



Low Level Laser Therapy & blood irradiation

clinical research

Effect of Low-Level Laser Radiation on Some Rheological Factors in Human Blood: An in Vitro Study

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Objective: The purpose of this study was to investigate the in vitro effects of low-level laser radiation (LLLR) on some rheological factors of the human blood, such as complete blood count (CBC) parameters and blood sedimentation rate (BSR). We were mainly concerned with the alterations caused by LLLR action on blood cells (erythrocytes and leukocytes) of fresh blood obtained from apparently healthy adult patients. We used low doses ranging between $0.80 \text{ J}\cdot\text{cm}^{-3}$ and $4.40 \text{ J}\cdot\text{cm}^{-3}$, at the very low-power densities of the laser radiation, so as not to damage the cell structure and not to alter in an undesired manner their functions. **Methods:** Blood samples were taken from 22 volunteers. Where health problems existed, they were indicated for each case. The parameters mentioned above were measured before (control samples) and after irradiation. A He-Ne laser, operating in continuous wave, as a radiation source (632.8 nm, 1 mW, intensity of $8\cdot 10^{-2} \text{ W}\cdot\text{sr}^{-1}$, mean power density incident on blood samples around $30 \text{ mW}\cdot\text{cm}^{-2}$, beam spot diameter 2 mm) was used. The measurements were performed immediately after irradiation. Only the erythrocyte complex was irradiated. EDTA anticoagulant was used. **Results:** The measurements using a computerized hemoanalyzer type SERONO showed significant differences between control and irradiated blood samples concerning the following parameters: RBC (in 22% of cases), HGB (47.3%), HCT (84.2%), RDW (11%), PLT (5.26%), MPV (33.3%), WBC (5.26%), MONO (26.3%), and GRAN (63.15%). In the case of BSR (44%), the significant differences were noticed especially in the cases of patients suffering from some acute or chronic diseases. Nonsignificant differences were noticed in the cases of MCV, MCH, MCHC, RDW, and LYMPH. **Conclusions:** This study has shown that LLLR, even though used at low doses and low power densities, produced some changes of the rheological factors of the blood, as follows: a revitalizing and regenerating effect on mitosis stimulation and a nondamaging and biostimulating effect on the cell membrane (by keeping unmodified MCV, MCH, and MCHC). In 3 cases out of 22, hemolysis (complete or partially) occurred, but we are not yet sure whether this was caused by laser exposure or by certain environmental physical factors

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