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Omadacycline in Treating Community-Acquired Pneumonia

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Since the late 1940s, the tetracycline family has been in commercial use [1]. The increasing incidence of bacterial resistance has banished older tetracyclines to a limited role in treating common infections [2, 3]. Omadacycline, a first-in-class aminomethylcycline can overcome the most common mechanisms of tetracycline [4, 5]. Omadacycline is a semisynthetic aminomethylcycline derived from minocycline with a novel modified aminomethyl group present at the C9 position of the basic tetracycline structure. This modification leads omadacycline to bacterial resistance mechanisms, including ribosomal protection, tetracycline efflux [6], and limits unwanted side effects, such as nausea and emesis [4, 7]. Omadacycline inhibits protein synthesis of bacteria without having a significant impact on synthesis of deoxyribonucleic acid, ribonucleic acid, or peptidoglycan. With an affinity similar to glycylcyclines, omadacycline binds to the 30S subunit of the bacterial ribosome at the tetracycline-binding site [5, 7]. Omadacycline is a broad-spectrum antimicrobial with activity against aerobic and anaerobic gram-positive, gram-negative bacteria, and atypical bacteria [6].

A clinical efficacy trial "The Omadacycline for Pneumonia Treatment in the Community (OPTIC)" trial was a phase III, randomized, double blind, multicenter study comparing the safety and efficacy of amadacycline to moxifloxacin for the treatment of adults with community-acquired bacterial pneumonia (CABP) [8]. Patients were randomized to intravenous (IV) omadacycline 100 mg twice/day for two doses followed by 100 mg IV/day or IV moxifloxacin 400 mg/day for 3 days, with the option to switch to oral treatment or continue IV treatment for a total of 7-14 days. The results revealed that omadacycline had similar clinical success rates as moxifloxacin against atypical pathogens, gram-negative bacteria, and Streptococcus pneumoniae. With comparison to moxifloxacin, clinical success rates for omadacycline were slightly less with Staphylococcus aureus (81.8% versus 72.7%, respectively) [8].

In conclusion, omadacycline represents a novel antimicrobial with a potent broad-spectrum activity against community-associated bacterial pathogenic microorganisms, particularly CABP. Omadacycline presents favorable pharmacokinetics, low potential for drug-drug interaction, low plasma protein binding, penetrating into the epithelial lining fluid, lack of renal dosing adjustments, and early evidence of tolerability and efficacy that allow it for once daily dosing.

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