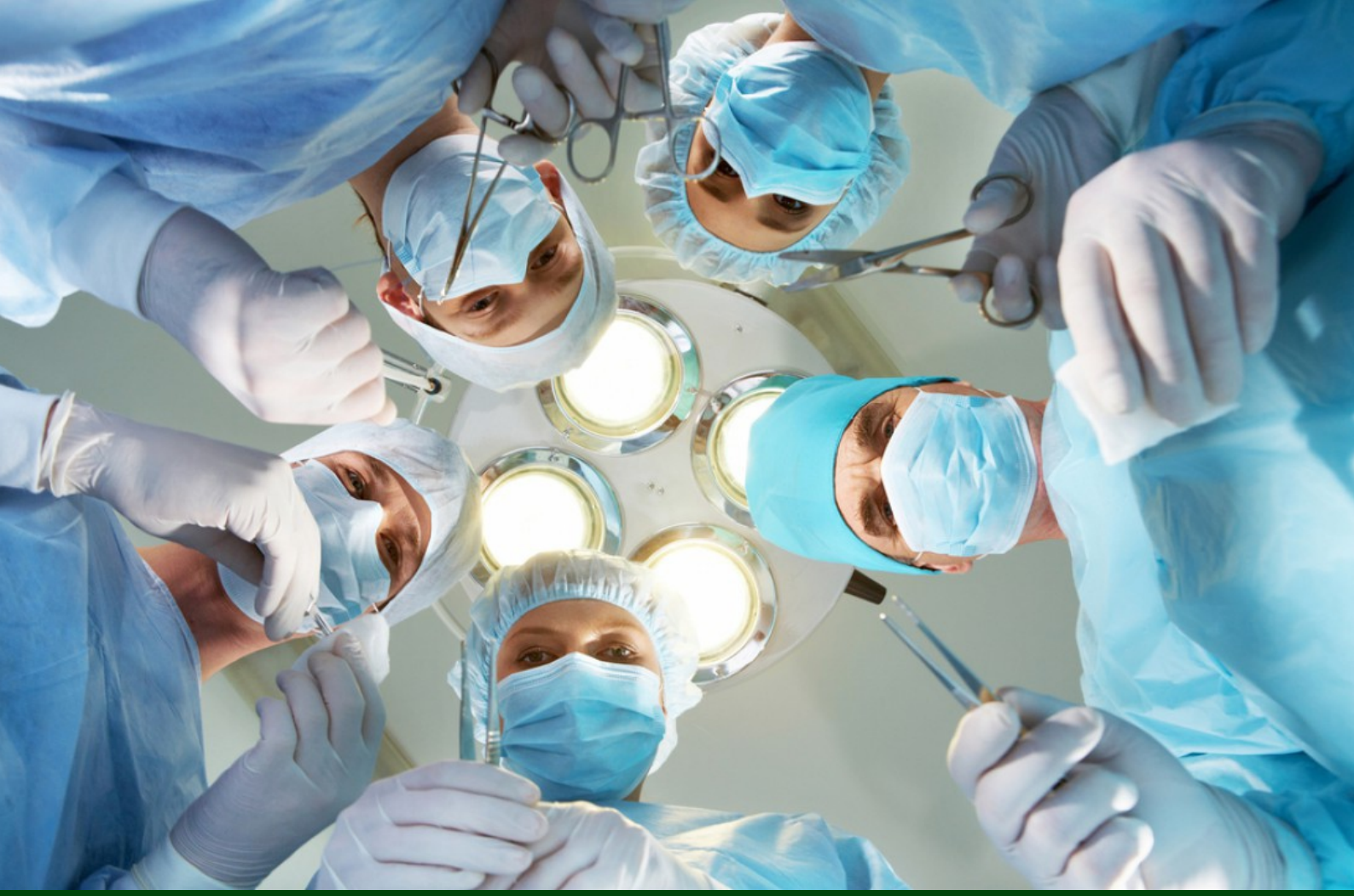

ABSTRACT BOOK

ISIC

INTERNATIONAL SCIENTIFIC
INTERDISCIPLINARY
CONGRESS

KHARKIV, UKRAINE

MAY 24th-26th, 2017

INTERNATIONAL SCIENTIFIC INTERDISCIPLINARY CONGRESS

BIOMEDICAL SCIENCES

INTERNATIONAL SCIENTIFIC
INTERDISCIPLINARY
CONGRESS

Asiome W., Karmazina I., Isaeva I.

CHALLENGES OF ADAPTATION TO PHYSIOLOGICAL FACTORS IN PERSONS WITH SICKLE CELL DISEASE

Kharkiv National Medical University
(Department of Physiology)
Research advisor: Prof. Karmazina I., Isaeva I.
Kharkiv, Ukraine

Introduction. Sickle cell disease (SCD) is characterized by intermittent vaso-occlusive events and chronic hemolytic anemia which result in tissue ischemia leading to acute and chronic pain as well as injuring of bones, lungs, liver, kidneys, brain, eyes, and joints. About 50 % of children with SCD experience either an overt or silent cerebral infarct; hemorrhagic stroke and aneurysm are more common in adults (M.R. DeBroun, 2016).

Materials and methods. The aim of research was an analysis of physiological factors which influence on adaptation of persons with SCD. A literature review was made using various sources including PubMed, Scopus and GoogleScolar. From approximately 1500 articles 52 were chosen accoridng to the topic of research.

Results of research. Patients with SCD have limited abilities for adaptation to different physiological factors such as dehydration, physical exercises, fluctuations of ambient temperatures and being at high altitudes. Hypoxia drives HbS polymerization and the resulting alterations in RBC physiology and the microcirculation (Stephan C. Rogers, 2016). Exercise and physical activity are known to induce marked metabolic changes, including lactic acidosis, tissue hypoxia and dehydration, all of which predispose towards HbS polymerization and vaso-occlusion. Even moderate exercise can induce significant hypoxia, impaired heart rate recovery, abnormal increases in pulmonary artery pressure and increased oxidative stress in patients with SCD. (R. I. Liem et al., 2017). Two ion transport pathways, the K+-Cl- contraport and the Ca2+-activated K+ channel play prominent roles in the dehydration of sickle erythrocytes, causing rise of HbS concentration, and increases risk of vaso-occlusion (F. C. Brown, 2015). Extremes of both hot and cold weather have been found to precipitate acute complications. Exposing of patients with SCD to cold results in acute pain caused by peripheral vasoconstriction which results in greater deoxygenation of blood in the peripheries, HbS polymerization, therefore, sickle red cells cause vaso-occlusion, presumably in tissues near to the areas exposed to cold. (S.H. Embury, 2000). The harmful effects of high altitude in SCD for many years, principally was due to potential problems associated with low oxygen partial pressures in high altitude. The most frequently reported complication at altitude of aircraft above 2000 m is acute splenic infarction in people with SCD (D.J. Weatherhall, 1994).

Conclusions. 1. Analysis of reported figures has indicated that patients with SCD have limited abilities for adaptation to different physiological factors.
2. Such physiological factors as physical exercises, hypoxia, dehydration, extreme temperatures and high are beneficial for polymerization of HbS resulting in progression of sickle RBCs hemolysis, increase of hypoxia severity and oxidative stress that significantly impact disease prognosis and outcome. 3. When these factors are brought under control it will ultimately augment measures aimed at managing the clinical disorders of sickle cell disease.

INDEX