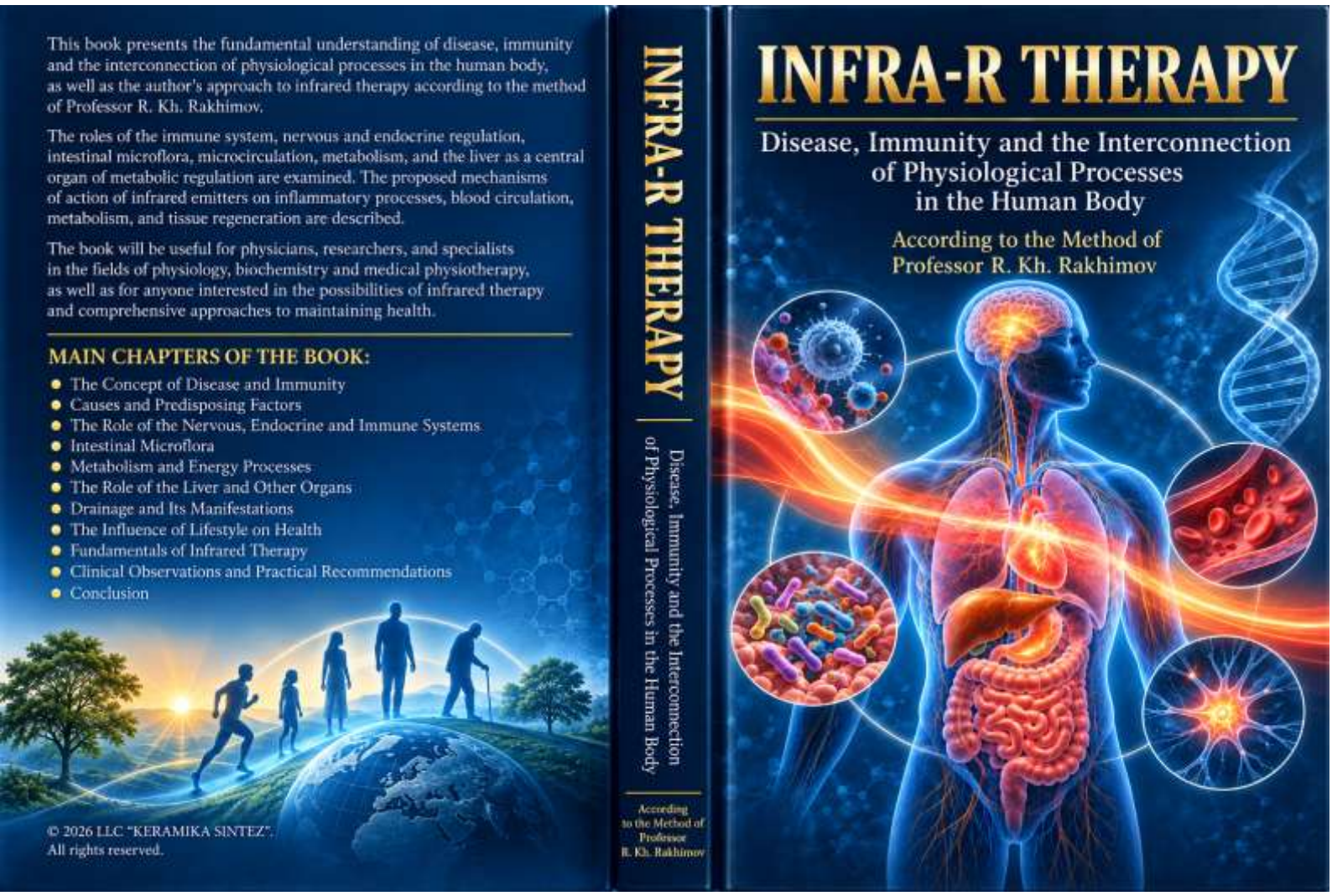


INFRA-R THERAPY

Disease, Immunity, and the Interrelationship of Physiological Processes in the Body According to the Method of Professor R. Kh. Rakhimov

