranasal. Consequently, the use of LAIV intranasal should be avoided within 2 weeks before or 48 hours after peramivir administration.

Precautions: (1) Some patients with influenza have experienced neuropsychiatric events including delirium, hallucinations, and abnormal behavior; monitor patients for such responses. (2) Monitor patients for serious skin/hypersensitivity reactions. (3) Dosage should be reduced in patients with impaired renal function.

Adverse reaction: diarrhea

Supplied as: single-use vials containing 200 mg per 20 mL

Dosage: 600 mg administered by I.V. infusion over 15 to 30 minutes. Consult the prescribing information for recommended dosage adjustments for patients with renal impairment.

Nursing considerations: (1) Dilute the appropriate dose to a maximum of 100 mL in 0.9% or 0.45% sodium chloride injection, 5% dextrose injection, or lactated Ringer injection. (2) Administer the diluted solution immediately or store it in the refrigerator for up to 24 hours. Allow refrigerated solution to warm to room temperature before administration. ■

REFERENCES

1. World Health Organization. Influenza (seasonal). www.who.int/mediacentre/factsheets/fs211/en.

2. Prescribing information. Rapivab (peramivir). http://rapivab.com/wp-content/uploads/2014/12/Rapivab-PI-121514.pdf.

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- Complete the registration information and course evaluation. Mail the completed form and registration fee of $24.95 to: **Lippincott Williams & Wilkins, CE Group**, 74 Brick Blvd., Bldg. 4, Suite 206, Brick, NJ 08723. We will mail your certificate in 4 to 6 weeks. For faster service, include a fax number and we will fax your certificate within 2 business days of receiving your enrollment form.
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