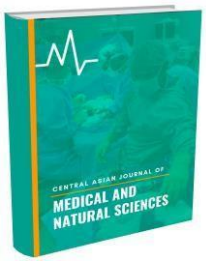

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Article

Principles of Modern Prevention of Nephropathy in Children

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Abstract: Based on our own research and recent literature data, we have studied risk factors influencing the formation and progression of nephropathies (hereditary, teratogenic, external environmental). With timely detection and adherence to simple preventive measures (diet, fluid regimen, microclimate, elimination of infectious, toxic, allergic effects, and dysmetabolism correction), they do not lead to complications (interstitial nephritis (IN), urolithiasis (UTI), secondary dysmetabolism (SD), secondary pyelonephritis). External environmental factors contributing to the manifestation of pathology in children with metabolic disorders include seasonal climatic fluctuations - adaptation to low and high temperatures, dietary errors, emotional and physical overloads, membranopathies, and intercurrent diseases. It has been established that the presence of latent diathesis in a child from a family with a predisposition to certain diseases (ancestry, hereditary burden index) is determined using biochemical, immunological, and functional studies. A scheme for the preventive prevention and metaphylaxis of nephropathies in uric acid diathesis has been developed.

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Introduction

The main strategy of preventive medical practice is not the detection of early stages of diseases, but the active prevention of morbidity, for which the reorientation of the activities of family doctors and the primary healthcare unit towards identifying hereditary predisposition (diatheses), borderline conditions, and carrying out preventive measures at this level is of leading importance [2,11,19].

The significant, moreover, year after year, widespread increase in the prevalence of urinary system diseases (UTS) in both adult and child populations, their tendency to recurrence and chronicity with outcomes in CPN, requiring replacement therapy already in childhood and young age, makes the development of preventive nephrology problems highly relevant [10,13,22,23]. Risk

factors influencing the formation and progression of nephropathies (hereditary, teratogenic, external environmental) are being intensively studied worldwide [9,24].

Our conditions are characterized by a combination of natural climatic - geographical ecopathogenic factors (thermal load, hypersolation) with a high technogenic xenobiotic load, as well as a high inbreeding coefficient (frequency of blood-related marriages), which are extreme risk factors for the formation of the disease in the presence of predisposition. Claims that in recent decades, the prevalence of chronic somatic diseases, in particular chronic kidney disease (CHD), has become epidemic [10,13] are increasingly appearing, emphasizing the undeniable priority of primary prevention of nephropathies, as chronic kidney disease inevitably progresses regardless of the nosology with CHD development at different times [22,23]. In the existing system of organizing specialized nephrological care, special attention should be paid to the outpatient stage (polyclinic). It is precisely under these conditions that the origins of the disease are first identified, risk groups for dispensary observation are formed, and primary diagnostics of nephropathology, children's medical examination, and rehabilitation are carried out [2]. A family doctor needs nephrological vigilance, which means careful attention to minimal changes from the kidneys - isolated proteinuria, microhematuria, crystalluria, etc., as well as markers of possible predisposition to nephropathology.

The reorientation of the dispensary service towards preventive prevention, the organization of specialized laboratories that allow for the identification of individuals prone to certain diseases, is a qualitatively new level of dispensary observation and requires new approaches, especially in terms of laboratory services: improvement and centralization on a city and district scale, taking into account the requirements of preventive medicine [8].

Currently, in the overall nosological structure of kidney diseases, the total frequency of various BMDs is significantly higher than in other kidney diseases [9]. Meanwhile, with the timely detection and observance of simple preventive measures (diet, fluid regimen, microclimate, elimination of infectious, toxic, allergic effects and correction of dismetabolization), they do not lead to complications (IR, ICD, secondary DIC, secondary pyelonephritis).

External environmental factors contributing to the manifestation of pathology in children with metabolic disorders undoubtedly include seasonal climatic fluctuations - adaptation to low, high temperatures, dietary errors, emotional and physical overloads, membranopathies, and intercurrent diseases[22]. It can be argued that currently, the real scientific concept that meets the requirements of preventive preventive medicine is the active identification of children with hereditary predisposition (diatheses), borderline conditions, and their early correction, preventing their clinical manifestation [2,7].

