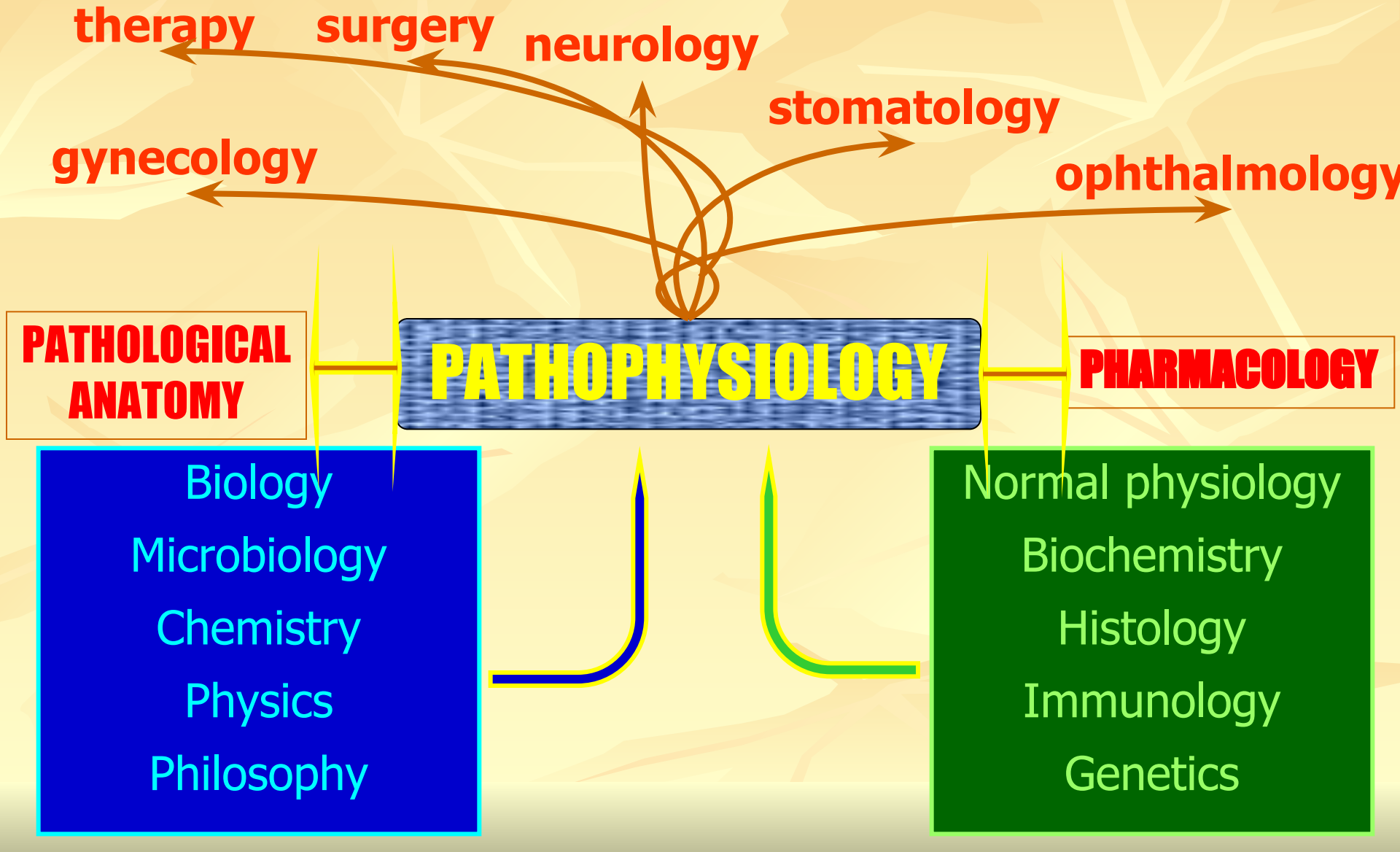
Pathophysiology

The interrelations between Pathophysiology and other medical disciplines



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Pathophysiology

- PATHOS – disease
- PHYSIS – essence
- LOGOS – knowledge

Science studying the basic patterns of occurrence, development and outcome of disease

Pathophysiology tasks

- Creation of the disease general conception (general nosology)

Study of :

- reasons and conditions of disease development (general etiology)
- general mechanisms of disease development (general pathogenesis)
- typical pathological processes which form the basis of the disease in different combination

Experimental therapy

Working out of new methods of diseases treatment and prophylaxis

- **Sanogenesis** – mechanism of recovery
  SANOS – health GENESIS – origin

sanogenic therapy – type of pathogenetic treatment (medicines, IR-rays, hypoxia, physical loading, starvation, normalization of mental state).

