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TABLE OF CONTENTS

AGRICULTURAL SCIENCES

1. *Бурлака Н. І., Крутякова В. І.* 16
БІОЛОГІЧНІ МЕТОДИ БОРОТЬБИ ЗІ ШКІДНИКАМИ ТА ХВОРОБАМИ РОСЛИН.
2. *Войтовська В. І., Третьякова С. О., Ясура Д. О.* 20
ВПЛИВ ПІСЛЯЖНИВНИХ РЕШТОК СІЛЬСЬКОГОСПОДАРСЬКИХ КУЛЬТУР НА СОРГО ЦУКРОВЕ І ЗЕРНОВЕ.
3. *Горбась С. М., Ляшенко Ю. М.* 27
ОСОБЛИВОСТІ ВИРОЩУВАННЯ ІНЖИРУ ФІКУС КАРІКА (FICUS CARICA L.).
4. *Станкевич С. В., Адаменко В. А., Чеховской Д. С.* 29
ВРЕДИТЕЛИ РИСА В УКРАЇНЕ.
5. *Юркевич Є. О., Валентюк Н. О., Циганець Д. М.* 33
АГРОБІОЛОГІЧНЕ ОБГРУНТУВАННЯ ПІДВИЩЕННЯ ЕФЕКТИВНОСТІ ЛАНОК КОРОТКОРОТАЦІЙНИХ СІВОЗМІН В УМОВАХ СТЕПУ УКРАЇНИ.

VETERINARY SCIENCES

6. *Гачак Ю. Р., Бінкевич В. Я.* 39
ВЕТЕРИНАРНО-САНІТАРНЕ ІНСПЕКТУВАННЯ СИРКОВИХ МАС ІЗ КРІОДОБАВКОЮ «ГАРБУЗ» ТА ЇХ ТЕХНОЛОГІЧНА ЕКСПЕРТИЗА.
7. *Кос'янчук Н. І., Вівич А. Ю.* 47
ДЕРЖАВНИЙ КОНТРОЛЬ СВИНИНИ НА АГРОПРОДОВОЛЬЧОМУ РИНКУ.
8. *Омельченко В. П.* 51
ТЕРМОРЕГУЛЯЦІЯ. ФІЗІОЛОГІЧНІ ПОРУШЕННЯ ТЕПЛООВОГО БАЛАНСУ.

BIOLOGICAL SCIENCES

9. *Дербак М. Ю., Ярема Ю. М., Нанинець М. В., Беца В. Л., Субота Г. М.* 55
КОРОТКА ХАРАКТЕРИСТИКА ЕКОСИСТЕМ НАЦІОНАЛЬНОГО ПРИРОДНОГО ПАРКУ «СИНЕВИР» ТА ЇХ ХІРОПТЕРОЛОГІЧНИХ ВИДІВ, ЯКІ ЗАСЕЛЯЮТЬ ЙОГО ТЕРИТОРІЮ.
10. *Діденко І. П., Ковальчук Т. Д.* 64
ПІДСУМКИ АКЛІМАТИЗАЦІЇ ТРАВ'ЯНИСТИХ ВИДІВ З КОЛЕКЦІЇ НАЦІОНАЛЬНОГО ДЕНДРОЛОГІЧНОГО ПАРКУ «СОФІЇВКА» НАН УКРАЇНИ.
11. *Маліков М. В., Сілін В. Г.* 67
ВПЛИВ ТРАДИЦІЙНОЇ ПРОГРАМИ ПОБУДОВИ ТРЕНУВАЛЬНОГО ПРОЦЕСУ НА ПОКАЗНИКИ ЗАГАЛЬНОЇ ФІЗИЧНОЇ ПІДГОТОВЛЕНОСТІ ФУТБОЛІСТІВ 15-17 РОКІВ.

12.	<i>Орлик Н. А., Кукелко О. О.</i> ДИНАМІЧНІ ЗМІНИ ЗАГАЛЬНОГО ФУНКЦІОНАЛЬНОГО СТАНУ МОЗКУ ДІВЧАТ 17–22 РОКІВ З ВИСОКИМ РІВНЕМ РУХОВОЇ АКТИВНОСТІ ВПРОДОВЖ ОВАРІАЛЬНО-МЕНСТРУАЛЬНОГО ЦИКЛУ.	73
MEDICAL SCIENCES		
13.	<i>Liudkevych H. P., Sukhan D. S., Pron A. A., Lysytska Ye. V., Melnyk V. A.</i> RELATION BETWEEN THE ACTN3 GENE AND ITS R577X POLYMORPHISM WITH ATHLETES STRENGTH LEVEL.	79
14.	<i>Mandryk O. E., Kratik Y. O.</i> INDICATORS OF DAILY BLOOD PRESSURE MONITORING IN PATIENTS WITH NON-ALCOHOLIC STEATOHEPATITIS WITH COMORBID OBESITY.	85
15.	<i>Najmutdinova D. K., Kamilova I. A.</i> PREVALENCE OF THE TP53 RS 17884159 ONCO SUPPRESSOR GENE IN PATIENTS WITH CERVICAL INTRAEPITHELIAL NEOPLASIA.	87
16.	<i>Olshevskiy V. S., Olshevskaya O. V.</i> INFLUENCE OF THE TYPE AND NUMBER OF UTERINE LEIOMYOMA NODES ON THE COURSE OF PREGNANCY AND ON THE CONDITION OF THE FETUS.	92
17.	<i>Pandikidis N., Maslova N., Maslova Y.</i> ANALYSIS OF HEART RATE VARIABILITY AS A POTENTIAL MARKER OF SHOCK FACTORS.	97
18.	<i>Samusenko S. O., Shevchenko A. S.</i> THE INFLUENCE OF PHYSICIANS AND PARENTS' PERSONALITY TO DIAGNOSTIC AND TREATMENT OF CHILDREN WITH RESPIRATORY TRACT INFECTIONS.	101
19.	<i>Shukurova U. A., Gafforova S. S., Azizova S. S.</i> CLINICAL ASSESSMENT OF THE QUALITY OF DOMESTIC RESTORATION COMPOSITE FILLING MATERIAL.	106
20.	<i>Tikhonova L. V., Hlushko S. M., Sloz D. V.</i> COMPLICATIONS OF COVID-19 FROM THE CENTRAL AND PERIPHERAL NERVOUS SYSTEM.	110
21.	<i>Tykhonova L., Tivari D.</i> DIFFICULTIES IN PARKINSONIAN SYNDROME DIAGNOSIS ASSESSMENT.	112
22.	<i>Абдумаджидов А. А., Бахромов Жаннатибло Ботиржон огли, Мухаммедова Ф. С., Дусмуратова Дурдонахон Мирзаилхом кизи</i> НЕРВНАЯ РЕГУЛЯЦИЯ ПИЩЕВАРЕНИЯ В АСПЕКТЕ ФИЗИОЛОГИИ.	115
23.	<i>Аскарьянц В. П., Гринкевич С. А., Ибрагимова М. Ш., Крайнова Д. Р.</i> ВЛИЯНИЕ СТРЕССА НА ОРГАНИЗМ.	121