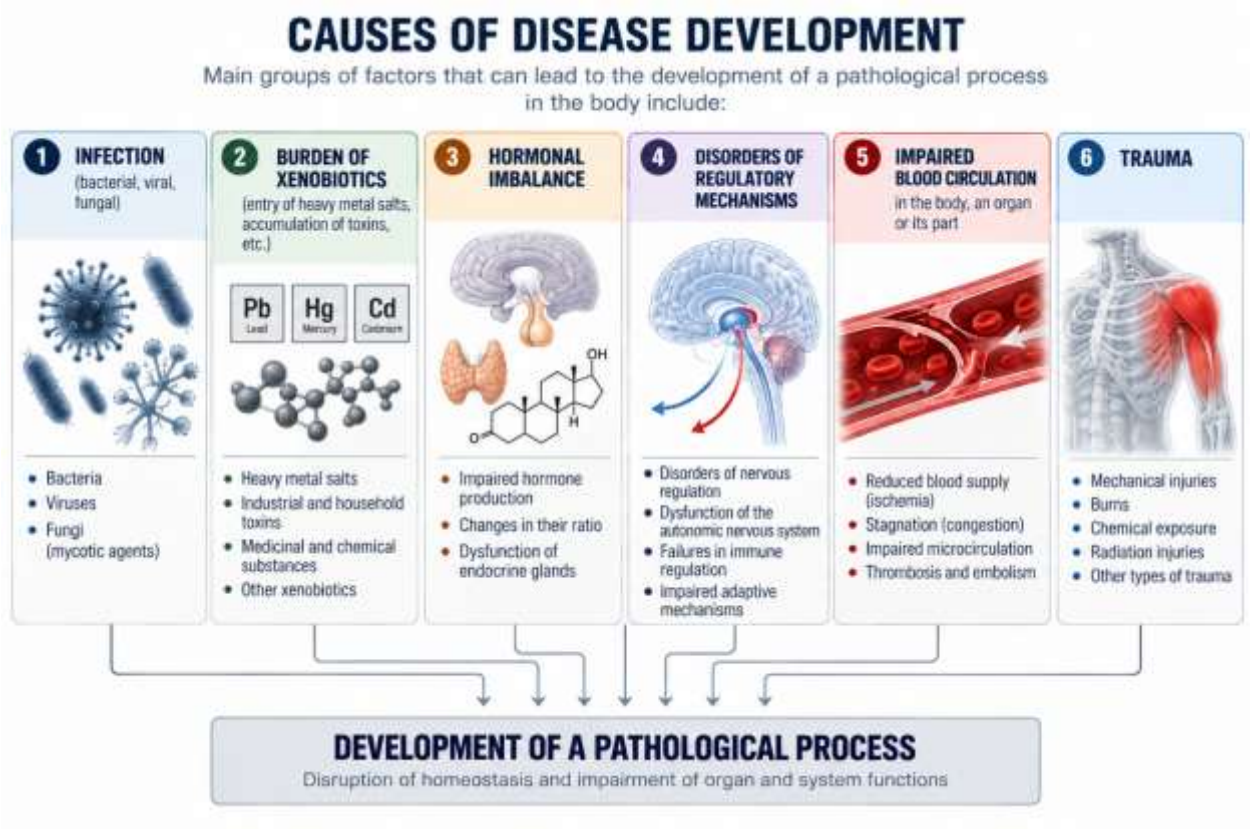
THE CONCEPT OF DISEASE AND IMMUNITY

Disease is a response of the body that develops when pathogenic factors enter the organism and is aimed at restoring homeostasis.

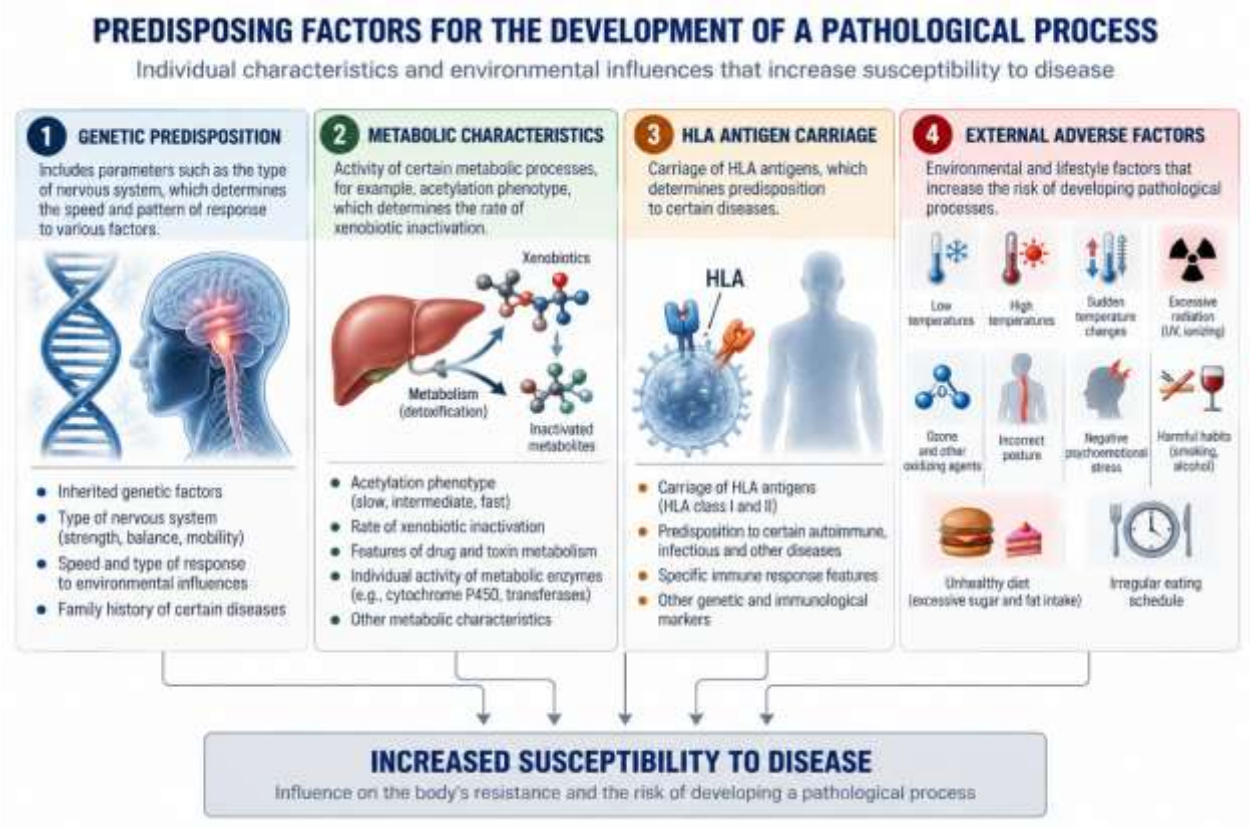
What causes can lead to the development of a pathological process?

