



1-800-533-1710

Supersaturation, 24 HR, Home Kit, U 1

SSIN1

PATIENT NAME TESTINGSSH24, PEDSMALEHISTORY					ORDER NUMBER I929007726
PATIENT ID SA01112629	DATE OF BIRTH 05/02/2010	AGE 13 Y	SEX Male	REQUESTED BY CLIENT CLIENT	
COLLECTED 6/29/2023, 12:00 AM	RECEIVED 6/29/2023, 8:01 AM	REPORTED 6/29/2023, 8:06 AM			
The collected, received, and reported dates and times on the report are in the time zone of the performing location.				CLIENT ORDER NUMBER SA01112629	
7028846 MCL Rochester Campus Rochester MN 55901				CLIENT MRN SA01112629	

RESULT(S)					
RESULT NAME	RESULT	FLAG	UNITS	REFERENCE VALUES	RESULT COMMENT
Calcium Oxalate Crystal	2.21	H	DG	Reference Mean= 1.89	
Brushite Crystal	-3.11		DG	Reference Mean= 0.46	
Hydroxyapatite Crystal	0.18		DG	Reference Mean= 4.19	
Uric Acid Crystal	1.31		DG	Reference Mean= 1.18	
Collection Duration	24		h		
Volume	1234		mL		
Patient Street Address	1324				
Patient City	Lake City				
Patient State	MN				
Patient Zip Code	55041				
Patient Country	USA				
Patient Home Phone	123456				

INTERPRETATION

The DG is related to supersaturation. DG is negative for undersaturated solutions, zero for solutions at the solubility product, and positive for saturated solutions.

Any value greater than the Reference Mean is considered a risk for the respective crystal type formation.

In general, a higher calculated SS means the risk for forming that type of stone is increased. A positive DG value indicates that the urine is supersaturated for that crystal type.

SSIN1 is the reportable component of the orderable test code, SSH24. A full copy of the interpretative report is available as a PDF appended to this cover sheet and is ready to review.

Code : MCR Laboratory : Mayo Clinic Laboratories - Rochester Main Campus
Lab Director : WILLIAM G MORICE MD, PHD

Address : 200 FIRST STREET SW
ROCHESTER MN 55905

CLIA Certificate : 24D0404292



Patient ID SA01112629	Patient Name TESTINGSSH24, PEDSMALEHISTORY	Birth Date 05/02/2010	Sex M	Age 13	Weight 55 kg
Order Number I929007726	Client Order Number SA01112629	Ordering Physician CLIENT, CLIENT	Previous Supersaturation Testing: Patient has 2 prior 24 hr duration tests.		
Account Information C7028846 MCL Rochester Campus		Collection Date* 06/29/2023 00:00			

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Patient Specific Diagnostic Comments

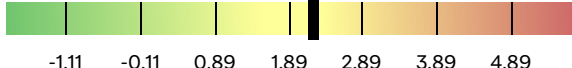
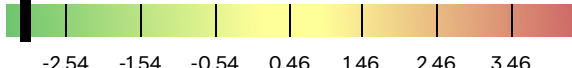
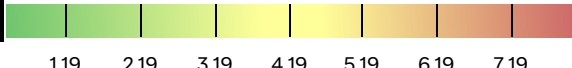
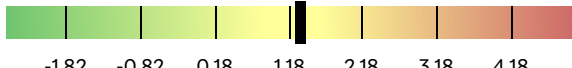
- D1** Consistent with diarrhea or other gastrointestinal losses.
- D2** Consistent with decreased fluid intake or exposure to hot environments.

Patient Specific Therapeutic Comments

- T1** Low urine citrate. Changes in diet or medications to increase urine citrate might be helpful.
- T2** At risk for uric acid stones. Changes in diet and medications to increase urine pH might be helpful.
- T3** Urine overly concentrated. Increased fluid intake would reduce stone risk.

