



Feb 07, 2021

Working Theory of Flow Cytometry

181830691¹¹California Baptist University

1

Works for me

This protocol is published without a DOI.

181830691

ABSTRACT

Flow Cytometry (FCM) is a scientific technology developed in the 1970s. In the 1980s, its application ranged from basic research to clinical medical research and disease diagnosis and treatment monitoring. It set of optics, electronics, fluid mechanics, cell chemistry, biology, immunology. At the same time, it has the function of analyzing and sorting cells, and can quickly analyze the cell suspension. The light scattering and fluorescence indices of the cells were obtained by detecting the single row of cells in the flowing liquid one by one.

EXTERNAL LINK

<https://www.creative-proteomics.com/services/flow-cytometry-facs-service.htm>

EXTERNAL LINK

<https://www.creative-proteomics.com/services/flow-cytometry-facs-service.htm>

PROTOCOL CITATION

181830691 2021. Working Theory of Flow Cytometry. **protocols.io**
<https://protocols.io/view/working-theory-of-flow-cytometry-br6pm9dn>

KEYWORDS

Flow Cytometry

LICENSE

This is an open access protocol distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited

CREATED

Feb 07, 2021

LAST MODIFIED

Feb 07, 2021

PROTOCOL INTEGER ID

47023

MATERIALS TEXT

Working theory

The working principle of the [Flow Cytometry](#) is that the cells to be tested are stained with a specific fluorescent dye and placed into the sample tube. And then under the pressure of gas, it enters a flow chamber filled with sheath fluid. Under the constraint of the sheath fluid, cells are ejected from the nozzle of the flow chamber in the form of column. Flow cytometry usually uses a laser as the source of light. After focused and shaped, the beam is irradiated vertically on the sample stream, and the cells stained by fluorescence are irradiated by the laser beam to generate scattered light and excitation fluorescence. Both signals are received by both the forward photodiode and the 90° photomultiplier tube. The receiving direction of the fluorescence signal is perpendicular to the laser beam, and after the separation of a series of dichromatic mirrors and band-pass filters, a number of fluorescence signals of different wavelengths are formed.

Clinical application

1. clinical cellular immunity

With the help of fluorescent antigen and antibody detection technology, FCM is analyze cell surface antigen, cell classification and subgroup analysis. This technique plays an important role in the evaluation of human cellular immune function and the diagnosis and treatment of various hematologic diseases and tumors. FCM can also be used to monitor renal rejection after renal transplantation. If the T4/T8 ratio is inverted, the patient has a good prognosis and is less likely to experience renal rejection. Conversely, the risk of rejection increases. It is also used in the diagnosis and treatment of AIDS.

2. Application in the diagnosis and treatment of hematologic diseases

Diagnosis and treatment of leukemia

FCM uses a variety of monoclonal antibodies against blood cell surface differentiation antigen (CD), with the help of a variety of fluorescent dyes FCM is able to measure a variety of parameters of a cell, in order to correctly judge the properties of the cell.

Determination and clinical application of reticulocyte

Reticulocyte count is an important indicator reflecting the hematopoietic function of bone marrow. FCM combines some fluorescent dyes (acridine orange, thiazole orange, etc.) with RNA in red blood cells to quantitatively measure RNA in reticulocyte and obtain the percentage of reticulocyte in mature red blood cells.

3. Application in oncology

This is one of the earliest applications of FCM in clinical medicine. The first step is to take solid tumor tissue depolymerization, dispersion preparation into single cell suspension.

4. Application in thrombus and hemorrhagic diseases

When the platelet activation happens, a significant change in the plasma membrane glycoproteins will happen, FCM can monitor platelet function and activation by monoclonal antibody immunofluorescence labeling, which is beneficial to the diagnosis and treatment of thromboembolic diseases.