In acute diseases, clinical manifestations reflect the cause of their onset. In chronic processes, the underlying cause generally becomes less prominent in the clinical manifestations or becomes asymptomatic. The patient presents complaints that are more closely associated with the consequences of the primary insult. In any case, effective treatment can be achieved only by eliminating the underlying cause of the disease.

The causes of disease may include:



Predisposing factors in the development of a pathological process include:



It is well known that the decisive factor in the development of a disease is the state of the body's immune system. The state of immunity determines the body's resistance to the effects of foreign agents. All the body's response reactions to external and internal stimuli are controlled by the nervous system. It precisely identifies the nature of a stimulus and determines how our

metabolism must change to resist, neutralize, destroy, compensate for, or eliminate the irritating agent from the body (infection, toxins, restoration of processes disrupted by psychoemotional stress, etc.).

In response to a stimulus, the nervous system triggers the release of hormones and enzymes, causes vascular spasms, stimulates antibody production, and initiates other reactions. If a stimulus has a strong effect on metabolism, the body produces more components than necessary, forcing the nervous system to neutralize the excess substances produced.

When a stimulus is continuous and its intensity changes chaotically, the processes of producing active substances, destroying them, and triggering excitation responses occur repeatedly and chaotically as well.

When there are too many destabilizing factors, such as various infections, toxins, heavy metal ions, and especially negative psychological influences, our nervous system becomes disrupted because it enters a state of conflict: it must produce active substances, immediately destroy them, and remain ready to produce new ones whenever necessary.

Specifically, the production and release of these active substances into the bloodstream essentially constitute the immune system's response. Their destruction when they are no longer needed is also a function of the immune system. Under such contradictory conditions, its functioning becomes severely disrupted. This is expressed as reduced activity of the sympathetic nervous system, which may, for example, lead to decreased steroid levels or contribute to the development of autoimmune processes.

Based on the above, it can be concluded that all processes aimed at restoring and maintaining dynamic homeostasis collectively constitute immunity.

INTESTINAL MICROFLORA

One of the essential conditions for the absence of pathology is a normal intestinal microflora. In all patients, without exception, with oncological, cardiovascular, allergic, endocrine, and skin diseases, as well as wound suppuration, mastitis, peritonitis, gangrene, and other conditions, disturbances in the microflora of the small and large intestines have been observed. It is often impossible to restore the balance of the autonomic nervous system without normalizing intestinal function.

Following chemotherapy or radiation therapy, a complete disruption of the intestinal microflora and, consequently, its function is observed. In such cases, the use of the GI emitter reportedly allows intestinal function to be restored within 5–15 days after chemotherapy, with daily treatment three times a day for 10 minutes per session, and within 30–90 days after radiation therapy using the same treatment schedule. In patients who have not received other forms of therapy, normal intestinal function can reportedly be fully restored within 1–2 days. Patients who had suffered from allergic diseases for many years reportedly achieved complete recovery in 95% of cases after intestinal function was normalized. More than half of the patients with psoriasis and other skin diseases also reportedly recovered after normalization of intestinal function. Patients with hypertension or hypotension, as well as those with impaired cholesterol metabolism, reportedly recovered in 90% of cases following normalization of intestinal function and the use of Z-series emitters to remove pathological tissue and normalize blood flow. Our observations indicate that effective treatment of virtually all pathologies, at least over the long term, is impossible without normalizing intestinal function.

Normal intestinal microflora produces vitamins and enzymes essential to the human body. Its composition determines the condition of the intestinal barrier function and the activity of antibody production in the lymph nodes located along the intestinal wall. Changes in the quantitative and qualitative composition of the intestinal microflora, as well as alterations in its localization, may cause various diseases and a decline in immunity.

Every physician's goal is to eliminate pathogenic infections while preserving and restoring beneficial microflora with the appropriate composition and concentration. Antibiotics can destroy

a significant proportion of pathogenic flora but may also severely disrupt the body's beneficial microflora. The GI emitter generates infrared energy with a specific spectrum and temporal parameters that, according to the described method, eliminate pathogenic flora. Beneficial microflora is claimed to survive because its absorption spectrum is similar to that of our own tissues, while the radiation used reportedly exerts a bacteriostatic rather than a bactericidal effect on normal microflora.

The human body coexists with a large number of microorganisms without suffering any harm; on the contrary, many of them provide benefits, such as lactic acid bacteria that help process the residues of digested food. Different bacterial species compete with one another and may destroy each other, including disease-causing bacteria, thereby limiting the proliferation of other species. Against the background of this vast community of microorganisms coexisting with one another and with the human body, pathogenic microorganisms are the exception rather than the rule. Moreover, bacteria of the same species may include both pathogenic and harmless strains. The concept of microbial pathogenicity is relative; nevertheless, pathogenic microorganisms do exist and can damage tissue cells through their interactions with them, triggering pathological reactions. In reality, most microorganisms are opportunistic pathogens, as illustrated by tuberculosis bacilli.

