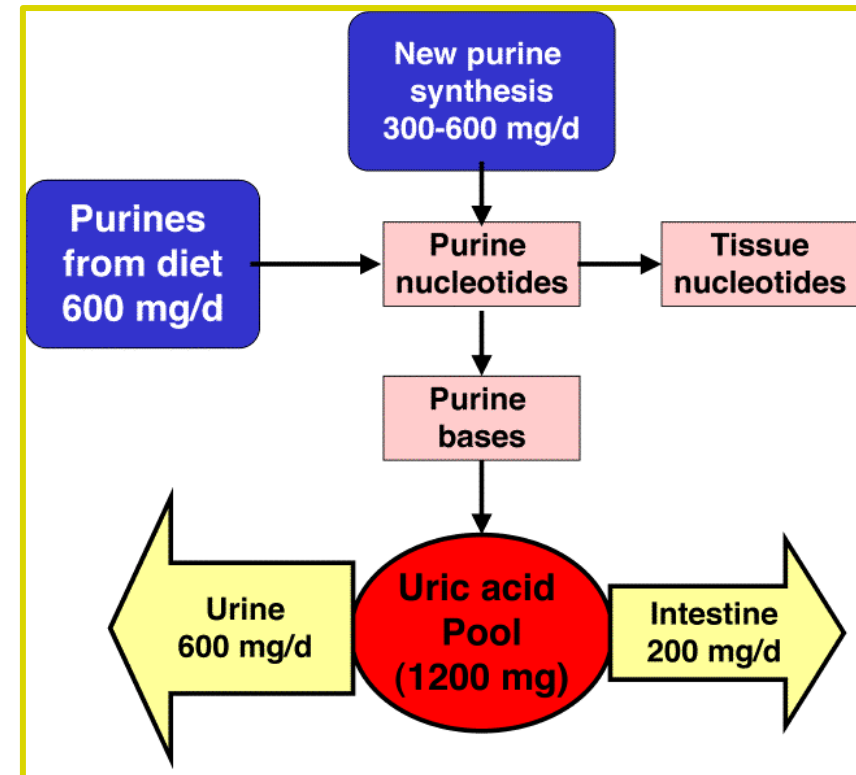
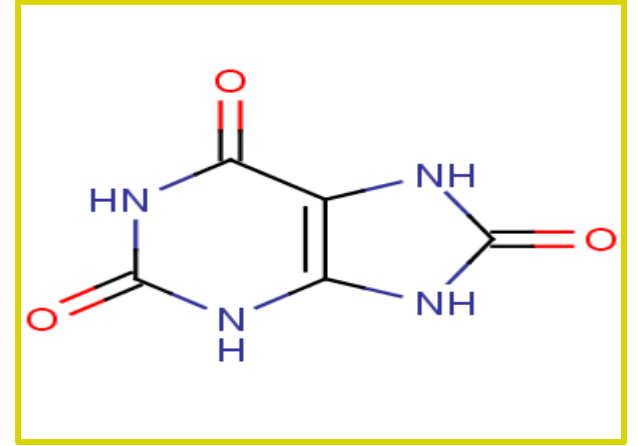


