IMPORTANCE OF RESISTANCE TO CIPROFLOXACIN IN *Campylobacter* spp.

Prof. dr Biljana Miljković Selimović, Prof. dr Branislava Kocić,

Dr sci. med. Tatjana Babić

IMPORTANCE OF RESISTANCE TO CIPROFLOXACIN IN *Campylobacter* spp.

- Sproston EL, et al. Trends in fluoroquinolone resistance in Campylobacter. Microb Genom. 2018 Jan;4(8):e000198. doi: 10.1099/mgen.0.000198. Epub 2018 Jul 19. PMID: 30024366; PMCID: PMC6159550.

- It is well known that ….

IMPORTANCE OF RESISTANCE TO CIPROFLOXACIN IN *Campylobacter* spp.

- *Campylobacter* are the leading cause of bacterial gastroenteritis in many countries
- *Campylobacter jejuni* (approximately 90 %)
- *Campylobacter coli* (approximately 10 %) cause infection in humans,
- after consumption of
  - contaminated,
  - cross contaminated or
  - under-cooked food, especially poultry.

IMPORTANCE OF RESISTANCE TO CIPROFLOXACIN IN *Campylobacter* spp.

- Drugs used to treat *Campylobacter* infections are macrolides, particularly erythromycin, for laboratory-confirmed cases.
- Members of the genus Campylobacter are generally susceptible to erythro-
- mycin and to gentamicin in Serbia
- **The fluoroquinolones (FQ) predominantly ciprofloxacin (CIP) are broad-spectrum antimicrobials used to treat a variety of infections including undiagnosed cases of diarrhea**

IMPORTANCE OF RESISTANCE TO CIPROFLOXACIN IN *Campylobacter* spp.

- Nelson J. Et al. Fluoroquinolone-Resistant *Campylobacter* Species and the **Withdrawal of Fluoroquinolones from Use in Poultry: A Public Health Success Story**, *Clinical Infectious Diseases*, Volume 44, Issue 7, 1 April 2007, Pages 977–980, https://doi.org/10.1086/512369

IMPORTANCE OF RESISTANCE TO CIPROFLOXACIN IN *Campylobacter* spp

- Since the end of 1980's there has been an increasing trend in the proportion of FQ-resistant strains of members of the genus Campylobacter isolated from both clinical samples and livestock, where FQs (particularly enrofloxacin) are frequently used to treat animals in intensive production

- Nelson J. Et al. Fluoroquinolone-Resistant *Campylobacter* Species and the Withdrawal of Fluoroquinolones from Use in Poultry: A Public Health Success Story, *Clinical Infectious Diseases*, Volume 44, Issue 7, 1 April 2007, Pages 977–980, https://doi.org/10.1086/512369

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- FQs inhibit the enzyme, DNA gyrase, that is involved in DNA replication and transcription.
- The most frequent mechanism of CIP resistance in members of the genus Campylobacter is a single point mutation C257T in the gyrA gene
- This results in an amino acid substitution in the Gyrase A subunit at position 86, from threonine to isoleucine and has been reported in all CIP-resistant strains of C. jejuni isolated from clinical samples

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- Other mutations within the gryA gene have been associated with increased resistance to ciprofloxacin but at lower concentrations and frequency.
- The mutation in the gyrA works synergistically with the drug efflux pump CmeABC, where, the emergence of FQ-resistant strains is increased.
- In the absence of the gyrA gene mutation over-expression of the CmeABC efflux pump does not generate ciprofloxacin resistance

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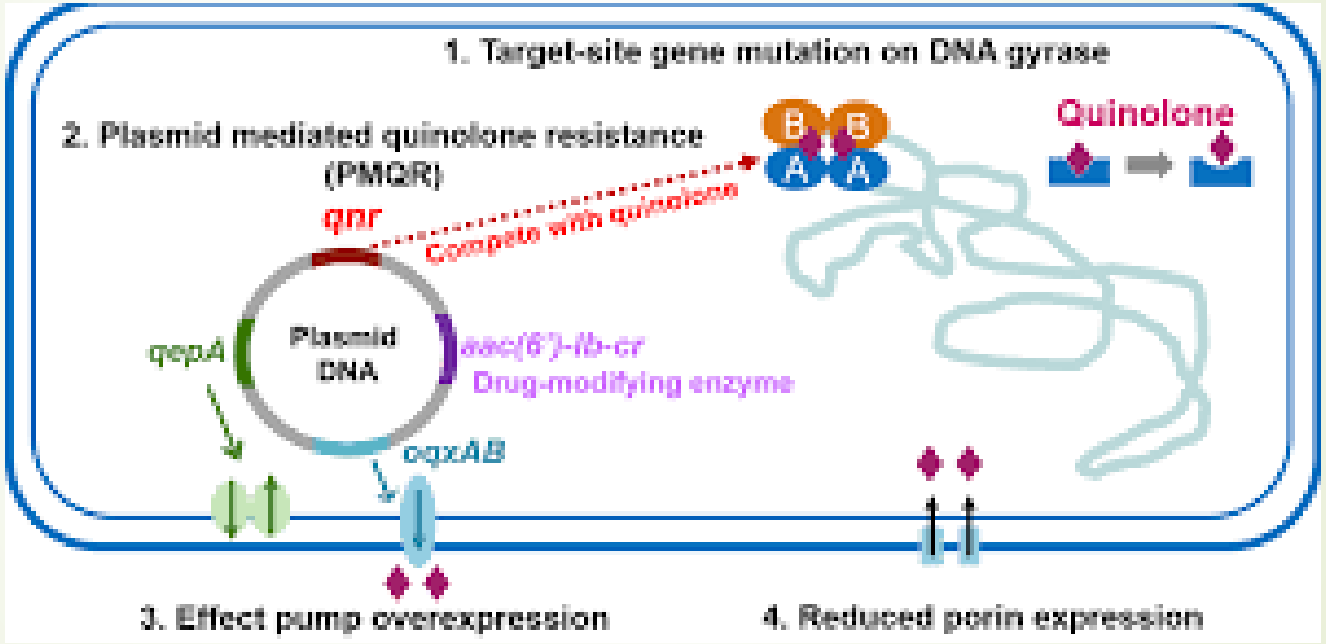

