

# How new visitation and diagnostic of intestinal parasite infections, changes the understanding of occurrence



## Introduction

Parasitic gastrointestinal diseases are considered a major health problem worldwide.

## Aims

Investigate visitation criteria and diagnostic methods for *Giardia duodenalis*, *Cryptosporidium* species, *Entamoeba histolytica* and *Cyclospora cayetanensis*.

To see whether this shows an endemicity of, otherwise thought travel-related, intestinal parasitic infections in a part of Denmark.

Peter Kromann<sup>1,2</sup> Marianne Nielsine Skov<sup>1,2</sup> and Gitte Nyvang Hartmeyer<sup>1</sup>  
<sup>1</sup>Department of Clinical Microbiology (KMA), Odense University Hospital (OUH), Region of Southern Denmark  
<sup>2</sup>Clinical Institute (KI), University of Southern Denmark (SDU)

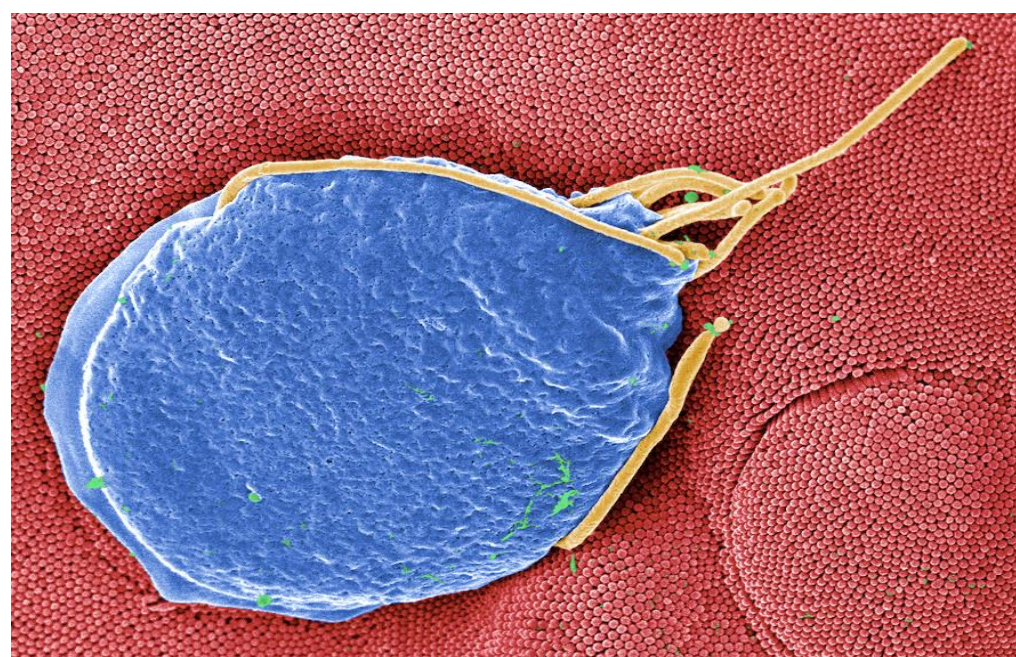
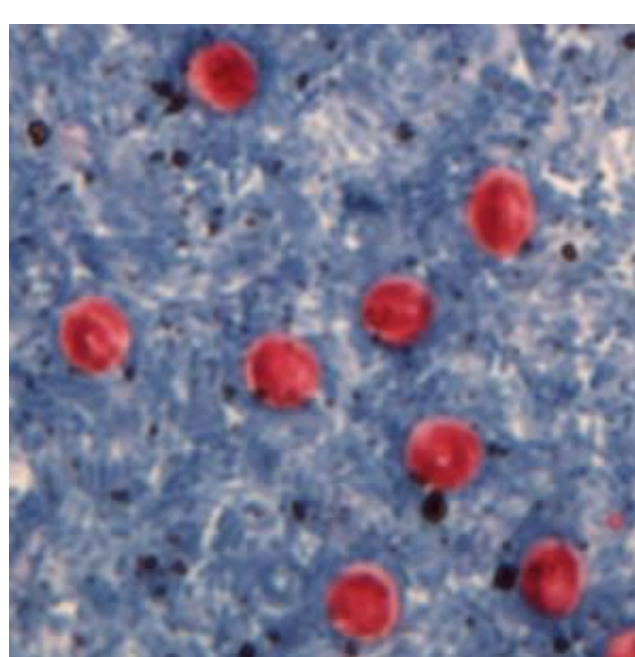
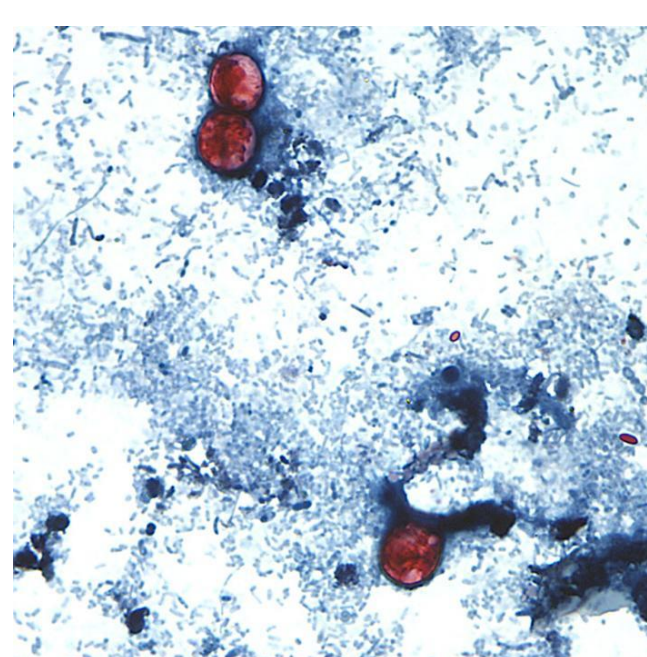