Overall Calculated Supersaturation Profile By Stone Type

MCR

Stone Type	Patient Supersaturation Delta Gibbs (DG)	Non-Stone Formers**		Deviation from Reference Mean	
		Mean	25% - 75% Range	<Less Stone Risk	More Stone Risk>
Calcium Oxalate	 2.21	1.89	1.42 - 2.13		
Calcium Phosphate (Brushite)	-3.11	0.46	-0.41 - 1.32		
Calcium Phosphate (Hydroxyapatite)	0.18	4.19	3.33 - 5.31		
Uric Acid	1.31 T2	1.18	-1.10 - 3.41		

** Based on normal value study of 48 adult men and 52 adult women

The DG is related to supersaturation. DG is negative for undersaturated solutions, zero for solutions at the solubility product, and positive for saturated solutions. Any value greater than the Reference Mean is considered a risk for the respective crystal type formation.

In general, a higher calculated SS means the risk for forming that type of stone is increased. A positive DG value indicates that the urine is supersaturated for that crystal type.

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MCR	Mayo Clinic Laboratories-Rochester Main Campus	200 First Street SW, Rochester, MN 55905	WILLIAM MORICE MD, PHD	24D0404292

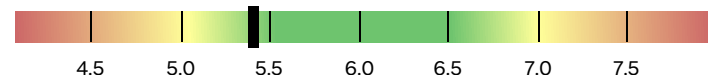


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Urine pH

5.4



<Favors Uric Acid Stones

Favors Calcium Phosphate Stones>

Creatinine

543 mg/24 h

REFERENCE VALUE

Reference Values have not been established for patients who are less than 18 years of age

Normalized Values

Analyte Ratio	Result	Normal Range*
Creatinine/kg/24h	10	9-29 mg/kg/24 h
Calcium/Creatinine	0.23	<0.25 mg/mg
Calcium/kg/24h	2.24	<4 mg/kg/24 h
Oxalate/BSA	0.19	<0.5 mmol/1.73 m2
Oxalate/Creatinine	 0.04	<0.03 mg/mg

*Literature-based normal values

Analyte Ratio	Result	Normal Range*
Uric Acid/Creatinine	0.36	<0.60 mg/mg
Phosphorus/Creatinine	0.34	<0.75 mg/mg
Magnesium/Creatinine	0.11	>0.05 mg/mg
Magnesium/kg/24h	1.12	>0.04 mg/kg/24 h
Citrate/Creatinine 	0.28	>0.25 mg/mg

*Literature-based normal values

Metabolic Risk Factors

Analyte	Result (24 h)*	Non-Stone Formers**		Relative Risk
		Median	25% -75% Range	
Calcium	123 mg	234	159 - 291	
Oxalate 	0.27 mmol	0.30	0.25 - 0.35	
Uric Acid	197 mg	685	565 - 833	
Citrate 	154 mg 	637	492 - 911	

* Items are flagged based upon the reference range cut-offs

** Based on normal value study of 48 adult men and 52 adult women

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Dietary Risk Factors

MCR

Analyte		Result (24 h)*	Non-Stone Formers**		Relative Risk
			Median	25% -75% Range	
Red = More Stone Risk					Green = Less Stone Risk
Fluid Intake	Volume	1234 mL	1307	1119 - 2037	11192037
	Osmolality	466 mOsm/kg T3D2	693	550 - 815	550815
Salt Intake	Sodium	51 mmol	187	156 - 247	156247
	Chloride	30 mmol	189	149 - 225	149225
Fruits/Veggies	Potassium	19 mmol	72	54 - 88	5488
	Magnesium	62 mg	140	101 - 157	101157
Protein Intake	Sulfate ①	20 mmol	27	23 - 31	2331
	Urea Nitrogen	7.1 g	11.5	7.8 - 14.3	7.814.3
	PCR	69 g	97	73 - 114	73114
Other	Phosphorus	185 mg	1164	1010 - 1419	10101419
	Ammonium ②	43 mmol	31	24.5 - 42	24.542

* Items are flagged based upon the reference range cut-offs

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Overall Calculated Supersaturation Profile By Stone Type

Historical Trends

	Calcium Oxalate	Brushite	Hydroxyapatite	Uric Acid	pH
Range*	1.42 - 2.13	-0.41 - 1.32	3.33 - 5.31	-1.10 - 3.41	5.7 - 6.3
Units	DG	DG	DG	DG	
06/29/2023**	2.21	-3.11	0.18	1.31	5.4
05/02/2023	2.88	-0.74	3.27	-1.35	6.0
03/28/2023	6.36	2.80	8.03	-0.89	6.5

