Stabilization of intracellular dye concentration for simultaneous DNA/RNA measurement for leukemia monitoring by flow cytometry

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Simultaneous measurements of the amount of intracellular DNA and RNA after acridine orange staining have been used for a number of years in experimental cell research as well as for monitoring leukemic cells prior and during treatment. The quantitative measurement of intracellular DNA and RNA is dependent on maintaining a certain intracellular dye concentration. This can easily be acheived during short periods of measurement . Following leukemic patients during the course of treatment a larger number of mononuclear cells must be measured for statistical significant analysis of malignant cells at low concentration. We introduce a flow system with an additional dye sheath of 10 µ width surrounding cells as they flow through the measuring system. This dye sheath compensates a concentration gradient otherwise present across the cellular membrane in our system. This allows stable fluorescence emittion of intracellular DNA and RNA even after more than 1 hour after acridine orange staining. Several leukemic patients have been monitored during their final stage of hospitalization. Data derived by flow cytometry did preceed the routine clinical laboratory tests for several days. This system allows the evaluation of leukemic cells at very low concentration during treatment and remission.