Treatment of *E.coli* infections and the multidrug resistant strains

Escherichia coli (*E. coli*) are bacteria that normally colonise the gastrointestinal tract of humans and animals. However, some strains of *E. coli*, particularly *E. coli* O157:H7, can cause intestinal infections and become life-threatening, with huge implications at social and economic levels.

Since first recognised as a pathogen in 1982 during an outbreak in United States, enterohaemorrhagic *E. coli* (EHEC) became a public health problem of serious concern due to the high number of outbreaks registered all over the world.

The majority of infected individuals with EHEC make a full recovery within a week, but those who are susceptible such young children, pregnant women, elderly individuals and people with compromised immune system may develop complications as bloody diarrhea or at the last instance haemolytic uremic syndrome (HUS). There is not a specific and broadly protective treatment for pathogenic *E. coli* and in most of the cases the resting and hydration are enough to replenish fluids lost from diarrhea and vomiting and the own immune system is able to control the infection. However, HUS complicates 6 to 9 percent of EHEC infections overall and about 15 percent of EHEC infections in children under age 10.

Antimicrobials known to be useful in cases of traveller's diarrhea include doxycycline, trimethoprim/sulfamethoxazole (TMP/SMZ), fluoroquinolones, and rifaximin. They help to attenuate the diarrhea. However in the case of enterohaemorrhagic *E. coli*, antibiotics are not usually applied. Indeed, there are evidences that giving antibiotics such ciprofloxacin to children who have gastroenteritis or colitis caused by EHEC O157 may increase the production of Shiga toxin (main virulence factor of this pathotype) and their risk of developing HUS. In other hand, during the most recent outbreak of EHEC/STEC in northern Germany, new aspects regarding the antibiotic therapy were reviewed with some good results. Indeed, in some individual cases, use of azithromycin did not worsen the outcome in long term carriers of the bacteria.

This should be a good perspective to fight future EHEC outbreaks if we are not facing another public-health concern. In April 2014, world health organization elaborated the first global report on antibiotic resistance and positioned antibiotic resistance as highest treat in the present. In Europe the resistance of *E. coli* invasive isolates to fluoroquinolones ranges from 10 in the north to over 30 percent in south Europe. This means that infections that could be treated easily few years ago are no longer treatable. Moreover, the ability and capability of bacteria to mutate and transfer the antibiotic resistance to another strains is highly effective. In the case of EHEC the panoply of effective antibiotics is very limited due to the obvious reasons and he overall problem is exacerbated by the increasing antibiotic resistance and the number of recurrent infections. These facts indicate the need to develop new therapeutic strategies against *E. coli* such a broadly protective and safe vaccine.