Materials and Methods

Thus, in relation to nephrology, life dictated the need to develop and implement the principles of pre-disease diagnostics and dispensary observation. For this purpose, convincing prerequisites have been created for focusing the family doctor's activities primarily on prevention:

- ❖ Primary prevention of nephropathy in children with diathesis (hereditary predisposition) is organized, if possible, not only non-invasive, but also predominantly non-medicinal methods (regime, microclimate, diet, phytopreparations, therapeutic exercises, elimination of chronic infection foci - a healthy lifestyle).
- ❖ The priority of preventive prevention of PMD implies the implementation of these measures in the preclinical stage.

CKD often begins in childhood, and objective predisposition signs can be considered even in newborns (heavy heredity due to nephropathology, OMS diseases in mothers, etc.). Accordingly, early detection of risk factors, hereditary predisposition, and elimination of exogenous risk factors (rejection of nephrotoxic drugs, implementation of membranoreparative therapy in the early neonatal period in nephropathic fetopathy, etc.) are significant, but still insufficiently used reserves capable of many times increasing the effectiveness of the family doctor's preventive activities [2,11].

- ❖ The function of a family doctor in the aspect of providing nephrological care to children is currently established, however, there is still no priority in its activities in the formation and quality dispensary observation of children at risk of developing OMS diseases. The contingent of

children who should be under dispensary observation with nephrological vigilance is currently known and significant.

During 6-year catamnestic observation of children who underwent nephropathology in the neonatal period, complete recovery was observed in only 15% of cases, while in all other cases, a particular pathology of the urinary system organs was observed [13].

Recent studies have revealed pathological kidney immaturity in 62-74% of full-term pregnancies in children from mothers with chronic pyelonephritis complicated by gestosis [7,8], i.e., the presence of kidney pathology in the pregnant woman, as well as gestosis, is a risk factor for nephrogenesis disorders, as the basis for the development of nephropathies in the postnatal period. Observation of 68 children born to mothers with kidney pathology (GN, PN) over 13 years showed that 60% of them had one or another kidney disease [2]. Newborns whose gestation occurred against the background of OPG - gestosis combined with chronic pyelonephritis, even without pronounced disadaptation syndromes, need to be compensated for the antioxidant deficiency that occurs during the intrauterine period in the early neonatal period [18,19]. This allows avoiding the development of critical conditions in the neonatal period and the formation of chronic somatic pathology in the postneonatal period. The cornerstone, the basis for active prevention of all multifactorial diseases, is the early detection of hereditary predisposition (diatheses) and the implementation of preventive measures at this level [8]. "Diathesis is neither a disease, nor a pre-disease, nor a borderline condition, it is only a predisposition to certain diseases, thanks to which we can develop a preventive direction of pediatrics" [11]. At the same time, there is no clear boundary, a criterion for differentiating between "predisposition" (diathesis) and so-called "boundary conditions," as well as the latter from early manifestations of pathology. Regarding OMS, M.S. Ignatova (2013) defines it as follows: "structural changes of anatomical, histological nature, biochemical shifts that occur at the cellular and subcellular levels in the kidneys - until they cause manifestations of syndromes characteristic of kidney pathology - can be considered a borderline condition." At the same time, preventive measures, taking into account the nature of the predisposing factor, are preventive in nature. Determining the type of diathesis should dictate recommendations for the prevention of certain diseases [13], and therefore, the latter should have clear diagnostic criteria. There are 4 variants of such predisposition: allergic, dismetabolic, organ (systemic) and neurotropic [5]. Within these groups, the various subtypes of diathesis are much larger than those listed here. Consequently, active observation of children with diathesis, organization of rational nutrition taking into account the nature of diathesis, active hygienic education constitute elements of preventive prevention of morbidity.

