Tracing and quantitative detection of Campylobacter jejuni

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Key words
real-time PCR, multilocus sequence typing (MLST), epidemiology

Aim of the study
Direct detection, identification and quantification of C. jejuni and C. coli from poultry by real-time PCR. Genotyping and antibiotic resistance towards quinolone and macrolide of Campylobacter isolates from poultry and human clinical cases to investigate their diversity and the role of poultry in human campylobacteriosis.

Material and methods
Swiss poultry neck skin and caeca samples collected in the framework of the 2008 “EU baseline study” were used in the project. The application of a newly developed fusA gene-based real-time PCR was directly tested on 351 neck skin samples. A total of 340 Campylobacter isolates from caeca and neck skin were genotyped (MLST, flaB, rpoB), antibiotic resistance towards macolides (mutations in the 23S rRNA gene) and quinolones (mutations in gyrA) determined and later on compared with 136 human C. jejuni isolates from the same year.

Results and significance
The new real-time PCR assay proved to be a sensitive method for direct detection, quantification, and differentiation of C. jejuni and C. coli from poultry neck skin. A Campylobacter prevalence of 70% was determined with 60% of positive samples identified as C. jejuni, 10% as C. coli and 30% were positive for both. Genotyping and antibiotic resistance determination of poultry isolates showed a broad variety of types. Comparison of caecal and neck skin isolates indicated self-contamination from the flock during slaughter as the main source of Campylobacter. Antibiotic resistance against macrolides was low (3%) and only found in C. coli whereas resistance towards quinolones was found in 19% of C. jejuni and 28% of C. coli isolates. Genotypes found in human C. jejuni showed a significant overlap with those of poultry isolates. Quinolone resistance in human C. jejuni was much higher (38%) possibly resulting from therapeutic use of quinolones or reflecting infections acquired in other countries with elevated levels of quinolone resistance. The results provide a solid basis for further quantitative and qualitative analysis of Campylobacter in poultry by real-time PCR as well as for investigating more thoroughly source attribution of Campylobacter.

Publications, posters and presentations
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The Annual meetings of SGM (Lausanne 2009, Zürich 2010) and at Swiss Molecular Microbiology Workshop SWIMM2010 (Gwattzentrum Thun) (Poster presentations).

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