Which drug is better: pradofloxacin or ciprofloxacin? Studies of antibiotic resistance in *E. coli*

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Antibiotics, well known medicine with a few side effects and efficient target activity, are commonly used to treat bacterial infections. They have been developed into a large number of classes which can be applied as oral antibiotics, intravenous antibiotics, eye drops or ointments and function by inhibiting bacterial metabolism to inhibit the growth or kill the bacteria in the processes such as DNA replication, transcription, small molecule transmembrane transportation. Nowadays, the treatment by antibiotics becomes much more difficult, not because antibiotics are losing their efficiency, but because of the misuse or overuse of antibiotics around the world which increases the bacterial resistance to antibiotics. Bacteria become resistant to the drugs by alterations within the target genes, by increasing drug's pumping out of the cell (efflux) or decreasing drug's pumping into the cell (influx), or by modification or inactivation of the drug, and reduce antibiotics effect.

Urinary tract infections (UTIs) are diseases commonly found in women. *E. coli* prevalently exists in the lower intestine of warm-blooded animals. Fluoroquinolones belong to the third generation of antibiotics mostly used to treat UTIs. The fluoroquinolones target DNA gyrase and topoisomerases IV during bacterial replication. DNA gyrase and topoisomerases IV are two important enzymes involved in double strand DNA breakage and reunion for DNA replication. Fluoroquinolones can form a complex with gyrase and topoisomerases immediately after addition and block the progress of replication, and thereby inhibit bacterial growth.

Ciprofloxacin (CIP) is a fluoroquinolone widely used to treat lower respiratory infections and urinary tract infections. Because of long time usage and uncontrolled application, it resistance to CIP has bcome common. Another drug, pradofloxacin (PRA) is a new fluoroquinolone which hasn't been used to treat humans. My experiments were performed on different closely related *E. coli* strains by measuring the lowest concentation that inhibited growth (minimum inhibitory concentration, MIC), the lowest concentration that precvented growth of resistant mutants (mutant prevention concentration, MPC), and evolution of resistance, with the purpose to compare the efficiency of CIP and PRA. The results showed that PRA and CIP have very similar characteristics but PRA is associated with a slightly lower MIC and a slightly higher MPC than CIP, and resistance was slightly more likely to evolve in the presence of PRA than CIP. Different strain has different MIC, MPC and appears different evolution of resistance toward two drugs, which are associated with different mutations of the strain.

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