The main methods of Pathophysiology

- Experimental modelling of:
  - pathologic processes on animals;
  - protective and adaptive reactions on animals and humans;
- Types of experiments:
  - acute (vivisection) – collapse, shock, renal failure
  - chronic – atherosclerosis, arterial hypertension

Pathophysiological experiment

It includes four stages:

- Planning the experiment;
- Carrying out of experiment (modelling and obtaining results);
- Statistic analysis of observations;
- Formulating the conclusions.

The main methods of Pathophysiology

- **Physical and mathematical modelling**

- Clinical examination of various diseases with different tests (**clinical pathophysiology**)
  - to reveal specific features of a disease in a certain patient
  - to increase effectiveness of treatment

Scientific work of department

- neuro-endocrine mechanisms of endocrine pancreas regulation
- the role of hypothalamic neuro-hormones in diabetes mellitus pathogenesis
- new methods of treatment and prophylaxis of diabetes mellitus and prevention of its complications
- pathogenesis of arterial hypertension

Pathogenesis is the study of general mechanisms of diseases onset and development.

The role of etiologic factor in disease development

- Etiologic factor can "**switch**" some diseases (radiation sickness, myocardial infarction).
- Etiologic factor can be **constantly present** in the organism (insulin deficiency in diabetes mellitus).
- The role of etiologic factor in chronic infectious diseases **changes according to the stage of disease**

The main link of pathogenesis

- The main link of pathogenesis is that process that is absolutely important and underlies disease development.
  - Allergy – release of biologically active substances and their influence on tissues (histamine and others)
  - Atherosclerosis – accumulation of lipids inside the vessel wall

The role of local and general changes in the organism

- **Local changes** may **start the disease** (trauma, burns) and then become the part of organism's general reaction to injury.
- **Local changes** may **appear after** the development of disease's **general signs** and symptoms.

The role of pathogenic and adaptive reactions during disease development

- Pathogenesis of all the diseases and pathological processes includes **both pathological and adaptive** reactions.
- **Their combination**, importance and the level of expression **widely vary** even in the patients with the same pathology.

The difference between disease and pathological process

	Pathological process	Disease
Reason	many, different	one
Manifestation	cite of pathological process location determines which disease will occur	
Mechanism	one mechanism of process	includes mechanisms of many pathological processes
Decrease of working ability	might be absent	usually present

Civilization (lifestyle) diseases

- Positive consequences of civilization: resistance to infections, increased life duration.
- Negative consequences: ↑ amount of meat and lipids in food, hypodynamia, smoking, stresses.

- Civilization diseases: circulatory and respiratory system diseases, atherosclerosis, malignant neoplasms, diabetes, allergy etc.

