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Question about role of the genetically modified products in food allergy onset in children

Key words: food allergy, children, genetically modified products, interview-questioning.

Data about spread of the allergic diseases each year are proven by new epidemiologic researches. Susceptibility to the allergy is genetically determined. Quick increase of the food allergy (FA) morbidity nowadays can be caused not only by inheritance, but epigenetic influence of the environment too. That leads to the failure of the adaptation mechanisms even in organisms, who do not have atopy genes [1]. Allergy is «the disease of the civilization», in some way is immune reaction, changed by «goods» of the civil progress (preservatives, colorants, regulators, pollutants).

Since genetically modified organisms / food (GMO) appeared on the market, interest to them increases day by day. Different attitude to them can be found. Their polarity can be characterized by one thesis «GMO: harm or benefit?». GMO role in the FA onset is studied during not long period, since 1999. Their results were discussed and were suggested as false [2, 6]. On the other hand, true FA spread in the world is still unknown, and is in range 1–17 % in the different age groups.

Among main meals that can cause severe allergic reactions in different ages are soy, nuts, sea food. According to the American data frequency of the anaphylactic reactions after peanut intake in children ranges from 3 to 8 % [8]. The next products are commonly genetically modified: soy, wheat, potato, nuts, corn [9]. Thus we suggest probable role of the GMO in FA spread, especially severe forms.

Aim of the GMO creation is get of the bigger quantity of the

product with minimal charges. Incorporation of the new genes in the genome of the organism-recipient has aim to get new character, unobtainable or hardly obtainable for this organism. Tasks that they solve: stability to the diseases and pests, parasites, cold, storage safety, sustenance [2, 4, 6].

New character achievement can be caused not only by new proteins, but influence on the neighbour genes. All negative phenomena that can have association with GMO intake can be divided into 3 groups: food, ecological, agrotechnical risks. In food risks separately should be noticed Risk of the horizontal transmission of the transgene constructions, to the simbiotic bacterias genom in the first (*E.coli*, *Lactobacillus* (*acidophilus*, *bifidus*, *bulgaricus*, *caucasicus*), *Streptococcus thermophilus*, *Bifidobacterium* et al.). And direct action of the toxic and allergic transgenic proteins of the GMO [1]. Literature review show absence of the studies that can detect direct action of the GMO on the humans. First studies in the field of the food risks of the GMO were conducted by A. Pusztai, they were widely discussed in the literature [6].

From the point of view of genetics probability of the introduction of the transgene oligonucleotide from plant to the mammalian is impossible. Although we should consider that eucariotic cells have several isolative barriers, that prevent transmission. Even if this will happen accidentally, such cell can't multiply because it is in the terminal stage of the differentiation. Transmission in the gonades is impossible due to

the presence of the hematotesticular barrier, that is not permeable for the big molecules. On the other hand, human have endosymbionts (flora) that can achieve this gene [6, 9].

From the point of view of allergology, changed protein generated by modified gene can stimulate synthesis of the new specific IgE or link with already exist IgE. In both cases allergic reaction will be finally. Fact that even non GMO soy and nuts cause severe allergic reactions in children and adults, we shouldn't expect to have decrease of the allergenicity risk of these GMO products. Since detection of the structure of all known allergens we can find cross reactivity of the «new» protein [5, 7, 10]. Several authors showed possibility of the cross immune reactivity to the transgene plant protein [5, 7].

Epithelial barrier damage of the GIT can be named as one of the probable aggressive action of the GMO. A. Pusztai showed influence of the potato, that was modified by snow-drop lectin, on the histological level – on the intestinal mucous membrane condition, liver and thymus. On the physiological level – on the relative weight of the rat internal organs, that was on the 9 mo GMO diet in comparison with those who was on the nature potato diet. As the rule such toxic effect is typical for proteins that give plant resistance to the pests, molds, bacterias. These results were widely discussed in 1999–2000 and it was shown that some of that reactions were detected in non GMO too. Such new proteins sometimes can be founded in nature products due to the action of some extrafactors. For example, biosynthesis of the alkaloids (solanin) in the solanaceous (tomato, pepper, potato) [3, 4].

