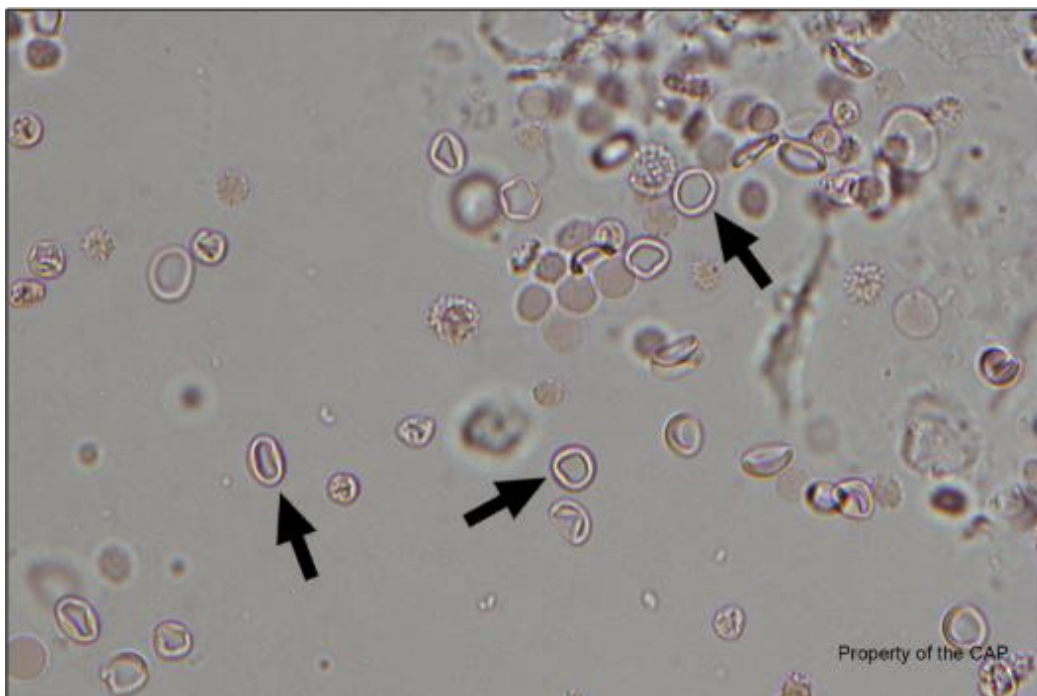
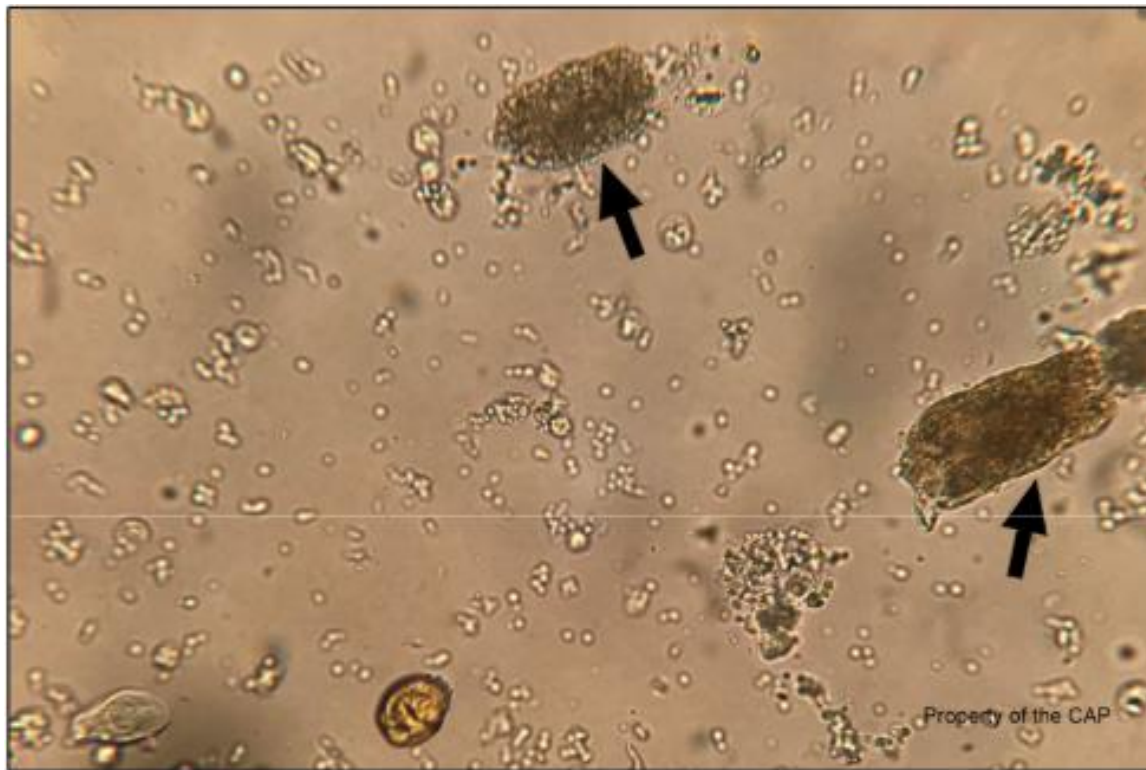


