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MODERN PRINCIPLES OF THE PATHOGENESIS OF UROLITHIASIS

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Annotation.
Today there is no single theory describing the etiology and pathogenesis of urolithiasis. This issue remains debatable. However, it is generally accepted that there are a number of constant internal factors that may conditionally predispose to the formation of stones. The results of the analysis of literature data on the etiology and pathogenesis of urolithiasis are presented.
Key words: pathogenesis, etiology, urolithiasis, kidneys, urolithiasis.

Relevance. Urolithiasis is a chronic disease that is associated with impaired metabolic processes in the body and is accompanied by the formation of stones (uroliths) in the organs of the urinary system [1, 2]. In our time, urolithiasis is one of the most urgent problems in the field of healthcare due to an increase in its prevalence by an average of 2.4% per year. It should be noted that the increase in morbidity is largely due to an increase in the proportion of elderly and senile people [7]. Many authors draw attention to the fact that the incidence of urolithiasis is noticeably increasing among patients of all ages. Relapses are observed in 60% of cases after 3 years after diagnosis [5, 7]. Among urological diseases leading to disability, urolithiasis ranks 4th in frequency; 76% of disabled patients have only one kidney; 90% of disabled people are of working age [8, 9]. In recent years, there has been an increase in the frequency of complex forms of urolithiasis: bilateral kidney calculi, single kidney calculi, staghorn and unilateral multiple calculi, and high density calculi. One of the most complex forms of urolithiasis is staghorn nephrolithiasis. Many urologists distinguish this form of urolithiasis as an independent nosological unit due to the nature of the course of the disease, often with complications (constant recurrent infection, chronic renal failure) up to the complete loss of kidney function. Stalk nephrolithiasis accounts for 3 to 5% of all cases of urolithiasis [10]. In connection with the use of a multidisciplinary approach and the principles of evidence-based medicine, the study of the ICD has recently reached a new level. Many problems have been overcome thanks to a broad study of the etiopathogenesis of urolithiasis, the development and application of modern methods of diagnosis and treatment [11]. At a certain point, a situation arises when some external factors join the constant factors, which can give a kind of impetus to the formation of urolithiasis.

It is known that various infectious diseases can aggravate the course of the disease or cause this pathology. The waste products of a number of bacterial agents can significantly change the qualitative composition of urine and the alkaline environment, which causes crystallization and the formation of stones.

Today, a large amount of information has been accumulated on the etiology and pathogenesis of KSD, but a general theory of the pathogenesis of KSD has not yet been developed. Many factors can influence stone formation in the kidney. Urine from the moment of formation in the distal tubules of the nephron is an aqueous solution of salts, which normally does not form free

crystals due to the buffer system [12]. Accordingly, when the latter is damaged, the formation of crystals begins, which is often combined with congestion in the urinary tract [13]. A certain role in the development of KSD is played by tuba scapula, which is a violation of reabsorption processes in the proximal and distal parts of the nephron tubules [12]. The most common tubular transport disorders are aminoaciduria, galactosemia, oxaluria, cystinuria, and fructosemia. With such tubulopathies, substances necessary for the formation of the primary nucleus and the formation of a calculus in the future accumulate in the kidney [14]. There are exogenous and endogenous factors that, against the background of tubulopathies, lead to lithogenesis. The exogenous include nutritional features, the nature of the climate and ecology. So, meat food causes the oxidation of urine, vegetable and dairy food - its alkalization. The formation of uroliths is provoked by an excess in the diet of canned food, freeze-dried products, a deficiency of vitamins A and C, and an excess of vitamin D [15]. Elevated air temperature and humidity, mineralization of drinking water also affect the formation of uroliths. For example, increased sweating and dehydration in a hot climate increases the concentration of salts in the urine and leads to their crystallization [13]. Endogenous factors include a violation of the outflow of urine, the presence of a chronic inflammatory process in the kidney, foreign bodies, injuries of the urinary system. In addition, the development of KSD can provoke diseases that require prolonged bed rest. A special role among the endogenous factors leading to KSD is played by hyperfunction of the parathyroid glands - primary and secondary hyperparathyroidism. In hyperparathyroidism, pronounced dystrophy of the proximal convoluted tubules of the nephron is observed due to the toxic effect on them. This is accompanied by an increase in the content of neutral mucopolysaccharides in the blood and urine, from which polysaccharide cylinders can subsequently form, potentially being the core for the formation of a calculus in the urinary system [16]. There are 5 theories of stone formation [10]. 1. The matrix theory says that the core of the calculus is formed due to infection and desquamation of the epithelium in the urinary system. 2. The colloidal theory describes the state in which protective colloids pass from a lyophilic to a lyophobic state, creating conditions for crystallization. 3. The ionic theory is based on the idea that the formation of uroliths leads to insufficient hydrolysis of proteins, a change in the pH of the urine. 4. According to the theory of precipitation and crystallization, uroliths are formed in urine with a high salt concentration and an enhanced crystallization process. 5. The inhibitory theory is that lithogenesis is caused by a change in the balance of inhibitors and promoters in the urine, which maintain the metastability of its composition. The presented theories are united by the idea that the condition for the development of KSD is the metastability of the urine composition and an excess of stone-forming substances in it [10, 17].

The formation of stones in the urinary system is a pathological condition that is diagnosed in people of different age groups in many countries of the world. The recurrent nature of KSD, its severe complications often lead to disability of patients, which is of great medical and social importance.

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