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Differentiation of human and calf isolates of  
*Giardia intestinalis*

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## **ABSTRACT**

Traditionally farm runoff has been blamed for the contamination of aquatic waterways with *Giardia* cysts especially during the natural calving seasons. But despite *Giardia intestinalis* being one of the most commonly acquired waterborne gastrointestinal parasites in humans little is known about the extent of *G.intestinalis* transmission between humans and animals throughout a defined geographical region. This study examines the characterisation of human, calf and laboratory adapted isolates of *G.intestinalis*.

Specific amplification primers were developed to target a section of the ribosomal DNA (rDNA) unit. This locus is considered to be rapidly evolving and therefore suitable for use in the elucidation of phylogenetic relationships between *G.intestinalis* isolates. The isolates characterised were collected in the Waikato district from naturally infected humans and calves throughout 1998 but especially during the spring calving season of August and September. *Giardia* from calves from a second province as well as laboratory adapted isolates cultured from a variety of hosts were also surveyed. Sequence analysis of human, calf and laboratory adapted *G.intestinalis* isolates showed the presence of three distinct groups. All calf *G.intestinalis* isolates clustered together despite differences in the collection time and site. The human *G.intestinalis* isolates split into two clusters, corresponding to recognised 'Polish' and 'Belgian' subtypes. Surprisingly the laboratory adapted isolates grouped with the human 'Polish' subtype despite striking differences in isolate origin. The current data strongly suggests that host specific *G.intestinalis* strains are present in the environment. Cross-transmission has so far not been detected.

The occurrence of isolate specific rDNA sequences enabled the development of diagnostic polymerase chain reaction (PCR) amplification primers. In conjunction with the existing primers these allow the identification of human specific *Giardia* as well as differentiating between the 'Belgian' and 'Polish' subtypes. These primers offer the ability to quickly and economically identify potential sources of human giardiasis in the environment. Using such molecular tools may lead to an overall decrease in human giardiasis resulting from environmental contamination sources.

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Cindy Lee Lou Dunny Hunt dedicates her thesis to her brothers,  
Clynton and Vaughan,  
and looks forward to playing basketball again with them both one day.

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