
[Ultraviolet irradiation of the blood].
[Article in Russian]

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Abstract
An analysis of the experience with using the method of ultraviolet irradiation of blood in 85 patients with different surgical diseases has shown the method to be simple, available and highly clinically effective.


Inactivation of pathogens in single units of therapeutic fresh plasma by irradiation with ultraviolet light.
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Abstract
BACKGROUND:
Ultraviolet (UV) light, especially UVC, is germicidal but its ability to penetrate layers of protein containing solutions is poor. This hampers its use to inactivate pathogens in therapeutic fresh plasma (FP).

STUDY DESIGN AND METHODS:
FP units were spiked with lipid-enveloped or nonenveloped viruses. Others were used without spiking. The units were transferred into UV-transparent bags and irradiated with UVB or UVC light from both sides. The bags either were clamped between quartz plates or remained loose. In addition they were agitated at different speeds. Before and after irradiation virus titers or plasma variables were measured.

RESULTS:
Virus inactivation by UV irradiation was marginal when the FP units were not agitated or when the irradiation bags were fixed between quartz plates. It was strongly enhanced when they remained unfixed and were intensively agitated during treatment. At 100 rpm and UVC doses of approximately 1 J/cm(2), with the exception of human immunodeficiency virus Type 1, all viruses used were effectively inactivated. UVB up to 2.5 J/cm(2) was less effective. At 1 J/cm(2) UVC or 2.5 J/cm(2) UVB the activities of the clotting factors tested in general were reduced by approximately 10% to 20% compared to untreated plasma. More sensitive was clotting factor XI whose activity was lowered by approximately 23 and 29%, respectively. No further reductions were determined after storage of UVC-treated FP for 3 months at 30 degrees C or less.

CONCLUSIONS:
Pathogen inactivation of FP by UV light becomes effective when the unfixed irradiation bags are strongly agitated. The decrease in some clotting factor activities could be acceptable.
Irradiation eradication and pathogen reduction. Ceasing cesium irradiation of blood products

P D Mintz and G Wehrli

Abstract
The irradiation of cellular blood components to prevent transfusion-associated (TA)-GVHD is an established practice in the developed world. Susceptible patients include those who are immunosuppressed, fetuses, very premature neonates and patients who have an increased likelihood of possessing one HLA haplotype for which the blood component donor is homozygous. Problems and challenges associated with blood component irradiation include transfusion delay, cost, failure to irradiate when indicated, increased potassium accumulation in and decreased shelf life of RBC units, reduced RBC recovery and, in the United States, substantial and onerous security requirements for cesium-137 source irradiators and their operators. Microbial contamination of blood components can pose life-threatening risks for transfusion recipients. Donor history screening and infectious disease testing are a reactive response and expensive, as well as an imperfect and incomplete means for preventing these infectious risks. In response to these threats, pathogen reduction technologies have been developed. Two such innovations (INTERCEPT, Cerus Corporation, Concord, CA, USA; and Mirasol, CaridianBCT Biotechnologies, Lakewood, CO, USA) are approved for clinical use in many countries, though not in the United States. These processes have been shown to effectively prevent proliferation of nucleic acid-containing microbes, thereby providing broad protection against transfusion-transmitted infection. These technologies have also been shown to prevent the replication of WBC. In this report, we review the substantial in vitro, clinical trial and clinical practice observational evidence that non-irradiated INTERCEPT- and Mirasol-treated cellular blood components do not cause TA-GVHD. Implementation of these processes precludes the necessity for irradiating cellular blood components to prevent TA-GVHD.
[Ultraviolet irradiation of blood in surgery].

Abstract
The results of complex treatment of 81 patients with pyoinflammatory diseases with the use of blood ultraviolet irradiation are discussed. A marked clinical effect was noted, the terms of treatment reduced by 5-10 days, the outcomes improved, and the number of complications decreased. Irradiation of autologous blood by ultraviolet rays led to modulation of the indices of antimicrobial protection, increase of the intensity of the histochemical reaction to peroxidase up to 40-50%, and diminution of pH in the neutrophil phagosomes to 5.0. The ultrastructure and ability of thrombocytes to store serotonin were restored, and intensity of their metabolic processes increased, the membrane phospholipid composition changed, and juvenile platelet forms appeared.

[Effectiveness of chemotherapy in combination with electrophoresis and ultraviolet irradiation of blood in newly diagnosed patients with destructive pulmonary tuberculosis].

Abstract
Efficacy of inpatient treatment was compared for 222 new-onset cases of destructive tuberculosis of the lungs. 86 patients received chemotherapy plus electrophoresis and UV blood irradiation (group 1), 136 patients received chemotherapy alone (group 2). Group 1 patients benefitted more; bacterial discharge ceased in 100%, destruction in 89% of patients within 3 months against 59% and 38%, respectively, in controls. Combined therapy prevents toxic allergic reactions and shortens hospital stay by 48 days.

[Study of the effectiveness of ultraviolet irradiation of blood in the treatment of traumatic uveitis].

Abstract
Sixty-five patients (65 eyes) with traumatic uveitis were treated. Ultraviolet irradiation of autoblood was included in therapeutic complexes of 28 patients. 37 patients received traditional therapy (corticosteroids, nonsteroid inflammatory agents, etc.). Addition of UV exposure of autoblood to combined therapy for traumatic uveitis more effectively (92.9 vs. 75.7%) and sooner liquidated posttraumatic inflammatory reaction (8.10 +/- 1.5 vs. 12.7 +/- 1.7 days), decreased the hospital stay (11.0 +/- 2.0 vs. 15.8 +/- 1.3 days), and eventually more often improved the visual acuity (in 42.9 vs. 24.3% patients). Hence, UV exposure of autoblood is an effective, safe, and virtually atraumatic method of treatment.
Mechanisms of therapeutic action of UV blood irradiation and optimal irradiation scheduling were studied in the course of UV-irradiated blood transfusions capable of correcting lipid peroxidation (LPO) and antioxidant system (AOS) in acute pneumonia (AP) patients. Single and multiple measurements of LPO and AOS parameters (malonic dialdehyde, diene conjugates, red cell resistance to peroxide hemolysis, catalase, superoxide dismutase, ceruloplasmin, plasma total estrogens, progesterone and testosterone) were made in 10 young males with moderate AP and 20 healthy controls. UV blood irradiation in AP is shown to be pathogenetically validated. It works via effective stabilization of LPO as a result of early adequate stimulation of endogenic AOS. Positive changes were also induced in the system of hormonal regulation. It is suggested that hyperestrogenemia plays a compensatory role in AP pathogenesis.