Harmless microorganisms can cause pathology under certain conditions, and the reverse is also possible. For example, the fungus Candida, which is part of the normal flora of the oral cavity, may proliferate extensively when antibiotics eliminate most competing microorganisms. In the absence of competition, this can lead to severe fungal infections of the digestive tract.

Another factor that increases the risk of intoxication by metabolic waste products and contributes to the development of disease is impaired microcirculation, which leads to blood and lymph stagnation. This, in turn, disrupts the normal nourishment of tissues and organs and promotes intoxication, since all the materials required for tissue growth and energy production are delivered by the blood, while metabolic waste products are eliminated from the body through the blood and lymph.

Normalization of these intestinal functional disturbances is a necessary stage in the treatment of a wide range of diseases.

Intestinal microflora is normalized by applying the GI(s) emitter to the abdominal area, rotating the emitter around the navel. The procedure is performed simultaneously with a gentle intestinal massage. The massage consists of circular movements with light pressure along the course of the intestine. Care must be taken to ensure that the emitter's beam falls on the patient's abdomen rather than on the physician's hand.

WOUNDS

A wound is mechanical damage to the skin or mucous membrane. Although wounds have been treated since ancient times, there is still no universally accepted theory of wound treatment. One hundred years ago, microorganisms were isolated from wounds, and since then, wound suppuration has been regarded as an infectious complication. Consequently, the same measures used to treat infectious diseases have been applied to prevent and treat it: protecting the body from contact with pathogens and destroying microbes.

Antisepsis played a decisive role in the development of modern surgery. Sterile instruments and surgical linens, the disinfection of the surgeon's hands, and the preparation of the surgical site have all made it possible to sharply reduce the incidence of postoperative suppuration. Numerous bactericidal agents have been developed. Nevertheless, when treating wounds that are not sterile, as in an operating room, but already infected accidental wounds, these agents have failed to meet expectations.

The discovery of sulfonamide drugs and antibiotics revived the long-standing hope of defeating infection. Initially, progress seemed promising: postoperative complications, particularly fatal ones, did indeed become less frequent. However, as these drugs came into wider use, the

incidence of suppuration once again reached levels seen at the beginning of the twentieth century, and the mortality rate associated with sepsis has reportedly reached 80%.

It is necessary to consider that infectious agents constantly mutate and adapt to external influences. In the past, boiling instruments was sufficient for sterilization, whereas today, even treatment with steam at 132°C or in a dry atmosphere at 160–180°C does not always achieve complete sterilization. Furthermore, instruments may corrode after such treatment, which can lead to undesirable consequences. Other factors must also be considered, including the general deterioration of environmental conditions; impaired circulation due to a sedentary lifestyle and disturbed cholesterol metabolism; food intake that is not appropriate for energy expenditure; an unbalanced diet; and disruption of the intestinal microflora, leading to constipation and colitis and the absorption of toxic substances.

The combined effects of these factors may adversely affect the body's immune defenses.

In recent years, reports have increasingly indicated that antibiotics are insufficiently effective in preventing suppuration. They are toxic, may cause severe allergic reactions, and suppress immunity, increasing the risk of particularly severe forms of sepsis.

The fact is that a balance exists in the body between fungal and bacterial microflora. Bacteria destroy fungi, while fungi, in turn, produce antibiotics that act destructively on bacteria. The widespread use of antibiotics has shifted this balance toward fungal microflora, which is why difficult-to-treat fungal diseases are increasingly observed. As is well known, the initial use of a new antibiotic often produces a very strong effect because, in such cases, pathogenic bacteria are indeed the cause of the disease. With subsequent use of the same antibiotic, however, the balance may shift toward fungal microflora, and the disease begins to progress in a more severe form, becoming virtually unresponsive to drug treatment. The body then begins to combat the cause of the now different disease through its own immune system, since the causative agents are no longer bacteria but fungi, and somehow compensates for the toxins produced by the fungal microflora. What are the consequences? They depend on the pathway through which a particular patient can most easily eliminate toxins. In other words, they depend on which type of drainage predominates in that individual. If elimination occurs primarily through the skin, skin diseases such as psoriasis, eczema, and others are most commonly observed. If drainage occurs more readily through the gastrointestinal tract, diseases of the corresponding organs may develop. In most cases, periodontal disease is also considered a form of drainage.

Let us consider psoriasis as an example of skin drainage.

If, initially, in a condition such as psoriasis, the substances being eliminated are produced by bacteria, antibiotic treatment will produce a pronounced positive effect because the antibiotics will destroy the pathogenic bacteria.

After some time, psoriasis reappears in these patients. The physician already knows which medication was effective for the patient and prescribes the same antibiotic again.

However, this time the disease begins to progress rather than improve.

The reason, according to this theory, is that the body is now eliminating substances produced by fungal microflora, as the microbial balance has shifted toward fungi and there are virtually no bacteria left to counteract them.

As an example, consider the treatment of severe psoriasis.

Given the declining effectiveness of antibiotics and similar drugs, surgeons have once again begun using antiseptic agents that had previously been abandoned, including organic and inorganic acids, solutions of potassium permanganate and silver nitrate, and others.

