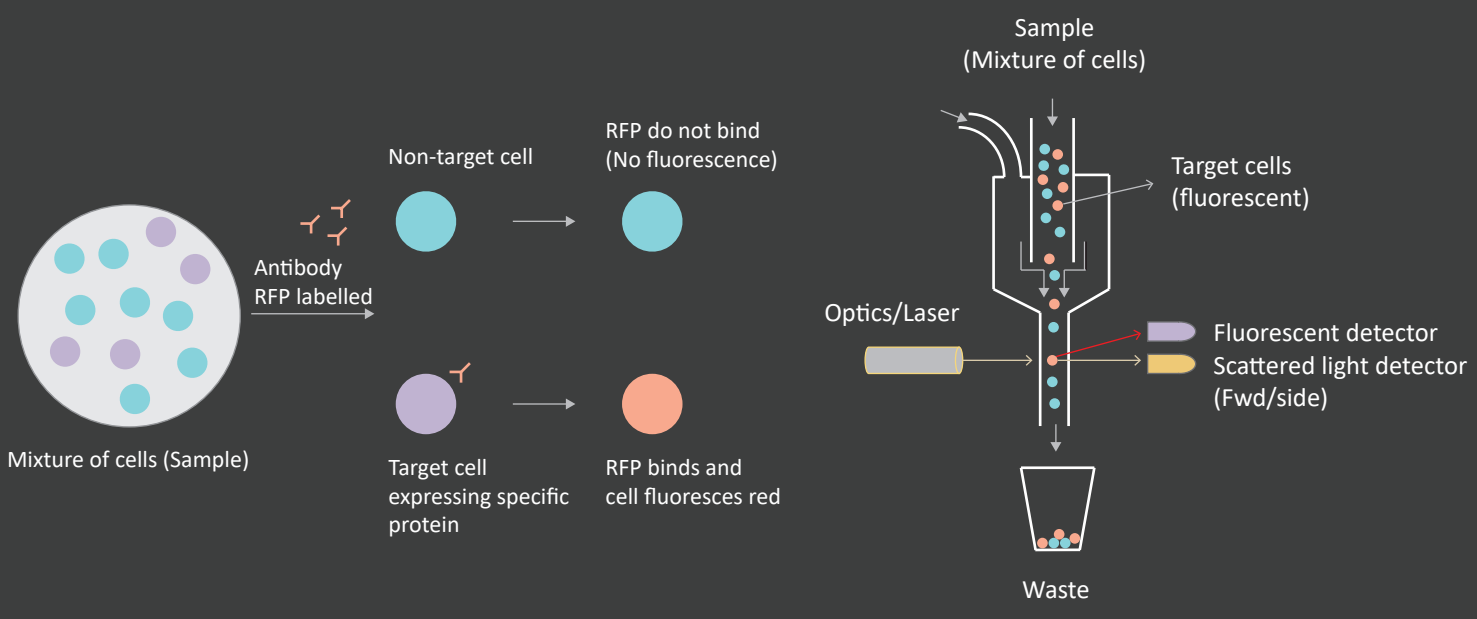
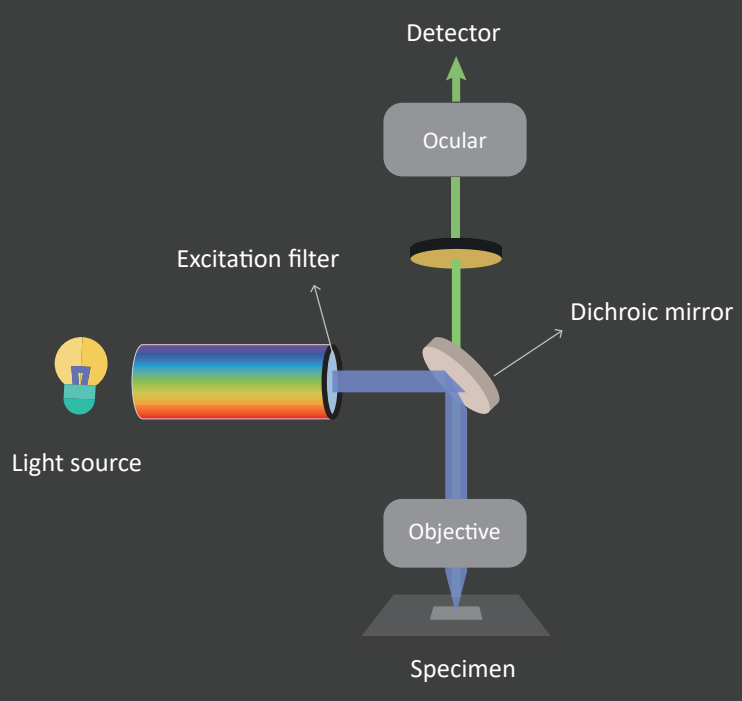
FLOW CYTOMETRY VS FLUORESCENCE MICROSCOPY

Flow Cytometry and Fluorescence Microscopy

Flow Cytometry (FC) determines multiple physical and biological characteristics of cells by detecting the intensity of the scattered or emitted light of a single cell in a linear flow state before laser irradiation. This technology can analyze cells rapidly at a rate of tens of thousands of cells per second. The types of samples can be various types of cells (such as peripheral blood, bone marrow, solid tissues, cells in suspension or adherent culture), microorganisms, synthetic microspheres, etc.



A fluorescence microscope is an enhanced optical microscope that uses a higher intensity of light to excite the fluorophore in a sample. The fluorophores, in turn, emit a lower energy light with a longer wavelength that produces the magnified image. The location of specific cell types of intracellular molecules in tissue can be observed using a fluorescence microscope.



Comparing the Two in Cell Analysis

	Flow Cytometry	Fluorescence Microscopy
Features	Flow cytometers often cannot specify the exact location of components inside the cell. When flow cytometry quantifies cell composition, it is performed at the whole cell level, while fluorescence microscopy can quantify the composition of the cell compartment.	Fluorescence microscopy can show how a component is distributed in the cells, uniformly or clustered in the anatomical compartment. It can also indicate the change (or not) in concentration overtime.
Throughput	Up to 100,000 cells per second	Several hundreds of cells per second with specific imaging instrumentation
Sensitivity	Depends on the fluorochromes, experimental design, and instrumentation	Depends on fluorochrome choice and exposure time
Number of parameters detected on a single cell	Up to 30 on a single cell	Up to 6 on a single cell with special instruments
Complexity and cost	The more parameters needed, the more complex and costly instruments and software will be	More complex experiments require more expensive instruments and software
Applications	• Cell sorting: physical separation and collection of user-defined cell populations with specialized sorter • Rare cell detection: easily performed • RNA detection: specialized assays required to detect RNA and protein expression • Structural/morphological data: imaging cytometers are available for this purpose • Kinetic/time-lapse data: possible but challenging	• Cell sorting: not possible • Rare cell detection: time-consuming to identify without software or instrumentation • RNA detection: easily visualized, new assays allowed to develop multiparametric analysis • Structural/morphological data: major strength of this technique • Kinetic/time-lapse data: routinely done

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