Results

Thus, dysmetabolic nephropathies in these families often manifest against the background of oxidative stress (OXST) in respiratory infections (ARVI, pneumonia, bronchitis), which is an important pathogenetic mechanism for the development and progression of OMS diseases [8]. This mechanism is relevant for all types of diatheses, especially for families with calculous (oxalate-calcium) diathesis, for which familial cytomembrane instability is characteristic. In addition, it is known that there is a correlation between pulmonary ventilation and renal hemodynamics (respiratory-renal syndrome), i.e., deadaptive vascular reactions in bronchopulmonary diseases lead to a decrease in renal hemodynamics, glomerular filtration, which causes nephrological problems in pulmonological patients, especially with a hereditary predisposition. It is known that for individuals with calculous diathesis, the starting point for the onset of the pathology can be:

- Hyperinsolation contributing to oxidative stress and other factors with a similar mechanism, infection, etc.;
- Excessive consumption of oxalate-rich foods, excessive vitamin C in the diet and foods rich in it;
- Vitamin B deficiency$_6$;
- Decreased activity of intestinal microflora - oxalobacter formigeres.

One of the ways to prevent such cases, along with other measures, can be the development of food products with limited oxalagenic substances while simultaneously enriching them with natural protective factors - vit F, E, etc. [2]. When situations contributing to oxidative stress arise, along with eliminating the main factor, it is indicated to prescribe complex antioxidant drugs such

as Veteron (containing water-soluble B-carotene, vitamins C and E), Kudesana (containing ubiquinone and vitamin E).

The priority of preventative preventive focus of clinical medicine requires raising to a new level biochemical, immunological, and functional research that allows for the identification of markers of hereditary predisposition, which can be achieved by establishing large centralized laboratories [24].

The presence of latent diathesis in a child from a family with a predisposition to certain diseases (ancestry, hereditary severity index) is determined using biochemical, immunological, and functional studies. Preventive prevention and metaphylaxis of nephropathies in uric acid diathesis are presented to us as follows (Table. 1):

Table. 1.

Preventive prevention and metaphylaxis of nephropathies in uric acid diathesis

Health groups	Markers	Prevention and metaphylaxis measures	Level preventive measures
I - Health of children	Without heaviness hereditary, biological and social anamnesis, physiological course of pregnancy and childbirth, with normal level physical and nervous mental development, with sufficient resistance organism, without functional deviations from the organs and systems, absence of chronic diseases and VPR	Observation and advice on feeding, care and child's hardening in Decreed deadlines	I.
II - Children with uric acid Diathesis	Uricopathic spectrum of pathology in the genealogy at the level of the heritability index > 0.7 Hyperuricemia > 0.230 m Hyperuricosuria, uraturia High activity Xanthine oxidase	Restricted diet purines in food, at metabolic type of GU, in stressful situations allopurinol, regulation microclimate, drinking regimen, vitamin therapy	I.
III - Children with uric acid diathesis, complicated pyelonephritis	Against the background of main markers uric acid diathesis: clinical - laboratory picture pyelonephritis;	1. Unloading potato diet for 2 -3 weeks, then low-purine diet; 2. According to the allopurinol, orate potassium; 3. Warning crystalluria, vitamin therapy. 4. Antibacterial therapy under control bacteriuria and their sensitivity	II.
- IN.	Clinical and laboratory picture interstitial nephritis	1,2,3 delagil, antioxidants, membrane-protective therapy	II.
- ICD	Clinical - radiological and laboratory picture of ICD	1,2,3. Conservative therapy is acceptable uric acid lithiasis. 5. According to the surgical treatment	II.
Autoimmunity layers and development	Extra-renal and renal clinical - laboratory symptoms	1,2,3, glucocorticoids, cytostatics, heparin, antihistamine	II.