In reality, suppuration resembles an infectious disease such as dysentery. They are similar in several respects, including the obligatory presence of microbes and the possibility of transmitting infection from one patient to another, for example, during dressing changes, a phenomenon known as a hospital-acquired infection. However, significant differences between them are also easy to identify.

Thus, the causative agent of an infectious disease is always highly specific: each infectious disease is caused by its own microorganism, whereas different wounds may contain different

microorganisms. Moreover, several microbial species may sometimes be present in the same wound simultaneously.

If pathogenic microorganisms are detected in a patient, this generally clearly indicates the presence of a disease. However, the presence of microbes in a wound does not necessarily lead to suppuration. When swabs taken from the surfaces of surgical wounds at the end of an operation were examined, microbes were found in 80–90% of cases. Nevertheless, postoperative suppuration occurred much less frequently. During the Great Patriotic War, when surgeons sutured infected wounds, four out of five healed without suppuration.

Another difference between suppuration and infectious disease concerns their evolutionary significance. Contact between an organism and a microbe that causes an infectious disease is a random event that may never occur; in that case, the person or animal will not develop the disease. An injury, however, is a different matter. There is probably no creature on Earth that does not sustain abrasions, scratches, and cuts throughout its lifetime. Since microbes are ubiquitous, they inevitably enter wounds. Therefore, during evolution, a mechanism must necessarily have emerged to prevent every injury from becoming the cause of a life-threatening disease, or some form of symbiosis with microbes must have developed. The second assumption is more likely, because at every stage of wound healing, right up to complete recovery, a specific set of microorganisms can be found in the wound, even when the healing process proceeds under the most favorable conditions.

When an accidental injury occurs, a wide variety of microbes enter the wound. However, after some time, the wound microflora changes considerably and begins to resemble the flora inhabiting the skin, mucous membranes, and intestines. These include staphylococci, Pseudomonas aeruginosa, and various anaerobic bacteria. Naturally, not all microbes multiply in a wound, but only those for which the physical and chemical conditions are most suitable.

A characteristic feature of microbes inhabiting the intestines and wounds is that they possess a powerful enzymatic system capable of breaking down proteins. Intestinal microorganisms use their enzymes to hydrolyze food residues and facilitate their absorption. In a wound, by contrast, there is always dead, necrotic tissue, and a wound never heals as long as nonviable tissue remains in it. The only mechanism provided by nature for removing such tissue is enzymatic breakdown. Naturally, the enzymes responsible for this process are produced primarily by the body itself, but microbes also contribute to it.

Thus, the biological significance of the presence of microbes lies in their ability to promote the breakdown of dead tissue, thereby accelerating wound cleansing and healing. If this is the case, completely eliminating microbes prevents necrotic tissue from being removed from the wound. This runs counter to the mechanism developed by nature. By using antibiotics and sulfonamide drugs, we disrupt the ecological relationships that have evolved between microbes and wounds.

Research conducted over recent decades has made it possible to understand the regular patterns of wound healing. In particular, it has been established that all wounds heal through inflammation, and the vast majority of wounds also undergo suppuration unless they have received specialized surgical treatment.

In any wound, whether a minor scratch or extensive tissue damage, a neurovascular response occurs immediately after injury, leading to edema. Within the first few minutes, the tissues become more acidic, and the pH decreases to 5 or lower.

The concentration of salts increases in the surrounding tissues, while osmotic pressure rises within the wound. Plasma and blood cells—erythrocytes, leukocytes, and platelets—begin to enter the wound. Two types of cells, neutrophilic leukocytes and eosinophils, break down during the first few days and release proteolytic enzymes capable of degrading proteins into the wound. This process involves the breakdown of nonviable, dead tissue. Living cells, however, contain anti-enzymes that prevent proteolytic enzymes from exerting their activity.

These stereotypical changes are usually regarded as deviations from normal physiological conditions. For example, acidification is attributed to metabolic disturbances and the accumulation of lactic acid; increased osmotic pressure is associated with disturbances in water and electrolyte

balance; and tissue edema is attributed to impaired microcirculation and altered capillary permeability.

However, these processes occur consistently in every wound. What is the biological purpose of wound acidification?

An acidic environment inhibits the growth of pathogenic flora. An acidic environment also inhibits the development of fungal infections.

Increased osmotic pressure promotes the removal of nonviable cells from deep tissues, while elevated enzymatic activity accelerates their breakdown and separation (pepsin exhibits maximum activity at pH 3).

The biological purpose of inflammation and suppuration in a wound is also to accelerate its cleansing. A wound will not close until all necrotic tissue has been removed. If the amount of necrotic tissue is small, macrophages and other cells can manage the task. They remove microorganisms in much the same way as foreign bodies are eliminated, allowing the wound to heal. However, when the amount of necrotic tissue increases and macrophages cannot cope with it on their own, microbes begin to multiply in the wound. As long as their number remains low, up to 10^5 per gram, suppuration does not occur. However, if a large amount of dead tissue remains in the wound and the small number of macrophages present cannot remove it, microbes can multiply in this nutrient-rich environment. In response to their rapid proliferation, increasing numbers of leukocytes enter the wound, engulf the microorganisms, and die along with them, forming pus. As they break down, leukocytes also release their own proteolytic enzymes into the wound.

Surgical debridement is not feasible for every type of injury; even when it is performed, complete removal of necrotic tissue is not always possible. Preventing suppuration and treating wounds using nonsurgical methods therefore remain challenges.

