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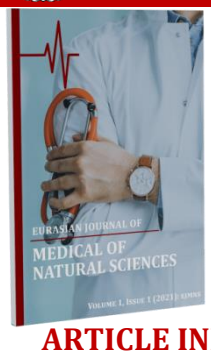

# NUTRITIONAL STATUS IN CHILDREN WITH DERMORESPIRATION SYNDROME

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**ABSTRACT**

*For boys at the age of 5, 7, 8, 11, 12, 13, 17 girls aged 6, 9, 10, 17, 18 showed high BMI values, while boys aged 9, 10, 14, 16, 18 and girls aged 7, 11, 13, 14, 15, 16 found age deficits in BMI. In boys aged 6, 15, and 17, BMI values corresponded to age norms. Thus, in adolescents with a high BMI, we have identified asthma, for such children low self-esteem is often tormented, the pathological process tends to chronicle. Vitamin D plays a key role in regulating immunity, maintaining skin barrier function, and preventing osteoporosis. In children with DRS, its deficiency is associated with a severe course of AS. In addition, researchers have evidence that with insufficient vitamin D levels in children, fat will accumulate in the body. Studying blood pressure levels is very important because vitamin D modulates innate immunity by producing antimicrobial peptides that reduce the risk of skin infection.*

**Background NUTRITIONAL STATUS IN CHILDREN WITH DERMORESPIRATION SYNDROME**;

**Materials and methods.** The study included 151 patients with DRS aged 5-18 years with bronchial asthma (BA), allergic rhinitis (AR), atopic dermatitis (AD), and food allergy (PA).

We calculated the children's body mass index (BMI), and determined their nutritional status (HC) in accordance with WHO recommendations.

The research was conducted at the Department of Hygiene of Children, Adolescents and Nutrition (TMA) and at the Children's National Medical Center (Tashkent).;

**RESEARCH DESIGN**

We divided the children aged 5-18 years in the main group into 5 subgroups (Fig. 1).

Inclusion criteria:

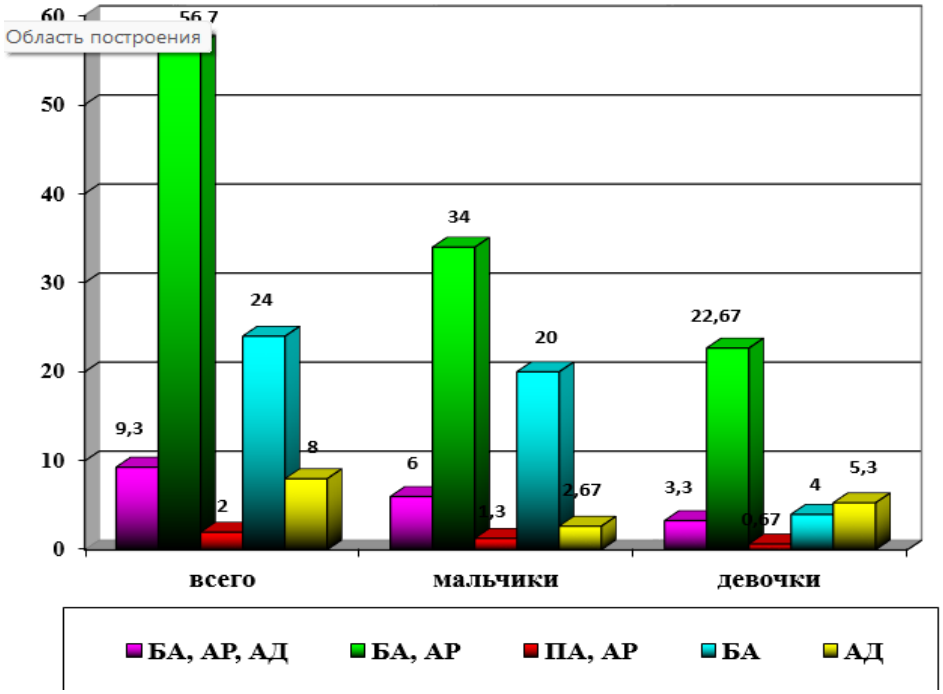
- children aged 5-18 years with DRS;
- The diagnosis of DRS included: BP, BA, AR, PA (main group);
- children of health groups I–II (control group);
- parental consent to participate in the study.

