



Looking For Toxins

Toxicology Part2

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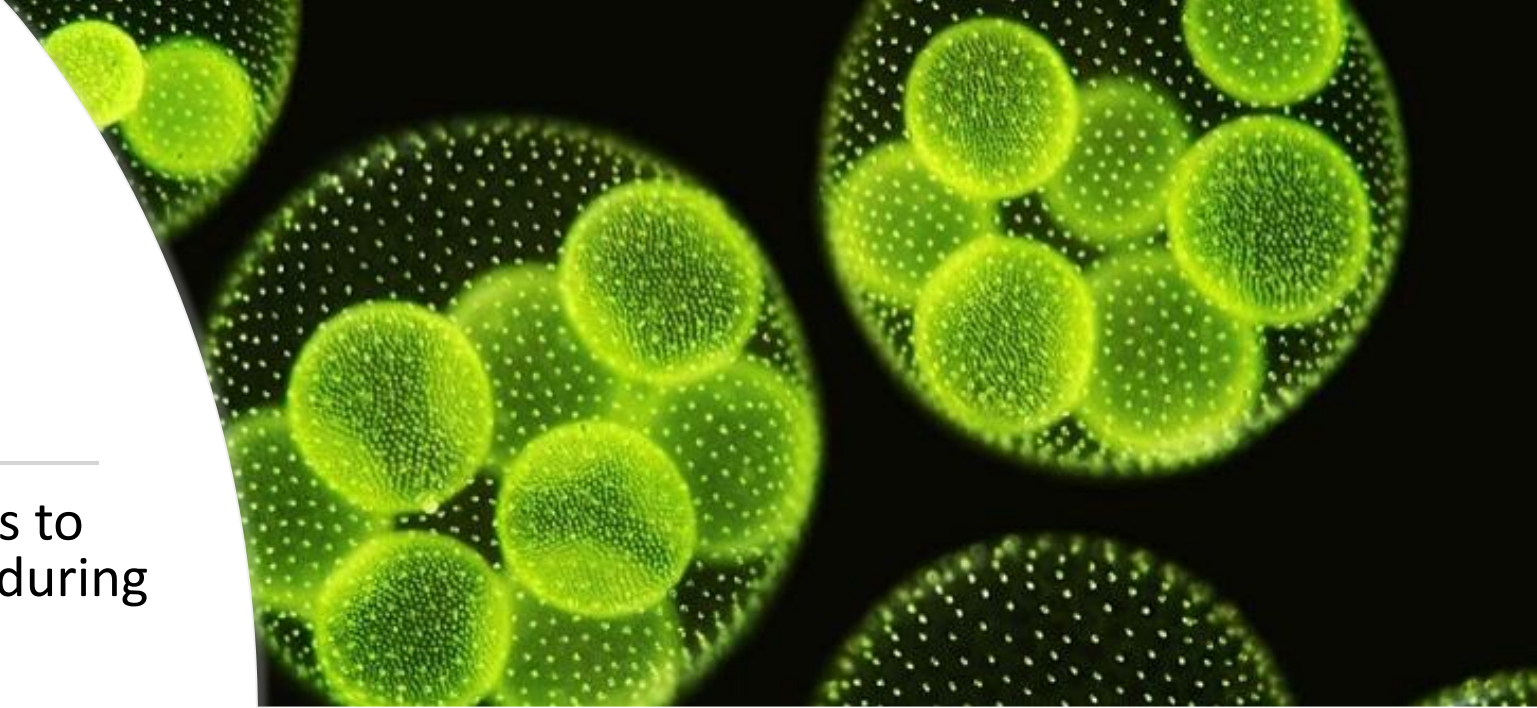
Forensic Science

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Toxins

- Most poisons don't cause visible changes to the body –neither in a living person nor during an autopsy.
- Some do, but most poisons work their mischief within the cells of the body and leave behind no visible footprints.
- As a result the medical examiner doesn't often see visible evidence of toxins during an autopsy or on slides from body tissue that he or she prepares for viewing under the microscope.
- Therefore, the ME collects fluids and tissues from the body that the toxicologists analyzes for the presence or absence of toxins.