Given the patient presentation and urinalysis result below, identify the object(s) denoted by the arrow(s) in the three following images.

This urine sample is obtained from a 70-year-old woman with acute hypoxic respiratory and secondary liver failure in the setting of COVID-19 infection. Laboratory data include: specific gravity = 1.012; pH = 5.5; protein, blood, and leukocyte esterase = positive; glucose, ketones, and nitrite = negative.



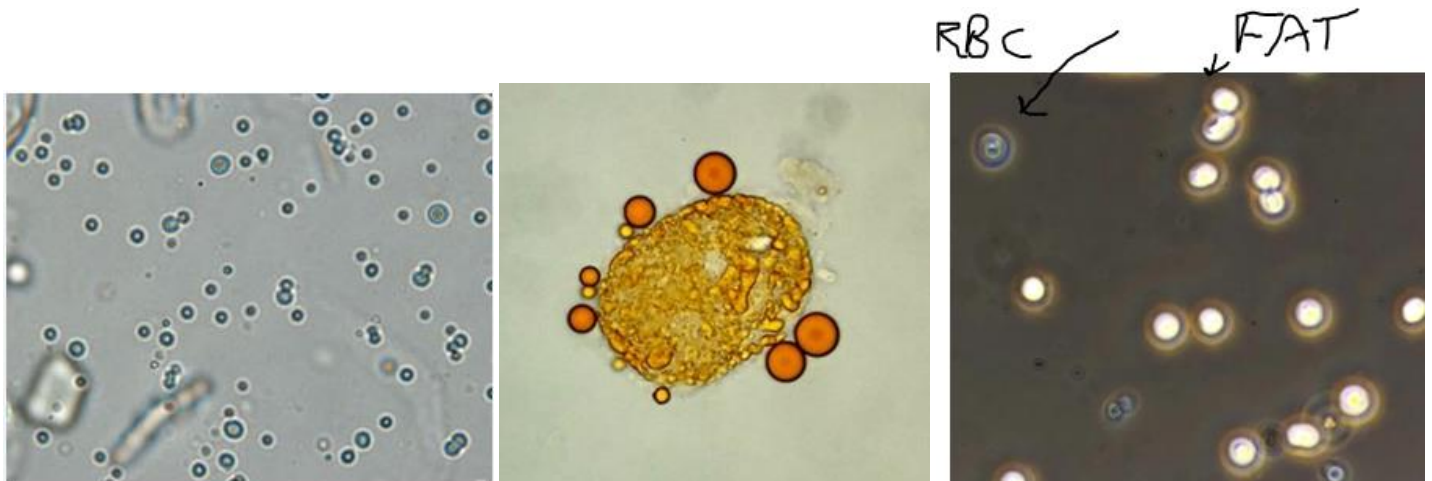


Did you just scroll to the next page thinking you were going to get answers right away??????