Criteria for non-inclusion (general):

• the presence of signs of acute and chronic illness in the child during the visit;
• Parents' refusal to participate in the study.

Gender distribution:
- boys: 97 (65.24%).
- girls: 54 (35.76%).

Average age of children: 13.15±3.2 years.




1. Prevalence by gender of the studied groups (n=151), in %.

The main group consisted of the following subgroups:

Subgroup 1: children with asthma of various degrees (N 3, N 2) – made up 24% of the studied;

Subgroup 2: children with asthma and AR accounted for 56.7% of the studied;

Subgroup 3: children with asthma, AR and AD – accounted for 9.3% of the studied;

Subgroup 4: children with PA and AR – accounted for 2.0% of the studied;

Subgroup 5: children with manifestations of blood pressure accounted for 8.0% of the subjects.

The control group included 30 children aged 5-18 years without DRS, without any special pathologies, with normal physical development (health groups I–II).

Based on anthropometric data, we built development graphs (GR), which analyzed the height, weight and BMI of children, taking into account age and gender, and compared the results with WHO recommendations.

As you know, GRS help to identify the correspondence between the physiological growth and development of a child.

Studying the growth of children makes it possible to identify children who, for some reason, are stunted. In our case, we clarified the relationship with DRS, especially with asthma.

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The study of children's weight makes it possible to identify children who have a deficiency or insufficiency of body weight, this phenomenon is observed with insufficient and inadequate nutrition, on the contrary, if there is weight gain due to overweight or obesity, which can contribute to the course of DRS and ASTHMA, as well as other diseases.

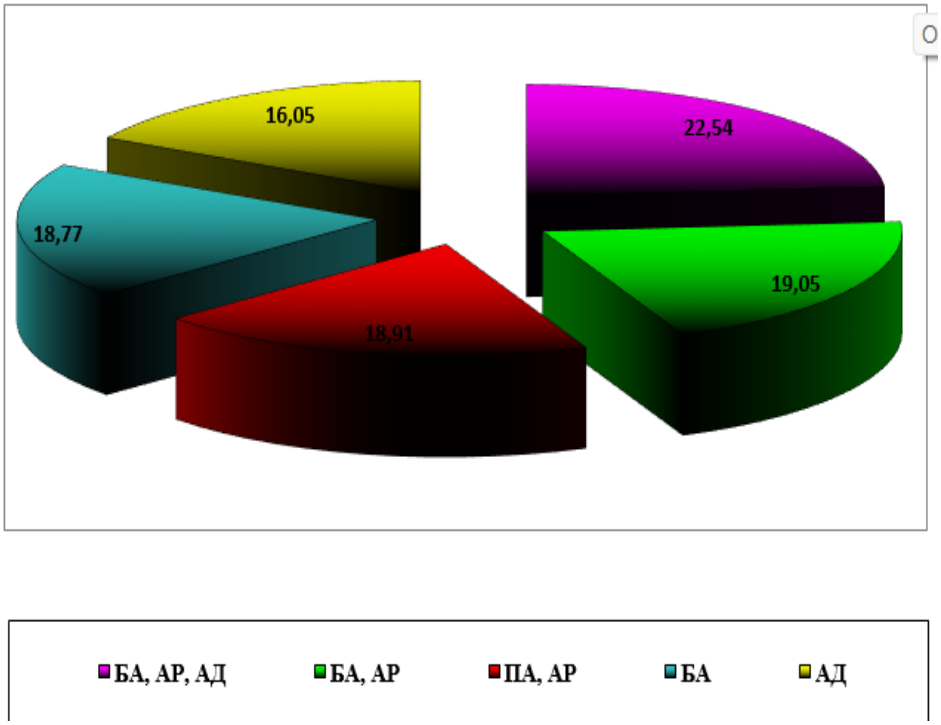


Fig. 2. Average BMI values of children of the studied groups (n=151)

We studied the BMI of children in all 5 groups in order to study the effect of BMI on respiratory, dermarepiratory, and dermatological diseases (Fig. 2).

