Automated Sorting Devices Encyclopedia Article

Automated Sorting Devices

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Automated Sorting Devices

Automated **cell** sorters are devices commonly used to analyze the properties of cells. In **flow cytometry**, the flow of cells is such that one cell at a time intersects a laser beam while moving at high velocity. Each single cell produces a scattering of light from the beam. The data is processed in a computer to interpret the scattering pattern.

Properties, which can be studied using automated cell sorters, included cell number, identification of specific cell types, identification and enumeration of cells possessing specific properties. The latter is typically accomplished by fluorescence-activated cell sorting. Fluorescently labeled monoclonal antibodies can be placed on the surface or in the interior of the cell prior to its journey through the cell sorter. Multiple types of monoclonal antibodies can be simultaneously applied, increasing the specific data subsequently obtained using the cell sorter. Properties, which can be measured, include size, volume, viscosity, the content of **DNA**, **RNA**, and **enzymes**, and also surface antigens.

In practice, air pressure is applied to the cell solution to force the cells through a nozzle at high speed. As the cells pass through the nozzle, they are met with a liquid jet of saline or water that envelopes the cells for protection. Vibrations at the tip of the nozzle interrupt the stream and break it up into droplets. Droplet size can be controlled to the extent that each drop houses one cell. A monochromatic laser beam illuminates the droplets, which are then monitored by fluorescent detectors. Those droplets, which emit the desired fluorescent wavelength following laser excitation, are electrically charged between deflection plates in order to be sorted into collection tubes. Up to 5,000 cells can be analyzed per second by this method.

The technique is particularly valuable in the diagnosis of leukemia, lymphoma, immunodeficiencies, and in judging the suitability of cells for transplantation. Flow cytometers are thus becoming a common instrument in clinical laboratories.

Flow cytometers may also be of benefit in providing alternatives to drug treatment for patients. Sorted cells, which show promising immune or antigenic responses, can then be used to repopulate an immunodeficient individual.