Causality-effective relations in pathogenesis

- **Direct raw of events**

heat increases cell's metabolism ⇒

accumulation of suboxidised substances ⇒

organism's intoxication ⇒

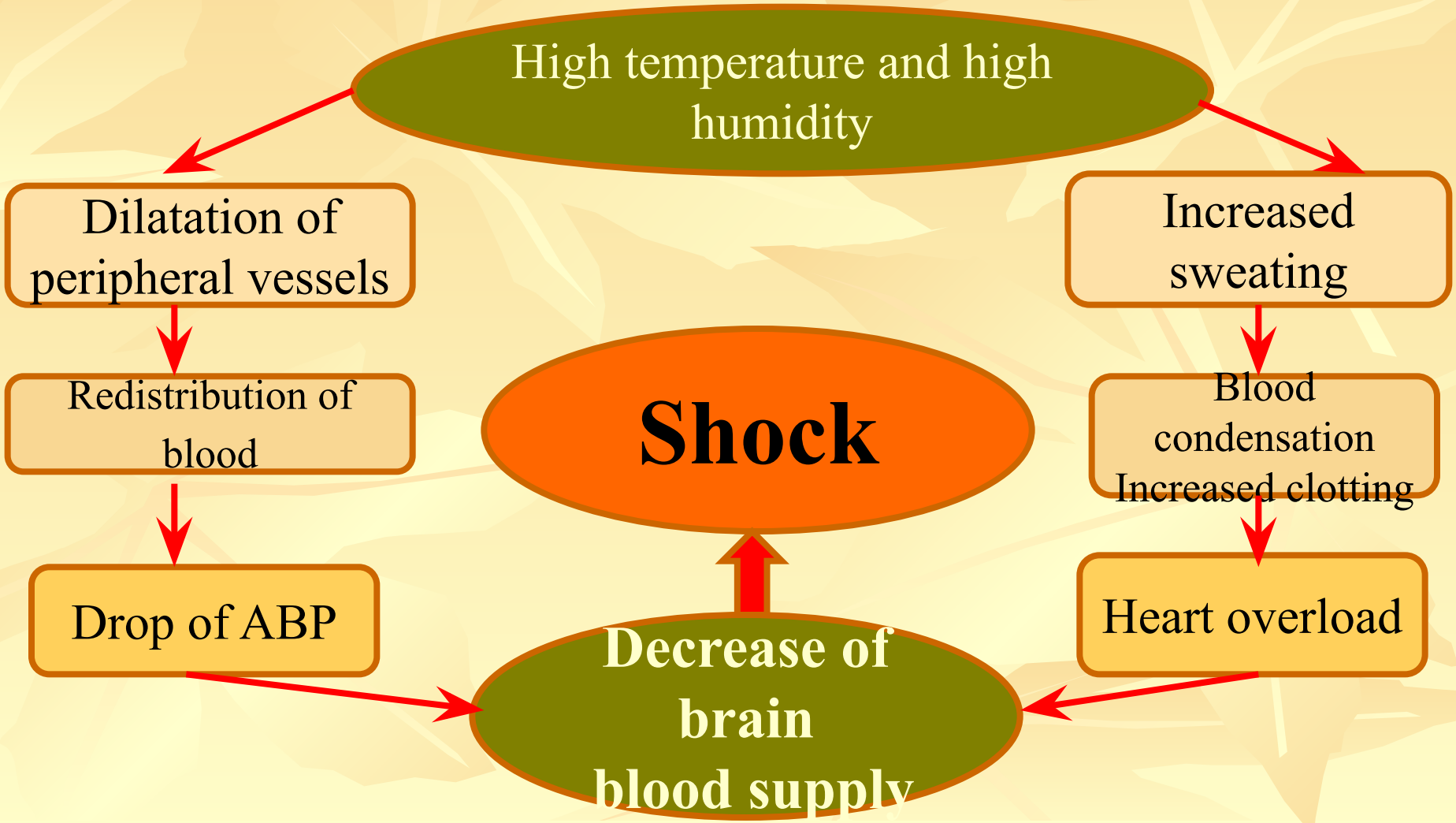
irritation of chemoreceptors ⇒

alteration of CNS neurons function ⇒

heat shock development.

