NATIONAL UNIVERSITY OF PHARMACY

DEPARTMENT OF PATHOLOGICAL PHYSIOLOGY

FEVER

PLAN OF LECTURE

1. Definition of fever, etiology.
2. Stages of fever.
3. Changes in organs and systems, compensatory and adaptive mechanisms.
4. The biological significance of fever. The concept of pyrogenotherapy.

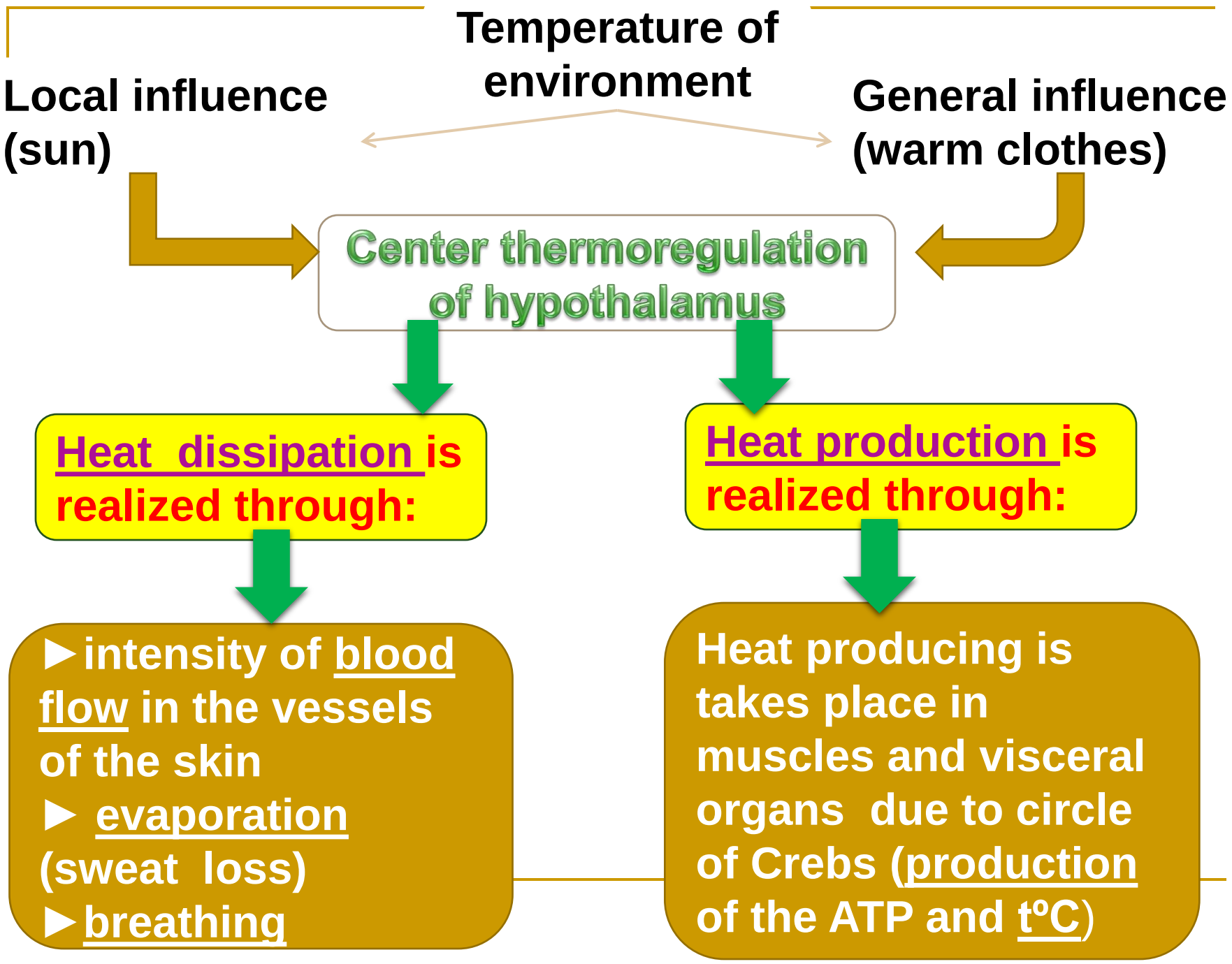
Suggested Reading

Basic

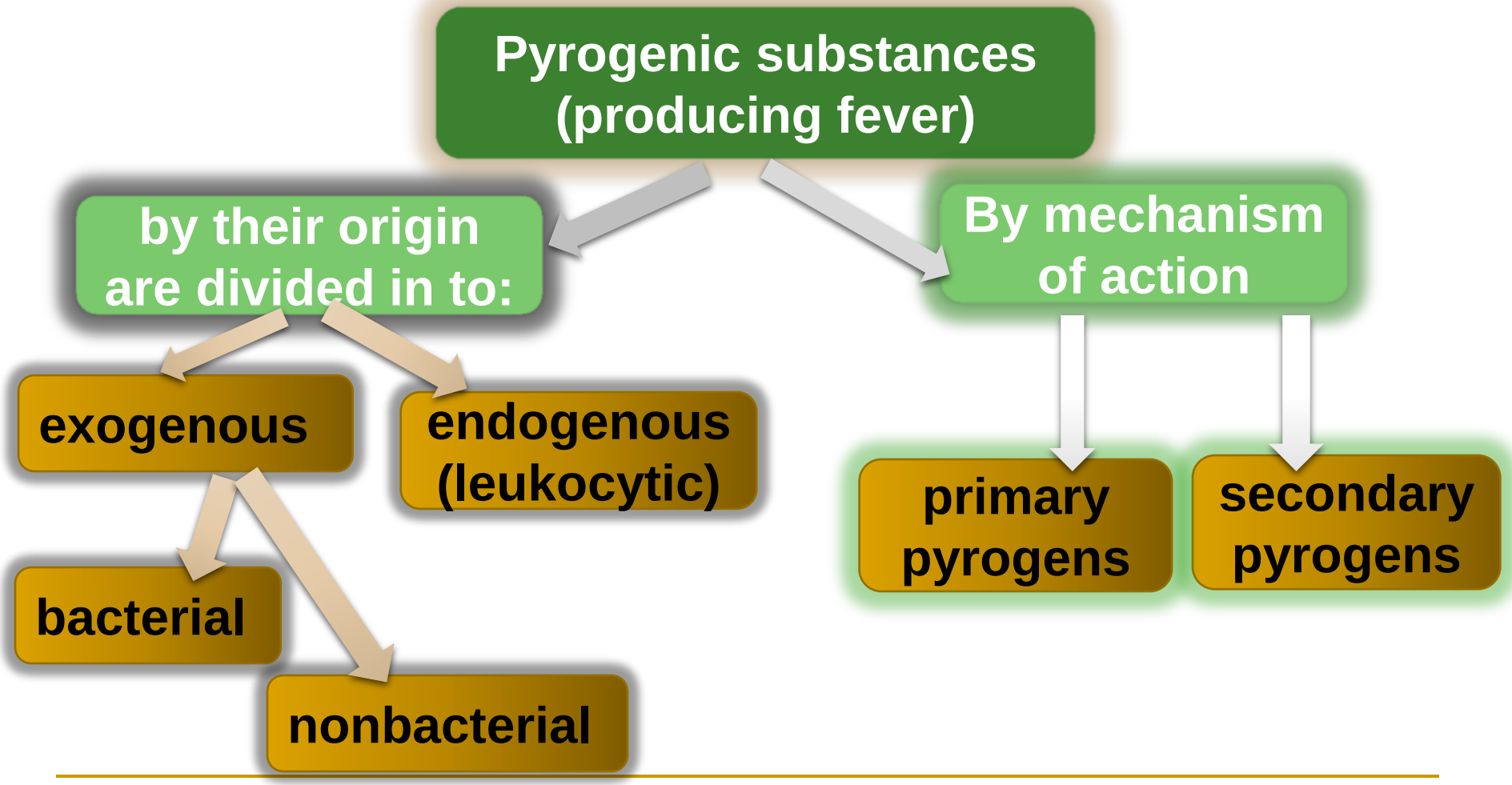
1. General and clinical pathophysioilogy/ Editer by Anatoliy V. Kubyshkin. – Vinnytsa : Nova Knyha Publishers, 2016. – 656 p.
2. Lecture notebook pathological physiology. Manual for working in lectures / N.M. Kononenko, S.I. Kryzhna, V.A. Volkovoy at al.; Kh.: NPhaU, 2013. – 99 p.
3. Pathological Physiology: The textbook for the students of higher pharmaceutical educational institutions and pharmaceutical faculties og higher medical educational institutions III-IV levels of accreditation / S/I/ Kryzhna, N.M. Kononenko, I.Yu. Tishenko et al.: under edition of the professor A.I. Bereznyakova. – Kharkiv: NphaU, 2006. – 416 p.