Studying the BMI of children also provides information about the child, comparing with the average statistical data, it is possible to predict the course of the disease and take preventive measures to prevent undesirable effects associated with obesity.

For a more in-depth analysis, we studied the indicators of height, weight, and BMI in children depending on age, taking into account gender (Table 1).

**Table 1**

| Возраст и пол детей | рост⁂ | Рост норма * | Пр. | вес⁂ | Вес норма* | Пр. | ИМТ⁂ | ИМТ норма* | Пр. |
|---|---|---|---|---|---|---|---|---|---|
| **5 м** | 1,1 | **1,1-1,15** | **н** | 23 | **18,5-20,3** | **и** | 18,47 | **15,3** | **и** |
| **6 д** | 1,14 | **1,15-1,2** | **н** | 23,87 | **20,2-22,2** | **и** | 17,53 | **15,3-15,4** | **и** |
| **6 м** | 1,08 | **1,16-1,21** | **д** | 18 | **20,5-22,7** | **д** | 15,27 | **15,3-15,5** | **н** |
| **7 д** | 1,17 | **1,2-1,26** | **н** | 20 | 22,4-24,8 | **д** | 14,61 | **15,4-15,7** | **д** |
| **7 м** | 1,21 | **1,21-1,26** | **н** | 25,5 | **22,9-25,2** | **л.в** | 16,59 | **15,5-15,7** | **и** |
| **8 д** | 1,27 | **1,26-** | **н** | 28,6 | **25,0-27,9** | **и** | 16,53 | **15,7-16,1** | **л.в.** |

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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **1,32** | | | | | | | |
| **8 м** | 1,17 | **1,27-1,32** | **д** | 30,8 | **25,4-27,9** | **и** | 22,45 | **15,7-16,0** | **и** |
| **9 д** | 1,16 | **1,32-1,38** | **д** | 27,17 | **28,2-31,5** | **д** | 20,1 | **16,1-16,6** | **и** |
| **9 м** | 1,21 | **1,32-1,37** | **д** | 23,37 | **28,1-30,9** | **д** | 15,62 | **16,0-16,4** | **д** |
| **10 д** | 1,35 | **1,38-1,44** | **д** | 35 | **31,5-32** | **и** | 19,20 | **16,6-17,2** | **и** |
| **10 м** | 1,31 | **1,37-1,42** | д | 27,17 | **31,2** | **д** | 15,55 | **16,4-16,9** | **д** |
| **11 д** | 1,35 | **1,45-1,5** | д | 27 | | | 14,94 | **17,2-17,9** | **д** |
| **11 м** | 1,33 | **1,43-1,48** | д | 33,2 | | | 18,59 | **16,9-17,5** | **и** |
| **12 м** | 1,45 | **1,49-1,55** | д | 40,5 | | | 19,22 | **17,5-18,2** | **и** |
| **13 д** | 1,46 | **1,56-1,59** | д | 37,75 | | | 17,92 | **18,8-19,5** | **д** |
| **13 м** | 1,49 | **1,56-1,62** | д | 43,8 | | | 19,45 | **18,2-18,9** | **и** |
| **14 д** | 1,45 | **1,59-1,61** | д | 32,42 | | | 15,37 | **19,6-20,2** | **д** |
| **14 м** | 1,40 | **1,63-1,68** | д | 41,92 | | | 17,87 | **19,0-19,7** | **д** |
| **15 д** | 1,4 | **1,61-1,62** | д | 34,76 | | | 17,04 | **20,2-20,7** | **д** |
| **15 м** | 1,59 | **1,69-1,72** | д | 50,56 | | | 20,03 | **19,8-20,4** | **н** |
| **16 д** | 1,6 | **1,62-1,63** | **]н** | 50,14 | | | 19,7 | **20,7-21,0** | **д** |
| **16 м** | 1,61 | **1,72-1,75** | д | 43,81 | | | 16,91 | **20,5-21,1** | **д** |
| **17 д** | 1,45 | **1,62-1,63-** | д | 52 | | | 24,73 | **21,0-21,2** | **и** |
| **17 м** | 1,58 | **1,75-1,76** | д | 53,8 | | | 21,61 | **21,1-21,7** | **н** |
| **18 д** | 1,6 | **1,63** | **н** | 56,75 | | | 22,17 | **21,3-21,4** | **и** |
| **18 м** | 1,64 | **1,76-1,77** | д | 54,5 | | | 20,48 | **21,7-22,2** | **д** |