hyperuricemic glomerulonephritis in stages compensation kidney functions	glomerulonephritis. Volume renal of functions makes up 80 - 50% of norms. Creatinine in blood 0.088 - 0.265 mmol/l and instrumental signs of pyelonephritis, interstitial nephritis and glomerulonephritis, ICD. Violation of partial and tubular functions of kidneys	drugs, symptomatic therapy	
IV - All of the listed groups patients with uric acid with diathesis in stages sub-compensation kidney functions, tubular violations.	Volume of kidney functions is 50 < - 25%, number of active nephrons less than 30% Creatinine in blood 0.12 - 0.53 mmol/l	Conservative therapy is aimed at saving residual kidney function, renoprotective therapy, directed at slowing of nephrosclerosis	II.
V - All listed groups patients with insufficient renoprotective therapies have a risk development of CPN with decompensation- with kidney function	The volume of kidney functions is less 30%, number of active nephrons less than 30%, often osteodystrophy develops, arterial anemia hypertension, complications with cardiac-vascular side systems. Creatinine in blood 0.485 - 0.8 mmol/l	Conservative therapy directed for correction metabolic violations, warning complications. At decrease in CFT to 5 ml/min/1.73 m2 , increased creatinine more than 1.2 mmol/l, potassium more than 6.5 mmol/l patient is being converted to dialysis therapy	III.

Hereditary predisposition to many diseases (diatheses) remains hidden for a long time and only under certain conditions transitions to a borderline state (the disease's micro-signs or its biochemical markers appear) or bypasses it directly into the disease. Even nephropathies in children living in unfavorable ecological conditions in regions contaminated with heavy metals manifest primarily in individuals with hereditary predisposition. Children with dyspurinosis constitute an immunocompromised contingent, as they are interested in lymphocyte maturation and differentiation processes [4] and therefore, it is advisable to take 1-2 courses of immunocorrective agents (prodigiosan, lysozyme, levamisole) per year. In dysmetabolic diatheses, the kidneys are the primary elimination organ. However, in the absence of timely correction of metabolic disorders, changes in various organs and systems may occur (Figure 1).