# Estimation of Uric Acid in serum

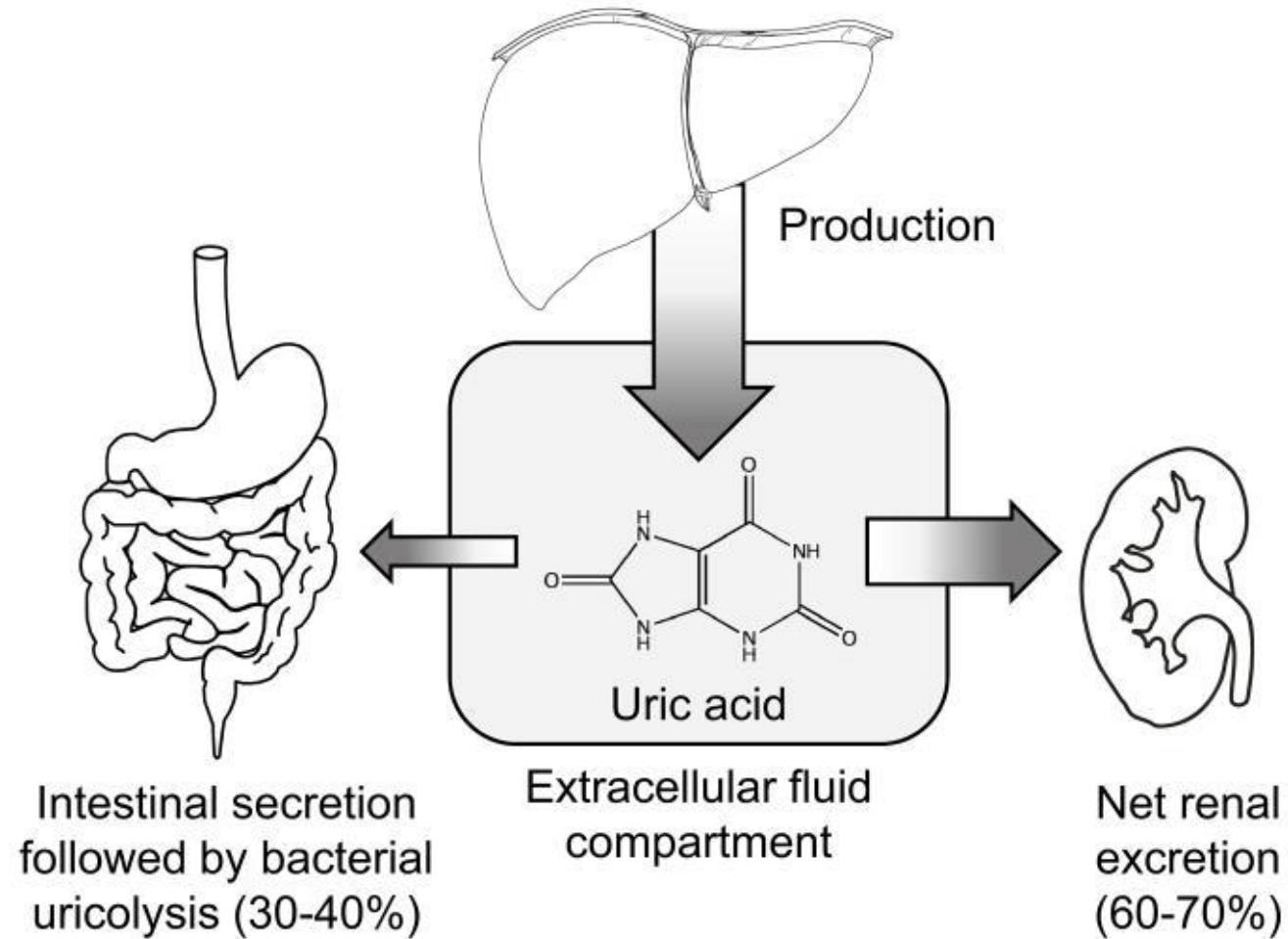
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# -Uric acid production:

