Preface

Since our last review in this journal in 1999, there have been remarkable advances in FP technology. We felt it necessary therefore, to put together a special issue on the recent developments and reviews in various disciplines of FP described by experts currently working in the field. This explosive progress in FP is also partly due to the availability of portable as well as high throughput instruments. Samples can be run one at a time (point of care, or in the field) using small portable instruments, or 96, 384 or even higher samples densities using automated high throughput plate readers (important for drug discovery). Of course it is not possible to invite all the experts in the field to contribute due to their busy schedules, space restrictions or for other reasons.

Although fluorescence polarization (FP) was first described by Perrin in 1926, it took almost 25 years before Weber developed this technique for practical use. Jameson and Croney have excellently reviewed the history of the development of FP from a personal viewpoint (pp 167-176). They have also discussed some often misunderstood considerations in FP. Future developments in the field are discussed, with special description of multi-photon techniques. Gomez-Hens and Aguilar-Caballos describe the use of stopped-flow FP to measure the initial rate of an FP assay, rather than the equilibrium state, and show the utility of the method in the clinical, environmental and food analysis fields (pp 177-182). However, they also point out the current limitations of stop-flow FP instrumentation.

FP has been very instrumental in rapid developments in drug discovery. For example, Burke, Loniello, Beebe and Ervin describe the use of FP to detect inhibitors of kinases, phosphatases, proteases, G-protein coupled receptors, and nuclear receptors (pp 183-194). Complementing this article, Sportsman, Daijo and Gaudet discuss different methods to investigate signal transduction (pp 195-200). They describe a new FP assay format (IMAP) and compare it to antibody-based inhibition assays.

Some other fields of diagnostics are the uses of FP in enzyme assays, DNA detection and a relatively new field of single nucleotide polymorphism (SNP). Nikiforov and Simeonov describe a new approach to assays for the high throughput screening of kinases, proteases and phophatases, using cationic poly-amino acids (pp 201-212). They further describe a new SNP typing approach based on the polymerase-catalyzed extension of 3'-fluorescein-labeled primers. A nice review of SNP genotyping is also given by Chen (pp 213-224) where he describes FP template-directed dye-terminator incorporation (FP-TDI) assays. Tsuruoka and Karube (pp 225-234) describe the rapid and specific determination of DNA in many examples using FP coupled asymmetric PCR. They have used high salt concentration for speeding up the DNA detection with FP.

A very important, and relatively new, application of FP is the detection of infectious diseases. We are the first and only group to develop these assays. Here we describe assays for the detection of antibodies to the gram negative bacteria *Brucellae* and *Salmonellae*, and the cells themselves, by the use of labeled carbohydrate epitopes (Jolley and Nasir, pp 235-244). We also discuss the use of labeled peptides to detect antibodies to *Mycobacterium bovis* and Equine Infectious Anemia Virus. The coupling of FP to various amplification methods to detect bacterial DNA is also discussed.

FP assays also show great promise in the field of environmental monitoring. Johnson describes the development of metal chelate-based immunoassays for the determination of lead and cadmium in a variety of samples from different environment sources including soil, dust, solid wastes and drinking water (pp 245-255). Eremin and Smith have reviewed the development of FP assays for the determination of pesticides in environmental and food samples (pp 257-266). We are once again the first group to extend the use of FP to the important field of grain mycotoxin determination (Nasir and Jolley, pp 267-273). In this issue we review the quantitative determination of aflatoxins, fumonisins and deoxynivalenol (DON) in various grains. FP is a great screening method for these mycotoxins in the field, in grain elevators or in the laboratory.

We would like to acknowledge the excellent scientists in FP who could not contribute to this issue, due to their busy schedule. Many of those experts however, were very helpful in reviewing the work put together in this issue. Without their help, the quality of this work could not be guaranteed. It is also very difficult to bring together the work of all the researchers into one issue. Nevertheless, we have tried our best. Considering the latest developments of FP in a variety of new fields, it will be interesting to see how far the limits of FP can further be stretched in the coming years.

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