

Determination of the importance of the microbiota profile and selected viruses of the upper respiratory tract and the profile of volatile compounds in the exhaled air in the prediction of asthma exacerbations in children.

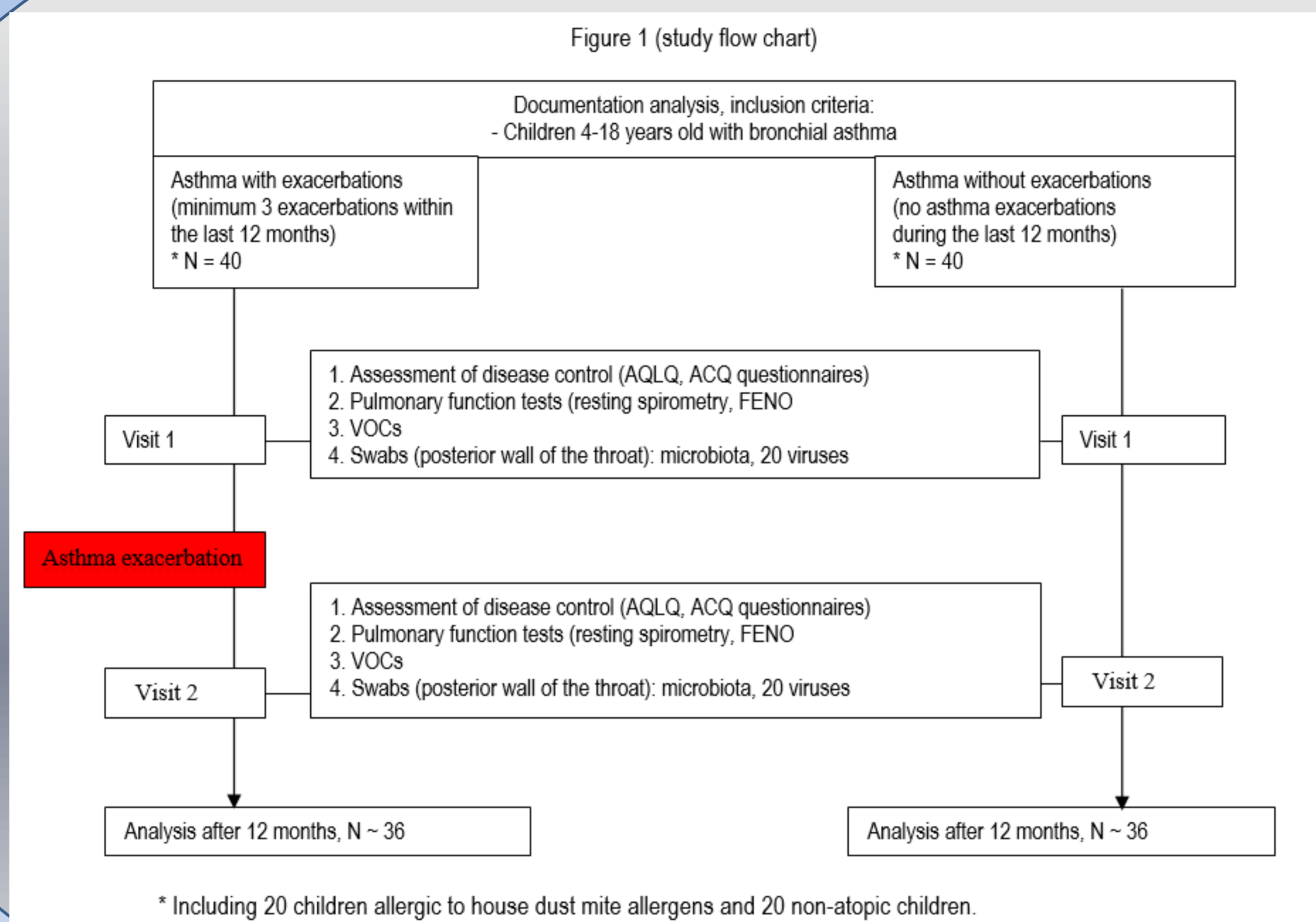
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Objectives:
 □ Assessment of the relationship between the composition and biodiversity of the microbiota as well as the presence of selected viruses of the posterior pharynx and the clinical course of asthma, including exacerbations of the disease.
 □ Assessment of the relationship between asthma exacerbations and the metabolomic profile assessed using non-invasive test methods - the assessment of free volatile organic compounds in the exhaled air (VOCs).