ANALYSIS OF HEART RATE VARIABILITY AS A POTENTIAL MARKER OF SHOCK FACTORS

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Abstract: Changes in the functional state of the autonomic nervous system are accompanied by various functional states of the heart itself, as well as cardiac and non-cardiac diseases. Was conducted an analysis of the literature of recent years, the importance of analyzing heart rate variability in diagnosing various lesions of the central nervous system, as well as predicting the survival of patients.

Keywords: heart rate variability, dysfunction, sympathetic hyperactivity, stress marker.

Analysis of heart rate variability (HRV) has attracted considerable attention from both researchers and practitioners. This is primarily due to the recognition of HRV as one of the indicators of the state of the body's regulatory systems, which has important prognostic value. In recent years, according to the literature, the determination of heart rate variability has a great importance in supporting valuable information in diagnosing various brain lesions, as well as predicting the survival of patients.

Brain damage due to various neurological conditions can be complicated by autonomic dysfunction, which has been reported in the literature as sympathetic hyperactivity. The mechanisms of dysautonomy still remain partial. As a result of the literature research, there was a very low variability of heart rate, the ratio of LF / HF

was higher. In the SSR test, the amplitude of responses from the arm and leg was significantly lower or without changing their latency. The results indicate hyperactivity of the sympathetic nervous system in patients with primary brain tumors. In the pathogenesis of dysautonomy, local brain damage with high intracranial pressure is possible.

The correlation between HRV and patient prognosis was studied in works of Giese-Davis J. and Kloter E., who described a model for overall survival prognosis. They suggested that the correlation between high-frequency power and overall survival indicates that efferent cardiac vagus activity may reflect general afferent and efferent information transfer between the vagus nerve and the immune system and may provide early clinical prognosis in cancer patients.

Guo Y and others, showed on a 24-hour ECG monitoring significantly lower survival in patients with SDNN <70 ms compared with patients with SDNN > 70 ms. The same conclusion - lower SDNN associated with lower survival - came in their studies Fadul N., Kim D, and De Couck M. Chiang JK studied a group of patients in palliative care in the last weeks of life , although much shorter ECG time frames were used (10 seconds to 5 minutes ECG). This study also showed that patients with high-frequency power less than two measurements had a higher risk of survival for less than 7 days. Significant differences in HRV values were found for predicting the prognosis and survival outcomes of cancer patients and studying comparisons between different groups of patients and healthy people.

Has been shown that HRV is significantly lower in cancer patients compared to healthy people, and significantly lower in patients with metastases or in general with advanced stages III or IV compared to non-metastatic patients. Regardless of the duration of HRV measurements and variables, all studies have shown a reduction in HRV in groups with more severe disease. De Couck M. et al. evaluated the difference between patients with advanced stages compared with patients with primary and secondary stages, as well as with healthy people. They reported that the severity of the disease affected HRV because patients in the early stages showed significantly higher vagus nerve activity than patients in the later stages.

The main prognostic hypothesis discussed in many publications is that lower HRV is associated with tumor growth in three ways: inflammation, oxidative stress, and sympathetic nerve activation. De Couck M., argued that in earlier stages of the tumor, commonly used treatments, such as surgery and radiation therapy, successfully reduce the burden on the tumor, leaving less opportunity for vagus nerve activity to facilitate the process. In contrast, these treatments may have less effect at later stages of metastasis, when vagus nerve activity may be even more important. The HRV-lowering effects of chemotherapy and radiation therapy were reversed after cessation of treatment. Therefore, this effect may not be relevant to the patient's prognosis. In a recent study, HRV indices were compared with other clinical changes to determine the overall survival of patients with advanced NSCLC. SDNN significantly correlated with poor survival, but was not an independent prognostic factor for survival. The authors concluded that HRV as a stand-alone method may be a useful tool for monitoring a patient's overall well-being rather than predicting overall survival.

Thus, the above literature shows that HRV analysis can provide additional valuable information about many physiological and pathological conditions, it serves as a potential marker of stress and health in the body's functions related to adaptability and health.

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