* - average data according to age and gender according to WHO recommendations [3]

⁂ - actual data of children with DRS.

m- boys; d-girls

| | | | |
|---|---|---|---|
| | - Overweight by age | | - The age norm |
| | - Overweight by age | | - Age deficit |

For boys at the age of 5, 7, 8, 11, 12, 13, 17 girls aged 6, 9, 10, 17, 18 showed high BMI values, while boys aged 9, 10, 14, 16, 18 and girls aged 7, 11, 13, 14, 15, 16 found age deficits in BMI.

Boys aged 6, 15, and 17 had BMI values that corresponded to age standards (marked in green), but their height and weight were below the age average.

As our research has shown, 43.7% of children have anemia (Ah), so it was found that Ah is a risk factor for developing DRS in children.

As shown by the analysis of alanine aminotransferase (14.98±4.53) and aspartate aminotransferase (24.19±3.64), total bilirubin (14.78±2.85), total protein (61.8±6.59), there was no positive correlation with vitamin D levels and weight, height, BMI (average research results are shown in parentheses).

It should be noted that blood pressure as a chronic, recurrent disease can be inherited, and the role of vitamin D in the pathogenesis of this pathology has not been fully studied [3]. For this purpose, we studied the level of vitamin D in the blood.

The assessment of vitamin D deficiency in children suffering from DRS includes several stages that make it possible to establish a deficiency of this vitamin and assess its impact on health. DRS can include diseases that can affect the immune system and increase the body's need for vitamin D.

Vitamin D deficiency can manifest as general weakness, bone pain, and increased fatigue. In children with DRS, these symptoms may be a consequence of skin and upper respiratory tract conditions.

Vitamin D deficiency in children can be caused by several factors, including insufficient exposure to ultraviolet rays on the skin, a sedentary lifestyle, poor nutrition and insufficient exposure to fresh air. In addition, some children may be deficient in vitamin D due to illness or genetic factors [1].

In vitro, vitamin D analogues inhibit the production of class E (IgE) immunoglobulins. Studies regarding the positive effect of vitamin D in patients with hypertension vary.

The development of blood pressure with vitamin D deficiency, genetic polymorphisms have been identified as factors influencing the increase in morbidity.

Serum level 25(OH)D has a connection with the severity of blood pressure. Vitamin D is known as a protective factor, as it has a positive effect on the barrier properties of the skin, however, it has been noted that it may be a risk factor for the development of blood pressure. According to A.A. Benson and co-authors, there is a statistically significant nonlinear relationship between the levels of 25(OH)D and IgE in blood serum. It was noted that patients with low levels of vitamin D (<10 ng/ml) in the blood serum, or if its amount exceeds 54 ng/ml, show high levels of IgE, compared with healthy people.

At the next stage of the study, we identified the level of bone density and the concentration of 25(OH)D in blood serum using the IHL method (immunochemiluminescent immunoassay).

Venous blood was taken in the morning on an empty stomach in a volume of 5 ml in vacutainers with a separating gel.

Concentration of vitamin D - 25(OH)D was detected by the IHL method.

Analytical sensitivity of the test: 4 ng/ml.

Interpretation.

25(HE)D - 20 ng/ml - **vitamin D deficiency,**

21-29 ng/ml — **insufficiency,**

30-100 ng/ml **is the norm,**

> 100 ng/ml is the **toxic concentration of the metabolite**.

It should be noted that children's vitamin D levels vary in different climatic conditions. For example, vitamin D deficiency depends on the climate, the level of annual sunlight, and the nature and eating habits of the population.

With sufficient care and a well-organized daily routine, a child's sunbathing can help increase the level of vitamin D in the blood serum, as well as reduce the clinical picture of blood pressure, which is reflected in laboratory tests.

As our studies have shown, low vitamin D levels were characterized by an exacerbation of asthma, whose attacks became more frequent and had a positive correlation with this marker. With sufficient levels of this vitamin, cases of ASTHMA exacerbation decreased dramatically [6].