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## Methods

Data from January 2015 to March 2023 were used to establish three time periods (Table 1).

Table1: Methods of diagnostic and visitations criteria in the three periods.

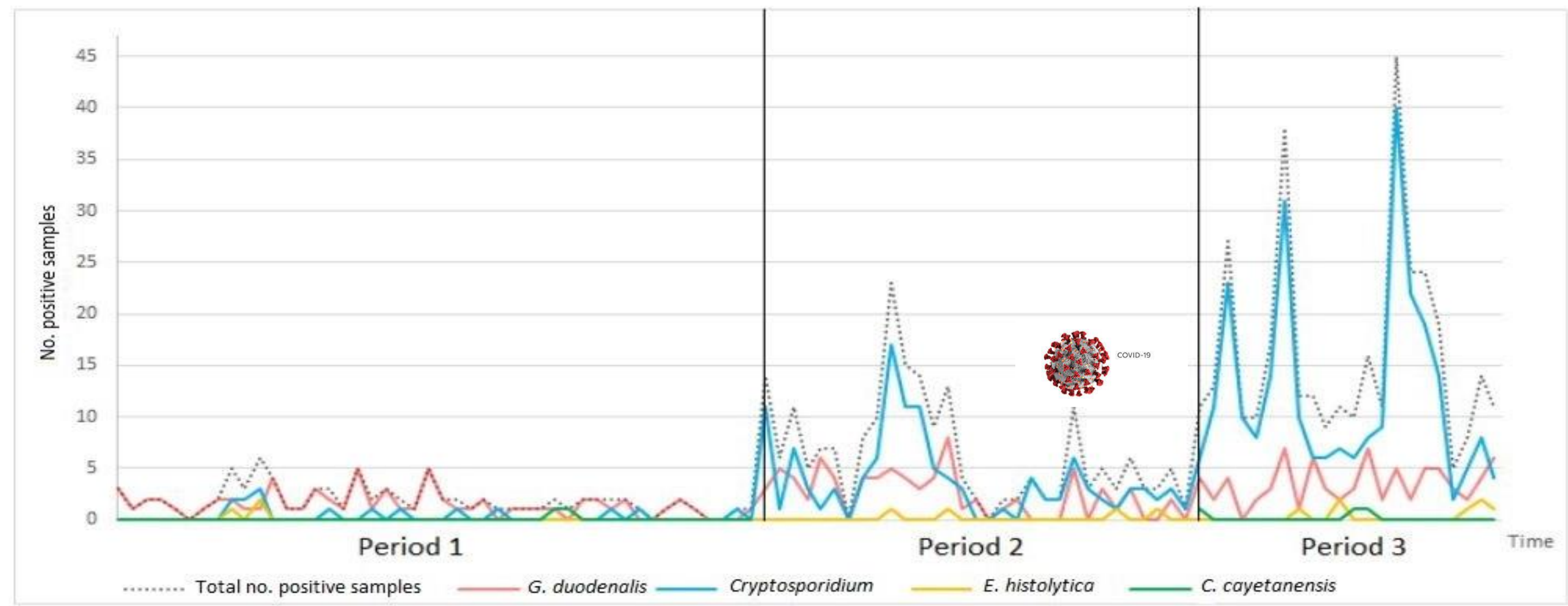
|                     | Period 1                                                                                                                    | Period 2                                                                                                                                                                                                                                                             | Period 3                                                                                                                                                                                              |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Time period         | 01/01/2015 – 31/10/2018<br>(46 months)                                                                                      | 01/11/2018 – 31/05/2021<br>(31 months)                                                                                                                                                                                                                               | 01/06/2021 – 31/03/2023<br>(22 months)                                                                                                                                                                |
| Diagnostic method   | <b>Microscopy</b> <ul style="list-style-type: none"><li>All intestinal parasites</li></ul>                                  | <b>In-House species-specific PCR</b> <ul style="list-style-type: none"><li><i>G. duodenalis</i></li><li><i>Cryptosporidium</i> spp.</li><li><i>E. histolytica</i></li></ul> <b>Microscopy</b> <ul style="list-style-type: none"><li><i>C. cayetanensis</i></li></ul> | <b>Commercial multiplex PCR</b> <ul style="list-style-type: none"><li><i>G. duodenalis</i></li><li><i>Cryptosporidium</i> spp.</li><li><i>E. histolytica</i></li><li><i>C. cayetanensis</i></li></ul> |
