



## Discordant Susceptibility Results: Amoxicillin-Clavulanate and Ampicillin-Sulbactam

Amoxicillin-clavulanate (Augmentin) and ampicillin-sulbactam (Unasyn) are two antibiotics with very similar spectrums of activity and often regarded as interchangeable. In the United States, amoxicillin-clavulanate is only available orally and ampicillin-sulbactam intravenously, therefore decisions to use over another is based on route of administration. But how should clinicians interpret susceptibility results when they are discordant, such as when amoxicillin-clavulanate is susceptible and ampicillin-sulbactam is intermediate?

### Considerations for discordant results on a susceptibility report

#### *Clavulanate and sulbactam are different $\beta$ -lactamase inhibitors*

- The spectrum of inhibition of clavulanate and sulbactam largely overlaps, but nevertheless has differences.<sup>1</sup> In other words, some beta-lactamase enzymes expressed by bacteria may be inhibited by clavulanate but not sulbactam and vice versa. Additionally, *in vitro* data indicate clavulanate is a more potent inhibitor of certain beta-lactamase enzymes than sulbactam.<sup>1</sup> This could explain why studies have documented higher rates of susceptibility to amoxicillin-clavulanate than ampicillin-sulbactam.<sup>2,3</sup>

#### *Laboratory error*

- Antimicrobial susceptibility testing are subject to margins of error. Most clinical microbiology laboratories employ commercial automated susceptibility testing devices (e.g. MicroScan, Vitek 2, BD Phoenix). These devices are required to demonstrate  $\geq 90\%$  agreement with a reference test in terms of category (e.g. susceptible, intermediate, resistant) and minimum inhibitory concentration or MIC ( $\pm 1 \log_2$  dilution).<sup>4</sup> This means that potentially up to 10% of the time, an ampicillin-sulbactam MIC reported to be 16/8  $\mu\text{g}/\text{mL}$  (intermediate) could in reality be 8/4  $\mu\text{g}/\text{mL}$  (susceptible) or 32/16  $\mu\text{g}/\text{mL}$  (resistant). This may explain the discrepancy between amoxicillin-clavulanate and ampicillin-sulbactam in some situations.

**Key Takeaways:** Susceptibility testing results for ampicillin-sulbactam (Unasyn) do not predict amoxicillin-clavulanate (Augmentin) susceptibility. Amoxicillin-clavulanate can be used if it tests susceptible regardless of ampicillin-sulbactam susceptibility. Differences between amoxicillin-clavulanate and ampicillin-sulbactam susceptibility can be due to differences in beta-lactamase potency or due to laboratory error.

### References

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