МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
БУКОВИНСЬКИЙ ДЕРЖАВНИЙ МЕДИЧНИЙ УНІВЕРСИТЕТ»

М А Т Е Р І А Л И

105-ї підсумкової науково-практичної конференції
з міжнародною участю
професорсько-викладацького персоналу
БУКОВИНСЬКОГО ДЕРЖАВНОГО МЕДИЧНОГО УНІВЕРСИТЕТУ
присвяченої 80-річчю БДМУ
05, 07, 12 лютого 2024 року

Конференція внесена до Реєстру заходів безперервного професійного розвитку, які проводитимуться у 2024 році № 3700679

Чернівці – 2024

УДК 001:378.12(477.85)
ББК 72:74.58
М 34

Матеріали підсумкової 105-ї науково-практичної конференції з міжнародною участю професорсько-викладацького персоналу Буковинського державного медичного університету, присвяченої 80-річчю БДМУ (м. Чернівці, 05, 07, 12 лютого 2024 р.) – Чернівці: Медуніверситет, 2024. – 477 с. іл.

ББК 72:74.58

У збірнику представлені матеріали 105-ї підсумкової науково-практичної конференції з міжнародною участю професорсько-викладацького персоналу Буковинського державного медичного університету, присвяченої 80-річчю БДМУ (м. Чернівці, 05, 07, 12 лютого 2024 р.) із стилістикою та орфографією у авторській редакції. Публікації присвячені актуальним проблемам фундаментальної, теоретичної та клінічної медицини.

ISBN 978-617-519-077-7

layers in organic-based photovoltaic devices.

Ivanchuk M.A.

DEVELOPMENT OF STATISTICAL ANALYSIS SOFTWARE

Department of Biological Physics and Medical Informatics
Bukovinian State Medical University

Introduction. Statistical analysis plays a pivotal role in modern medical research by providing the means to extract meaningful insights from vast and complex datasets. It allows researchers to identify patterns, correlations, and statistically significant findings, which are essential for evidence-based decision-making in healthcare. Moreover, statistical analysis helps ensure the reliability and validity of research findings, ultimately improving the quality of medical research and its impact on patient care and treatment outcomes.

The aim of the study. This paper focuses on the development of statistical analysis software specifically tailored for medical scientific research.

Material and Methods. Statistical software was built by using Google tables.

Results. The main advantage of the developed software is its ability to analyze big data sets. Using the proposed software, one can input information about several tens of laboratory indicators from two researched groups and apply statistical tests to all indicators at once.In addition to descriptive statistics, which includes mean, median, standard deviation, and interquartile range, there are a number of parametric and nonparametric tests available in the software. Parametric tests are represented by paired and non-paired t-tests, ANOVA, while nonparametric tests include the Wilcoxon, Mann-Whitney and Kruskal-Wallis tests. For correlation analysis, one can use Pearson, Spearman, and Kramer correlation. For nonnumerical data, the software provides odds ratio, chi-squared test and Fisher's exact test.

Conclusion. Thedeveloped statistical analysis software is a powerful tool for medical research, offering the capability to handle large datasets and a wide range of statistical tests for both numerical and nonnumerical data.

Kulchynskyi V.V.

PROSPECTS FOR MEDICAL APPLICATIONS OF HYPERSPECTRAL IMAGING

Department of Biological Physics and Medical Informatics
Bukovinian State Medical University

Introduction. A hyperspectral image (HSI) is an array of two-dimensional images of objects that contains information about each point of objects in a wide spectrum of electromagnetic radiation. HIS is used in many fields. All uses are united by the fact that this scanning mode allows you to identify and display the spatial distribution of the studied substances in objects. The physical basis for the identification of substances is that each substance has a unique set of frequencies in the optical absorption spectra – the so-called optical fingerprint. However, different substances exhibit their optical fingerprints in different parts of the electromagnetic spectrum. That is why the technique of HSI involves obtaining images in a wider spectral range than visible.

The aim of the study.To review the existing applications of hyperspectral research in medicine and, based on the physical limitations of equipment and mathematical limitations of processing methods, to outline possible prospects for the use in medicine.