Data analysis has shown that vitamin D deficiency is associated with the clinical manifestations of DRS. The level of vitamin D in the blood serum of children of OG and KG varied.

In the study group with pathology of asthma, AR, and BP, we observed a statistically significant ($p < 0.05$) decrease in vitamin D levels. Thus, vitamin D deficiency or deficiency was noted in children with DRS

With insufficient vitamin D levels, hypocalcemia was observed, in our case, the calcium level in the blood of children with DRS averaged 1.94± 0.19 mmol/L.

It should be noted that calcium is involved in the formation of the musculoskeletal system, but its metabolism is closely related to vitamin D, vitamin deficiency, in turn, leads to a worsening of peripheral vascular diseases and a decrease in cardiac activity. Vitamin D is important in the activity of the immune system, and also reduces the growth and division of malignant cells [4].

It is known that the use of hormones - glucocorticosteroids, malnutrition, and calcium malabsorption are risk factors for developing vitamin D deficiency

Among patients, children with hormone dependence averaged 4.6%, in order to eliminate the risk of diabetes, blood glucose levels were determined in the blood serum. The tests showed that the average fasting blood glucose level in children with DRS was 3.82±0.51 mmol/L.

**RECOMMENDED ALGORITHM FOR ASSESSING THE NUTRITIONAL STATUS OF CHILDREN WITH DRS:**

**1. Identification of risk factors:**

Eating disorders

Positive heredity

**2. Conduct anthropometry:**

Weight determination

Height determination
Definition of BMI
Determination of muscle mass

**3. Study of clinical signs:**

Growth and development disorders
Presence of skin diseases (AD)
Presence of AR and/or BA
The presence of BP and BA
Obesity and asthma.

**4. Laboratory diagnostics:**

Determination of the UAC for anemia
Determination of blood calcium levels
Determination of vitamin D levels in the blood
Determination of blood glucose levels
Definition of general and specific IgE.

**Prevention of DRS:**

- **Correction of the diet**
- **Periodic medical examinations, consultations with specialized specialists, identification of a risk group**
- **Morning walks, exercise.**

It is known that the skin is the organ where vitamin D is metabolized, a properly organized daily routine and a rational diet for children contribute to the adequate functioning of this hormone-like substance. It is a part of fatty fish, liver, and dairy products, but in our climatic conditions, sunlight is also very important for vitamin D metabolism. . In addition, if vitamin D levels are insufficient, children may be at risk of osteoporosis, which requires further prevention of vitamin D deficiency.

**Recommendations**

The results of the obtained data on the assessment of nutritional status in children serve to prevent complications of DRS.

If a child has a tendency to obesity, overweight should identify the cause, adjust the daily routine, and change the diet. Such children should be regularly consulted by specialized specialists, sent to sports clubs, and physical activity should be added to the daily routine, taking into account the underlying disease.

In the presence of AR and asthma in children, respiratory exercises, sports, and monitoring of medications used should be added to the daily routine, with regular consultations with a pediatrician and an allergist.

In the presence of blood pressure, morning walks, sunbathing, dieting should be added, fatal allergens (nuts, legumes, marinades, citrus fruits) should be excluded from the diet during the height of the disease.

In the presence of PA and respiratory allergopathology, etiological agents, i.e., causally significant allergens, should be identified. In our conditions, with the year-round course of the disease, the etiological factors may be house dust mites, fungi of the genus Aspergilli,

Alternaria, Penicillinum, Cladosporum, etc. with the seasonal course of the disease, plant pollen, trees, and food of plant origin may often be causative factors.

It should be noted that in our region, the prevalence of PA is very high in infants and gradually decreases after a year, so boys from one year to one year have high sensitivity to cow's milk and chicken eggs. It should be remembered that if there is a sensitivity to food at the age of one year, it may further indicate an increased risk of PA in adolescence. In our region, the most frequently detected food allergens in children were wheat (23.1%), buckwheat (18.3%), gluten (17.7%), chicken eggs (15.6%), peanuts and nuts (14.5%), lemon, strawberries, pineapple (11.3%), oats (10.2%) [2, 5].

Thus, the nutritional status of children with DRS is influenced by many factors, such as lifestyle, diet, as well as phenotypic traits and heredity. We found that 20% of the parents surveyed had AZ.

