of vascular walls are subjects of light exposure during the intravenous laser blood irradiation treatment. In the current study the influence of the laser light on endothelial cells and platelets was investigate. HUVEC endothelial cell culture was irradiated by HeNe laser. The expression of E-selectin was detected as a sign of activation of adhesive function of the cells after 20 min of laser irradiation. Higher adhesion rate of intact platelets to irradiated endothelial cells was revealed. So, activation of endothelial cells and higher ability of adhesion of platelets were results of laser irradiation of endothelial cells. Platelet response to laser irradiation was completely different. Inhibition of platelet activation by TRAP due to decrease of expression of P-selectin and weaker ability of binding fibrinogen by GPIIbIII membrane receptor were detected. Inhibition of aggregation induced by different inductors (ADP, ristocetin, adrenalin, collagen) and inhibition of adhesion on extracellular matrix, collagen covered surfaces as well as intact vascular endothelium was detected. The inhibitory effect of laser irradiation on platelets was mediated by photoactivation of guanilatcyclase, higher amount of cGMP and inhibition of intracellular reactions with proteincinase C participation. As a conclusion, the different way of reacting of endothelial cells and platelets on laser irradiation is an important factor, supporting circulatory hemostasis during intravenous laser blood irradiation.

123

APPLICATION OF BIOLOGICAL FEEDBACK SYSTEMS AND OTHER METHODS OF EXAMINATIONS FOR CONTROL OF EFFECTS OF LIGHT THERAPY

A.V. Dunaev[1], L.V. Gasparyan[2]. *[1]Oryol State Technical University, Oryol, Russia; [2]EMRED Oy, Helsinki, Finland*

Wide application of light therapy, including low level laser therapy (LLLT) and non-coherent LED therapy, is forcing to look for ways for increase the effectiveness and adequacy of treatment sessions. Individualization of sessions can be done easier by including biological feedback systems and devises to calculate absorbed doses. In modern medicine methods of influence and testing, including methods traditional Chinese medicine, are used separately. Chronobiological approach can be useful in delivering light of proper treatment parameters. Unfortunately, currently existing laser therapy systems either do not include optical sensors to detect condition of tissues, or do not use sensors to detect pulse and breathing. That means that optical features of tissue are ignored during applying sessions of laser therapy. Moreover, to calculate absorbed dose with higher precision, it is necessary to take into account also thermophysical (heat-transfer) and electrical (acupuncture points) properties of tissue, to use sensors for temperature, electricity, and applied special algorithms of calculations.

There are a number of problems for designing of systems with biofeedback, among which are: lack of clear answers for most of the questions concerning the influence of laser radiation not only on sub-cellular or cellular level, but even on level of organs of human organism. Designing of measuring transducer and electrodes for testing different individual features and parameters of bio-objects is a complicated task.

This work describes the main problems in designing systems with biofeedback and methods of individualizing the therapy process. As an object of analysis we examined systems with biofeedback, including main unit, to collect and evaluate signals and information from sensors, and control unit which can deliver light according to the individually adjusted algorithms.

124

THE INFLUENCE OF LED IRRADIATION AT DIFFERENT WAVELENGTHS AND ANTIOXIDANTS ON FUNCTIONAL ACTIVITY OF BLOOD PLATELETS

L.V. Gasparyan[1], I.N. Dementieva[2], A.M. Makela[3]. *[1]EMRED Oy, Helsinki, Finland; [2]St. Petersburg State Medical University, St. Petersburg, Russia; [3]ABER Institute, Helsinki, Finland*

The aim of the study was to compare the effects of LED light monochromatic irradiation at different wavelengths on induced blood platelet aggregation as well as to check the influence of light irradiation in the presence of different antioxidants.

Materials and Methods: LED clusters (Kingbright, USA) were used as sources of light at different wavelengths. The study was conducted on Wistar rat blood. The level of induced blood platelet aggregation was measured by AI-300 impedance aggregometer (Russia). ADP and adrenalin were used as aggregating agents.

In the first series of experiments the blood samples of test groups were exposed to LED irradiation (430, 565, 595, 660 and 880 nm) prior to aggregation induction. The control group blood was tested without light irradiation.

Results: In all test groups inhibition of aggregation was recorded. The strongest inhibition of aggregation in case of a single dose of irradiation (0.045 J/cm^2) was detected after blue and red light exposure (37% and 45% accordingly, $p < 0.05$). It was also noted, that in case of red and blue light, inhibition of aggregation was getting stronger according to increase of irradiation dose, while in case of green, yellow and IR light the weakest dose caused the strongest inhibition.

In the second series of experiments the blood samples of test groups were (a) exposed to red LED irradiation (660 nm), (b) treated with antioxidants (c) treated with antioxidants and exposed to red LED irradiation (660 nm) prior to aggregation induction. It was noted that inhibition of aggregation is strongest in case of combined action of red light and an inhibitor of superoxide dismutase (36%, $p < 0.001$), disulfuram. At the same time catalase by itself increased the level of aggregation ($p < 0.001$), whereas it decreased significantly in case of combine action of catalase and red light.

Conclusion and discussion: Presented data conforms with the results of Brill G.E. (1998) showing inhibitory effect of red light irradiation on blood aggregation. It was shown that there was an increase in the amount of cGMP in blood platelets after red light irradiation due to activation of guanylatecyclase. It is also possible that the primary effect of the light irradiation is the increase of the level of NO in the blood with secondary inhibition of blood platelet activity.

125

FLUORESCENT CYSTOSCOPY IN THE DIAGNOSIS OF BLADDER CARCINOMA

P.V. Glybochko, A.N. Ponukalin, V.Yu. Mikhailov, G.E. Brill. *Scientific Research Institute of Experimental and Clinic Uronephrology of the State Medical University, Saratov, Russia*

Introduction: Early diagnosis of superficial bladder cancer is a prerequisite for its efficient treatment. High rate of recurrence and progression, especially at early stages, is typical for this type of cancer. The reason for this is residual tumors and foci of dysplasia that could not be determined visually, or carcinoma *in situ* that had not been removed during transurethral resection. The efficacy of the routine cystoscopy and biopsy could be increased by using optical markers. 5-Aminolevulinic acid (5-ALA), a precursor of photodynamically active protoporphyrine IX, could be used as such a marker.

Materials and Methods: Fifteen patients with bladder cancer were examined. All patients underwent standard and fluorescent cystoscopy. In the latter case, 50 ml of 3% 5-ALA in saline was injected into patient's bladder. Waiting period after injection was 90–120 min. After that irradiation of bladder wall was performed