Toxins Continued

- Even when the toxicologist can't find a toxin, he or she may be able to find its effect.
- Biotransformation is the conversion or transformation of one chemical into another by the body.
- This process is called metabolism, and the new products it produces are called metabolites, which are simply the results of the body destroying or breaking down chemicals in order to eliminate them.



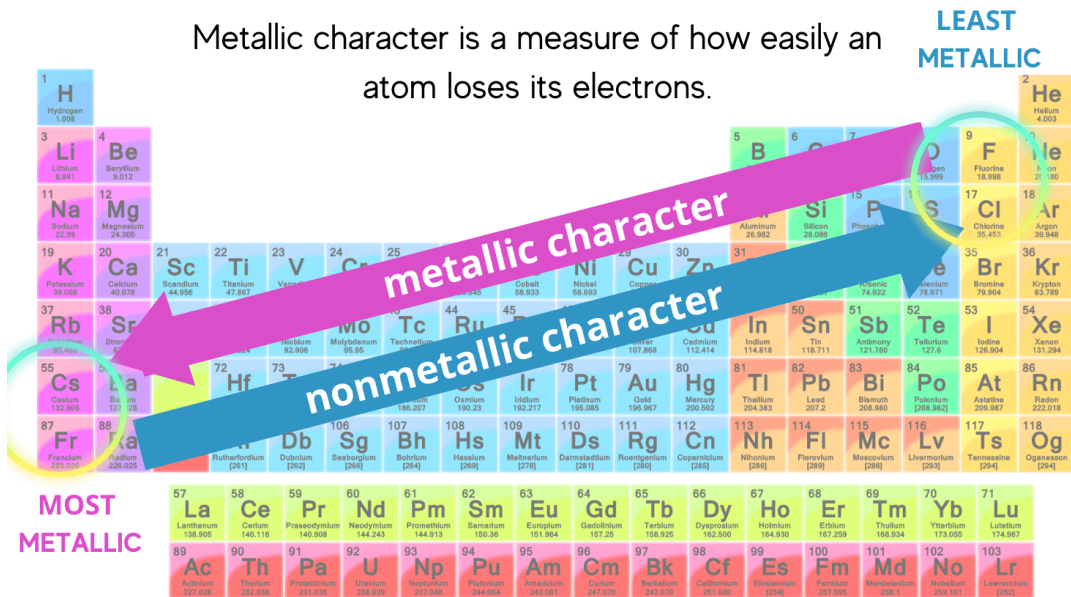
Metabolism Continued

- For Example;
- Heroin is made from Morphine, and when it's injected into the blood stream, it's immediately converted back into morphine.
- So looking for Heroin is pointless for the toxicologist, but finding morphine is a good sign that heroin was present.



Metallic Character

Metallic character is a measure of how easily an atom loses its electrons.



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Other Toxins

- Metallic elements also cause disease and death.
- Excess Iron, Mercury, Lead. And Copper in the body can lead to serious health problems.
- Mercury, lead, arsenic, antimony, selenium, and many other metals can kill you, and they've caused accidental, suicidal and homicidal deaths for many years.

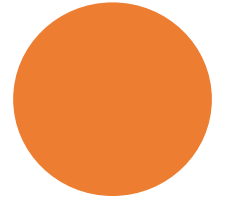
Collecting Samples

- Part of poison's popularity is that it's sneaky. Toxins rarely leave behind visible clues, so finding a toxin – and enough evidence to determine that it was the cause of death – is a tricky business that involves several specialized tests and a variety of bodily tissues and fluids.