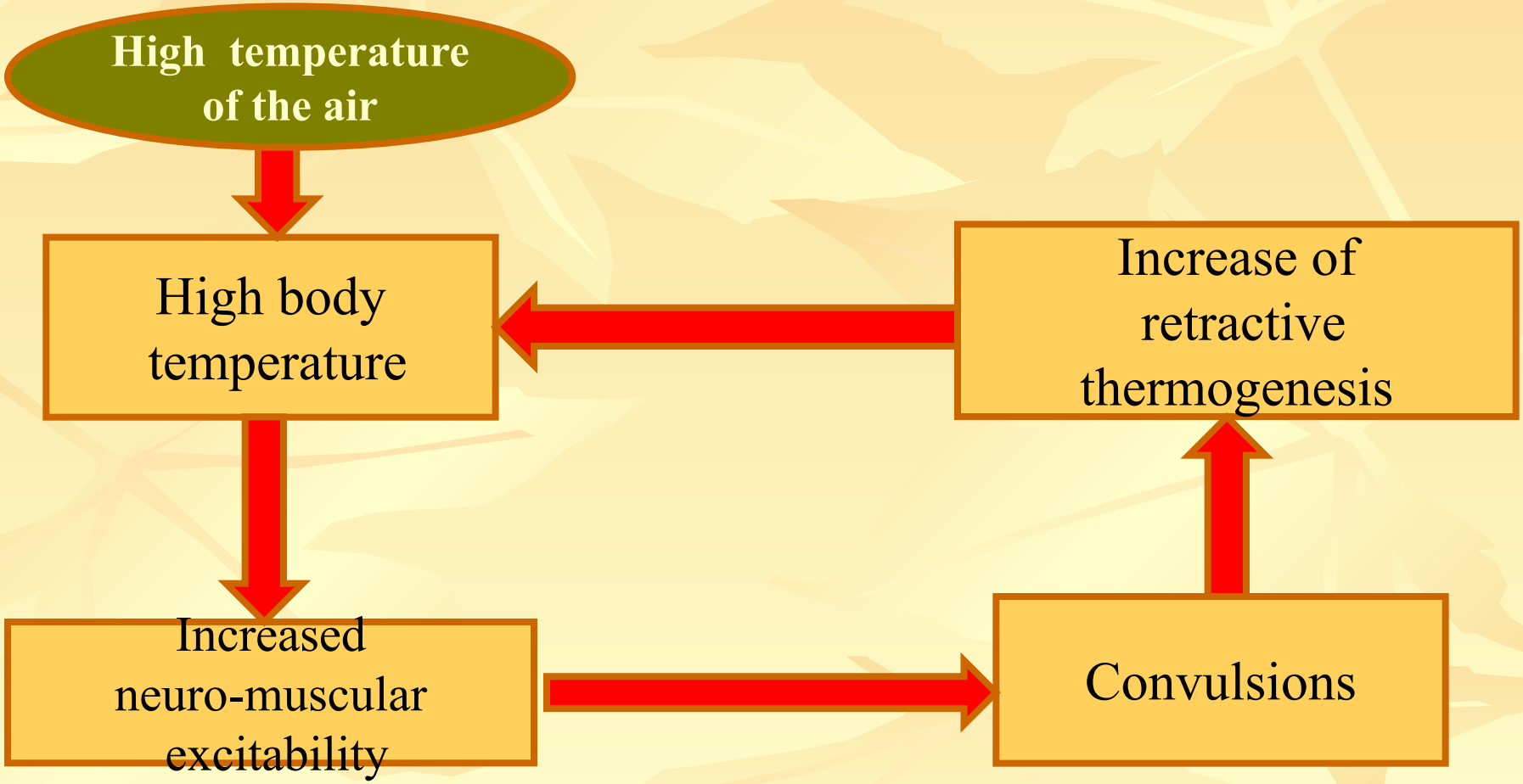
Causality-effective relations in pathogenesis

