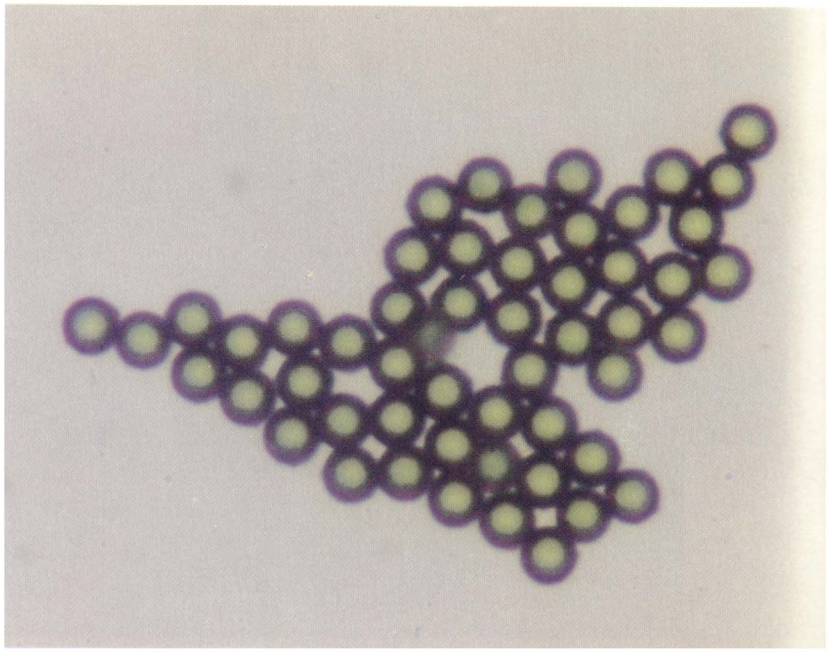
Microspheres

Human blood contains many different types of cells, among them T-cells and B-cells, lymphocytes of the same shape and size that help the immune system protect the body from the invasion of disease. Each has a different function in the immune system.

Vital information on a person's physical condition can be obtained by identifying and counting the population of T-cells and B-cells. At Jet Propulsion Laboratory (JPL), beginning in 1976, a team of scientists led by the late Dr. Alan Rembaum developed a method for identifying the cells. Dr. Rembaum is pictured at right (seated) as he was presented by JPL director Dr. Lew Allen a NASA Career Award in 1986, in recognition of his 52 patented contributions to the field of polymer chemistry, biology and medicine. One of NASA's most distinguished scientists, Dr. Rembaum was twice recipient of the NASA Exceptional Scientific Achievement Award.

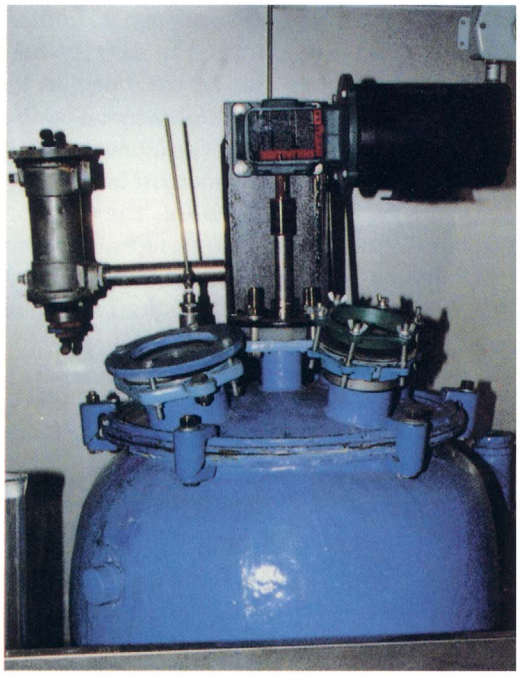
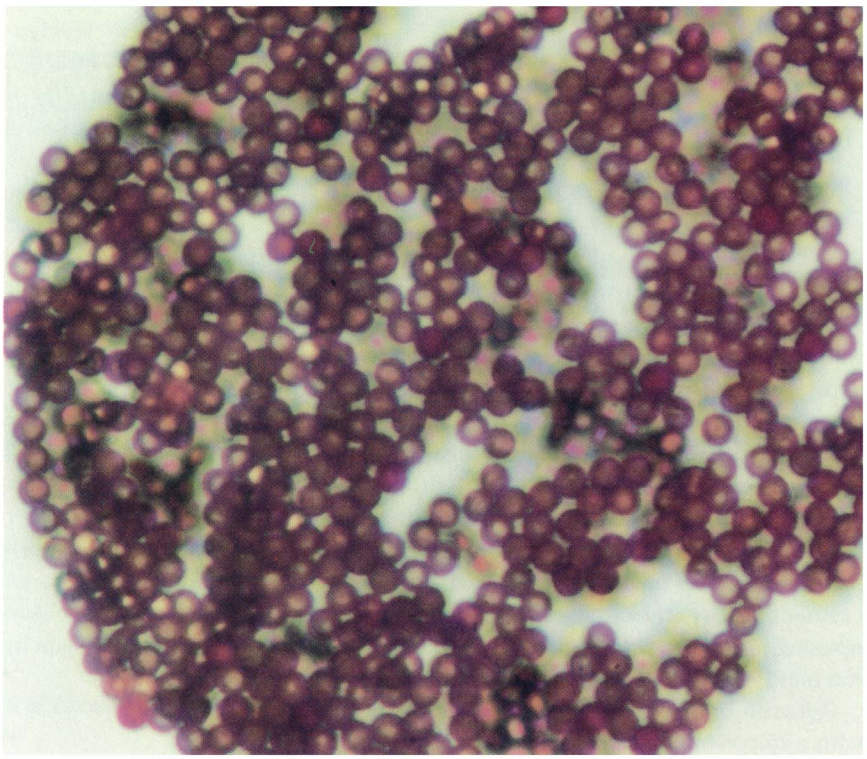
The method developed by the Rembaum group involved tagging the T-cells and B-cells with microspheres of different fluorescent color. At lower right are a group of microspheres used for cell identification, shown at 800X magnification; each cell has a diameter of seven microns, or seven millionths of a meter.



The microspheres, which have fluorescent dye embedded in them, are chemically treated so that they can link with antibodies. With the help of a complex antibody/antigen reaction, the microspheres bind themselves to specific "targets," in this case the T-cells or B-cells. Each group of cells can then be analyzed by a photoelectronic instrument at different wavelengths emitted by the fluorescent dyes.

This same concept was applied to the separation of cancer cells from normal cells. The microspheres were also used to conduct many other research projects, among them cell labeling in microbiology research and immunoassays, analyses of bodily substances by testing their reactions with antibodies.

Among the scientists of several disciplines in the Rembaum group was Dr. Manchium Chang,

the polymer chemist who was in charge of preparing the microspheres. In 1988, Dr. Chang obtained patent licenses for the JPL technology from California Institute of Technology, JPL's parent organization, and formed Magsphere, Inc., Pasadena, California to commercialize the technology; he is now president of the company.

Above, Dr. Chang is examining a batch of microspheres in his Magsphere laboratory. At right is the reactor for creating microspheres and below is a sample of the product, a batch of red-dyed microspheres typically used in such immunoassays as one-step pregnancy tests. Having expanded the original JPL technology with the company's in-house proprietary technology, Magsphere is producing a wide spectrum of microspheres on a large scale and selling them worldwide for such applications as immunodiagnostics, cell labeling, instrument calibration, high performance liquid chromatography and other biomedical and chemical uses.