| Visitation criteria | <ul style="list-style-type: none"><li>Foreign travel outside Europe</li><li>Allogenic bone marrow transplantation</li></ul> | <ul style="list-style-type: none"><li>Age &lt;16 years</li><li>Travel</li><li>Immunosuppression</li><li>Suspicion of foodborne infection</li><li>Outbreaks (&gt;2 different, but related cases of diarrhoea)</li></ul>                                               | <ul style="list-style-type: none"><li>Suspicion of gastro-intestinal infection</li></ul>                                                                                                              |

## Results

Table 2: Total number of patients examined in the respective time periods are listed in the top. Percentages of total number of patients regarding the different parasites are shown in parentheses.

| Time period                 | 1         | 2          | 3          |
|-----------------------------|-----------|------------|------------|
| No. patients                | 8871      | 9182       | 15118      |
| <i>G. duodenalis</i>        | 66 (0.7)  | 76 (0.83)  | 78 (0.5)   |
| <i>Cryptosporidium</i> spp. | 15 (0.17) | 120 (1.3)  | 269 (1.78) |
| <i>E. histolytica</i>       | 3 (0.03)  | 4 (0.04)   | 7 (0.05)   |
| <i>C. cayetanensis</i>      | 2 (0.02)  | 0 (0)      | 3 (0.02)   |
| Total no. events            | 86 (0.97) | 200 (2.18) | 357 (2.36) |

Figure 1: Consecutive numbers of events, regarding the individual parasites. Total number of events (dotted black) throughout the three time periods.



## Take-home message

***Cryptosporidium* spp.** increase significantly as the visitation criteria and diagnostic methods are changed. This may indicate a previous underestimation and endemicity in Denmark for *Cryptosporidium* spp..

*G. duodenalis* increases marginally from period one to period two, but seems stagnant in period three, and more common as a travel-related infection.

*E. histolytica*, and *C. cayetanensis*, are almost the same throughout the changes, and is considered travel-related.