

受 験 番 号		氏 名	
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英 語 (基礎薬学分野)

以下の文章を読んで、問に答えなさい。

The emergence of carbapenem resistance

Since 2000, the number of bacterial species carrying ESBL genes has increased, and community-acquired *Escherichia coli* isolates with the ability to produce ESBLs that hydrolyze almost all β -lactam agents, except for carbapenems, have been reported worldwide. As a result, the clinical use of carbapenems has increased. This in turn caused an increase in the number of clinical bacterial isolates producing β -lactamases that have the ability to hydrolyze carbapenems, known as carbapenemases. Thus, the overuse of carbapenems has led to the emergence of carbapenem resistance, which is the ability of bacteria to grow and survive in the presence of clinically relevant carbapenem concentrations.

Mechanism of carbapenem resistance

Resistance to carbapenems may be attributed to three major mechanisms: porin-mediated resistance to reduce uptake of carbapenems, efflux pumps, which pump the carbapenem outside the cells and enzyme-mediated resistance which is mediated via the acquisition of carbapenemase genes. The reduced uptake or increased efflux of antibiotics are usually associated with an overexpression of β -lactamases possessing weak affinities for carbapenems. The nature of the resistance determinants can affect the dynamics of their spread.

Enzyme-mediated resistance

In most cases, resistance is due to the production of β -lactamases capable of hydrolyzing carbapenems and other β -lactam antimicrobials, hence they are called carbapenemases. This resistance mechanism poses the greatest threat, as these enzymes can inactivate the majority of β -lactams and are encoded by genes carried on transposons, plasmids or other mobile genetic elements, which can be horizontally transferred to other bacterial species.

ESBL : extended-spectrum β -lactamase

出典 : Ann A Elshamy and Khaled M Aboshanab, Future Sci OA. 2020 Mar; 6(3) : FSO438. より抜粋

問1 なぜカルバペネム耐性菌が増加したのか、また、なぜ脅威なのか説明しなさい。

問2 カルバペネム耐性菌の耐性機序を説明しなさい。

採 点	
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