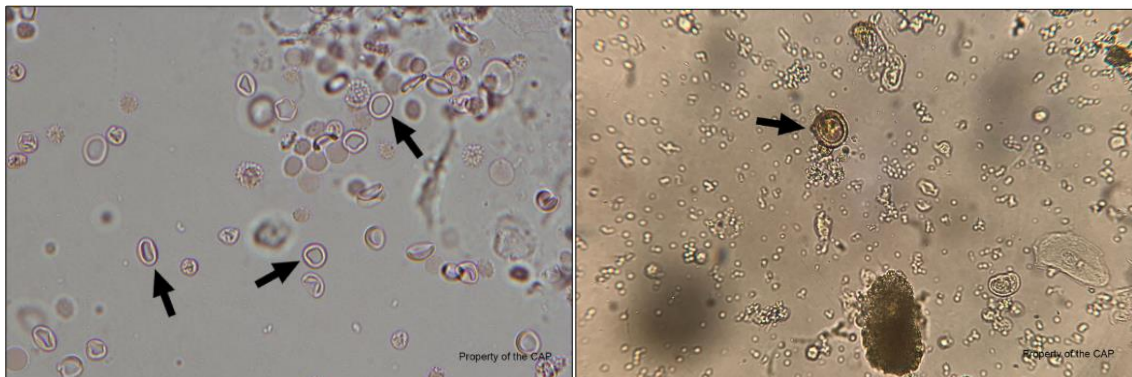
Think again!!!!!! 😊😊😊😊😊

First, let's discuss what is NOT identified by the arrow in the three images.

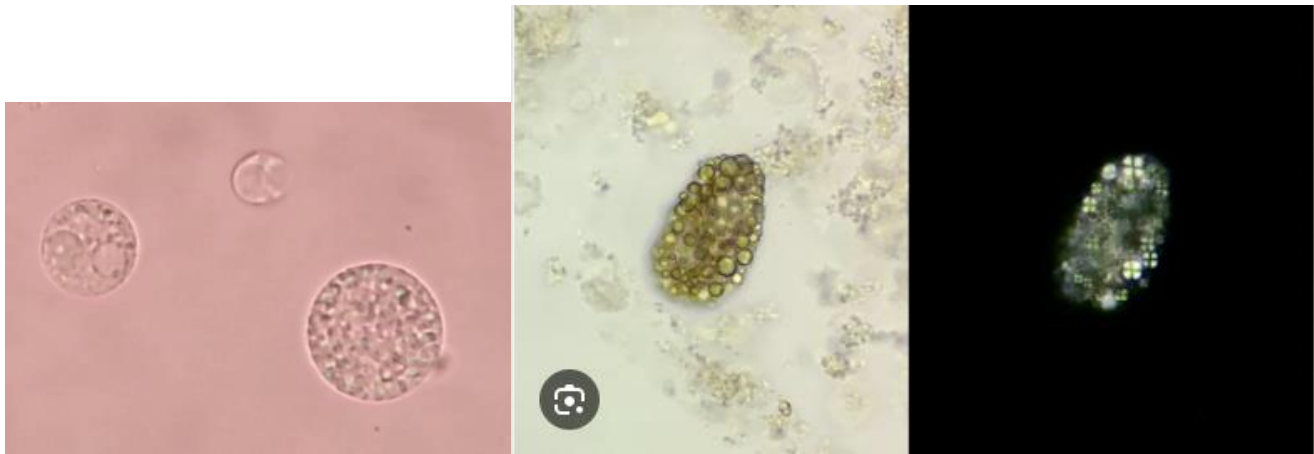
There are NOT fat droplets present.



Reminder of CAP images



Nor are there Oval Fat Bodies present, though that 2nd image is suspicious.