Thus, it is necessary to:

- Accelerate the breakdown of necrotic tissue.
- Preserve the tissues' regenerative capacity and suppress microbial growth.

When resonant infrared emitters are used, treatment is reportedly more effective and occurs without suppuration. If a wound has already become infected and suppurated, it may still heal very quickly without adverse consequences.

The primary emitter used in wound treatment is the GI series, as it is described as having anti-inflammatory and anti-infective effects. In addition, it normalizes the intestinal microflora, including the microorganisms that should be present in a wound to facilitate healing without suppuration.

As previously noted, normal blood flow is essential. By eliminating the inflammatory response, the GI emitter improves circulation.

Corticosterone plays an important role in this process. Its deoxy form induces an inflammatory response, whereas its oxy form suppresses it. The GI emitter is claimed to convert the deoxy form of corticosterone into its oxy form.

In addition, it is claimed to promote the dissociation of transcortin, releasing cortisol, which under these conditions facilitates catabolic reactions, particularly the breakdown of necrotic tissue into smaller proteins and ultimately amino acids that the body may even use for its own needs. Besides cortisol, transcortin releases blood proteins that are particularly necessary for the body at this time. Blood flow can be further restored using Z-series emitters. After the wound has healed, the resulting keloid tissue may be removed using this emitter. This effect may also be applied in plastic surgery.

In any case, K-series emitters should also be used to normalize the immune system by coordinating the rates of metabolic processes. In addition, during illness, the body predominantly relies on glycolytic energy metabolism. This means that the pancreas operates under considerable strain, while K-series emitters are claimed to normalize endocrine system function.

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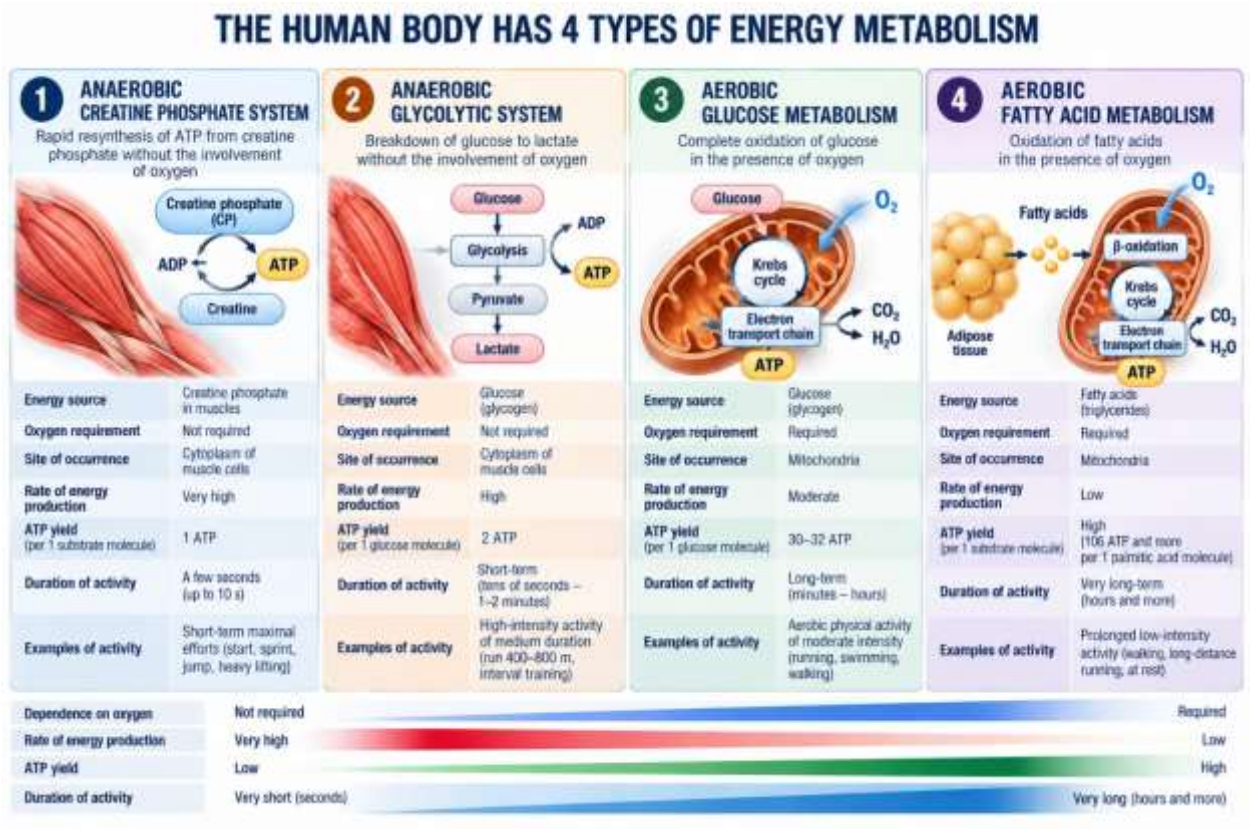
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TYPES OF ENERGY METABOLISM AND THEIR SIGNIFICANCE IN THE TREATMENT OF DISEASES



The creatine phosphate cycle is very short, lasting approximately 6–9 seconds. This cycle occurs anaerobically through the breakdown of creatine phosphate and is accompanied by the

release of the maximum amount of energy per unit of time. This pathway supplies energy during activities of very high intensity, such as sprinting, high jumping, weightlifting, and so on.

