

# A Brief Study on Kidney Stones

By Kristina Kaszei



# Introduction

This article is a brief overview of kidney stones, specifically calcium stones. Its focus is on imaging kidney stones in different ways to have a closer, more in depth look at them. Photographic techniques such as photo-stacking and ultraviolet imaging will be shown as well as what kidney stones are made of and how they are formed in the body.

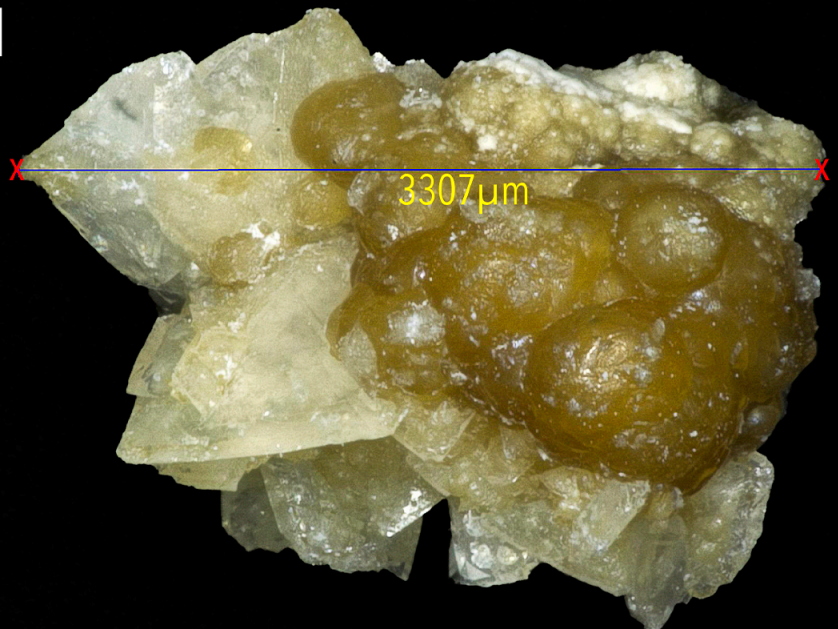
## Kidney Stone Facts

- Kidney stones affect up to 5% of the population
- Kidney stones are broadly categorized as calcareous stones (calcium containing)
- There are four main types of kidney stones: calcium, uric acid, struvite, and cystine
- Men are more likely to develop kidney stones than women

# *What are Kidney Stones?*

The National Institute of Diabetes and Digestive and Kidney Diseases define kidney stones as hard, pebble-like pieces of material that form in one or both of your kidneys when high levels of certain minerals are in your urine. Kidney stone size and shape can vary as well as texture and color. Size can range from a grain of sand to as large as the size of a pea or golf ball, while texture can be smooth or jagged and usually yellow or brown in color.

Calcium kidney stones are the most common type of kidney stone. These occur when extra calcium that isn't used by your bones and muscles stays in the kidneys and joins with other waste products to form a kidney stone.

