



Title: Ischemic-reperfusion injury of the liver during transplantation: concentration of free radical fragmentation and oxidation lysophospholipid products in the blood serum of recipients

Presenting author name: Prof. Alexey Fedoruk MD., PhD., D.Sc.

Affiliation details of Presenting author:

Head of Department of Hepatology and Minimally Invasive Surgery, Minsk Scientific and Practical Center for Surgery, Transplantology and Hematology, 220087 Semashko st., 8, Minsk, Republic of Belarus. Department of Surgery and Transplantology Belarusian State Medical University, 220083, Dzerzhinsky Ave., 83, Minsk, Republic of Belarus

Co-authors' details:

Irina Edimecheva Ph D, b, Dmitry Fedoruk MD PhD, a, Valery Khrutskiy b,c, Olga Lebedz MD ,a, Leanid Kirkovsky MD PhD,a, Viktor Sorokin b Ph D,c, Halina Talkachova MD,a

Affiliation details of Co-authors:

- a) Department of Hepatology and Minimally Invasive Surgery, Minsk Scientific and Practical Center for Surgery, Transplantology and Hematology, 220087 Semashko st., 8, Minsk, Republic of Belarus
- b) Laboratory of Chemistry of Free Radical Processes, Research Institute for Physical Chemical Problems of the Belarusian State University, 220006 Leningradskaya st., 14, Minsk, Republic of Belarus
- c) Department of Radiation Chemistry and Chemical Pharmaceutical Technologies, Belarusian State University, 220030 Nezavisimosti av., 4, Minsk, Republic of Belarus

Abstract:

Introduction. The interaction of reactive oxygen species with cell membrane lipids is usually considered in the context of lipid peroxidation in the nonpolar component of the membrane. We found out for the first time that ROS can cause damage to human cell membranes in the polar part of lysophospholipids at the interface with the aqueous environment due to the processes of free radical fragmentation (FRF) and oxidation.

It is a well known fact that the basis of ischemia-reperfusion injury (IRI) to the liver during the transplantation is connected with the development of oxidative stress, which occurs at the stage of ischemia and intensifies during reperfusion.

The aim of the study: to evaluate the concentration of FRF products in liver transplant recipients with the development of IRI.

Materials and methods:

The study involved 61 liver transplant recipients with a median age of 55[39;61;] years, MELD-Na -16,3[11,9;22,6;] who received an allograft from a brain-dead donor (DBD). All the donors met standard criteria of a median age of 45[42;53;] years, total ischemia time of a median of 540[490; 615;] minutes.

Biological material for the study (blood serum and liver tissue) was collected within 2 hours after the portal reperfusion. Liver graft tissue was collected during the surgery by wedge resection, fixed with 10% neutral formalin, followed by the preparation of paraffin blocks and sections, which were stained with hematoxylin and eosin.

FRF products, namely 1-hexadecanoyloxyacetone (Pac) and 1-octadecanoyloxyacetone (SAc), were identified in the serum of liver transplant recipients and quantified using a GC-MS method.

Results and discussion:

A histopathological grading system of liver IRI in human OLT was used to differentiate the severity of IRI.

Morphological changes according to the severity of IRI in liver transplants were distributed: 1) minimal in 47.5% (n=29); 2) mild in 34.4% (n=21); 3) moderate in 18.1% (n=11).

In the studied sample there were no recipients without IRI or with a primary non-functioning liver transplant (severe IRI).

The groups differed significantly not only in morphological characteristics, but also in the concentration of FRF products. The median values of Pac + SAc concentrations were distributed: 1) IRI minimal severity - 3.59[3.01;4.46]; 2) IRI mild severity -5.46[4.33;6.37;]; 3) IRP moderate severity – 12.49[11.18; 13.3;] (Kruskal-Wallis test $r_{1-2}=0.0183$; $r_{2-3}=0.0032$; $r_{1-3}=0.0000$).

Conclusions: We found out for the first time that the concentration of lysophospholipid FRF products (Pac and SA) in the blood serum of liver transplant recipients can be used to assess the IRI of liver transplants.

Biography

Alexey Fedoruk MD, PhD, D.Sc., was born on December 25, 1957 in Brest, USSR. In 1983 he graduated from the Minsk State Medical Institute with a degree in general medicine.

Professor of Clinical Medicine, Honored Doctor of the Republic of Belarus, Head of Department (surgeon) Department of Hepatology and Minimally Invasive Surgery, Minsk Scientific and Practical Center for Surgery, Transplantology and Hematology.

The main area of work is devoted to the diagnosis and treatment of complications after high-tech operations and transplantation of solid organs.

Has academic degrees in gastroenterology, surgery and radiology.

Author of 19 inventions, 17 patents, 7 monographs, 3 teaching aids and more than 250 published works.

Successfully combines practical medical activities with scientific and pedagogical work - professor of the Department of Surgery and Transplantology of the Belarusian State Medical University.

