MD627 993 Seminar in Medical Microbiology

Title: Genomic and Proteomic Identification of Colistin Resistant *Acinetobacter* spp.

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Date: 16th July 2024

Abstract

Antimicrobial resistance (AMR) is a leading cause of death and seriously for public health. The development of antibiotic resistance is increasing every year. Colistin is a last line drug for treatment of infections caused by gram-negative bacteria. Therefore, characterization of the pathogen that resistat to colistin and development of new method for detection colistin are essential for clinical diagnosis.

Acinetobacter colistiniresistens is a gram-negative coccobacillus with oxidase-negative and catalase-positive and heightened colistin resistance characteristics. *A. colistiniresistens* had been isolated only from clinical specimen and never been found in environmental niches, animals or healthy individuals. The genotypic characteristics of *A. colistiniresistens* within the community remain poorly understood. To study the whole genome of *A. colistiniresistens* C-214 isolated from the feces of a healthy member of the community, they found that size of chromosome is similar to *A. baumannii*. GC content is typical for this strain. The virulence factor related gene in *A. colistiniresistens* C-214 were found to be similar polymorphisms of *lpxA/C/D* and *lpxL* genes in all *A. colistiniresistens* stains. Those genes may play role in colistin resistance. The pathogenicity of *A. colistiniresistens* C-214 in the *Galleria mellonella* after injected with 10^7 CFU/larvae for 24 hours, survival rate is 40%, but after 120 hours survival rate is decreased to 0% (Muzahid et al., 2023). Therefore, the presence of *A. colistiniresistens* C-214 in samples from healthy community members is warranted investigation. and raised attention to the possibility of future outbreaks.

The colistin is an antibiotic from polymyxin E and it's a last-line treatment option for multidrug-resistant Gram-negative bacteria (MDR-GNB). A lipopolysaccharide (LPS) modification is reported to be a mechanism of colistin-resistance in gram-negative bacteria such as addition of phosphoethanolamine to modify the lipid A of cell membrane, and loss of LPS production by mutation in *lpxA, lpxC* and *lpxD* genes. Recently, Matrix assisted Laser Desorption Ionization Time of Flight mass spectrometry (MALDI-TOF MS) can characterize modifications of lipid A on LPS. Therefore, MALDI-TOF MS has been used to detect colistin-resistant bacteria. The sample preparation method is novel MALDI-TOF MS method (BACLIB), but this method has limitations such as involving centrifugation and labor-intensive washing steps and requires overnight lyophilization impractical for a clinical test and take a long time. To achieve limitation for clinical use, they developed a new extraction method—FLAT ("fast lipid analysis technique"). To compare FLAT results to results of BACLIB, they found that there was no difference in spectral in bacteria and fungi. FLAT extraction can detect antibiotic-resistance-associated structures in gram-negative bacteria. And they found FLAT spectra can be used in place of BACLIB spectra to identify bacteria and fungi and detect colistin resistance (Sorensen et al., 2020). Therefore, using FLAT for sample preparation has advantages, it takes less than an hour, use clinic-friendly reagents There is low actual work time, and does not need to be centrifuged. This makes it suitable for clinical diagnostic.

References

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