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Diagnosis of *Cryptosporidium parvum* with microscopy, striptest, ELISA and real-time PCR

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**Objectives:** *Cryptosporidium parvum* remains largely under diagnosed in current routine diagnostic procedures in microbiology laboratories. We compared four different diagnostic methods for the detection of *C. parvum* in faeces in both acute and chronic diarrhoea.

**Methods:** Microscopic examination (Auramin stain confirmed by Kinyoun stain), Crypto-strip (Coris Bioconcept), ELISA (Novitec Cryptosporidium ELISA) and real time PCR for the detection of *C. parvum* were compared.

**Results:** Five hundred and fifteen faeces were included. One hundred and fifty-four watery specimens from acute diarrhoea were sent for bacteriological examination and 361 triple faeces test (TFT)-samples, representing a more chronic form of diarrhoea, were sent to the parasitology department. Using real time PCR as the gold standard, the positive predictive values of microscopy, Crypto-strip and ELISA were 100%, 85% and 99%, respectively. The sensitivities of microscopic detection, Crypto-strip and ELISA were 37%, 78% and 71%, respectively, while the specificities of the three methods were never lower than 98%. Remarkably, the majority of the positive *Cryptosporidium* samples were not found in watery stools, as described in all textbooks, but rather in loose to mushy stools (57%). Furthermore, the majority of the positive watery samples were not sent for parasitological examination but only for bacterial culture.

**Conclusion:** The widely used microscopy is a very specific but less sensitive method for the laboratory detection of *C. parvum* in faeces. Both ELISA and Crypto-strip have good sensitivity and both positive and negative predictive values. Real time PCR is a very sensitive and specific method for the detection of *C. parvum*. The majority of positive *Cryptosporidium* samples were found in mushy stools from children younger than 10 years old. Examination of watery stools sent only for bacteriological examination, for the presence of *C. parvum* yields additional positive samples which would otherwise not have been detected.
Laboratory diagnosis of Cryptosporidium using microscopy, striptest, ELISA and real-time PCR

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**Introduction**

Infection with Cryptosporidium results in a wide range of manifestations, from asymptomatic infections to severe, life-threatening illness. The average incubation period is 7 days. Patients mostly present with watery diarrhea, which can be accompanied by dehydration, weight loss, fever and/or vomiting. In immunocompetent persons, symptoms are usually short lived (1 to 2 weeks). In immunocompromised patients the infection is more serious; it can become chronic and is sometimes fatal.

**Purpose of the study**

Cryptosporidium remains underdiagnosed in current routine laboratory procedures. We compared four different methods for the detection of Cryptosporidium in feces, in both acute and chronic diarrhea.

**Materials and methods**

1) Microscopy by Auramin staining [A] confirmed by Kinyoun staining [B]
2) Crypto-strip (Coris Bioconcept) [C]:

3) ELISA (Novitec Cryptosporidium ELISA).

**Results**

We included 515 fecal samples in the study. Of these, 154 watery specimens from acute diarrhea were sent for bacteriological examination and 361 triple feces test (TFT)-samples were sent for parasitological examination. The latter samples represented a more chronic form of diarrhea.

**Conclusion**

Microscopic detection is a widely used, very specific but less sensitive method for the laboratory diagnosis of Cryptosporidium in feces. Both ELISA and Crypto-strip have good sensitivity and specificity.

The Crypto-strip can easily be introduced for diagnostic screening purposes.

Real-time PCR is a very sensitive and specific method for the detection of Cryptosporidium.

Watery stools sent for bacteriological examination were found to be positive for Cryptosporidium which would otherwise have been missed.