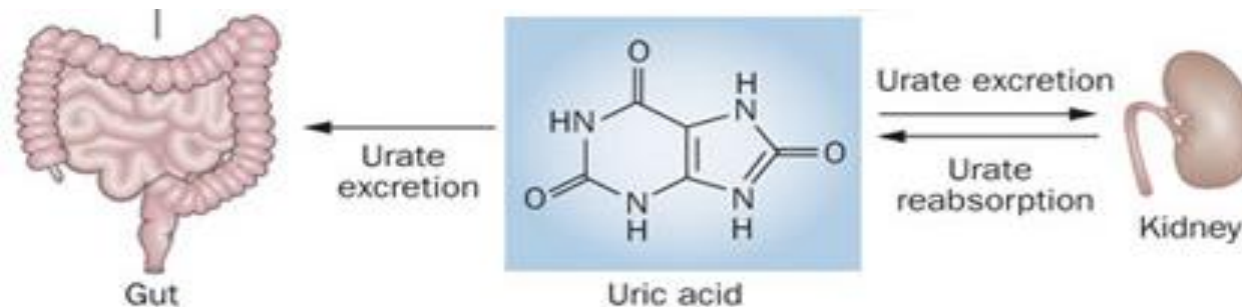
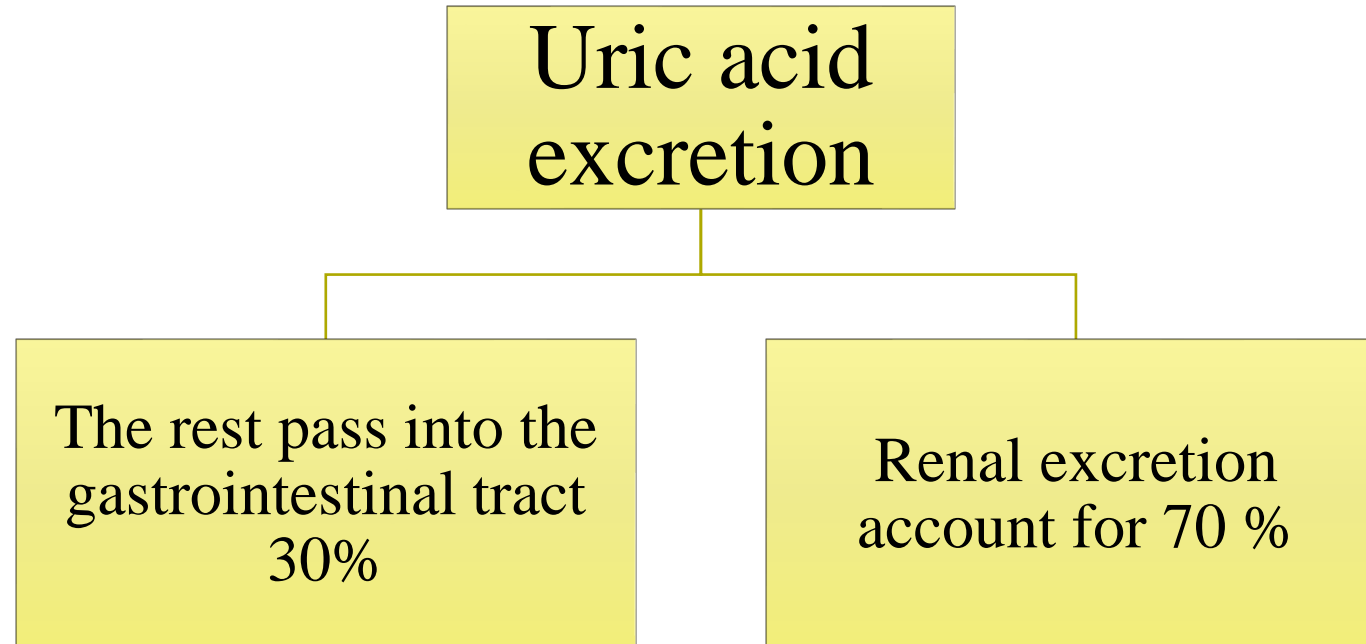
- Uric acid is the product of **catabolism of the purine** (adenosine and guanine) that result from the break down of ingested nucleic acid (exogenous) or from tissue destruction (endogenous).
- Uric acid is transported by the plasma from the **liver** to the **kidney**, where it is filtered and where about **70% is excreted**. The remainder of uric acid is excreted into the GI tract and degraded.