And though, again suspicious, neither is the 3rd CAP image a Fatty Cast. (see above picture as well).



Reminder of CAP images

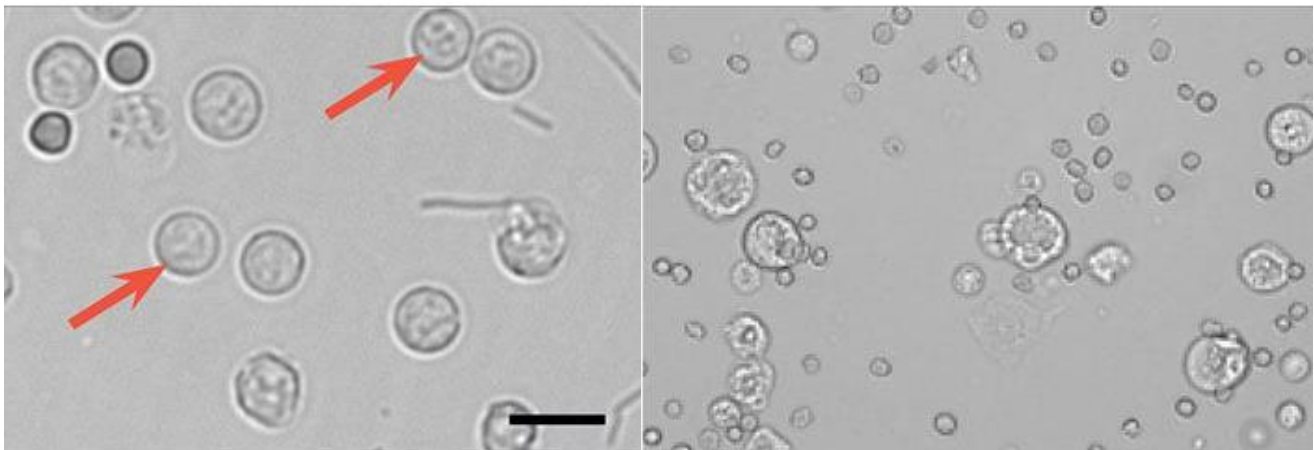


The involvement of the patient's liver in the case history could falsely lead a person to suspecting some fat or oval fat bodies in the urine sample. Though we do not have the option on CAP images, remember that if you ever suspect fat on a patient sample, you may **use polarizing microscopy** to see if the droplets shine or if you see the Maltese cross formation indicative of oval fat bodies.

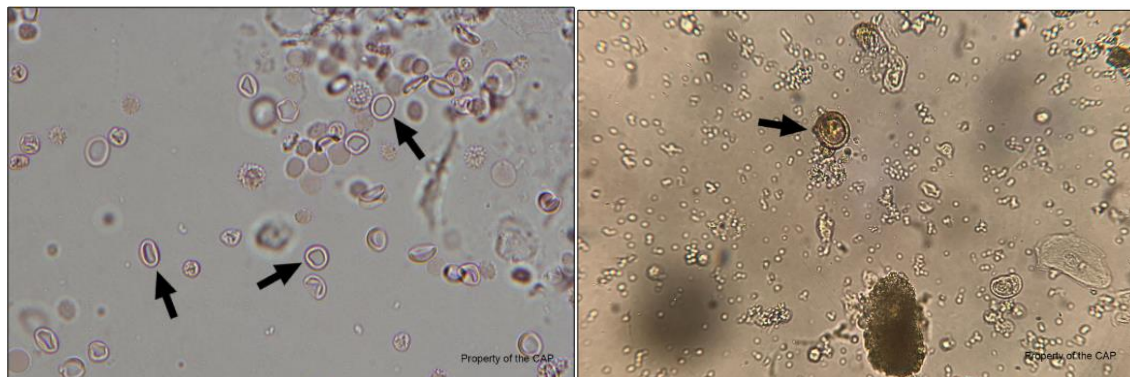
That's going to be a big take-away here. And will help with that mysterious second image if you are still unsure about it.

