

The acid crystals can
be found in a



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The urine includes the component that needs to eliminate from the body as a waste such as dissolved substances or solutes.

The formation of crystals requires these solutes and other factors like the increasing concentration of dissolved substances and the increase of pH level in acid or alkaline. These factors contributed to the condition of crystalluria which means the presence of crystals in the urine. Crystals can be found in both healthy people and unhealthy people. Type of crystal (Normal crystals) Description Uric Acid (Normal acid pH crystals) One of the by-products of protein digestion is uric acid.

Uric acid crystals can be found in a variety of shapes and sizes. The physical appearance under the microscope resembles parallelograms while the colour is between yellow to orange-brown. Although it is normal when uric acid found in urine but in the certain condition it is indicating some disease such as gout, uric acid nephropathy, urate nephrolithiasis or kidney stone. Sometimes, people who receive chemotherapy drugs may also have uric acid crystals in their urine. Calcium Oxalate (Normal acid pH crystals)

Monohydrate Dihydrate These crystals can be found in neutral or alkaline urine but mostly in acidic urine. It appears as colourless crystals under the microscope. It is found in two form which is the monohydrate form that is dumbbell shape and dihydrate form which appear in an envelope shape. It can be found in urine of normal individuals with intake of oxalate or vitamin c in large amounts and also in patients with nephrolithiasis and acute renal failure Hippuric (Normal acid pH crystals) Hippuric acid crystals can be found in acid, neutral, or slightly alkaline urine.

These colourless crystals look like prisms or needle-like in shape and usually will fuse together. Amorphous Urate (Normal acid pH crystals) It appears in pink for gross analysis but yellow microscopically. These small crystals comprised of urates, xanthine or phosphates and appear as dark or yellow-red granules in the urine sediment. Amorphous Phosphate (Normal alkaline pH crystals) This tiny type of crystal is found in alkaline urine with the colour of yellow to brownish colour but colourless under the microscope. It has the shape of coffee-lid. Calcium Phosphate (Normal alkaline pH crystals) These colourless crystals having the shape like bluntly ended needles, flat rectangles, rosettes or prisms.

Calcium Carbonate (Normal alkaline pH crystals) Calcium carbonate crystals are colourless to yellow-brown in colour which can result in brownish tinge. It may either appear in dumbbells or spheres shapes with radial striations or with a round to ovoid shapes. Triple Phosphate or Struvite (Normal alkaline pH crystals) It is composed of phosphate, magnesium and ammonium. It appears in colourless, rectangular in shape or looks alike with the coffin lid. People who associated with a bacterial urinary tract infection (UTI) caused by urea-splitting bacteria and patients who have infected calculi (struvite stones) more tend to have this crystal. The presence of urease-positive bacteria able to elevate the urine pH and free ammonia. Eventually, promote struvite crystalluria (and urolithiasis). Ammonium Biurate (Normal alkaline pH crystals) Ammonium urate or biurate crystals generally found in brown or yellow-brown spherical shape.

Its appearance looks like “ thorny-apples” due to the irregular protrusions but in some urine samples, it may resemble calcium carbonate due to its

smooth borders. Amorphous Phosphate (Normal alkaline pH crystals)

Amorphous phosphates are found in alkaline urine. These colourless granules usually appear in coffin-lid shape.

Type of crystals (Abnormal crystals) Description Bilirubin The formation of bilirubin crystals is from conjugated bilirubin that is water soluble. It has the appearance of needle-like to granular shape and yellow in colour. It usually has to view under high magnification due to its tiny size except when it masses into large crystals.

This type of crystal may be can found in the urine of hepatic disorders associated patients. Cholesterol This crystal present in the acidic urine of the nephrotic syndrome patient. It looks like a colourless notched rectangular plate. Cystine Cystine crystals are colourless, look like hexagonal shape or benzene rings. The present of cystine in acidic urine called as cystinuria.

This condition usually associated with an inherited disorder or amino acid reabsorption defect in proximal tubular. The size of this crystals varies in size from small to medium. Leucine The acidic or neutral pH urine may have the presence of this crystal. Leucine crystals usually found in the patient who has impaired amino acid metabolism in the liver. The appearance of leucine crystals is yellowish to the brownish sphere. It has the pattern of concentric circles with striations. Tyrosine These colourless or yellow cyrosine crystals appear as fine needles in acidic or neutral urine.

Tyrosine crystals may be seen in the patient who has tyrosinemia and/or certain liver disorders which cause impairment in amino acid metabolism.

Type of crystals (Drug-induced crystals) Description Sulfadiazine These

crystals can be found in striated shells or “shocks of wheat” shape.

Indinavir The figure A shows the crystals in rectangular plates shape with needle crystals in the variety of sizes while figure B shows a bundle of abundant, densely packed needles-like crystals. The crystals can cause crystalline blockage and eventually lead to an acute renal failure when the certain type of medications are given in high doses or given to volume-depleted patients. **Sulphonamide** These crystals are flat needles, bunches of small needles that often appear brownish. The presence of sulphonamide crystals usually indicates administration of a certain drug such as methamphetamine which is an illegal drug.

However, their presence sometimes also indicating kidney stone formation.

In conclusion, the normal crystals can be classified into two type which is acidic and alkaline pH crystals. Usually, these type of crystal is not indicating the pathologic condition. However, abnormal crystals and drug-induced crystals are not normally found in fresh urine which indicates pathologic condition.