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- Unlike the process for macrolide resistance CIP resistance can accumulate rapidly in the population through mutation in different strains of members of the
- genus Campylobacter and selection pressure enriching for isolates that have a resistance mutations

IMPORTANCE OF RESISTANCE TO CIPROFLOXACIN IN *Campylobacter* spp

- Fluoroquinolones (FQ), especially ciprofloxacin (CIP), are among the most common treatments for human and animal infection with Campylobacter – a common cause of gastroenteritis worldwide. Over time, this has resulted increased antimicrobial resistance (AMR), making these drugs much less effective.

IMPORTANCE OF RESISTANCE TO CIPROFLOXACIN IN *Campylobacter* spp

- The transmission of FQ-resistant bacteria from agricultural animals to humans is difficult to prove and a recent global report on surveillance of antimicrobial resistance emphasized the need to collect more data on the effects of AMR in foodborne bacteria on animal and human health.
- Currently, there is little direct evidence of the transmission of FQ-resistant bacteria within livestock and to humans via food.
- The occurrence of resistant members of the genus Campylobacter on retail poultry meat is a major concern since this is a principal source of isolates infecting humans
- Data covering the last three years reveals an overall increase in CIP-resistance among both C. jejuni and C. coli

https://pub

2009 Jul;66(7):522-6.

Antimicrobial susceptibility profiles of thermophilic campylobacters isolated from patients in the town of Nis Miljković-SelimovićB

- In the strains we investigated, resistance to gentamicin and chloramphenicol was not recorded, whereas a low rate of strains resistant to erythromycin (2.4%), a higher prevalence of strains resistant to tetracycline (9.9%), and a high level of resistance to ciprofloxacin (29.8%) and nalidixic acid (**33.3%**) were registered.

IMPORTANCE OF RESISTANCE TO CIPROFLOXACIN IN *Campylobacter* spp.

- **Resistance to FQ was 44%**

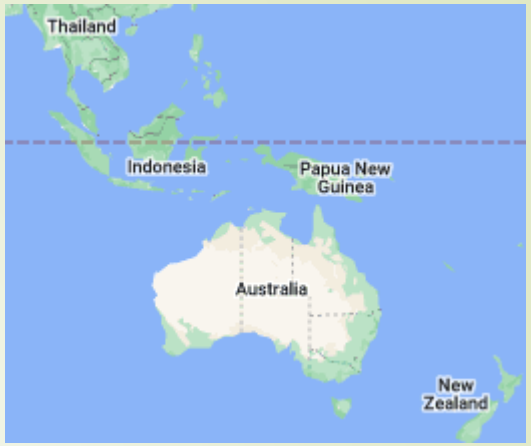
Pojava rezistencije kod bakterija Campylobacter jejuni i Campylobacter coli
Ristić L,..... Miljković Selimović B

Miljkovic Selimovic B. Rezistencija kod bakterije *Campylobacter jejuni*. Uzespecijalisticki rad, Univerzitet u Nišu, Medicinski Fakultet, Niš, **2013.**

- S I **R** S I **R**
- CIP 47.57 4.86 **47.57** 43.75 9.38 **46.88**
  - **C. jejuni** **C. coli**

IMPORTANCE OF RESISTANCE TO CIPROFLOXACIN IN *Campylobacter* spp.

- CC 78%
- CJ 89%
- **2019 – 2023** godina



IMPORTANCE OF RESISTANCE TO CIPROFLOXACIN IN *Campylobacter* spp

- Australia **has never legalized the use of fluoroquinolones in commercial chickens and until now fluoroquinolone-resistant *Campylobacter*** has not been detected in the Australian poultry.
- The survey of meat chickens derived from all major Australian producers describes the unexpected emergence of fluoroquinolone resistance in *Campylobacter jejuni* and *C. coli*.

IMPORTANCE OF RESISTANCE TO CIPROFLOXACIN IN *Campylobacter* spp

- Abraham S.et al. **Emergence of Fluoroquinolone-Resistant *Campylobacter jejuni* and *Campylobacter coli* among Australian Chickens in the Absence of Fluoroquinolone Use.** Appl Environ Microbiol. 2020 Apr 1;86(8):e02765-19. doi: 10.1128/AEM.02765-19. PMID: 32033955; PMCID: PMC7117913.
- There is a number of factors such as:
- the *low level* of resistance to other antimicrobials,
- the *absence of fluoroquinolone use*,
- the adoption of measures for preventing spread of contagion between flocks,
- *genomic identities of isolates*,
- **That point to HUMANS, RESISTANT species, OR WILD BIRDS**
- That study demonstrates the need for AMR based sampling to manage AMR risks in the food chain.

Conclusion

- **Multidisciplinary approach and the agreement between Food, Veterinary and Microbiology Authorities could bring the solution of this huge problem.**

- **THANK YOU VERY MUCH FOR YOUR ATTENTION!**