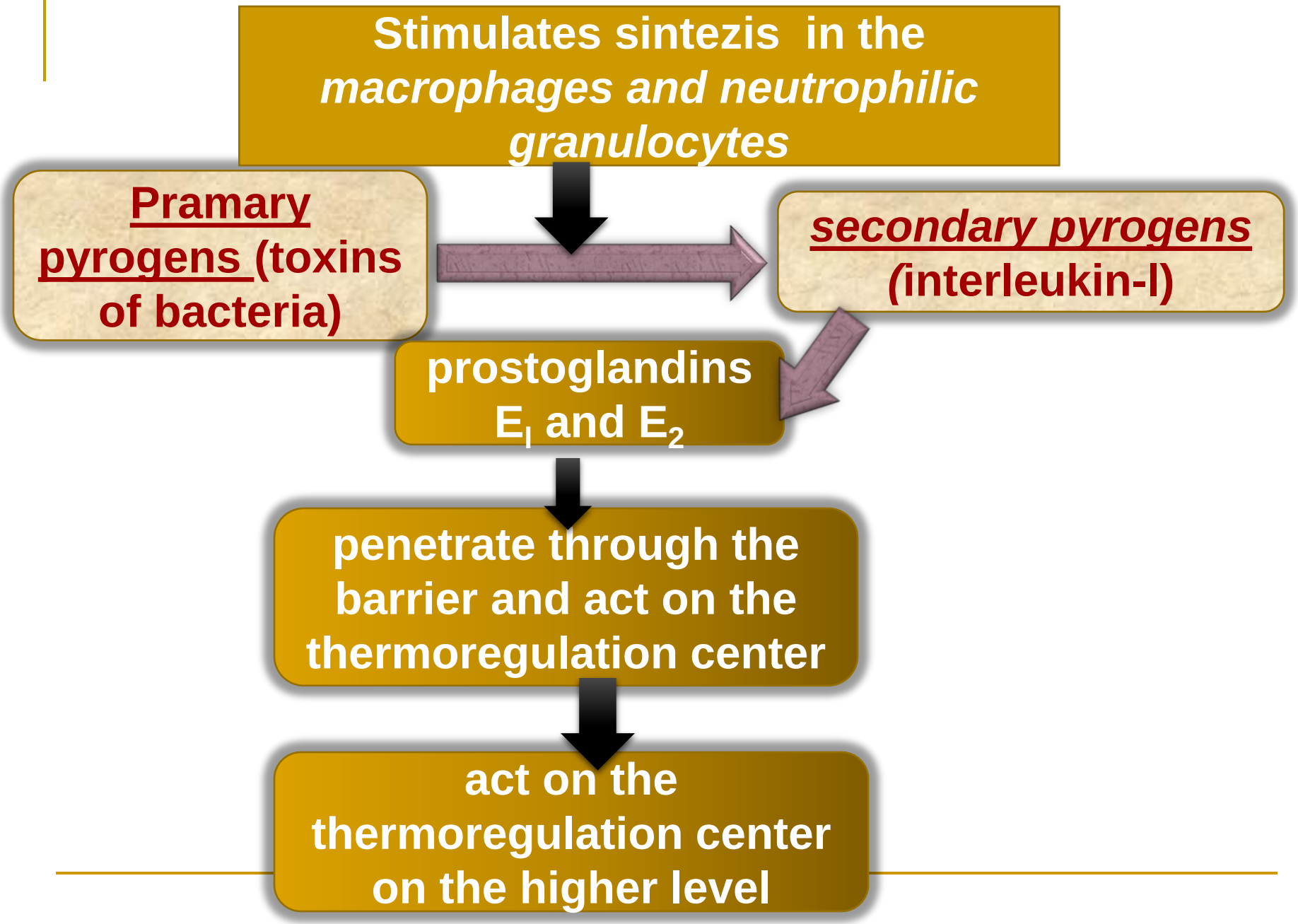
Auxiliary

1. Professional guide to Pathophysiology / M.H. Birney, C. L. Brady, K.T. Bruchak et al. – Lippincott Williams and Wilkins. – 2002. – 696 p.
2. Crowley L.V. An introduction to human disease: pathology and pathophysiology correlations / L.V. Crowley . – London : Lones and Bartlett Publishers International Bard House. 2001. – 790 p.