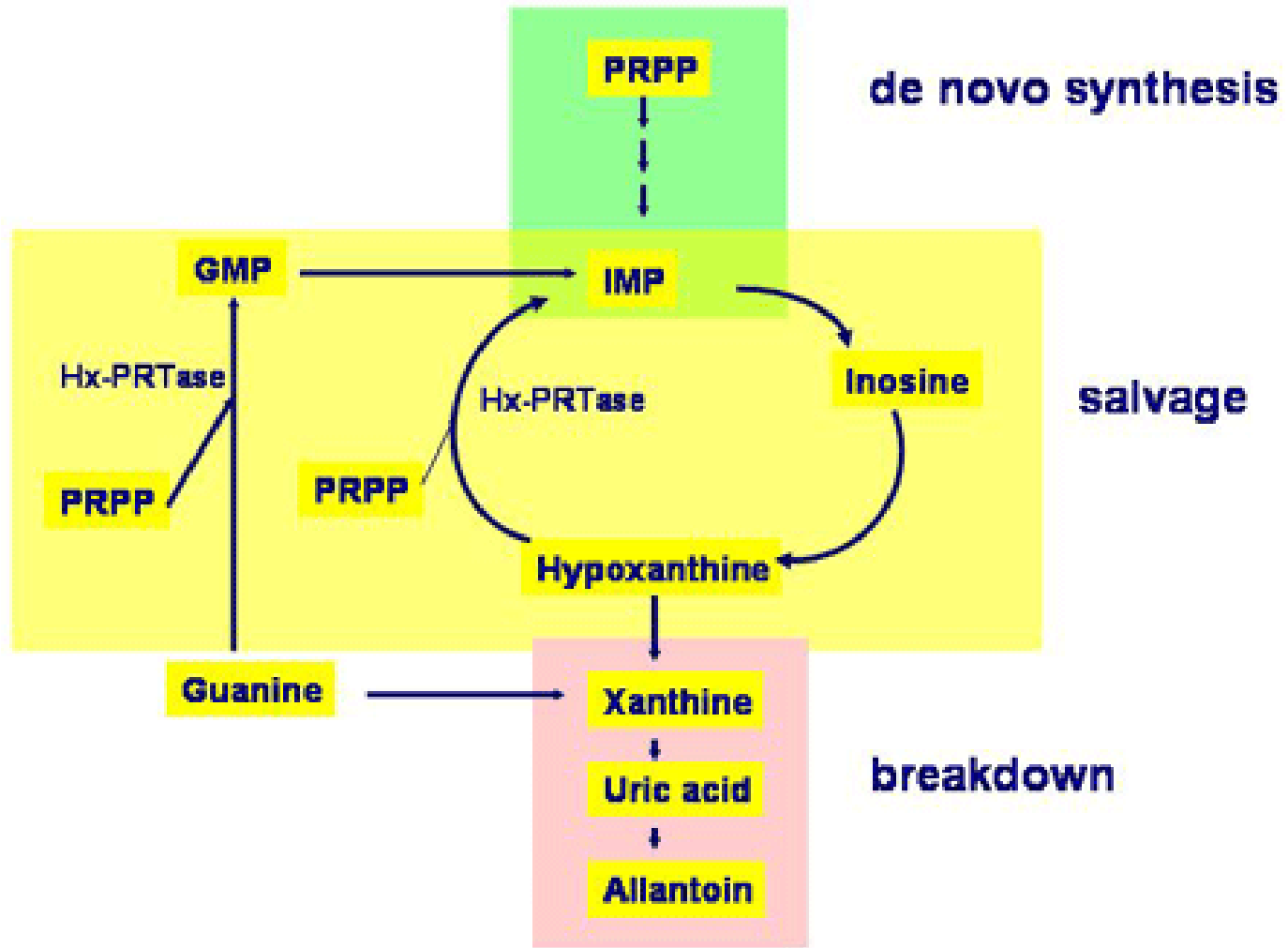
# -Uric acid excretion:



# -Uric acid excretion:



# - Purine metabolism:



# -Clinical application:

1. Uric acid is measured to assess inherited disorders of **purine metabolism**.
2. To confirm diagnosis and monitor treatment of **gout**.
3. To assist the diagnosis of **renal calculi** (uric acid kidney stones).
4. To detect **kidney dysfunction**.
5. Evaluation of **leukemia**.

# -Uric acid -Serum:

Case	Cause
<p data-bbox="422 629 1141 719"><b>Increased</b> uric acid serum (Elevated uric acid levels (hyperuricemia))</p>	<ul data-bbox="1256 354 2109 968" style="list-style-type: none"><li data-bbox="1256 354 2058 444">• Gout (the amount of increase is <u>not</u> directly related to the severity of the disease).</li><li data-bbox="1256 539 2048 629">• Renal diseases and renal failure (decreased excretion of uric acid)</li><li data-bbox="1256 729 2033 776">• Leukemia, multiple myeloma, lymphoma.</li><li data-bbox="1256 825 2109 968">• Lesch-Nyhan syndrome (rare hereditary gout result from an enzyme defiance hypoxanthine-guanine phosphoribosyltransferase (HGPRT)).</li></ul>
<p data-bbox="550 1148 1014 1238"><b>Decreased</b> uric acid serum (hypoureecemia )</p>	<ul data-bbox="1256 1068 2015 1268" style="list-style-type: none"><li data-bbox="1256 1068 1977 1110">• Liver disease (Decreased Production).</li><li data-bbox="1256 1225 2007 1268">• Fanconi syndrome (Increased excretion).</li></ul>