Material and methods. In medicine, the ability to identify and visualize the distribution of substances makes it possible to obtain the diagnostic information about the composition, morphology and physiological processes in the tissues of the human body. This is used in non-invasive methods of diagnosis and support of surgical operations. The light inside the biological tissues is repeatedly reflected by the inhomogeneities of biological structures and is eventually absorbed mostly by melanin, water, fats, and hemoglobin. One of the technique’slimitations is that depth of penetration of light into biological tissues differswith wavelength. The penetration depth depends on the light absorption degree by substances during its propagation. Substances selectively absorb light, which makes it possible to detect their presence in a biological object. In the IR range,

the dominant chromophore is water, in the visible range – blood and melanin, in the UV range – proteins and amino acids. The same depth of penetration describes different combinations of chromophores in the studied biological tissue – the so-called isosbestic points, which complicates unambiguous identification.The absorbed light energy can cause heating or luminescence at the absorption site. Cells in different disease states undergo different structural changes, which are manifested in changes in fluorescence spectra. This makes it possible to carry out live diagnostics without the introduction of exogenous fluorophores.In some spectral ranges, scattering is dominated by absorption, so the light propagation becomes diffuse. The knowledge about the tissue structural elements contribution to the scattering and absorption of light can simplify the interpretation of reflected light. Measurement of reflected light makes it possible to identify structural and biochemical features of the structure of the reflective part of biological tissue.

Results. Physiological processes, including pathological ones, lead to changes in the absorption, fluorescence or scattering of light by tissues. Therefore, HSI of reflection, transmission, or fluorescence provide quantitative diagnostic information regarding processes in biological tissues. Multimodal HSI combine information about absorption, reflection, or luminescence. In addition, the modern medical use of HSI requires a combination with various methods of microscopy, which allows obtaining additional information and detecting pathologies in tissues.Medical HSI techniques are classified according to the image acquisition method, spectral range, dispersing element, spatial resolution, detector arrays and are combined with other techniques. Mathematical methods for processing medical HSI focus on pre-processing, feature detection, selection, and classification.

Conclusions. Obtaining a HSI requires more complex and expensive equipment than conventional microscopy methods.In addition, mathematical methods for processing absorption, scattering and reflection spectra are complex and cumbersome. This reduces the technique accessibility. However, advances in recent years in the cameras for HSI production technology, in algorithms for processing and interpreting data, and in the power ofcomputing devices allow us to talk about the possibility of wider use and emergence of new applications of the HSI technique in medicine.

Makhrova Ye.G.

THE ROLE OF BONE PLATES IN FRACTURE MANAGEMENT

Department of Biological Physics and Medical Informatics
Bukovinian State Medical University

Introduction. Fractures, or broken bones, are common injuries that require specialized medical attention. In the realm of orthopedics, the use of bone plates in fracture management has become a standard practice. These impeccable devices play a crucial role in stabilizing broken bones, aiding in the healing process, and restoring the affected limb's function. This research delves into the purpose of bone plates, the methods involved in their application, and the outcomes of their use in the treatment of fractures.

The aim of the study. The primary objective of this research is to elucidate the significance of bone plates in managing fractures. Specifically, the study aims to: Investigate the role of bone plates in stabilizing fractures; Evaluate the methods and materials used in the application of bone plates; Examine the effectiveness of bone plates in promoting fracture healing and patient recovery.

Material and Methods. Types of Bone Plates: Bone plates come in various materials, including stainless steel, titanium, and biocompatible alloys. The choice of material depends on the specific patient and fracture. Surgical Procedure: The surgical procedure involves an incision at the site of the fracture, repositioning the bone fragments, and the application of the bone plate. The plate is secured using screws or pins. Biological Factors: The study also considers the influence of biological factors, such as the patient's age, overall health, and bone quality, on the choice of bone plate and the success of the procedure. Follow-up and Rehabilitation: Post-surgery, patients are typically required to undergo physical therapy to regain strength and mobility in the affected limb. The study includes data on the rehabilitation process and its impact on recovery.