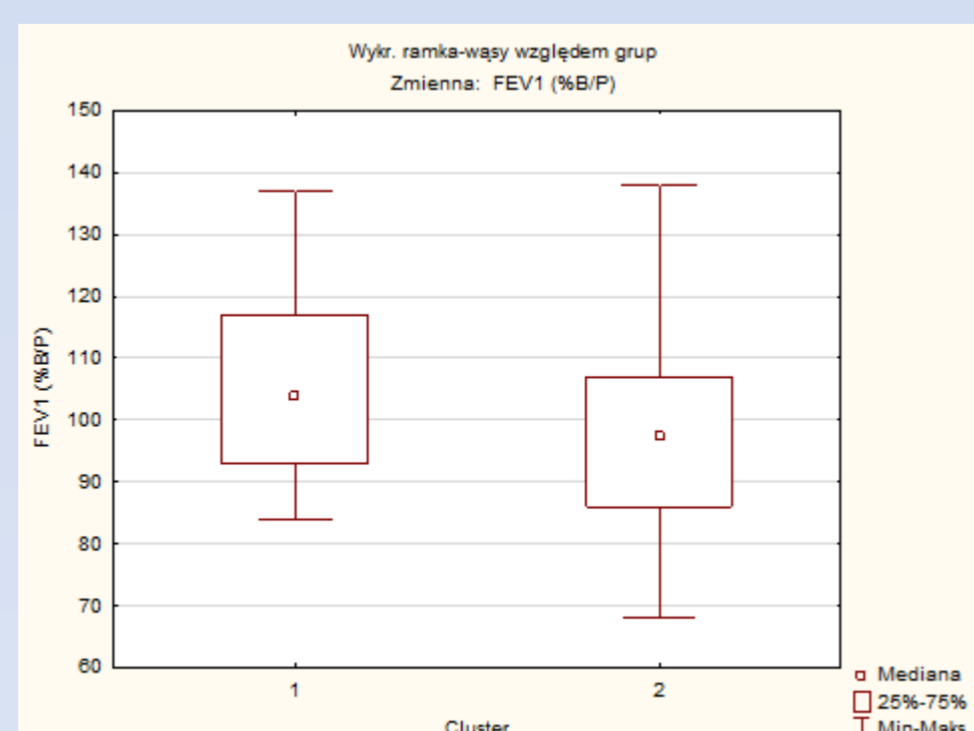
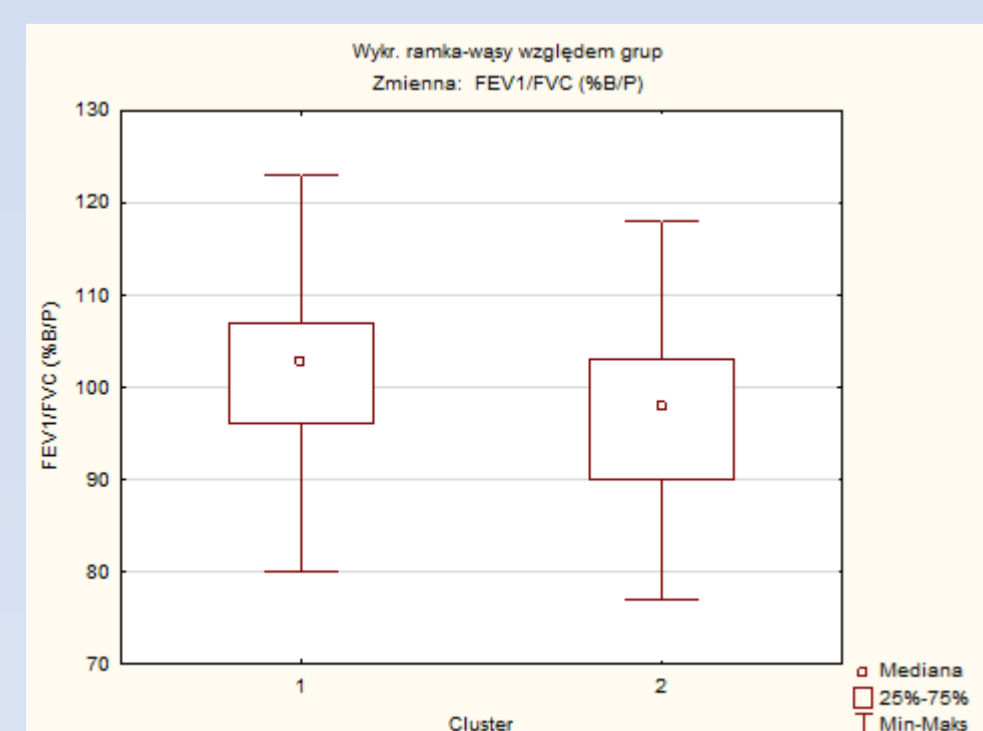
Methods:
 1. Medical examination, including detailed medical history using standardized asthma control questionnaires (AQLQ, ACQ).
 2. Pulmonary function tests - resting spirometry, FENO.
 3. Swab of the posterior wall of the throat for evaluation:
 - microbiota composition
 - genetic material of pathogenic viruses.
 4. Measurement of volatile organic compounds (VOC) in the exhaled air.