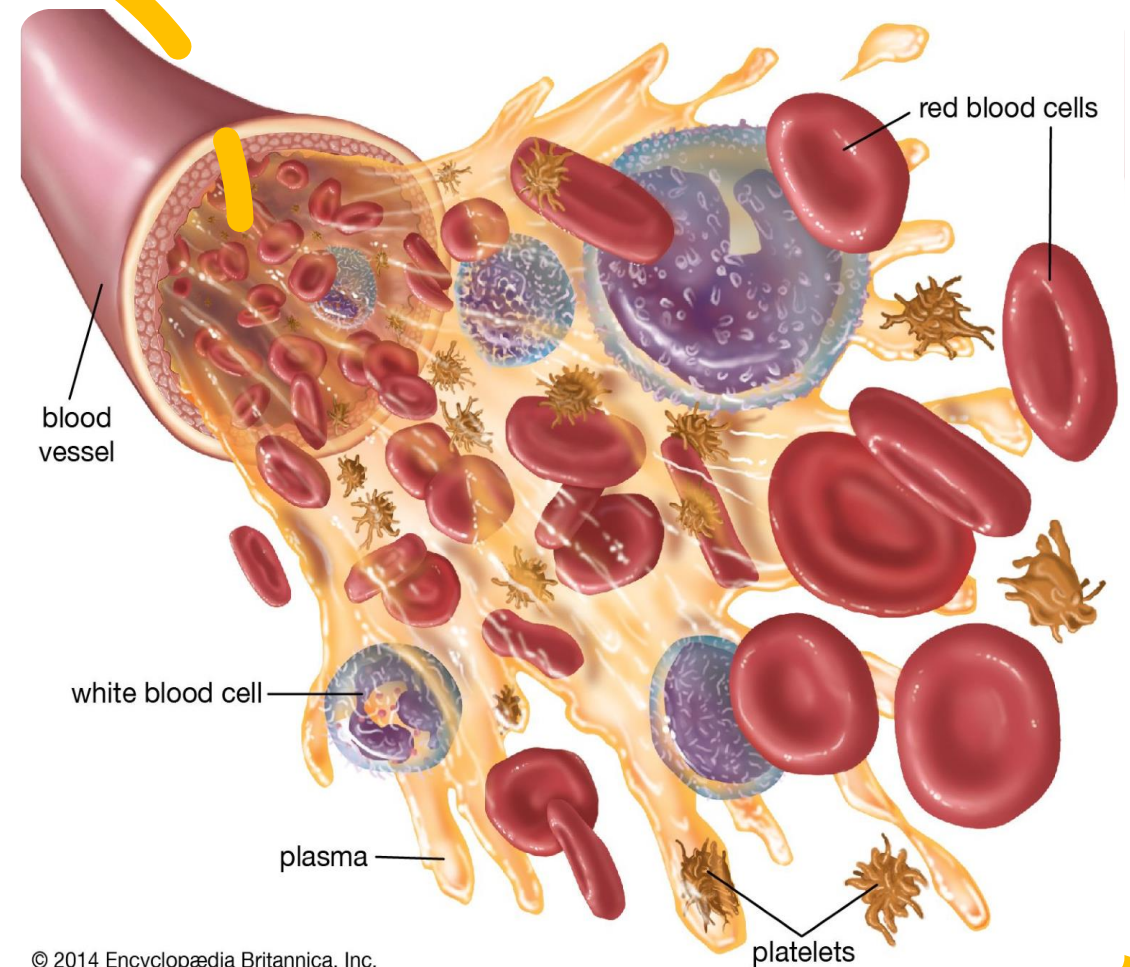
Testing

- The best place to get samples for testing are the locations where chemicals enter the body, where chemicals concentrate in the body, and along the routes of elimination.
- Thus blood, stomach contents, and tissues around injection sites may possess high concentrations of the drug.
- Analysis of the liver and brain, and other tissues can reveal where a drug and its metabolites accumulate.
- Finally, Urine testing can indicate where the drug and its metabolites are concentrated for final elimination.
- The following are potential sources of illicit toxins.