Aerobic glycolysis occurs continuously in the body in the presence of oxygen.

Anaerobic glycolysis occupies an intermediate position between the two previously described types of metabolism and proceeds through the breakdown of glycogen. Our body predominantly uses this type of energy metabolism in the presence of pathology. Given that maintaining the activity of this metabolic pathway requires active pancreatic function, therapy aimed at increasing its functional activity is considered necessary.

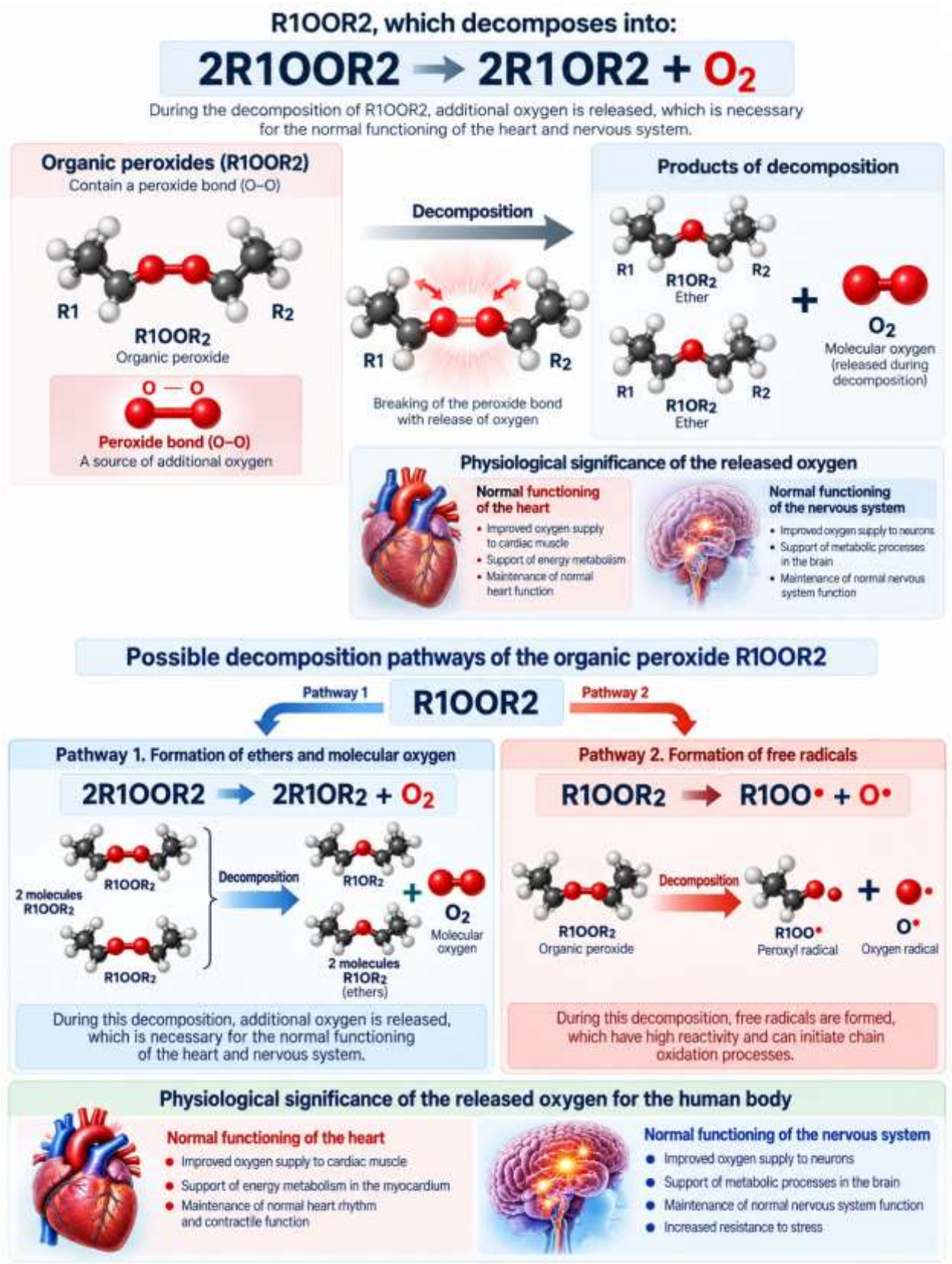
Aerobic energy metabolism through fatty acids also occurs continuously in the presence of oxygen.

It should be noted that during aerobic energy metabolism, one molecule of glucose produces 38 molecules of ATP, whereas anaerobic metabolism produces only 2.

Glucose breakdown is carried out by 11 enzymes. As already mentioned, enzymes are highly specific. In particular, at a certain pH, they catalyze particular reactions, while at a different pH, they may activate other reactions, including reverse reactions. The same applies to the enzymes involved in energy metabolism. As glucose is consumed, the blood becomes increasingly acidic due to the accumulation of breakdown products. During predominantly aerobic activity, this is mainly due to carbonic acid, whereas during anaerobic activity, it results from the accumulation of lactic acid. When a certain pH is reached, the enzymes can no longer break down glucose. This is perceived as fatigue. Under these conditions, the reactions proceed in the reverse direction, and glucose is synthesized from lactic acid molecules. In this way, the efficient utilization of energy substrates is ensured.