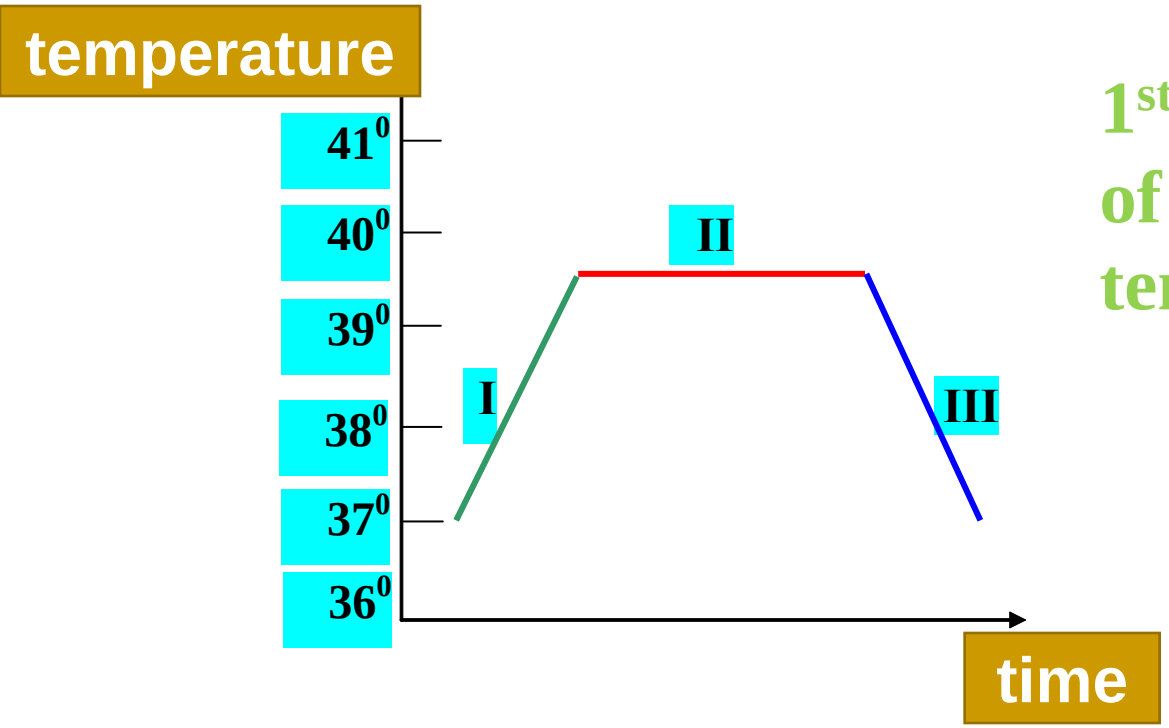

Temperature of environment
Local influence (sun)
General influence (warm clothes)
Center thermoregulation of hypothalamus
Heat dissipation is realized through:
Heat production is realized through:
►intensity of blood flow in the vessels of the skin
► evaporation (sweat loss)
►breathing
Heat producing is takes place in muscles and visceral organs due to circle of Crebs (production of the ATP and tºC)

Fever is a typical pathological process developing as result of changes of thermoregulation and characterized increase of body temperature




Stimulates sintezis in the *macrophages and neutrophilic granulocytes*
Pramary pyrogens (toxins of bacteria)
secondary pyrogens (interleukin-l)
prostoglandins E_1 and E_2
penetrate through the barrier and act on the thermoregulation center
act on the thermoregulation center on the higher level

Stages of the fever



1st stage: increasing of the body temperature

The IInd stage: stable high level

The IIIrd stage: decreasing of the body temperature

The 1st stage: increasing of the temperature.

Heat production is higher than heat emission

- Heat emission decreases due to contraction of peripheral vessels, the decrease of blood flow in the tissues, inhibition of sweating, depression of evaporation.
- Heat production takes place in muscles and visceral organs. Heat producing increases due to activation of metabolism in the muscles, muscular tremor occurs (spasm of peripheral vessels). Due to decrease of blood flow the temperatures of the skin is decreases too. Thermoreceptors are exited and the feeling of cold arises.

The 2nd stage: stable high level.

After the temperature increase at the 1st stage it keeps at this level for some time (for hours or days).

Heat production is equal to heat emission

Forms of fever depending on increase in the temperature

- ***Subfebrile*** – 37-37.9 °C;
- ***Moderate*** – 38.0-38.9°C;
- ***High*** -39.0-41 °C;
- ***Hyperpyretic*** - higher than 41°C;

The 3rd stage – decreasing of the temperature.

Heat emission is higher than heat production

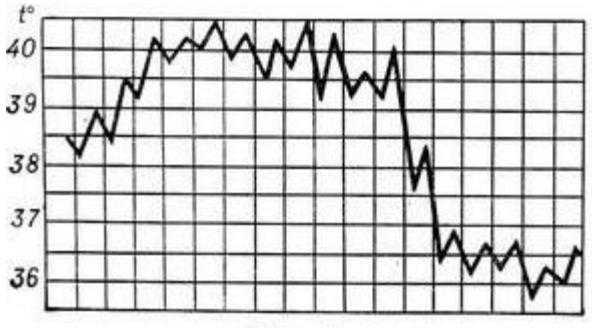
After the pyrogen action stops the thermoregulation center comes to its previous normal condition. The heat that accumulates in the body is relieved by heating, frequent respiration and dilating of the skin vessels.