Nevertheless according to the active European recommendations (Guidance Document of the Scientific Panel on Genetically Modified Organisms изданные European Food Safety Authority (EFSA)) all GMO must pass through obligatory study of the possible toxic and allergic action [10].

Child's organism reacts on the «alien» not known proteins. Nowadays Greenpeace and EAACI popularize loyal attitude to the GMO in the food for children. However, since 2004 in the EU countries GMO use in the food for children under 4 y. o. is prohibited [3, 11]. Although wide spread have «organic» products. Not long ago Ukraine introduced obligatory product marking. But big amount of the elemental markets and lack of the constant supervision under quality of the agriculture products leave possibility for the GMO in the Ukrainian markets.

The aim of our study was to estimate potential influence of the GMO on the spread and course of the FA in children in Zaporizhia city, Ukraine.

Materials and methods

Study was conducted on the costs of the Ministry of health of Ukraine. Approvals of the local regulatory organizations were achieved, all participants and their legal presenters signed informed consent form. Group of 127 children from 1 to 17 y. o. of life took part in the study (average age was (5 ± 3) y. o.). 97 of them had acute food allergy symptoms, 30 – healthy children. Inclusion criterions were: clinical symptoms of the FA, informed consent. Fact of the GMO intake was detected during interview-questioning, that had direct and indirect questions (Application).

Results

Although 100 % of the respondents with Food allergy avoid to intake GMO in meals and consider them as one of the cause of the FA onset. This fact proves alerted, not positive attitude to the GMO in Zaporizhia city. It was founded that 87 % of the respondents notice marking of the GMO content on the products and only 10 % know about GMO safety but do not prefer them. We suggested absent of the direct cause–effect relation between GMO intake and FA onset in our region, because such patient refuse GMO intake. On the other hand, all studies of the toxicity and allergenicity of the GMO were conducted on the animal models and we have no experience of the long lasting GMO intake by humans in generations. In correlation with Cocrane database of the drug administartion. Retrospective studies in experiments assessed influence of the GMO on the models after 90 days [9].

Conclusion

Although there was no direct link between FA onset and GMO founded, to our mind, further studies of the potential role of the GMO in the FA development, due to the might indirect influence, should be conducted. Risks and gene changes can be detected in several generations, after passing of the several cell division. As long as changeability - is characteristic variety in one species, this is ability of the new generation to achieve new characteristics. Absolute conservatism in the vertical gene transmission is impossible. That's why final assessment of the GMO influence on the human organism can be done in generations, but not now.

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Application

Questionnaire (cross the chosen answer)

1. Child's name _____ birth date _____
2. Parents age, mama _____ years, papa _____ years.
3. Occupational hazards: mama _____ papa _____
4. What feeding had mother during pregnancy? GOOD SATISFACTORY BAD
5. Was mother on hypoallergenic diet during pregnancy?
YES, PARTIALLY, NO
6. Usual meals were introduced in child's diet at age: _____ months,
What meals? _____
7. Do you know about genetically modified organisms/products?
YES, PARTIALLY, NO
8. Did mother eat genetically modified organisms/products during pregnancy?
YES, PARTIALLY, NO
9. Do you know about harmless/safety of the genetically modified organisms/products?
YES, PARTIALLY, NO
10. Do you notice marking about containing of the genetically modified organisms on the products?
YES, PARTIALLY, NO
11. Does your family eat genetically modified organisms/products?
YES, YES, but our child doesn't, NO
12. If yes, list them _____
13. Were do you usually buy products for your child?
In the shop on the market grow by myself
14. What products do you prefer?
Produced in UKRAINE imported
15. Will you eat products, containing genetically modified organisms?
YES, YES, but our child won't, NO
16. Do you and your family eat conserved genetically modified organisms (corn)?
YES, YES, but our child doesn't, NO
17. Do you and your family eat genetically modified wurst, sausages or other products containing soy?
YES, YES, but our child doesn't, NO
18. Do you and your family eat genetically modified potato?
YES, YES, but our child doesn't, NO
19. Do you and your family eat nuts, nut butter, bought on the market?
YES, YES, but our child doesn't, NO
20. Did your child ever have some allergic skin eruption?
YES, NO
21. Skin eruption was caused by: _____
22. When usually your child suffers from skin eruption?
January February March April May June July August September October
November December
23. Was ever food allergy and/or atopic dermatitis, eczema diagnosed in your child?
YES (At what age? _____), NO
24. Does your child have unusual feeling (burning, itching in the mouth, vomiting, diarrhea) after food intake? (cross the fit variant)?
NO YES (what products? _____)
25. How much meal should your child intake to have eruption?
MANY FEW LITTLE
26. Does your child have unpleasant feeling after intake of the salted, smoke-dried meals?
YES, NO
27. Do you think that food allergy and/or atopic dermatitis, eczema in your child was caused by genetically modified organisms/products?
YES, NO

