

Molecular typing of *Giardia duodenalis* detected in UK cats and dogs using an improved marker

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Giardia duodenalis is a flagellated protozoa which causes enteric disease in both humans and animals. In the United Kingdom (UK), knowledge of the zoonotic impact of this parasite is limited due to the inconsistent diagnostic testing and the availability of only low-resolution molecular markers for genotyping with variable efficacy. Human giardiasis has long been considered a travel-associated condition in the UK. However, recent studies have suggested the presence of an endemic *Giardia* cycle in the country, although the source of human disease is still unclear in most cases. Therefore, this study aimed to (i) improve a commonly used *Giardia* genotyping assay that distinguishes assemblages (broad genetic sub-groups), the nested *topoisomerase phosphate (tpi)* PCR, to increase the amplification success rate in both human and animal *Giardia* positive samples and (ii) molecularly characterise *Giardia* strains circulating in the UK human and companion animal populations (feline and canine). After adjusting the *tpi* primers to account for additional sequence diversity present in published *Giardia* genomes and optimising the PCR conditions in a step-wise manner, a revised assay was used to test human (n=79) and companion animal (n=174) faecal samples, to evaluate the molecular epidemiology of *Giardia* in the UK. The overall genotyping success rate of the new assay was 37.4 % (65/174) and 46.8 % (37/79) for animal and humans, respectively. Humans were found to be infected with known human-infective assemblage genotypes AI (n=1), AII (n=11) and B (n=25). Assemblage AI genotypes were also found in three feline and one canine sample, while one feline sample contained assemblage AII. In addition, four feline samples were infected with assemblage B genotypes. Alongside these potentially zoonotic assemblages, canine samples were found to be infected with assemblage C (10/52) and F (10/52), while feline samples with F (38/122) assemblage genotypes. This study demonstrates the presence of zoonotic *Giardia* genotypes circulating in the UK companion animal population by an improved *tpi* PCR, which also resulted in an increased success rate compared to previous studies. Notably, 17.4 % (8/46) of feline-derived *Giardia* strains were identified as being zoonotic genotypes. Therefore, this work highlights the potential role of domestic pets in the endemic transmission of *Giardia* in the UK and underlines the need for appropriate hygiene measures to be observed when interacting with both symptomatic and asymptomatic animals. Further studies are needed to assess the zoonotic risk of *Giardia* associated with companion animals in high-income countries such as the UK.