Decreasing of the temperature can be

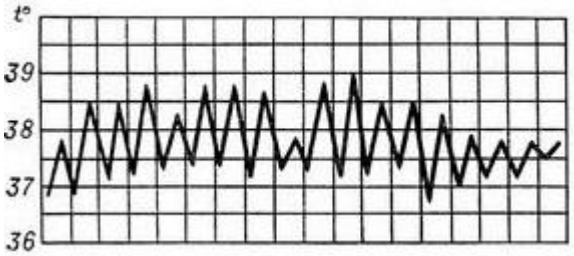
- ***lytic*** (few days)
- ***critical (few hours)***

Distinguish the following types of fever:

1) *Constant fever* — daily fluctuations of the temperature is not higher than 1°C (pneumonia, typhoid fever, neoplasma)

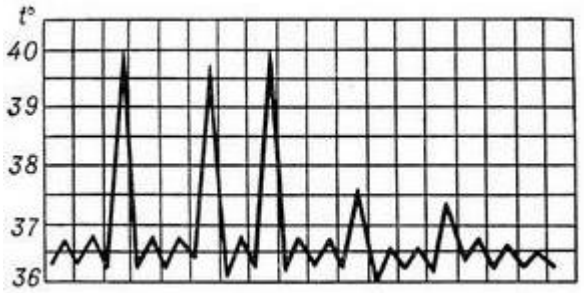


2) *Remittent fever* — daily fluctuations of the temperature is 1,5-2,0°C, but it doesn't touch normal (bacterial and virus infections, tuberculosis).

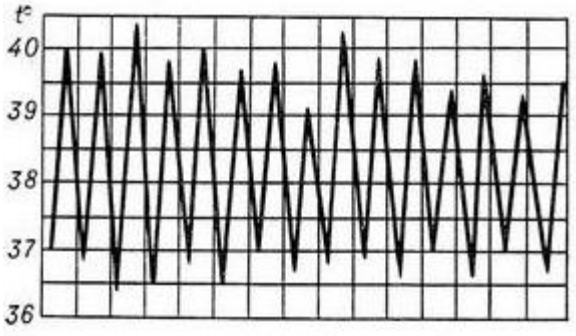


Distinguish the following types of fever:

3) *Intermittent fever* — fluctuation is higher than 2,0°C, but in the morning it gets to the standard and lower ones (lymphoma, wound infection).

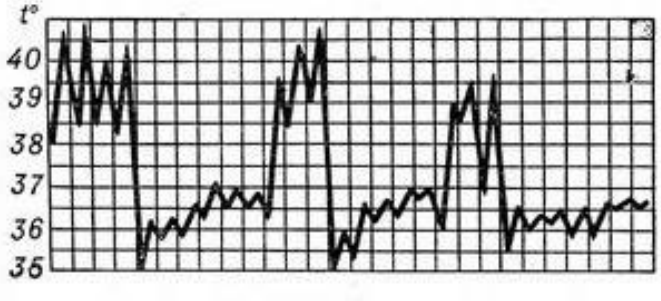


4) *Hectic fever* — fluctuation of the temperature from 3,0 to 6,0°C (causative agent: sepsis, wound infection).



Distinguish the following types of fever:

5) *Recurrent fever* — the temperature may fluctuate from high to standard condition, and these periods of high and standard temperature can last from one to several days.



6) *Atypical fever* — irregular daily temperature fluctuations (sepsis).

7) *Inverted fever* — body temperature in the morning is higher evening level (septic processes, tuberculosis)

Hyperthermia and its difference from fever

- We should distinguish hyperthermia (heart stroke) from fever. The mechanisms of these conditions are absolutely opposite.

Firstly, during hyperthermia the influence of pyrogens is absent and the increase of body temperature can be the result of an external action, which limits heat dissipation or primary disturbance of the hypothalamus thermoregu-lation center.

Pyrotherapy

- **There is method of treatment by artificially increased temperature of the body due to pyrogens. It represents a polysaccharide complex, secreted from cellular membranes of the gram-negative bacteria.**
- **Pyrotherapy is used for the intensification of the reparative process after trauma, healing of cuts, in nervous diseases. Likewise nonspecific effects of pyrotherapy are used for the treatment of the sexually transmitted diseases (STD's), e.g. gonorrhea, late stages of syphilis.**

Thanks for attention!