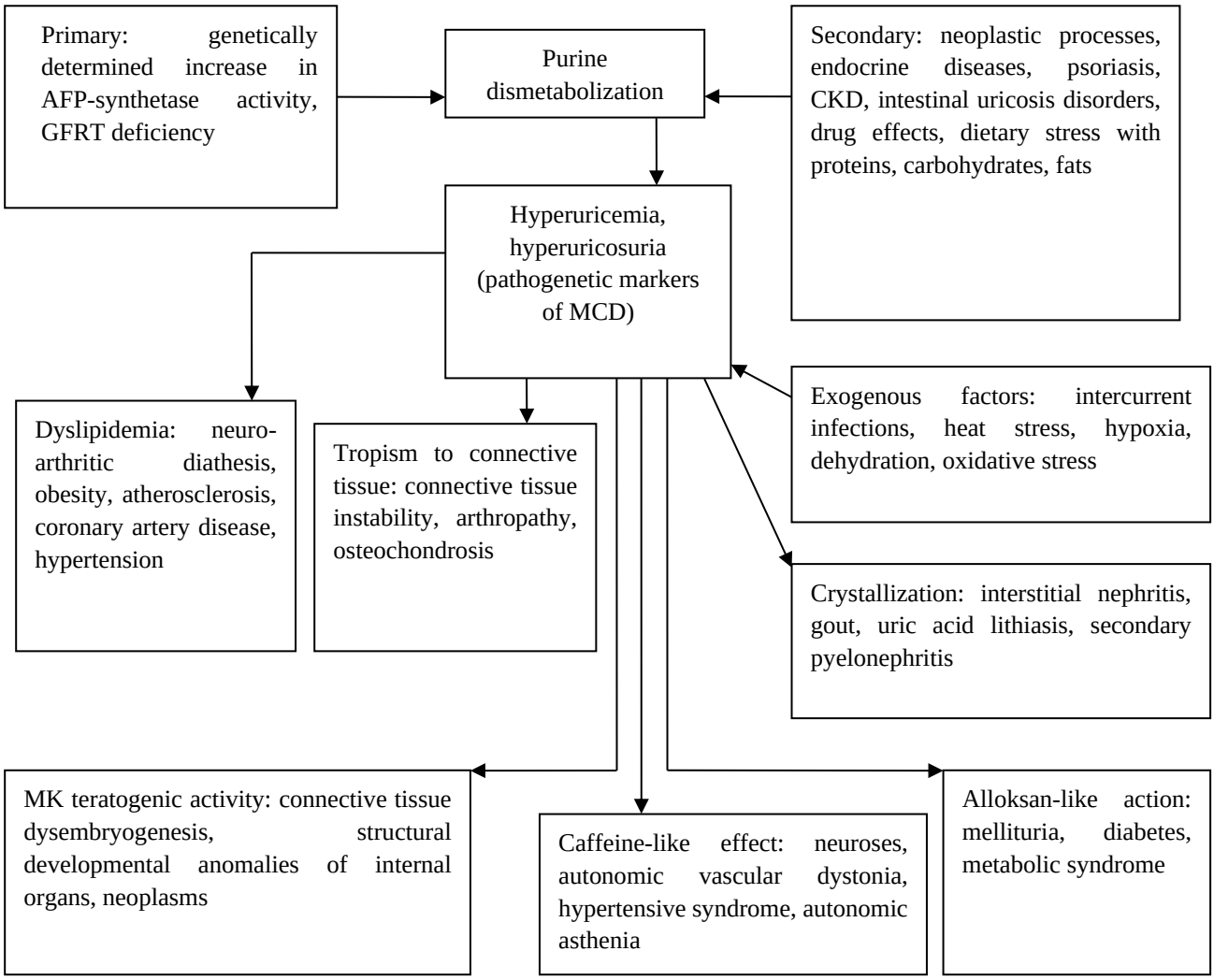

Fig. 1. Mechanisms of Multifactorial Disease Development in purine dismetabolization

This is very evident in the example of the formation of "uricopathies" in children and adults. At the same time, the use of a low-purine diet even before clinical manifestations, measures to influence the metabolism of purines and their renal excretion through the sequential use of allopurinol, magurlite, urodan, canephron, and others in age-related doses under urine reaction control, refers to the preventive prevention of uricopathies, including urate nephropathies.

Debate

The traditionally established system of specialized pediatric nephrological care is undoubtedly progressive, but it needs to be improved based on the scientific and practical achievements of pediatric nephrology in the 21st century [24]. The reorientation of the dispensary service towards preventive prevention naturally requires organizational solutions: the creation of large preventive centers with appropriate equipment and personnel support, and the use for these purposes of large multi-profile hospitals, etc., i.e., serious qualitative changes must occur both in the structure and in the content of the dispensary service. A system of dispensary observation for children who have undergone critical conditions at birth, as well as mandatory long-term dispensary observation of children who have undergone neonatal nephropathy, using diagnostic methods adopted in nephrological practice, is necessary. The scope of preventive prevention measures for nephropathy, depending on the nature of the risk factor (inclination) in different age periods, has not yet been developed. For each stage, task lists must be clearly formulated. Apparently, such a system should be multi-stage: Antenatal; Perinatal; Neonatal; Pediatric; Adolescent. It is necessary to ensure mutual compatibility between specialists (obstetrician-gynecologist, neonatologist, pediatrician, therapist).

Conclusion

1. The existing system of specialized pediatric nephrological care needs to be improved with an emphasis on the achievements of modern preventive nephrology.

2. The prioritization of primary prevention of chronic OMS diseases necessitates significant strengthening of specialized nephrological services at the primary level, the establishment of diagnostic centers that allow for the identification of pathogenetic markers of hereditary predisposition.

3. A strategically important and significant condition is the organization of preventive centers with appropriate biochemical, immunological, and genetic services that allow for the detection of borderline conditions.

4. At the current level of scientific medicine, it is still difficult to state that the etiological and pathogenetic mechanisms of many chronic somatic diseases have been studied exceptionally fully, and therefore, the recommended preventive measures remain predominantly hypothetical and, naturally, require further improvement.

Links (literature list) **:**

Series publication / journal article (printed edition) :

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