Let's give you one more thing an image is not.

Even though the leukocyte esterase is positive and the patient has COVID, none of the CAP images are Leukocytes.

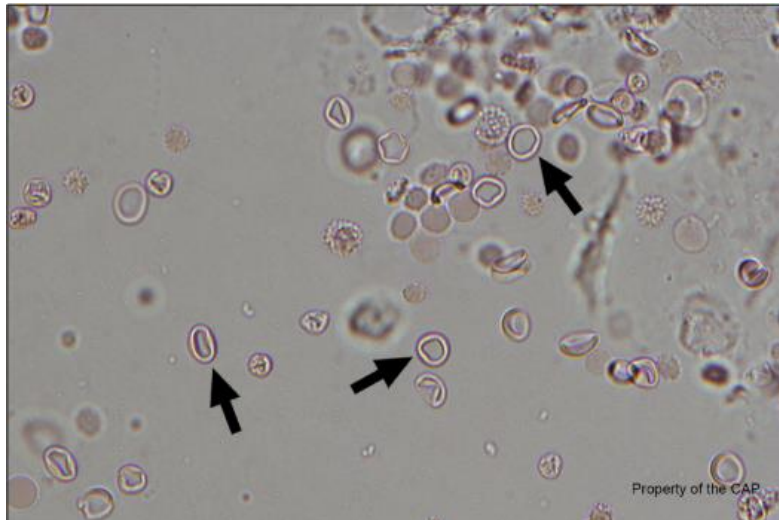


Reminder of CAP images

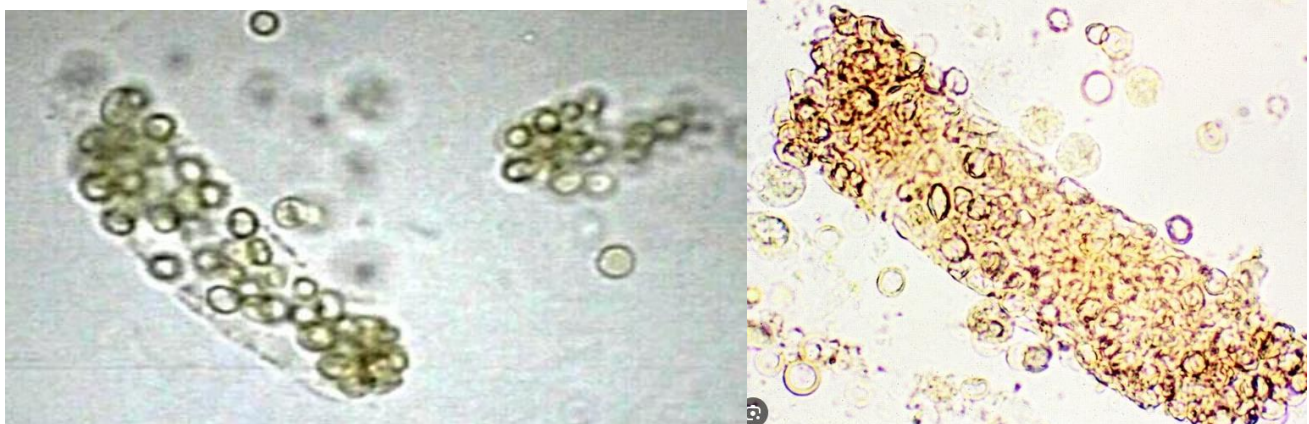


Let's pull back part of the curtain.

Image 1 is a Red Blood Cell.



I know you knew that. But what do you call image 3? It's not a fatty cast. Do you think it looks like an RBC cast?