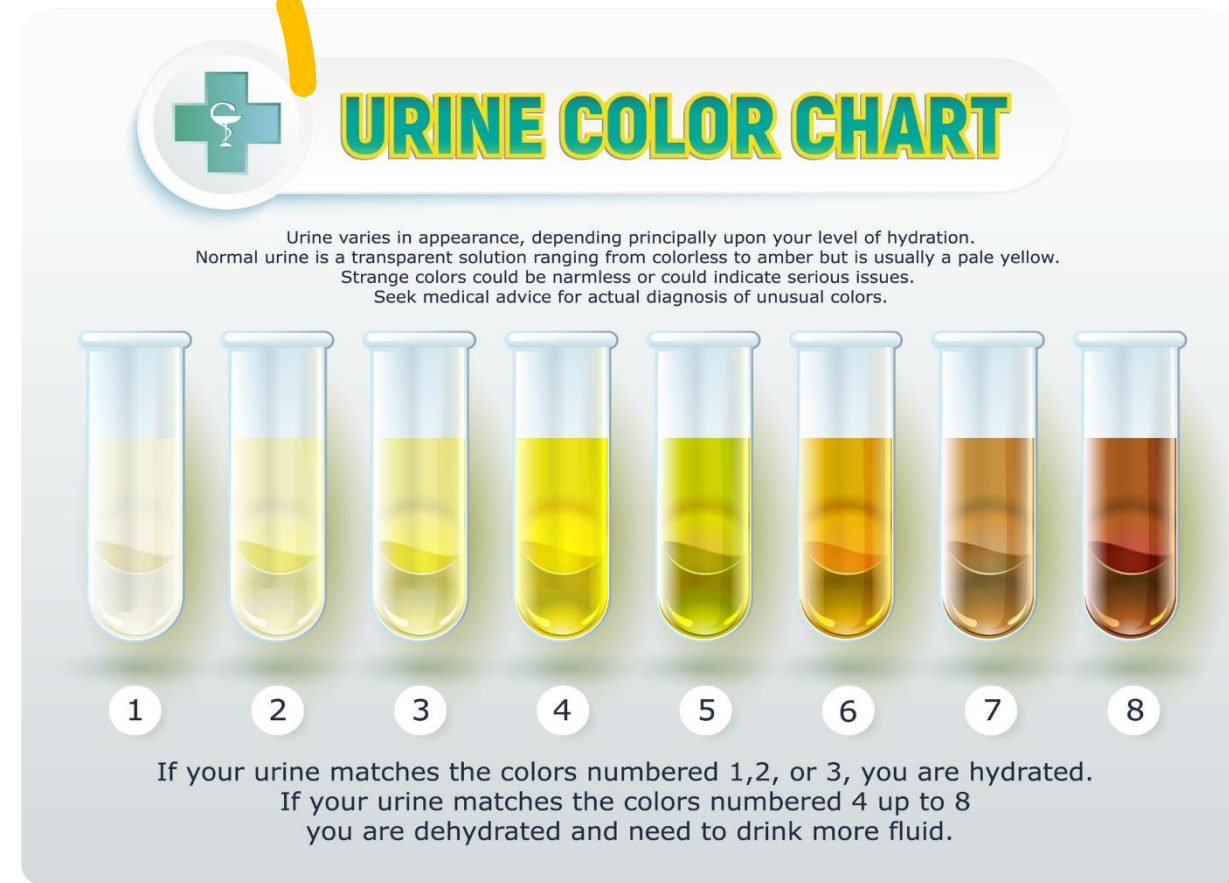
Blood

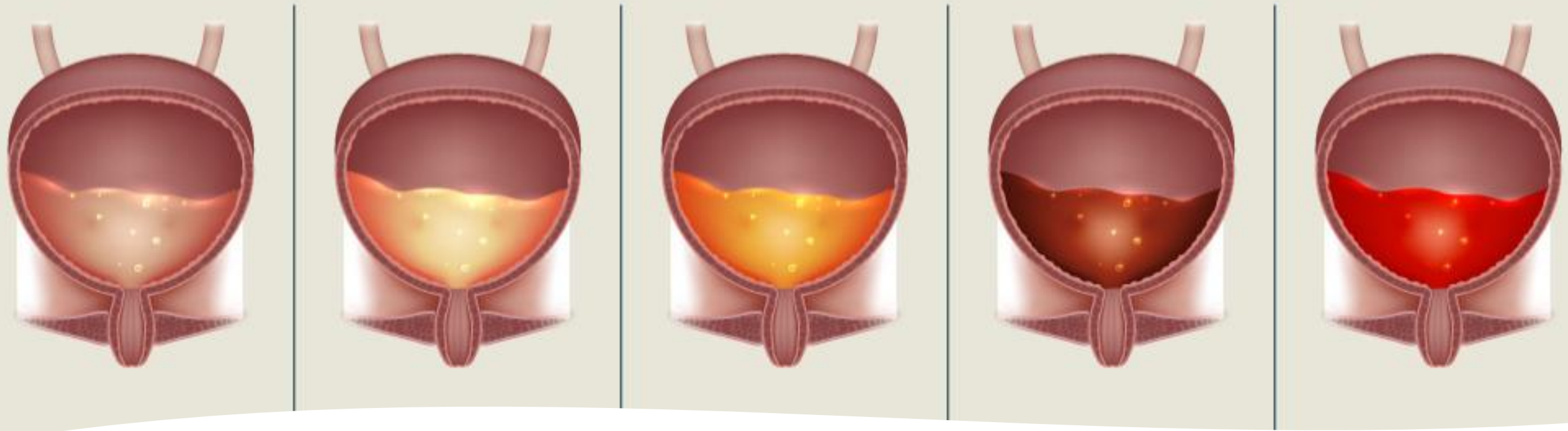
- Blood by far is the toxicologists most useful substance.
- With modern toxicological techniques, you can find essentially any drug and its major metabolites in the blood.
- Blood examination tells the toxicologists what was going on in the body at the time of death.
- Concentrations of medicines and drugs within the blood correlate well with levels of intoxication and with levels that are potentially lethal.



Urine

- Easily sampled with a cup and a trip to the restroom, urine testing is a sample of workplace drug testing.
- It can also prove useful during an autopsy.
- Because the kidneys are situated along one of the body's major drug and toxin elimination routes, toxicologists can often find such substances in greater concentration in the urine than in the blood.