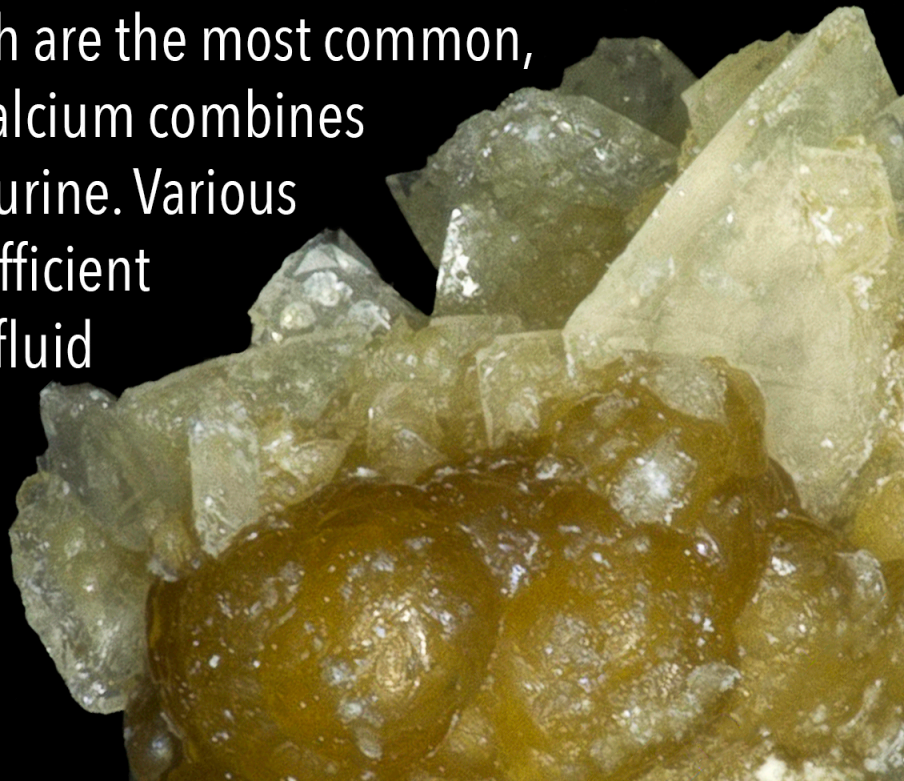




# *How do Kidney Stones Form?*

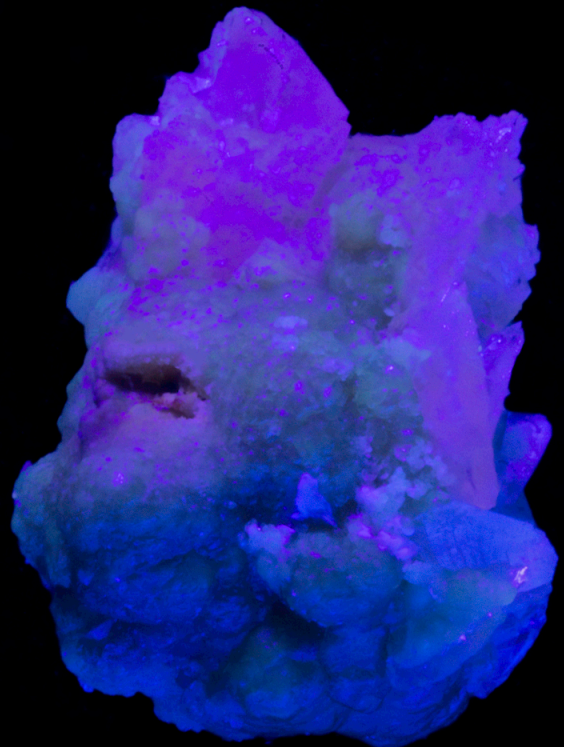
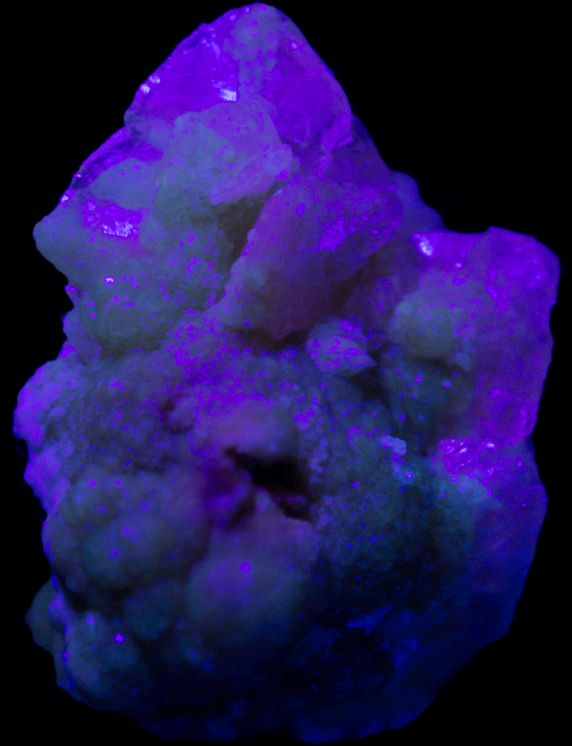
Crystals form when there is a surplus of waste in a small amount of liquid. These crystals join together with other elements that will continue to grow unless it is passed through the body in the urine. People who don't have kidney stones is due to their kidneys eliminating the waste prior to a stone from forming.

The six main components that assist in forming kidney stones are, calcium, oxalate, urate, cystine, xanthine, and phosphate. Specifically, calcium kidney stones which are the most common, are created when calcium combines with oxalate in the urine. Various factors such as insufficient calcium levels and fluid intake can assist in the formation of these in the body.



# Fluorescent Kidney Stones

Many minerals have the unique quality of fluorescing when placed under ultraviolet radiation. Calcium, one of the main minerals in calcium kidney stones, has fluorescent properties to it when placed under a UV light source. In order to fluoresce, a calcium kidney stone must be exposed to an ultraviolet light range between 200 and 400 nanometers. Using ultraviolet radiation as a technique to image kidney stones reveals the difference in the organic matter present and where it is interrupted with crystals.



# Equipment Used

- Canon 6D
- Canon 65mm 1-5x macro lens
- Stack Shot
- UV Light
- Keyence VHX-2000 series Digital Microscope

# Sources

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC421787/?tool=pmcentrez&report=abstract>

<https://jamanetwork.com/journals/jama/fullarticle/1187930>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC421787/?tool=pmcentrez&report=abstract>

<https://www.niddk.nih.gov/health-information/urologic-diseases/kidney-stones/definition-facts>

<https://www.kidney.org/atoz/content/kidneystones>

<https://news.illinois.edu/view/6367/693531>

# About

Kristina Kaszei, photographer and article author, is a current student at Rochester Institute of Technology.

Kristina is studying Biomedical Photographic Communications in the College of Art and Design and has a deep interest in Scientific Imaging.

# Contact

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