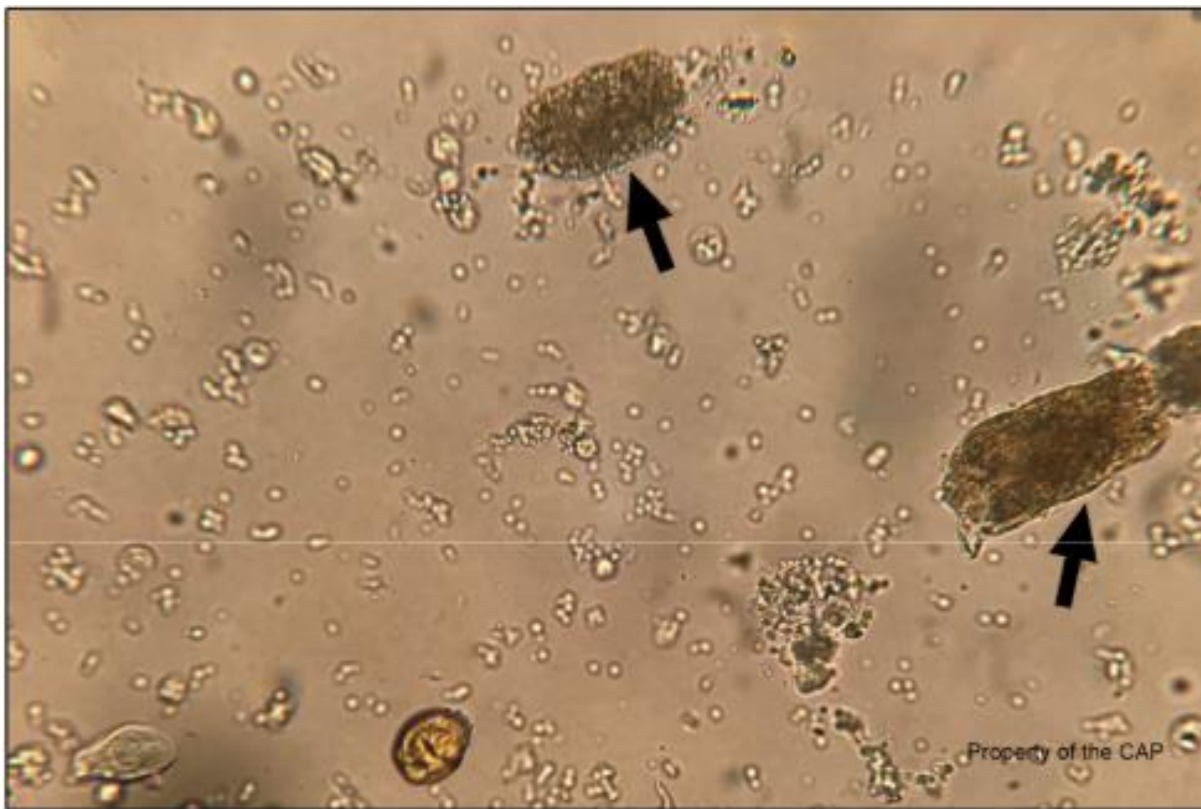
Reminder of CAP images



The truth is that you can't make out specific red blood cells within the casts that are being pointed to in the picture. If you can't specifically see RBC's in the matrix of the cast, you cannot call it an RBC cast. But the material in the matrix does look like it could be broken down red cells given its reddish hue and little specks all throughout the cast. We unfortunately do not have a polarized picture to absolutely rule out fat, but....

What do we call casts like that with cellular debris?

Image 3 is a Granular Cast!!!



Okay! One left. Let's look at a couple more things that image 2 is NOT.

Image 2 is NOT a pollen granule.