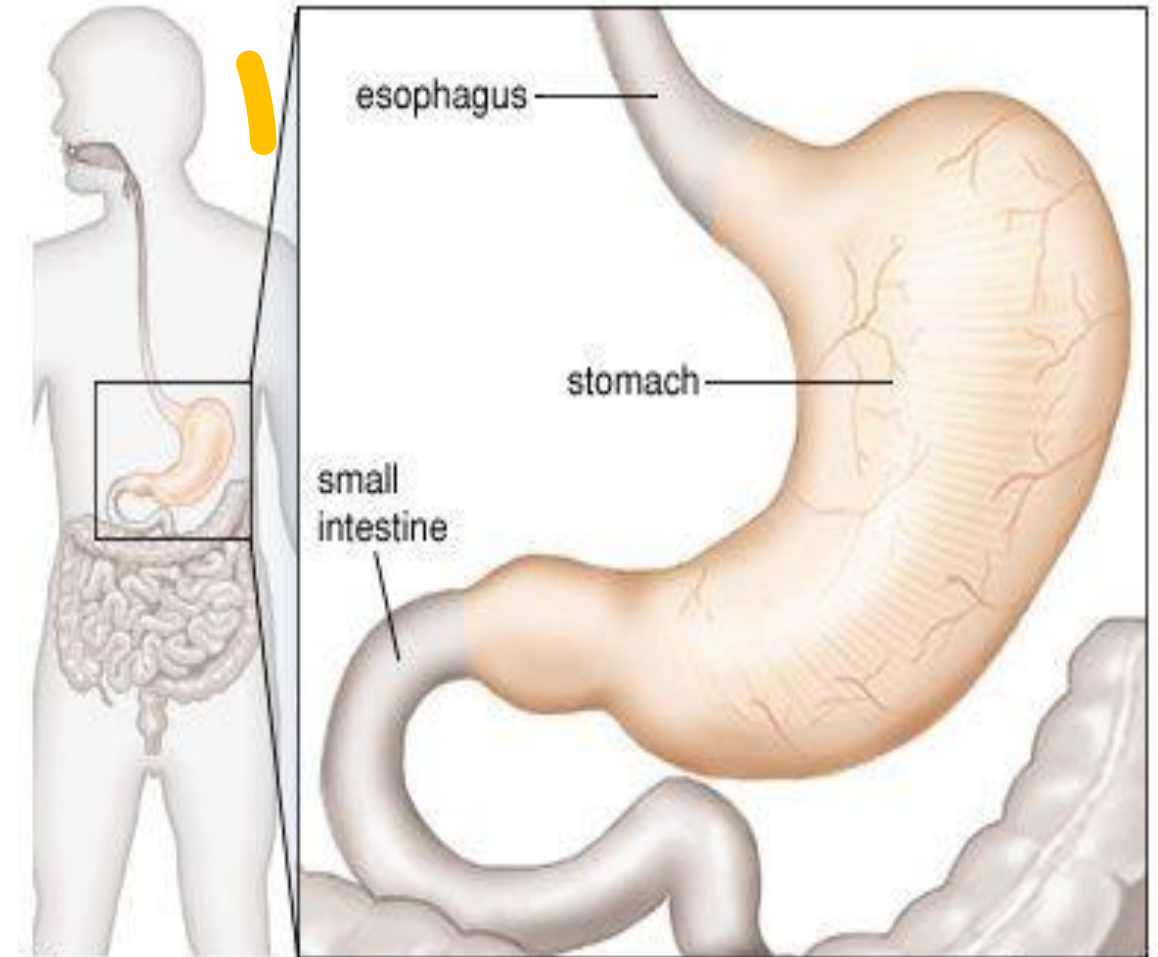


Urine Continued

- However, the correlation between urine concentration of a drug and its effect in the body is poor, at best.
- The urine level may reveal that the drug has been in the blood at some earlier time, but it can't determine whether the drug was exerting any effect on the individual at the time it was collected.
- Likewise, toxicologists can't estimate blood concentrations from urine concentrations.
- The concentration of any drug in the urine depends on how much urine the individual has produced.

Stomach Contents

- Doctors remove the stomach contents of survivors of drug ingestion by way of a gastric tube, which typically passes through the nose and into the stomach.
- The contents are then removed, or washed from the stomach and tested for the presence of drugs or poisons.
- During an autopsy, examiners test stomach contents in the same way.
- Obtaining stomach contents is critical in case where investigators suspect poison of drug ingestion.