Vitamin D deficiency (less than 20 ng/ml) was observed in children with DRS and high BMI, indicating a close relationship between excess weight and vitamin D levels. It should be noted that the majority of vitamin D-containing foods are of animal origin, but the best sources of this vitamin are egg yolks, fatty fish (herring, salmon, mackerel, sardines), liver, red meat, dairy products.

Given this, it is recommended that children with DRS (in the absence of an allergic reaction) include the above foods in their diet.

**RECOMMENDATIONS FOR THE IMPLEMENTATION OF METHODOLOGICAL RECOMMENDATIONS**

These guidelines include data on the study of nutritional status in children with DRS, taking into account height, weight, BMI by age in a comparative aspect with WHO recommendations.

Methodological recommendations are proposed to be implemented in the Scientific Research Institute of Pediatrics of the Ministry of Health of the Republic of Uzbekistan and its regional branches, the Children's National Medical Center and its regional branches, the Republican Specialized Scientific and Practical Center of Allergology and Clinical Immunology and its regional branches, the Committee for Sanitary and Epidemiological Welfare and Public Health and its regional branches in order to prevent DRS.

**ECONOMIC EFFICIENCY**

The prevention of unwanted allergic reactions and the prevention of DRS contributes to high economic efficiency.

For example, 1 bed per day in the allergology department for 1 patient in a single room averages 250,000 soums. If the recommended hospital treatment consists of an average of 10 days, then:

250,000 X 10 days =2,500,000 soums;

On average, 75,000 soums will be spent on pharmaceuticals per day.

75,000 x 10 days=750,000 soums;

On average, it will take about 38,285 soums per day to feed 1 patient:

38,285X10 days =382,850 soums;

EkEf=C1-C2/EH100%

C – the total cost of treatment: 2 500 000+750 000+382 850= 3 632 850 Sumy

E – economic costs

1) It takes about 580,000 soums to diagnose DRS.

C1-3,632,850 soums (treatment costs)

C2- 580,000 soums (diagnostic costs)

EcEf= C1-C2/E*100%=3 632 850 -580 000 / 3 632 850 X100%=84.03%.

**Conclusion:** with early diagnosis of DRS, 1,512,850 soums can be saved from each patient. If the average number of patients with DRS among allergic diseases (the absolute number of patients with Bronchial asthma is about 50,000+allergic rhinitis and hay fever is about 80,000) is about 10%, then there are about 130,000 in the republic.

130,000 X 1512850=196,670,500,000 soums.

Thus, it is possible to save 196,670,500,000 soums.

**Conclusion**

For boys at the age of 5, 7, 8, 11, 12, 13, 17 girls aged 6, 9, 10, 17, 18 showed high BMI values, while boys aged 9, 10, 14, 16, 18 and girls aged 7, 11, 13, 14, 15, 16 found age deficits in BMI.

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Thus, in adolescents with a high BMI, we have identified asthma, for such children low self-esteem is often tormented, the pathological process tends to chronicle.

Vitamin D plays a key role in regulating immunity, maintaining skin barrier function, and preventing osteoporosis. In children with DRS, its deficiency is associated with a severe course of AS. In addition, researchers have evidence that when there is insufficient the level of vitamin D in children will accumulate fat in the body.

Studying blood pressure levels is very important because vitamin D modulates innate immunity by producing antimicrobial peptides that reduce the risk of skin infection, and this vitamin plays an important role in nutritional status.

The role of vitamin D in inhibiting the production of class E immunoglobulins, which in turn helps to reduce chronic skin inflammation in children with DRS, has been proven.

**Abbreviations**

AD - Atopic dermatitis

AZ - Allergic diseases

ATM - Atopic march

An - Anemia

AR - Allergic rhinitis

BA - Bronchial asthma

WHO - World Health Organization

GR - Development schedules

DRS - Dermorespiratory syndrome

GIT - Gastrointestinal tract

ICL - Immunochemiluminescent immunoassay

PA - Food allergy

FIT - Food intolerance

UVR - Ultraviolet irradiation
ALP - Alkaline phosphatase
IgE - Immunoglobulin E
sIgE - Specific immunoglobulins E

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