

METHOD OF DIAGNOSTICS AND PREVENTION OF CANINE HIP DYSPLASIA USING AN ONLINE CARD



Anastasiia Shostak
National center «Junior Academy of Sciences of Ukraine» under the auspices of UNESCO

SUPERVISOR: Viacheslav Ponomarchuk
Teacher of biology and ecology,
honored teacher of Ukraine

**UKRAINE
TEAM**

Project aim

To develop a technique for early diagnosis of dysplasia hip joints in *Canis lupus familiaris*.

Tasks

- To process the scientific literature regarding the research problem in previous years;
- To find out the genetic factors leading to the development of CHD;
- To establish the dependence of the CHD development on the breed and sex of the animal;
- Create a public web resource for preliminary diagnostics of the CHD;
- Calculate the probability of disease in a healthy animal; to develop a treatment and prophylactic card of a new type.

Diagnosis, treatment and prevention of canine hip dysplasia, or CHD, completely correlate with similar procedures in humans, thus, developing a diagnostic and prophylactic model for *Canis lupus familiaris*, simultaneously solving the same aspects of the problem, but for *Homo sapiens*.

Hypothesis

The degree of CHD depends on the age, sex and breed of the dog.

Methodology

Analysis, synthesis, classification, diagnostic examination, generally accepted veterinary techniques.

Materials and methods

The project was carried out on the basis of the city veterinary center "Dingo", the veterinary clinic "MariupolVET" and the laboratory complex of the Mariupol technical lyceum; research began in June 2020 and is still ongoing. The number of animals in the total sample - 37 (n) the number of formed small samples (groups) - 7. To develop our own web resource, we used the layout of Google sites; To develop a program for calculating the probability of a dog's disease on the CHD, an open package CodePen and HTML and Java Script languages were used. Spearman's r-test of rank correlation was used for statistical processing.

The novelty of the project

Creation of a diagnostic and prophylactic card using the Internet resource.

Online access
24/7

Excessive
error up to
5%

Quick
diagnosis process

Timely
treatment thanks to
early diagnosis

User interface

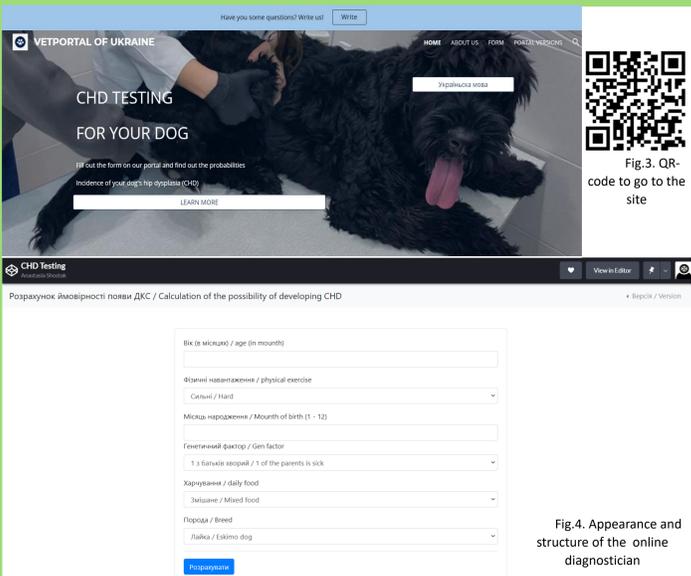


Fig. 3. QR-code to go to the site

Fig. 4. Appearance and structure of the online diagnostician

Inspection of animals with CHD



X-rays of patients



Conclusions

- CHD is determined by the expression (or its violation) of a group of genes (n = 12), which can be considered background markers of this disease.
- During the study period, all stages of CHD disease were detected in animals of the corresponding samples. Dogs of large breeds, especially German Shepherds, are more affected. The disease manifests itself from the age of 6-18 months; mainly female individuals suffer. In the city of Mariupol, most of the studied animals (within 6 months) have stage II CHD-15 out of 37, stage III-11, and stage 9 individuals. The smallest number of animals has stage IV-2 individuals.
- The dependence of the development of CHD on the age and breed of the animal according to Spearman's r-criterion was analyzed, the correlation between these indicators was revealed only in German Shepherds in other groups there were not enough individuals to calculate the validity.
- A diagnostic card was compiled that provides the possibility of online diagnosis, and the hypothesis regarding the diagnosis of dysplasia was confirmed. It was found that online diagnostics is a fairly productive method and an actual addition to traditional methods (for 9 months, the number of users of the web resource is ~ 1000 people, or ~125 persons per month).

Results and statistical processing

№№	Value A	Rank A	Value B	Rank B	d (rank A - rank B)	d ²	B		Ag		DD		B		Ag		DD		B		Ag		DD		B		Ag		DD	
							Group 1	Group 2	Group 3	Group 4	Группа 5	Group 6	Group 7	Group 1	Group 2	Group 3	Group 4	Группа 5	Group 6	Group 7	Group 1	Group 2	Group 3	Group 4	Группа 5	Group 6	Group 7	Group 1	Group 2	Group 3
1	3	4.5	3	7	-2.5	6.25	GS	3	3	RE	9	1	N	6.3	1	R	4	2	SB	3.2	2	GR	1.3	1	M	3	2			
2	10	8	3	7	1	1	CA	10	3	YH	5.2	2	N	8	2	R	4	3	SB	7.5	3	GR	1.8	1	M	0.8	1			
3	2	2	2	3.5	-1.5	2.25	GS	2	2	SH	1.5	2	N	1.2	2	R	1.1	1	SB	4.5	3	RL	5	3	BT	6	3			
4	11	9	4	9	0	0	CS	11	4	SH	1	1	N	1.7	3						RL	8	2	M	4	4				
5	1.5	1	1	1	0	0	GS	1.5	1	SH	4	3	N	2	2						RL	3.5	2	GD	5	1				
6	3.2	6	2	3.5	2.5	6.25	GS	3.2	2	YH	8	3																		
7	5	7	3	7	0	0	GS	2.6	2																					
8	2.6	3	2	3.5	-0.5	0.25	CA	3	2																					
9	3	4.5	2	3.5	1	1	GS	3	3																					
Sum		45		45	0	17																								

Result: $r_s = 0.888$

n	p
9	0.05
	0.01
9	0.68
	0.83

Answer: H_0 is not acceptable. The correlation between A and B is statistically significant.

Fig. 5. Result of statistical processing

The prospect of further research

The prospect for further research is to expand the site's capabilities, extend online diagnostics to other diseases of the musculoskeletal system of animals, which are better prevented than cured.