

Application of flow cytometry for parasitological diagnostics

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Flow cytometry (FCM) is a technique for counting, examining, and sorting microscopic particles suspended in a stream of fluid. It allows simultaneous multiparametric analysis of the physical and chemical characteristics of single cells flowing through an optical and electronic detection apparatus. The technology has applications in a number of fields, including molecular biology, pathology, immunology, plant biology, marine biology and parasitology. In the field of molecular biology it is especially useful when used with fluorochrome tagged antibodies. These specific antibodies bind to antigens on the target cells and help to give information on specific characteristics of the cells being studied in the cytometer. It has a broad application in medicine (especially in transplantation, hematology, tumor immunology and chemotherapy, genetics and sperm sorting). In marine biology, the auto-fluorescent properties of photosynthetic plankton can be exploited by flow cytometry in order to characterise abundance and community structure. In protein engineering, flow cytometry is used in conjunction with yeast display and bacterial display to identify cell surface-displayed protein variants with desired properties.

Currently flow cytometry offers several diagnostics applications for the fast and precise detection of parasites (*Cyclospora cayetanensis*, *Giardia lamblia*, *Cryptosporidium parvum*) in foods, water, faecal and clinical specimens. This method is also used for the detection of variant antigens on *Plasmodium falciparum* infected erythrocytes.

In our study, flow cytometry and fluorescent in situ hybridization (FISH) were evaluated for the identification and assessment of the viability of *Giardia lamblia* in environmental samples. We used specific nucleic acid probes and specific antibodies for detecting this parasite. FCM and FISH have been previously applied and evaluated for the enumeration and identification of airborne bacteria in agricultural environments.

The FCM method can be adopted to our needs, wherever it is possible to use fluorochromes. The basic principles of this technique and examples of practical applications in parasitology, as well as possible adaptations of the method will be reviewed.