Patients and Study Design



Results and achievements:

- A total of 80 children aged 4-18 with asthma have been included into the study
- A database was created containing the results of functional tests, the results obtained in the completed ACQ and AQLQ forms. Posterior pharyngeal swabs and breath volatile organic compounds tests from visit 2 are under development - require processing under standardized conditions during a joint sequencing session. The biological material (swabs from the back of the throat) was frozen at -90 degrees Celsius and is stored in the Bio-Bank of the Medical University of Lodz.
- Statistical analysis of the results obtained at visit 1. The study group and the control group were defined by two gas profiles (one for each group). After the cluster analysis, the results were correlated with clinical symptoms of the children studied, obtaining the following conclusions:
 - Gases characterized in cluster 2 occur in children with more asthma exacerbations, worse lung function parameters (FEV1/FVC and FEV1)
 - Gases classified in cluster 1 occur in children with a milder course of asthma.
 - The results are independent of the age of the studied children.



Zmienna	Sum.rang Grupa 1	Sum.rang Grupa 2	U	Z	p	Z popraw.	p	N ważn. Grupa 1	N ważn. Grupa 2	2*1str. dokł. p
(4E)-5-METHYL-4-HEPTEN-3-ONE	2351,000	1052,000	62,00000	7,19273	0,000000	7,82206	0,000000	38	44	0,000000
<alpha>-pinene	1364,000	2039,000	623,00000	-1,97602	0,048153	-1,97607	0,048148	38	44	0,047768
<alpha>-pinene	1811,000	1592,000	602,00000	2,17130	0,029909	2,32115	0,020280	38	44	0,029374
1-Butanol, 2-methyl-, acetate	1146,000	2257,000	405,00000	-4,00319	0,000063	-4,35346	0,000013	38	44	0,000039
1-Propanol	1197,000	2206,000	456,00000	-3,52895	0,000417	-3,86240	0,000112	38	44	0,000322
2-Butanone, 3-hydroxy-	1179,000	2224,000	438,00000	-3,69633	0,000219	-3,74976	0,000177	38	44	0,000159
2-Oxabicyclo[2,2,2]octane, 1,3,3-trimethyl-	1789,000	1614,000	624,00000	1,96673	0,049216	2,02206	0,043171	38	44	0,048841
2-Pentanone, 4-methyl-	1084,000	2319,000	343,00000	-4,57973	0,000005	-4,65441	0,000003	38	44	0,000002
2-Pentanone, 4-methyl-	1800,000	1603,000	613,00000	2,06901	0,038546	2,15442	0,031208	38	44	0,038073
2-Pinen-4-one, (1S,5S)-(-)-	1359,000	2044,000	618,00000	-2,02252	0,043124	-2,02253	0,043122	38	44	0,042691
2-Undecanone	1319,500	2083,500	578,50000	-2,38983	0,016857	-3,17153	0,001517	38	44	0,016079
3-Heptanone, 5-methylene-	1311,500	2091,500	570,50000	-2,46422	0,013732	-2,71545	0,006619	38	44	0,013004
3-Methyl-2(5H)-furanone	1070,500	2332,500	329,50000	-4,70526	0,000003	-5,18497	0,000000	38	44	0,000001
4-Hepten-3-one, 5-methyl-, (Z)-	1102,000	2301,000	361,00000	-4,41235	0,000010	-5,41413	0,000000	38	44	0,000005
4-Hepten-3-one, 5-methyl-, (Z)-	1331,000	2072,000	590,00000	-2,28289	0,022438	-3,02961	0,002449	38	44	0,021871
4-Hexen-2-one, 3,4-dimethyl-	2090,000	1313,000	323,00000	4,76571	0,000002	5,77272	0,000000	38	44	0,000001
