

# Carbapenems

**Carbapenems** are highly potent bactericidal beta-lactam antibiotics, which are beta-lactamases resistant.

## Antimicrobial spectrum and indications

Carbapenems have an extremely broad spectrum of action. They are effective against both aerobic and anaerobic microorganisms, G + and G−, including *Pseudomonas aeruginosa* and strains of *Streptococcus pneumoniae* highly resistant to penicillins. In general, they have the broadest spectrum of all beta-lactams.

They are used in the treatment of '*life-threatening infections*' and '*nosocomial infections*' caused by multidrug-resistant strains (*Acinetobacter* spp., *Klebsiella* spp., *Enterobacter* spp. , *Pseudomonas aeruginosa*), severe pneumonia, complicated intra-abdominal infections, and severe skin and soft tissue infections. They are also used in the empirical treatment of febrile neutropenia.

## Pharmacokinetics

Carbapenems are administered exclusively parenterally. They penetrate well into tissues and fluids, including the cerebrospinal fluid. They are excreted by the kidneys.

## Side effects

**They are quite rare and insignificant.** The most common are allergic skin symptoms and GIT problems. Having an allergy to carbapenems does not signify an allergy to other beta-lactams. Overgrowth of yeast may occur after therapy.

## Carbapenem resistance

Due to its low resistance, carbapenems are among the so-called backup antibiotics (last resort use), the use of which is limited to the most serious cases with the potential occurrence of resistant strains. Nevertheless, carbapenem-resistant bacterial strains appear. The most important mechanism of carbapenem resistance is the production of carbapenemases. Carbapenemases are enzymes produced by gram-negative microorganisms that are able to hydrolyze a carbapenem molecule. The emergence of carbapenem-resistant strains is associated with the use of broad-spectrum antibiotics. These organisms can cause both asymptomatic colonization and a range of infections such as bacteremia, ventilator-associated pneumonia, urinary tract infections, or catheter-associated sepsis. Carbapenemase-producing microorganisms include some strains of *K. pneumoniae* and *E. coli*. The treatment of infections caused by these microorganisms is very difficult and must involve a combination of carefully selected broad-spectrum antibiotics.

## Examples

### imipenem

The combination with cilastatin is used (not an ATB, but prevents imipenem from being converted to inactive metabolites in the kidneys by dehydropeptidase I activity).

### meropenem, ertapenem

These have good penetration into body fluids and tissues (lungs, bronchial secretions, bile, cerebrospinal fluids, gynecological tissues, skin, fascia, muscles, and peritoneal exudate). They penetrate into G + and G- bacteria.

## References

### Related Articles

- Antibiotics
- Beta-lactam antibiotics
- Penicillins
- Monobactams
- Cephalosporins

### External links

- Karbapenemy (česká wikipedie)
- Carbapenem (anglická wikipedie)

## Source

- BENEŠ, Jiří. *Studijní materiály* [online]. [cit. 2010]. <<http://jirben.wz.cz>>.

## Bibliography

- HAVLÍK, Jiří, et al. *Infektologie*. 2. edition. Praha : Avicenum, 1990. pp. 393. ISBN 80-201-0062-8.
- LOBOVSKÁ, Alena. *Infekční nemoci*. 1. edition. Praha : Karolinum, 2001. pp. 263. ISBN 80-246-0116-8.
- LINCOVÁ, Dagmar – FARGHALI, Hassan, et al. *Základní a aplikovaná farmakologie*. 2. edition. Praha : Galén, 2007. ISBN 978-80-7262-373-0.
- ŠVIHOVEC, Jan, et al. *Farmakologie*. 1. edition. Praha : Grada, 2018. ISBN 978-80-271-2150-2.