* Non-Stone Formers 25 - 75% Range ** Denotes Current Report Data

Normalized Values

Historical Trends

	Creatinine/kg	Calcium	Calcium/kg	Oxalate/BSA	Oxalate	Uric Acid	Phosphorus	Magnesium	Magnesium/kg	Citrate
Range*	9-29	<0.25	<4	<0.5	<0.03	<0.60	<0.75	>0.05	>0.04	>0.25
Units	mg/kg/24 h	mg/mg	mg/kg/24 h	mmol/1.73 m2	mg/mg	mg/mg	mg/mg	mg/mg	mg/kg/24 h	mg/mg
06/29/2023**	10	0.23	2.24	0.19	0.04	0.36	0.34	0.11	1.12	0.28
05/02/2023	14	0.21	3.01	0.53	0.08	0.32	0.68	0.13	1.80	0.85
03/28/2023	13	1	13.13	N/A	N/A	1	1	1	13.13	1

* Reference Range, 95% ** Denotes Current Report Data

Metabolic Risk Factors

Historical Trends

	Calcium	Oxalate	Uric Acid	Citrate
Range*	159 - 291	0.25 - 0.35	565 - 833	492 - 911
Units	mg	mmol	mg	mg
06/29/2023**	123	0.27	197	154
05/02/2023	165	0.74	248	658
03/28/2023	722	>5.78	722	722

* Non-Stone Formers 25 - 75% Range ** Denotes Current Report Data

Dietary Risk Factors

Historical Trends

	Volume	Osmolality	Sodium	Chloride	Potassium	Magnesium	Sulfate	Urea Nitrogen	PCR	Phosphorus	Ammonium
Range*	1119 - 2037	550 - 815	156 - 247	149 - 225	54 - 88	101 - 157	23 - 31	7.8 - 14.3	73 - 114	1010 - 1419	24.5 - 42
Units	mL	mOsm/kg	mmol	mmol	mmol	mg	mmol	g	g	mg	mmol
06/29/2023**	1234	466	51	30	19	62	20	7.1	69	185	43
05/02/2023	1654	405	89	40	66	99	18	12.7	104	529	76
03/28/2023	1444	250	72	72	72	722	8	0.3	27	722	7

* Non-Stone Formers 25 - 75% Range ** Denotes Current Report Data

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Urine Supersaturation Laboratory Trends Over Time

- Lower urine citrate than previously.
- Lower dietary protein than previously.

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General Comments - Pediatric Male Patients

Metabolic Risk Factors

Urine values that affect stone risk due to combinations of genetic and environmental influences.

Analyte	Non-Stone Formers 25 - 75% Range	Comment
Calcium	159 - 291	Hypercalciuria is a common risk for calcium oxalate and calcium phosphate stones. Most cases are idiopathic (familial/genetic) but hyperparathyroidism and other secondary causes need to be considered.
Oxalate	0.25 - 0.35	Hyperoxaluria is a common risk factor for calcium oxalate kidney stones. Mild hyperoxaluria is usually due to dietary imbalance between high oxalate intake and/or low calcium intake. Moderate increases (0.5 – 1.0 mM) are often due to enteric hyperoxaluria while values greater than 1.0 mM suggest the possibility of primary hyperoxaluria.
Uric Acid	565 - 833	Hyperuricosuria is usually due to a high protein/purine diet and is a risk factor for calcium oxalate stones. Low urinary pH is much more important risk factor for uric acid stones. Dietary intervention and or allopurinol can be considered.
Citrate	492 - 911	Low urinary citrate is a risk factor for calcium oxalate and calcium phosphate kidney stones. High-protein diet, lower gastrointestinal losses, and renal tubular acidosis are potential causes. Can treat with dietary intervention versus oral alkali such as potassium citrate.
pH	5.7 - 6.3	Low urine pH (<5.5) is a risk factor for uric acid stones while high urine pH (>6.5) is a risk factor for calcium phosphate stones.

Normalized Values

Normalizing urine values to urinary creatinine excretion can help to adjust for over or under collection of a 24 hr urine.