5-HEPTEN-3-ONE, 5-METHYL-, (Z)-	1994,000	1409,000	419,00000	3,87301	0,000108	4,96581	0,000001	38	44	0,000072
Acetone	996,000	2407,000	255,00000	-5,39803	0,000000	-5,83492	0,000000	38	44	0,000000
Acetone	1849,000	1554,000	564,00000	2,52466	0,011581	3,02121	0,002518	38	44	0,011048
aldehyd cynamonowy	2061,000	1342,000	352,00000	4,49604	0,000007	5,76464	0,000000	38	44	0,000003
aldehyd cynamonowy	922,000	2481,000	181,00000	-6,08616	0,000000	-6,66125	0,000000	38	44	0,000000
4-Pinene	1125,000	2278,000	384,00000	-4,19847	0,000027	-4,38811	0,000011	38	44	0,000015
Benzaldehyde, 2-hydroxy-	1131,000	2272,000	390,00000	-4,14268	0,000034	-5,08323	0,000000	38	44	0,000020
Benzene	1178,000	2225,000	437,00000	-3,70563	0,000211	-4,83095	0,000001	38	44	0,000152
BENZENE, 1,2-DIMETHYL-	1327,000	2076,000	586,00000	-2,32009	0,020337	-3,02465	0,002489	38	44	0,019768
Benzene, propoxy-	1983,000	1420,000	430,00000	3,77072	0,000163	3,87681	0,000106	38	44	0,000114
Benzenemethanol, a,a-dimethyl-	1352,000	2051,000	611,00000	-2,08761	0,036834	-2,08766	0,036830	38	44	0,036347
Benzothiazole	1236,500	2166,500	495,50000	-3,16164	0,001569	-3,20197	0,001365	38	44	0,001324
Cyclohexane P96	1333,000	2070,000	343,00000	4,57973	0,000005	4,64593	0,000003	38	44	0,000002
Cyclohexanol, 5-methyl-2-(1-methylethyl)-, [1R-(1a,2a,5a)]-	1349,500	2053,500	608,50000	-2,11086	0,034785	-2,70646	0,006801	38	44	0,033882
Cyclopentane, methyl-	1267,500	2135,500	526,50000	-2,87337	0,004061	-3,96713	0,000073	38	44	0,003638
Decanal	1201,000	2202,000	460,00000	-3,49175	0,000480	-3,49175	0,000480	38	44	0,000375
Dodecane	1968,000	1435,000	445,00000	3,63124	0,000282	4,06117	0,000049	38	44	0,000210
Heptane	1359,000	2044,000	618,00000	-2,02252	0,043124	-2,17377	0,029723	38	44	0,042691
Heptane, 2,2,4,6,6-pentamethyl-	1799,000	1604,000	614,00000	2,05972	0,039427	2,84375	0,004459	38	44	0,038961
Heptane, 2,4-dimethyl-	1046,000	2357,000	305,00000	-4,93309	0,000001	-5,04583	0,000000	38	44	0,000000
Hexadecanoic acid, methyl ester	1326,000	2077,000	585,00000	-2,32938	0,019839	-3,15086	0,001628	38	44	0,019270
Hexanoic acid, butyl ester	1962,000	1441,000	451,00000	3,57544	0,000350	4,83634	0,000001	38	44	0,000266
Limone	1310,000	2093,000	569,00000	-2,47817	0,013206	-3,42149	0,000623	38	44	0,012659
Methane, thiobis-	1131,000	2272,000	390,00000	-4,14268	0,000034	-5,08323	0,000000	38	44	0,000020
N,N-Dimethylacetamide	1275,500	2127,500	534,50000	-2,79898	0,005127	-3,58874	0,000332	38	44	0,004650
N,N-Dimethylacetamide	1365,000	2038,000	624,00000	-1,96673	0,049216	-3,09336	0,001979	38	44	0,048841

Legends: cluster's 1 gases cluster's 2 gases

Planned further actions:

- obtaining the results of throat swabs and measurement of volatile organic compounds in exhaled air from visit 2 and visit during asthma exacerbation.
- after obtaining data from the performed tests, supplementing the database and statistical analysis of the data - correlation of the microbiome with the profile of gases in the studied groups.
- publication of the obtained studies and their analysis in medical journals