



Chelation with Fluroquinolones and Tetracyclines

Fluroquinolones and tetracyclines are antibiotics that can be given intravenously and enterally. When given enterally, fluoroquinolones and tetracyclines can chelate with polyvalent cations forming poorly absorbed complexes resulting in reduced antibiotic serum concentrations. Polyvalent cations include calcium, magnesium, aluminum, iron, and zinc. Polyvalent cations can commonly be found in antacids and vitamins. How serious is this drug interaction and what measures can be taken?

How much are antibiotic serum concentrations reduced?

Significant reductions in total drug exposure have been documented. Differences in degrees of reduction exist among specific antimicrobials and specific interacting medications. Doxycycline bioavailability was reduced by 85% compared with a fasting state when co-administered with aluminum hydroxide.¹ Ciprofloxacin concentration reductions ranged from 23% to 85% among several polyvalent cation containing medications.² Levofloxacin concentration reductions ranged from 3% to 44%.

What negative outcomes occur from this interaction?

Evidence demonstrating worse clinical outcomes due to this drug interaction is limited. In one case series of 4 patients, the drug interaction was thought to have contributed to clinical failures with improvements following resolution of the drug interaction.³ In one cohort, coadministration of levofloxacin with a polyvalent cation containing compound was associated with subsequent identification of levofloxacin-resistant isolates.⁴

How can it be resolved?

Administering the antibiotic 2 hours before or 2-6 hours after cation administration is recommended. Refer to package labeling for specific timing instructions. One health system changed the default administration times of relevant medications at order entry in the electronic health record, which resulted in a statistically significant reduction in concomitant administration.⁵ If the interaction cannot be avoided, a risk benefit assessment is warranted, and alternative antibiotics should be considered.

Key Takeaway:

Fluroquinolones and tetracycline serum concentrations are reduced when co-administered with polyvalent cation containing medications such as antacids and vitamins. This may increase risk of clinical failure and the emergence of drug-resistant bacteria. Defaulting administration times in the electronic health record to avoid coadministration has been successful.

References:

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