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Functional genomics and transcriptomics of virulent and multidrug resistant *Escherichia coli* of poultry origin

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The pathogenic and multidrug resistant (MDR) *Escherichia coli* in poultry products may pose high risk to food safety. The MDR *E. coli* were selected by antimicrobial susceptibility tests. The Extended-Spectrum β-Lactamases (ESBL) were determined by antibiotics impregnated disks and double disk synergy test. The virulent characteristics, including the biofilm formation, the adhesion, invasion and survivability in Caco-2 and Raw 264.7, the median lethal dose (LD_{50}) in two-day old chickens, were determined via *in vitro* and *in vivo* tests. The genes involved in MDR, ESBL and virulence were amplified by PCR. Six MDR *E. coli* isolates with higher virulence (27, 112, 130, 351, 357 and 381) were selected for next generation sequencing. The multidrug resistance genes (*mdtE, F, G, and K*) and genes encoding resistance to β-lactams, aminoglycosides, chloramphenicol, fosfomycin, fluoroquinolones and tetracycline were found in one MDR *E.coli.* The *E.coli* 381 with higher virulence in cell culture and 1000-fold more virulence in a chicken model than other strains. The Illumina HiSeq2500 transcriptome analysis found that multiple pathways *inv*olved in the resistance (e.g *mdt* for multidrug resistance, *mate* for efflux family, *ompE* for outer member, *fsr* for fosmidomycin resistance and ABC Transporters) and virulence (e.g inv for invasion, BssR and *bdm* for biofilm formation, *NlpD* for lipoprotein and *ycr* for two component systems) were up-regulated in *E. coli* 381. The results provided critical information about the highly virulent MDR *E. coli* strain of poultry origin, which can further be used for the development of prevention strategies and treatment procedures.

Biography

Haihong Hao has completed his PhD from Huazhong Agricultural University and he is a Visiting Scientist from Iowa State University (2008-2009) and NCTR USFDA (2015-2017). He is an Associate Professor of College of Veterinary Medicine at Huazhong Agricultural University. He has published more than 50 papers in reputed journals.

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