Analyte	Reference Range, 95%	Comment
Creatinine/kg/24h	9-29 mg/kg/24 h	When high 24h urine possibly over collected; When low 24 h urine possibly under collected.
Calcium / Creatinine	<0.25 mg/mg	When high, treat as if 24 hour urinary calcium excretion were high.
Calcium/kg/24h	<4 mg/kg/24 h	When high, treat as if 24 hour urinary calcium excretion were high.
Oxalate / Creatinine	<0.03 mg/mg	When high, treat as if 24 hour urinary oxalate excretion were high.
Oxalate / BSA	<0.5 mmol/1.73 m2	When high, treat as if 24 hour urinary oxalate excretion were high.
Uric acid / Creatinine	<0.60 mg/mg	When high, treat as if 24 hour urinary uric acid excretion were high.
Phosphorus / Creatinine	<0.75 mg/mg	When high, treat as if 24 hour urinary phosphorus excretion were high.
Magnesium / Creatinine	>0.05 mg/mg	When low, treat as if 24 hour urinary magnesium excretion were low.
Magnesium/kg/24h	>0.04 mg/kg/24 h	When low, treat as if 24 hour urinary magnesium excretion were low.
Citrate / Creatinine	>0.25 mg/mg	When low, treat as if 24 hour urinary citrate excretion were low.

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Dietary Risk Factors

Urine values that reflect dietary intakes.

Analyte	Non-Stone Formers 25 - 75% Range	Comment
Volume	1119 - 2037	Low values are risk factor for all forms of kidney stones. Target at least 2 L per day although more may be necessary for larger individuals.
Osmolality	550 - 815	Urine osmolality is a better index of fluid intake and kidney stone risk than volume alone. Target urine osmolality less than 400.
Sodium	156 - 247	Urine sodium reflects dietary salt intake. Target less than 100 mEq per day.
Chloride	149 - 225	Urine chloride reflects dietary salt intake. Target less than 100 mEq per day.
Potassium	54 - 88	Very low values (<20 mEq) suggests gastrointestinal losses or chronic potassium deficiency. Higher values are typically seen with higher fruit and vegetable intake or use of potassium supplements.
Magnesium	101 - 157	Very low values (<60 mg) suggests gastrointestinal losses or malnutrition. High values suggest increased dietary magnesium intake via laxatives, magnesium supplements, or specific magnesium rich foods.
Sulfate	23 - 31	Sulfate is found in certain amino acids. Higher values suggest higher protein intake.
Urea Nitrogen	7.8 - 14.3	Urine urea nitrogen is derived from protein metabolism. Higher values suggest higher protein intake.
Protein Catabolic Rate (PCR)	73 - 114	This value is calculated from the urine urea nitrogen. Higher values suggest higher protein intake.
Phosphorus	1010 - 1419	Lower values suggest gastrointestinal losses or malnutrition. Higher values suggest high phosphorus intake. Does not directly alter kidney stone risk.

Calculated Supersaturation

The computer program EQUIL2 combines key urinary concentrations to estimate the urinary supersaturation for common stone types. Delta G stands for the thermodynamic term delta Gibbs. Positive Delta G values imply oversaturation and negative values undersaturation for that crystal type.

Analyte	Non-Stone Formers 25 - 75% Range	Comment
Calcium Oxalate	1.42 - 2.13	Most persons are somewhat oversaturated for calcium oxalate, but stone formers more so. Higher calcium and oxalate, lower volume and citrate all increase calcium oxalate SS.
Calcium Phosphate (Brushite)	-0.41 - 1.32	Although rare in stones, brushite is the most thermodynamically stable form of calcium phosphate. High urine pH (> 6.3) greatly increases brushite SS.
Calcium Phosphate (Hydroxyapatite)	3.33 - 5.31	The most common form of calcium phosphate in stones. High urine pH (> 6.3) greatly increases hydroxyapatite SS.
Uric Acid	-1.10 - 3.41	Low urine pH (<5.5) greatly increases uric acid SS.

Laboratory Notes

- This test was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. This test has not been cleared or approved by the U.S. Food and Drug Administration.
- This test has been modified from the manufacturer's instructions. Its performance characteristics were determined by Mayo Clinic in a manner consistent with CLIA requirements. This test has not been cleared or approved by the U.S. Food and Drug Administration.

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