

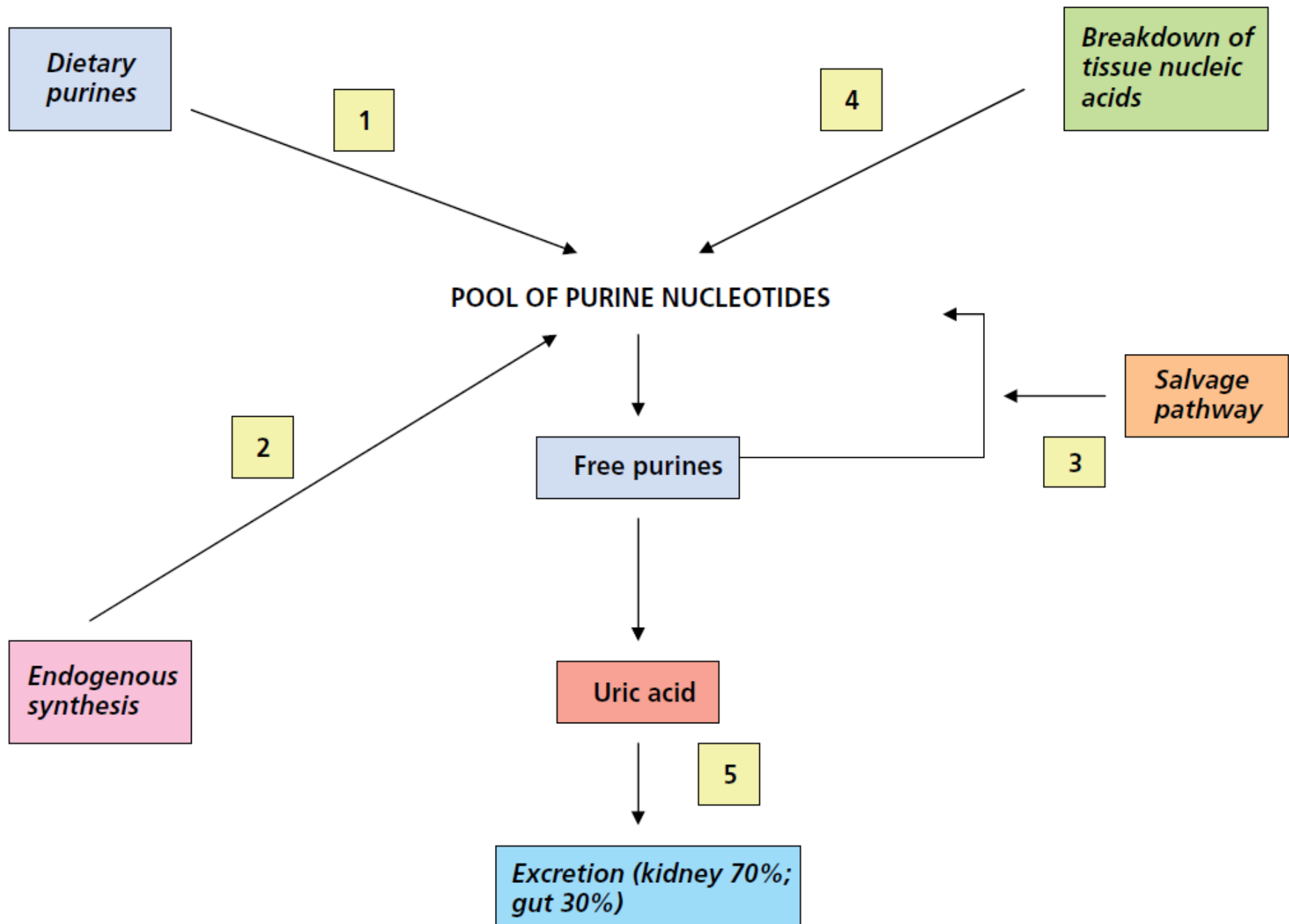
Biochemistry

Estimation of uric acid level in the
blood

Third Stage

Second Semester

Uric acid is a natural waste product created during the breakdown of *purines*, which are found in various foods and cells throughout the body. Once formed, uric acid is formed in the *liver* and then carried in the bloodstream to the *kidneys*, where it is filtered out and eventually excreted in the urine.



Excess levels of uric acid in the body can lead to health issues such as *gout* where uric acid crystals form in the joints, causing pain and inflammation. It can also contribute to *kidney stones* if crystals form in the kidneys.



What are the causes of high levels of uric acid in the blood ?

A high serum urate, called hyperuricaemia is a result of

- excessive formation*
- reduced excretion*
- a combination of both*

Other factors that influence levels of uric acid :

***Sex:** Serum levels are higher in males than in females.*

***Obesity:** Levels tend to be higher in the obese.*

***Diet:** Serum urate rises in individuals taking a high-protein diet (especially meat or seafood), High alcohol consumption and fructose-containing beverages. Dairy foods and coffee drinking appear to lower urate when examined in epidemiological studies.*

***Social class:** The more affluent social classes tend to have a higher serum urate.*

Genetic factors.

PRINCIPLE

Uric acid is oxidized by uricase to allantoin with the formation of hydrogen peroxide. In the presence of peroxidase (POD), a mixture of dichlorophenol sulphonate (DCBS) and 4-aminoantipyrine (4-AA) is oxidized by hydrogen peroxide to form a quinoneimine dye proportional to the concentration of uric acid in the sample.

Uricase



POD



H₂O

Allow the test, specimen, and/or controls to reach room temperature prior to testing

1. Pipette into labeled tubes:

	Blank	Sample	Standard
Reagent	1 ml	1 ml	1 ml
Sample		20 µl	
Standard			20 µl

2. Mix and let the tubes stand 10 minutes at room temperature or 5 minutes at 37 ° C.

3. Read the absorbance (A) of the samples and the standard at 520 nm against the reagent blank.

The color is stable for at least 30 minutes protected from light.

Calculations

Serum or plasma:

$$\text{Uric acid (mg/dl)} = \frac{\text{A Sample}}{\text{A STD}} \times \text{C-STD} = \text{mg/dL}$$

Urine:

$$\text{Uric acid (mg/24h)} = \frac{\text{A Sample}}{\text{A STD}} \times 600 \times \text{L/24h} \times 10 = \text{mg/dL}$$

❖ Samples with concentrations higher than 30 mg/dL should be diluted 1:5 with saline and assayed again.

Normal ranges

Serum, plasma

Men	3.5 - 7.2 mg/dL (208 - 428 $\mu\text{mol/L}$)
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Women	2.6 - 6.0 mg/dL (155 - 357 $\mu\text{mol/L}$)
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Urine	0.5-2.0g/24h.
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