**ЩОДО ПИТАННЯ ПРО РОЛЬ
ГЕНЕТИЧНО МОДИФІКОВАНИХ ПРОДУКТІВ
У РОЗВИТКУ ХАРЧОВОЇ АЛЕРГІЇ У ДІТЕЙ***О. П. Пахольчук*

Резюме. Стрімке збільшення проявів харчової алергії (ХА) може бути викликане не тільки спадковістю, а й епігенетичним впливом зовнішнього середовища, що призводить до зривів систем адаптації навіть у організмів, які не мають генів атопії. З моменту появи на ринку генетично модифікованих організмів (ГМО), які вживаються в їжу, цікавість до них тільки зростає, при цьому ставлення до них неоднозначне.

Метою даної роботи було вивчити можливість впливу ГМО на поширеність та розвиток харчової алергії у дітей жителів міста Запоріжжя.

Матеріали та методи. У дослідженні взяли участь 127 дітей у віці від 1 місяця до 17 років (середній вік становив (5 ± 3) років), із них 97 пацієнтів з гострими проявами шкірної форми ХА та 30 практично здорових дітей. Враховуючи наявність обов'язкового маркування продуктів, факт вживання ГМО виявляли за допомогою інтерв'ю-анкетування батьків та дітей, яке містило прямі та непрямі запитання.

Результати. Проведено огляд досліджень ймовірної ролі ГМО у розвитку ХА у дітей. Виявлено, що 87 % респондентів звертають увагу на маркування продуктів та лише 10 % знають про безпеку вживання ГМО. Водночас 100 % опитаних з ХА уникають генетично модифікованих продуктів, вважаючи їх можливою причиною розвитку алергії. Розглянуто перспективи подальших досліджень.

Висновки. Незважаючи на той факт, що прямого зв'язку виявлено не було, на думку авторів, вивчення ролі ГМО у розвитку ХА у дітей потребує подальших багатоцентрових досліджень у зв'язку із можливим їх непрямым впливом.

Ключові слова: харчова алергія, діти, генетично модифіковані продукти, інтерв'ю-анкетування.

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**QUESTION ABOUT ROLE
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ALLERGY ONSET IN CHILDREN***O. P. Pakholchuk*

Abstract. Quick increase of the food allergy (FA) morbidity nowadays can be caused not only by inheritance, but epigenetic influence of the environment too. That leads to the failure of the adaptation mechanisms even in that organisms, who do not have atopy genes. Since genetically modified organisms / food (GMO) appeared on the market, interest to them increases day by day. Different attitude to them can be found.

The **aim** of the study was to estimate potential influence of the GMO on the spread and course of the FA in children in Zaporizhia city, Ukraine.

Materials and methods. 127 children from 1 mo to 17 yr of life took part in the study (average age was (5 ± 3) yr.). 97 of them had acute food allergy symptoms, 30 – healthy children. Fact of the GMO intake was detected during interview-questioning, that had direct and indirect questions.

Results. Literature dedicated to this problem was observed. It was founded that 87 % of the respondents notice marking of the GMO content on the products and only 10 % know about GMO safety. Although 100 % of the respondents with Food allergy avoid to intake GMO in meals and consider them as one of the cause of the food allergy onset. Perspectives of the future researches were discussed.

Conclusion. Although there was no direct link between FA onset and GMO founded, to our mind, further studies of the potential role of the GMO in the FA development, due to the might indirect influence, should be conducted.

Key words: food allergy, children, genetically modified products, interview-questioning.

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