# -Uric acid -Urine:

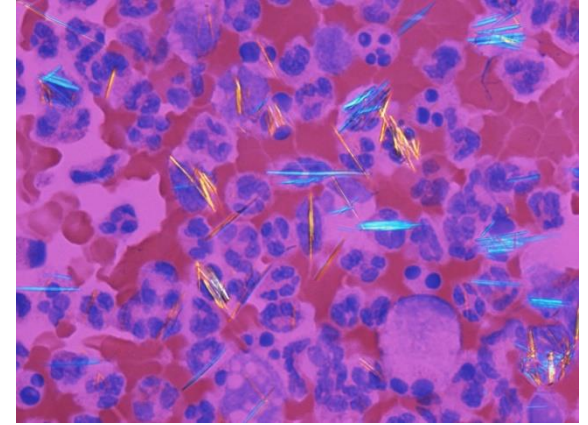
- This test evaluates uric acid metabolism in gout and renal calculus formation.
- The uric acid urine test measured in a sample of urine collected over 24 hours.
- A **high level of uric acid** in the urine means that the patient is **more** likely to develop uric acid kidney stones.

Case	Cause
Increased urine uric acid (uricosuria)	Tubular reabsorption defect (Fanconi syndrome)
	Multiple myeloma, lymphoma
	Lesch-Nayhan syndrom
Decreased urine uric acid	Kidney disease



# -Gout:

- Excess **monosodium urate crystallizes** and deposits (needle like crystals) in the joints, soft tissues, and organs.
- This will lead to inflammation of tissues → **This inflammation is responsible for the crisis symptoms acute gouty arthritis.**



monosodium urate crystals

## Notes:

- Hyperuricemia **does not** always lead to gout. Less than 20% of cases develop into arthritic gout disease.
- Uric acid level is just one of several criteria necessary for diagnosis.
- Blood test results can be misleading, though → Some people have high uric acid levels, but never experience gout, and some people have signs and symptoms of gout, but don't have unusual levels of uric acid in their blood.

# Practical Part

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## -Objective:

- To estimate the amount of uric acid in blood by using uric acid liquicolor kit.

## -Principle:

- Kit contains:

-The enzyme reagent used includes: buffer, uricase, peroxidase, 4-Aminophenazone and DCHBS.

1. Uric acid in the sample oxidized by **uricase** to allantoin and hydrogen peroxide.



2. Hydrogen peroxide reacts with 3,5-Dichloro-2-hydroxybenzene-sulfonic acid (DCHBS) and 4-aminophenazone (PAP) in the presence of **peroxidase** (Hydrogen peroxide oxidoreductase ) to yield a red-violet quinoneimine dye (**chromogen**). The intensity of the dye is measured at 520nm and it is directly proportional to the concentration of uric acid present in the sample.



# -Materials:

- Uric acid liquid (QCA) kit.

# -Method:

	Blank	Standard	Test
Buffer	1ml	1ml	1ml
Standard	—	0.02 ml	—
Sample	—	—	0.02 ml

1. Water bath at 37°C for 5 min.
2. Read absorbance at 520 nm.

# -Calculations:

- $\frac{\text{Absorbance of sample}}{\text{Absorbance of standard}} \times \text{concentration of standard (8 mg/dl)}$
- **Reference value in serum:**
- Serum: 2.5–7.0 mg/dL
- Urine: 250 –750 mg/24 hour

# References:

- Bobulescu, I. A., & Moe, O. W. (2012). Renal Transport of Uric Acid: Evolving Concepts and Uncertainties. *Advances in Chronic Kidney Disease*, 19(6), 358–371. <http://doi.org/10.1053/j.ackd.2012.07.009>.
- A Manual of Laboratory and Diagnostic Tests 9th edition (January , 2014), Frances T Fischbach RN, BSN, MSN By Lippincott Williams & Wilkins Publishers.