Urgent Action on Tackling Antibiotic Resistance

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Dear Editor-in-Chief

The progressive increase of antibiotic resistance poses an alarming threat on public health worldwide (1). Although antibiotic resistance is a problem of human health, a 'One Health' approach to tackling antibiotic resistance is required, due to the effect of animal and environment on human health. The concept of One Health is that the well-being of animals, the environment and humans are linked (2).

A recent study reported a retrospective, whole-genome sequencing study analyzing 288 *Salmonella enterica* serotype Typhimurium isolates obtained between 1911 and 1969 from 31 countries and from various sources, including human, animal and food (3). They showed the existence of ampicillin-resistant *S. enterica* serotype Typhimurium strains in human beings before ampicillin was released to the market. The authors suggested that the non-clinical use of narrow-spectrum penicillins, such as penicillin G, may exert selective pressure on the emergence of ampicillin-resistance *S. enterica* serotype Typhimurium in human. Therefore, One Health approach is needed due to the possibility of the transmission of genetic mobile elements or strains responsible for antibiotic resistance from animals and the environment to humans. Furthermore,

important scientific studies for exactly estimating the impact of humans on the spread of antibiotic resistance in the environment are needed, considering that antibiotic resistance may spread from humans to the environment and come back to humans, which results in the overwhelming and urgent threat of antibiotic resistance on the public health.

Fortunately, urgent action on antibiotic resistance was reported recently — urgent action on development and point-of-care application of single major or broadly accepted diagnostic system including rapid identification of infectious agents and fast antimicrobial susceptibility testing (4). As well as this diagnostic system, urgent action is needed to increase research and development for novel antibacterial drugs to ensure the sustained availability of treatment options against multi-drug (extensively-drug or pan-drug) resistant Gram-negative pathogens. The reason is the lack of antibacterial drugs for antibiotic-resistant Gram-negative pathogens (5).

According to recent analysis of the clinical antibacterial pipeline (6), thirty antibacterial drugs were identified, of which eleven drugs are expected to have some activity against at least one

critical priority Gram-negative pathogen expressing carbapenem resistance.

The clinical pipeline of drugs against Gram-negative pathogens is dominated by derivatives of established and old classes with limited innovation. The WHO critical priority pathogens — antibiotic-resistant *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and Enterobacteriaceae— are insufficiently addressed in the clinical pipeline. Therefore, novel antibacterial drugs without pre-existing cross-resistance are urgently needed.

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Conflicts of interest

The authors have no conflict of interests to disclose.

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