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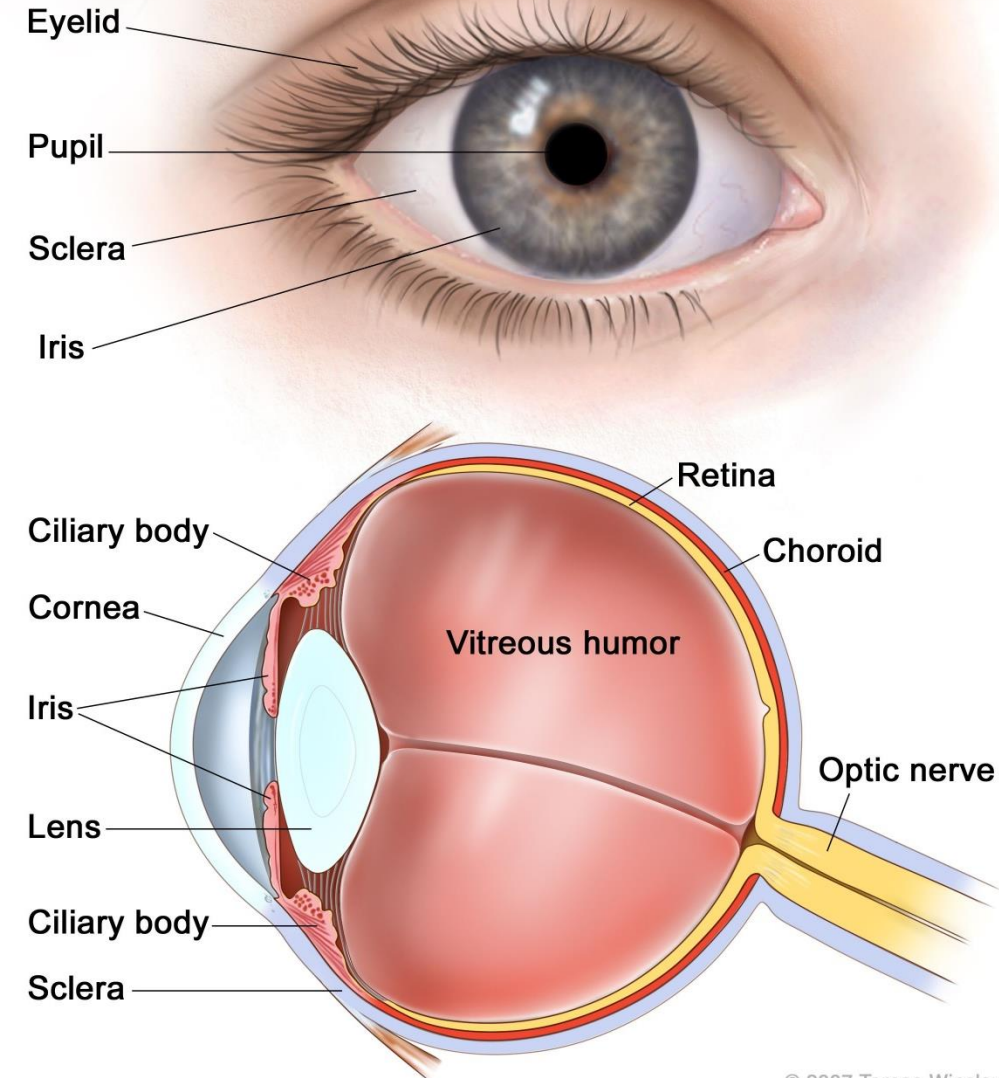
Liver

- The liver is intimately involved in drug and toxin metabolism.
- Testing liver tissue and the bile it produces often reveals a drug or its metabolites. Many drugs, particularly opiates, tend to concentrate in the liver and bile.
- So investigators can measure them in these tissues, even when blood shows no trace of them.
- The liver may reflect levels of a drug during the hours before death, and the bile may indicate what drugs were in the system during the past three to four days.
- Neither test is very accurate.



Vitreous Humor

- Vitreous humor is the liquid in the eyeball.
- It is very resistant to decay, and in severely decomposed corpses, it may be the only fluid remaining.
- The V.H. is a water like fluid, which means water-soluble chemicals dissolve in it.
- Furthermore, the V.H. and blood maintain equilibrium, meaning that any water soluble chemical in blood is also in the V.H.
- But substance levels in the V.H. Lag behind levels found in the blood by about 1- 2 hours, so testing the V.H. so testing the vitreous reflects the concentration of the toxin in the blood 1-2 hours earlier.



Hair

- Hair absorbs certain heavy-metal toxins and has the unique ability of providing and intoxication timeline for many of these substances.
- Toxicological examination of hair can reveal toxin exposure for ~ 5 years.
- This testing process is being used in governmental agencies and will soon become the devise for applicants' drug examinations.



Insects

- Toxicologists may test insects that feed on corpses for drugs in cases of severely decomposed bodies.
- Because certain drugs tend to concentrate in the tissues of these bugs, they may supply information about whether a drug was present in the deceased.



Thank You For Your Attention!

THANKS FOR YOUR ATTENTION