3 | AEROBIC EXERCISE PROTECTS AGAINST HEART FAILURE IN MICE

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Objective Studying the relationship between aerobic exercise and HRV is conducive to improving cardiovascular health and reducing the incidence of heart disease by aerobic exercise.

Methods 34 8-week-old male mice with well-functioning hearts were selected by sonography. The mice were divided into three groups: 8 in group A, 13 in group B and 13 in group C. Group A was a control group, and mice in groups B and C were subjected to severe aortic coarctation. After surgery, mice in group B returned to normal life and those in group C exercised 30 min/day for 12 weeks.

Results Compared with group A, the mice in group B experienced an increase in left ventricular end-systolic diameter at 6 weeks, a decrease in the left ventricular ejection fraction and the short axis shortening rate, hypertrophy of the heart and left ventricular enlargement. Compared with group B, the mice in group C experienced a decrease in left ventricular end diastolic diameter and left ventricular end systolic inner diameter and an increase in left ventricular ejection fraction and the short axis shortening rate. However, the above values did not reach the criteria of group A.

Conclusion Continuous aerobic exercise can play a role in protecting the hearts of mice with heart failure.

4 | RESEARCH ON THE CHANGE OF HEART RATE VARIABILITY UNDER STRONG NOISE STIMULATION

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Objective To investigate the effect of different strong noise stimuli on heart rate variability (HRV) in 5 min.

Methods 120 students aged 19–22 years with no diseases were selected; they had not done strenuous exercise within 24 hours. The subjects were divided into four groups of 30 people. Each group was stimulated by white noise for 5 min as follows: group A 105 dB, group B 100 dB, group C 115 dB, group D was the control group. A 1 hour ambulatory ECG was conducted in the four groups. The 5 min average HR, SDNN, PNN50, HF, LF and VLF were measured or calculated.

Results The levels of SDNN, PNN50, LF and VLF of groups A, B and C were significantly lower than those in the control group, while HR was significantly higher than that in the control group ($p < 0.05$). For PNN50, LF and VLF, group C had the lowest values and group A had the highest values.

Conclusion HRV of people exposed to noise appears blunted significantly, which suggests that long-term and regular exposure to strong noise not only harms the auditory system, but also may result in impairment of cardiac autonomic nerve activity.

5 | BREAST CANCER RISK FACTOR ANALYSIS

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Objectives Based on a large-scale epidemiological survey, the study was undertaken to determine the prevalence of breast diseases, to analyze the risk factors and to provide support to the health administration department.

Methods Random samples were obtained through multi-stage stratified cluster sampling between 1 March and 1 September 2017. The target population included women aged 18–70 in Jilin Province. All data analyses were performed using SPSS19.0.

Results This study found 160 cases of breast cancer, with a mean (SD) age at diagnosis of 53.46 (7.90) years. The high peak of age at diagnosis was between 45 and 65 years. Conditioned multivariate logistic regression analysis identified 4 variables related to breast cancer: history of benign breast tumor, economic status, family history of breast cancer and BMI.

Conclusions There was an increase in and a trend towards earlier onset in the prevalence of breast cancer in Jilin Province.

6 | COMPARISON OF FEATURE EXTRACTION METHODS FOR PROTEIN-PROTEIN INTERACTIONS BASED ON DEEP NEURAL NETWORKS

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Objectives Protein-protein interaction (PPI) is an important part of many life activities in organisms. Although a large number of PPIs have been verified by high-throughput techniques in the past decades, currently known PPI pairs are still far from complete.

Methods In order to improve the feature extraction methods of prediction performance, we used conjoint triad (CT), auto covariance (AC), local descriptor (LD) and AC+CT, four kinds of feature extraction methods to build DNN models based on deep neural networks.

Results The results showed that the model DNN-CT achieved superior performance with accuracy of 97.65%, recall of 98.96%, area under the curve (AUC) of 98.51% and loss of 26.69%, respectively. Although the performance of the DNN-LD was not prominent, the trends of various indicators were relatively stable, and achieved an accuracy of 95.30%, recall of 98.28%, AUC of 95.57% and loss of 36.23%, respectively.

Conclusions By comparison, we found that DNN-CT and DNN-LD were superior to DNN-AC and DNN-(CT+AC). The results of our experiment can provide a supplementary tool for future proteomics study.