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PREFERENTIAL ELIMINATION OF LEUKAEMIC CELLS BY PORPHYRIN-INDUCED LASER PHOTSENSITIZATION

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Porphyrins have been shown to have clinical use in chemotherapy through their ability to photosensitize tumor cells. We investigated the cytotoxic activity of light-activated hematoporphyrin derivative HPN on peripheral blood cells from patients with acute myeloblastic leukemia (AML) in blast phase (60-90% blasts). In all specimens, erythrocytes were removed from mononuclear cells by Ficol-hypaque centrifugation. Incubation of cells with 20 M HPN and subsequent spectroscopic measurements revealed that HPN was preferentially taken up into blast cells more than 10-fold greater than controls. After incubation (6 min), cells were washed free of exogenous HPN and then pulsed (10 nsec) with red light (625 nm) from a XeCl excimer pumped dye (Rhodamine 101 β) laser. Cells were maintained at 0 °C during irradiation procedures and the total dosage of applied light was 125 J/cm². No immediate effects such as lysis or agglutination were observed. Trypan blue viability studies revealed that incubation of controls or leukemic cells with HPN before irradiation did not alter viability. Laser irradiation experiments indicated that viability was not altered in controls or HPN exposed controls. However, leukemic cells exposed to HPN became destroyed (60% of the control) after exposure to the laser beam. This study demonstrates that human AML cells can be preferentially destroyed by laser irradiation after HPN exposure. These findings may have therapeutic potential in the destruction of leukemic cells in certain clinical situations.