- **Divaricated type of events**

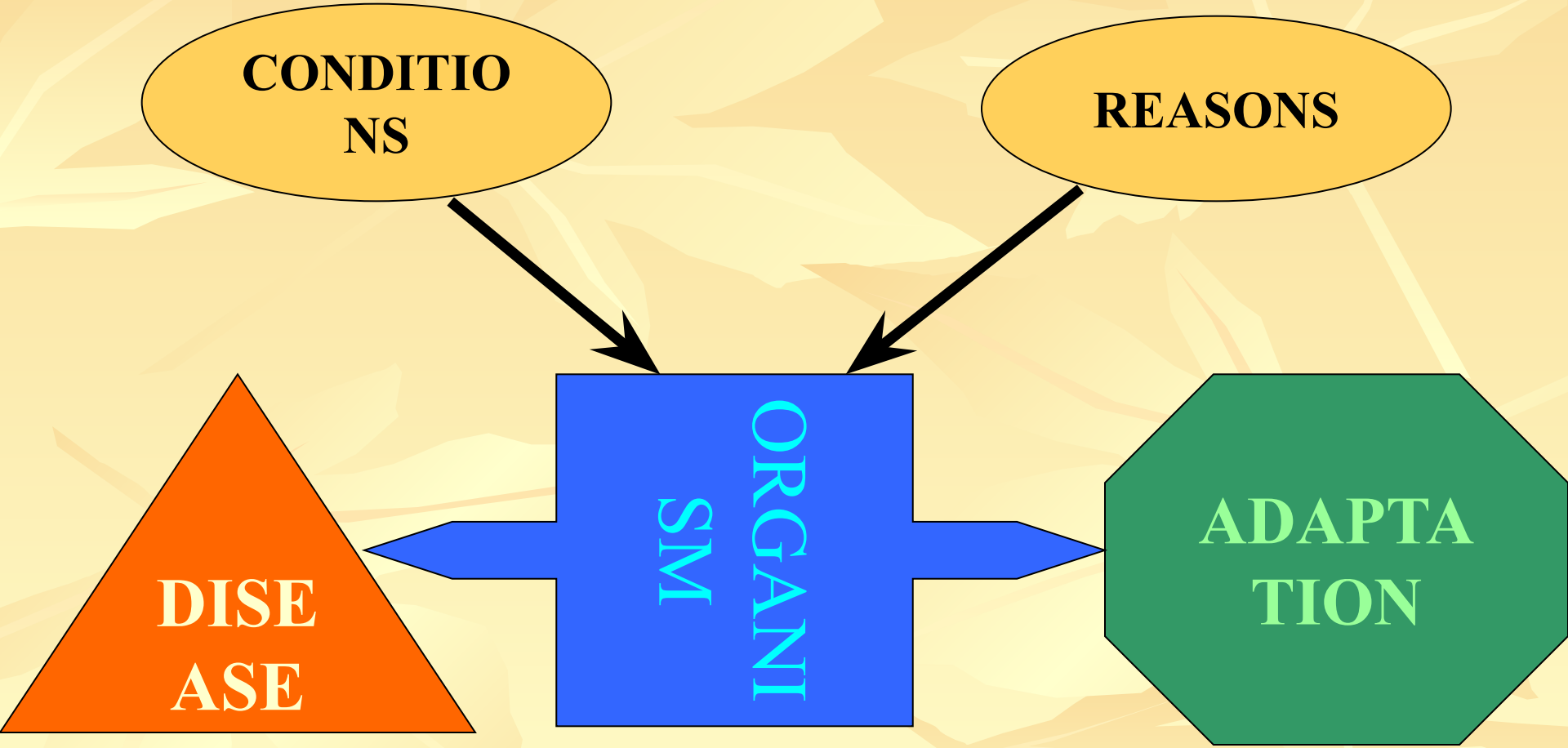


Causality-effective relations in pathogenesis

- **Vicious circle**



Why disease develop



Organism responce

- **Reactivity** - ability to respond to internal and external factors.
- **Resistance** - stability of the organism to the action of unfavorable factors.
- Relationship

Normally - direct dependence

irregular dependence:

 reactivity resistance – allergy

 reactivity resistance – in hibernating animals

Types of reactivity

- **Levels:** normal, increased, low, absent (anergy)
- **Species reactivity** (fish, bird, rat, dog, human)
- **Group reactivity**
  - Age-related (newborns, children, old people)
  - Sex-related
  - Constitution-related (asthenic, hyperstenic)
- **Individual reactivity**

Types of resistance

- **Passive resistance** – barrier systems, bactericidial agents, inborn immunity.
- **Active resistance** – adaptative and compensatory mechanisms.
  - Compensatory reaction – to restore the homeostasis and decrease the injury
  - Adaptation –organism is adapted to environment
- **Cross-resistance**: the development of resistance to one factor is accompanied with the stability to another factors (conditioning to cold, hypoxia)

Mechanisms of reactivity and resistance formation

- **General mechanisms** – influence of CNS, ANS, and endocrine system.
- **Non-specific mechanisms** include: phagocytosis, barrier systems of the body and humoral substances (lysozyme, complement)
- **Specific mechanisms** are provided by immune humoral and cell-mediated reactions.