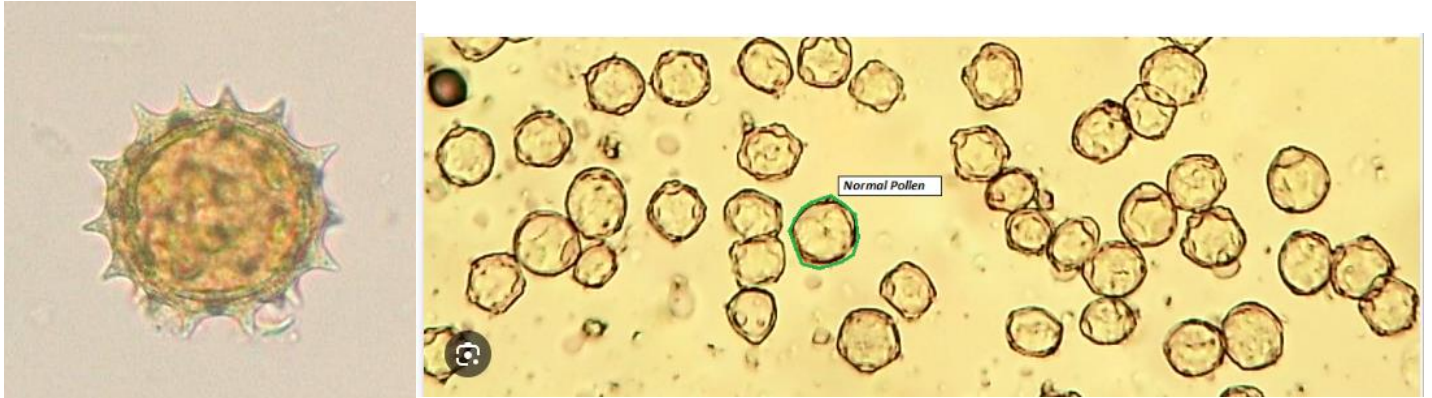
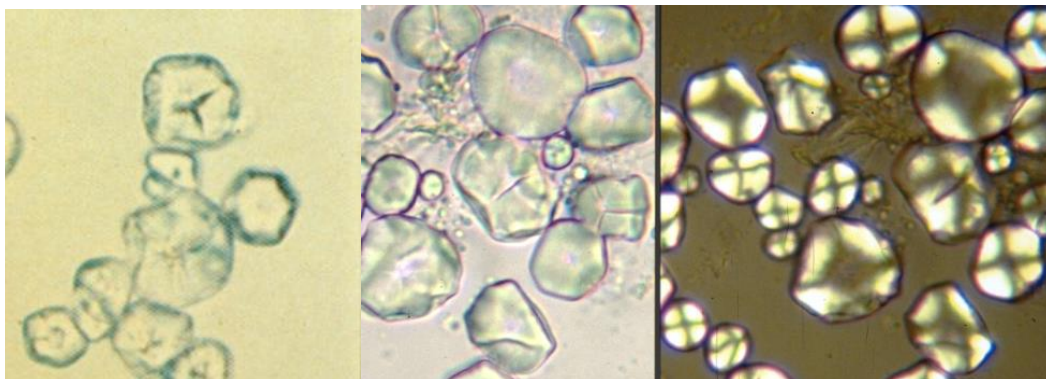


Image 2 is NOT a roundworm or pinworm egg (which hopefully wouldn't be in urine anyways).



Image 2 is NOT a starch granule.



Again, I wish we were given polarized pictures of the images, as we could have used that clue to help us see features of the object better. We could have also seen its birefringence.

Knowing that, you can deduce image 2 is a crystal.

Last chance, what is image 2?



Does it help if I describe it, even though it's practically impossible to see these details in the image as CAP provided it?

A highly refractile brown, spherical crystal with a central nidus and spoke-like striations extending into the periphery.

Here are some better images before I just give it away.



Image 2 is a ... Leucine Crystal.

Leucine crystals are very rare. They may be found in hereditary disorders of amino acid metabolism (inability to break down the amino acid Leucine), as well as in severe liver disease.

Apparently our 70-year-old's liver was in bad enough shape for the urine to have leucine crystals. Pretty crazy.

Also, know that only 70% of participants correctly identified that image. If we were able to use clues like another image or a polarized image, I have no doubt we all would have nailed that too. Congratulations if you identified all three with no help from this!!!

Please proceed to the tiny quiz.

Thank you for all the amazing work you do and the dedication you have to always learn and grow.