

Resistance to antibiotic of last resort found in pigs and humans in England and Wales

Government scientists have found a gene, which makes bacteria resistant to an antibiotic used as a last resort in human medicine, in *E. coli* from pigs and from human *E. coli* infections in England and Wales [1]. The emergence of resistance to the antibiotic, colistin, is considered to be a major step towards completely untreatable infections.

The colistin resistance gene, called *mcr-1*, was first found last month in China in pigs, retail meat and human infections [2]. Colistin is frequently used for mass medication of intensively farmed pigs and poultry, and scientists believe that the resistance gene has spread from farm animals to humans because the antibiotic is used much more widely in veterinary medicine than it is in human medicine.

A Freedom of Information request submitted by the Alliance to Save Our Antibiotics has established that 837kg of colistin were sold for use in British farm animals in 2014, whereas just 300kg are used per year in human medicine [3]. In Europe as a whole, the amount used in farm animals (545 tonnes) is more than 500 times higher than the amount used in humans (about 1 tonne), with use in farm animals in Spain (177 tonnes), Italy (133 tonnes), Germany (124 tonnes) and France (50 tonnes) being particularly high [4].

Cóilín Nunan, Scientific Adviser to the Alliance, said “Despite scientists saying that resistance to this last-resort antibiotic is likely to be spreading from farm animals to humans, it still remains completely legal in the UK and in most EU countries to routinely feed colistin to large groups of intensively farmed animals, even when no disease has been diagnosed in any of the animals.

“We need the government, the European Commission and regulatory bodies like the Veterinary Medicines Directorate to respond urgently. The routine preventative use in farming of colistin, and all antibiotics important in human medicine, needs to be banned immediately.”

Since the Chinese discovery of *mcr-1* in November, scientists around the world have been re-examining their collections of bacteria from farm animals and humans for the gene. British government scientists found the *mcr-1* gene in *E. coli* from two separate pig farms, in one stored *E. coli* from a pig, and in three *E. coli* from two separate patients. The *E. coli* from the human patients were also resistant to the critically important cephalosporin antibiotics. The colistin gene was also found in ten human salmonella infections and in salmonella from a single imported sample of poultry meat [5]. The earliest British positive sample was a salmonella from 2012.

In the past few weeks, the resistance gene has also been found in Denmark, France, the Netherlands, Portugal and in several Asian and African countries [6].

The *mcr-1* gene is found on mobile pieces of DNA which means it can jump from farm-animal bacteria into bacteria causing human infections. This also explains why it is spreading so widely and is already being found in many different strains of *E. coli*, salmonella and *Klebsiella pneumoniae*.

Notes for Editors

1. VMD releases more details of UK *mcr-1* gene tests, *Vet Times*, <http://www.vettimes.co.uk/news/vmd-releases-more-details-of-uk-mcr-1-gene-tests/>

2. Liu et al. Emergence of plasmid-mediated colistin resistance mechanism MCR-1 in animals and human beings in China: a microbiological and molecular biological study. *Lancet Infectious Diseases*
3. Farm-animal statistics were acquired from the VMD via an FOI, human use statistics are available from <http://ecdc.europa.eu/en/publications/Publications/antimicrobial-resistance-JIACRA-report.pdf>
4. Colistin is a polymixin antibiotic. Use of polymixins in humans and farm-animals in Europe is available from <http://ecdc.europa.eu/en/publications/Publications/antimicrobial-resistance-JIACRA-report.pdf>
5. Scientists find mcr-1 gene in food and human isolates, *Vet Times*, <http://www.vettimes.co.uk/news/scientists-find-mcr-1-gene-in-food-and-human-isolates/>
6. See various reports from Lancet Infectious Diseases <http://thelancet.com/journals/laninf/onlineFirst>