

Influence of terrain on the chemical structure of the staghorn stones from inhabitants of the South Region of Russia.

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Introduction. Factors, which cause differences in chemical composition of staghorn stones in the different area all over the world, are known, but no such study was performed in South Region of Russia (North Caucasus – mountainous and plain area).

Materials and methods. Chemical composition of 112 stagborn calculi from residents of South of Russia was evaluated using X-ray phase analysis. Patient's age was 50.2 ± 5.6 (25-73) years. Primary nephrolithiasis was seen in 62.5% patients, and recurrent stones were found in 37.5%. 58.9% patients were residents of mountainous areas, and 41.1% lived on the plains - 41.6%.

Results. Chemical composition of the stones is shown in table 1. In 62.9% cases the compound structure was found, with predominance incidence of two-component combinations, such as apatite/whewellite - (16.1%), apatite/witlockite- (8.1%), and apatite/uric acid calculi (8.1%). Evaluation of the recurrent calculi showed significant increase of apatite and whewellite calculi and significant decrease of uric acid stones, compared to primary cases ($p < 0.05$). Comparison of inhabitant of the mountainous and plain areas showed the different chemical structure of the stones, as follows: in chemical composition of recurrent stones in mountainous area's patients phosphate (apatite) and oxalate (whewellite) were predominant type and there was no uric acid stones, while in plain area's patients in addition to apatite stones, also uric acid calculi was found. Struvite stagborn calculi were seen only in mountainous area's patients. After performing percutaneous nephrolithiasis stone-free rate was 71.4%. It is established, that all residual calculi in inhabitants of mountainous area contained apatite and whewellite. Although, initially, magnesium was seen in minor concentration, sustainable role of struvite was determined. Predominate role of apatite nephrolithiasis in residual calculi in plain area's patients was noted.

Conclusions. Correlation between chemical structure of calculi and topography of residence area was shown. Recurrent and residual calculi in residents of the mountainous area were found to have direct association with oxalate and inverse association with uric acid stones ($r=0.56$; $p < 0.001$). Recurrent and residual uric acid and struvite stones were seen only in residents of the plain and mountainous areas, respectively.

	Primary		Recurrent		Residual	
	Mountainous area	Plain	Mountainous area	Plain	Mountainous area	Plain
Uric acid,%	58.3	71.4	0	75.0	0	33.2
Weddellite,%	8.3	14.3	0	25.0	0	0
Whewellite,%	16.7	42.8	80.0	50.0	100	33.2
Apatite,%	41.7	42.8	80.0	75.0	100	66.7
Struvite,%	16.7	0	20.0	0	66.7	0