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SPECIAL ISSUE SECTION:

Applications of flow cytometry across species

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The most basic definition of flow cytometry is an instrument system that is capable of characterizing cells by size and complexity based on the scattering properties of light beams passed through the single cell flow of their suspension. This in itself provides a method of rapidly analyzing a population of cells into subpopulations and determining any changes relative to the percentage of each. However, when fluorescent activity is added to the ability of such an instrument, the power of its applications logarithmically expands to include the characterizing ability of the many fluorescent agents available. This includes their permeability to distinguish live from dead or damaged cells, their ability to bind to specific chemicals in the cell, thereby detecting their presence and quantity, their conjugation to monoclonal antibodies to expand the specificity of the fluorescent label to distinguish a single epitope, and the action of enzymes on substrates to detect a fluorescent product.

Researchers have been able to apply flow cytometry to characterize cells from different species and different tissues. This is testament to the broad applicability of the technique. This special section of *Methods In Cell Science* presents a wide variety of methods developed to be applied to different species. Evenson et al. present the method they developed to assess fertility of sperm by examining the fragility of the chromosome as determined by acid-detergent exposure, and the DNA binding properties of acridine orange. Leukocytes, usually phenotyped after isolation from the blood or lymphatic tissue, are characterized after their isolation from secretions in cases of infectious mastitis in the article by Ebling and coauthors. The importance of a standardized method of gating is emphasized and demonstrated in the article by Byrne et al., establishing a method by which single clinical cases in veterinary medicine can be compared to normal values. Chabanne et al. define the flow cytometric events that define veterinary cases such as systemic lupus and immune-mediated thrombocytopenia. Konkel and Mixter describe a means to identify pathogenic mechanisms of intracellular bacteria by identifying an apoptotic effect. Articles by Blanton et al. and Don Evans' group demonstrate the wide applications of flow cytometry to very differing species. Blanton et al. have developed methods to sort a genetically-engineered population of porcine muscle cells following primary isolation and transfection with green fluorescent protein producing plasmids. Evans et al. has developed nonradiometric cytotoxic assays and methods to differentiate apoptosis and necrosis in teleost cells.

Each of the contributors have developed assays unique to their system and species. We hope that these contributions will encourage researchers new to flow cytometry to apply the techniques to their area of research and develop new methods uniquely suitable to their system.

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