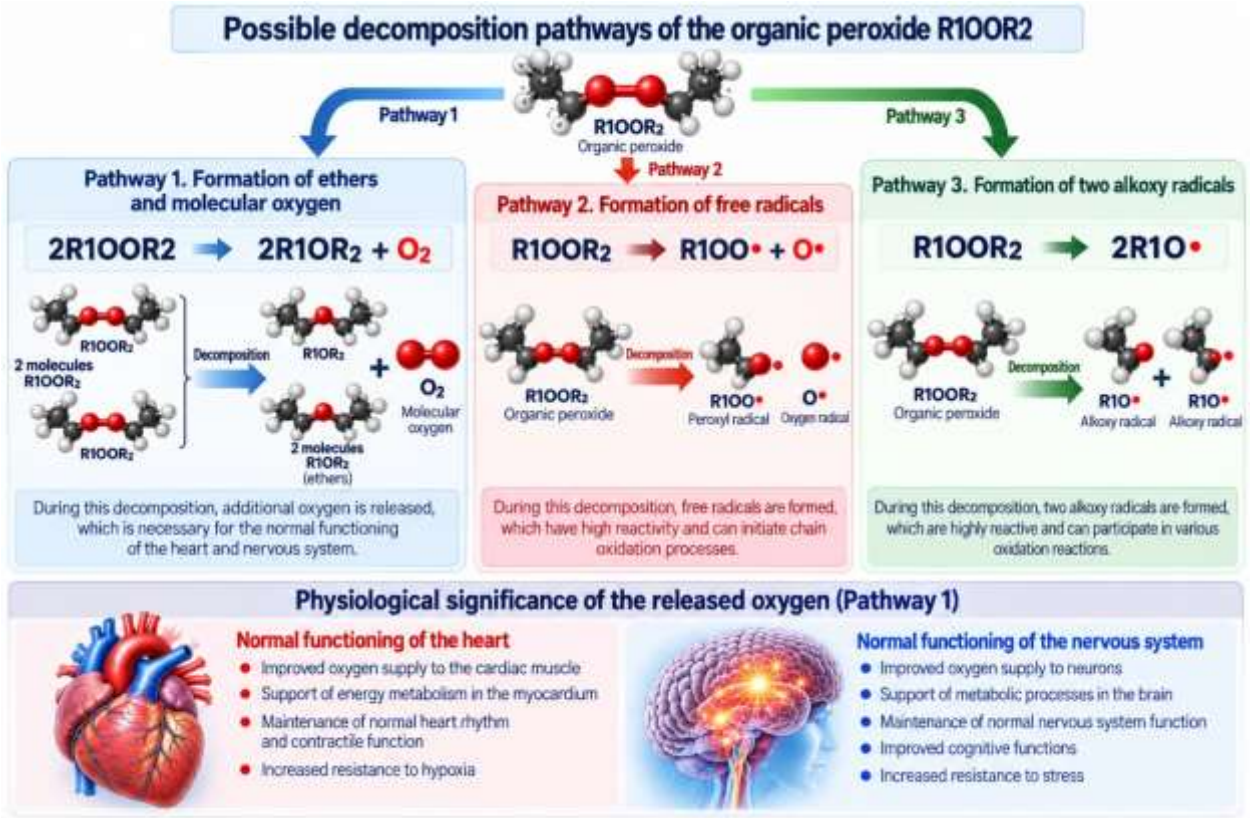
It is widely known that glucose is an essential component of the diet. Its oxidation provides between one-third and one-half of the energy used by the body. Fats are another important energy resource, but the roles of glucose and fats in supplying energy to different organs vary. The heart, for example, uses fatty acids—the products of fat breakdown—as its primary fuel. Skeletal muscles require glucose mainly to initiate activity and function more efficiently using energy derived from fatty acids. However, nerve cells, including those in the brain, are described here as using only glucose through aerobic metabolism. Their energy requirements account for 20–30% of the body's total energy balance, representing more than 50% of total glucose consumption. Nerve cells require a continuous supply of glucose every second.

During respiration, humans absorb only 3–7% of the oxygen they inhale. As already mentioned, the brain and heart can function only in the presence of oxygen. If the oxygen supply is insufficient for any reason, oxygen is stored in the form of superoxide:



This produces a superoxide radical, R1OO•. Such a radical can attack the membranes of heart muscle cells (the myocardium), ultimately leading to cell fusion. As a result, this causes a myocardial infarction.

It can also attack the blood vessels of the brain, potentially leading to a hemorrhagic stroke.



Most often, such radicals lead to oncological diseases. Thus, hypoxia is considered the underlying cause of the most serious diseases. Fortunately, in many cases, the nervous system is capable of protecting the body.

The venoms of many snakes, particularly cobras, contain phospholipases. Their mechanism of action involves the breakdown of cell membranes. As a result, a kind of “infarction” occurs in cells that interact with this enzyme.

In view of the above, it is necessary to stimulate pancreatic function. The role of the nervous system in the recovery process and in the body's preventive defense is of decisive importance.

Pancreatic function is stimulated by exposing it to radiation generated by the KL emitter. The emitter is directed at the pancreas from three angles, targeting the head, body, and tail.

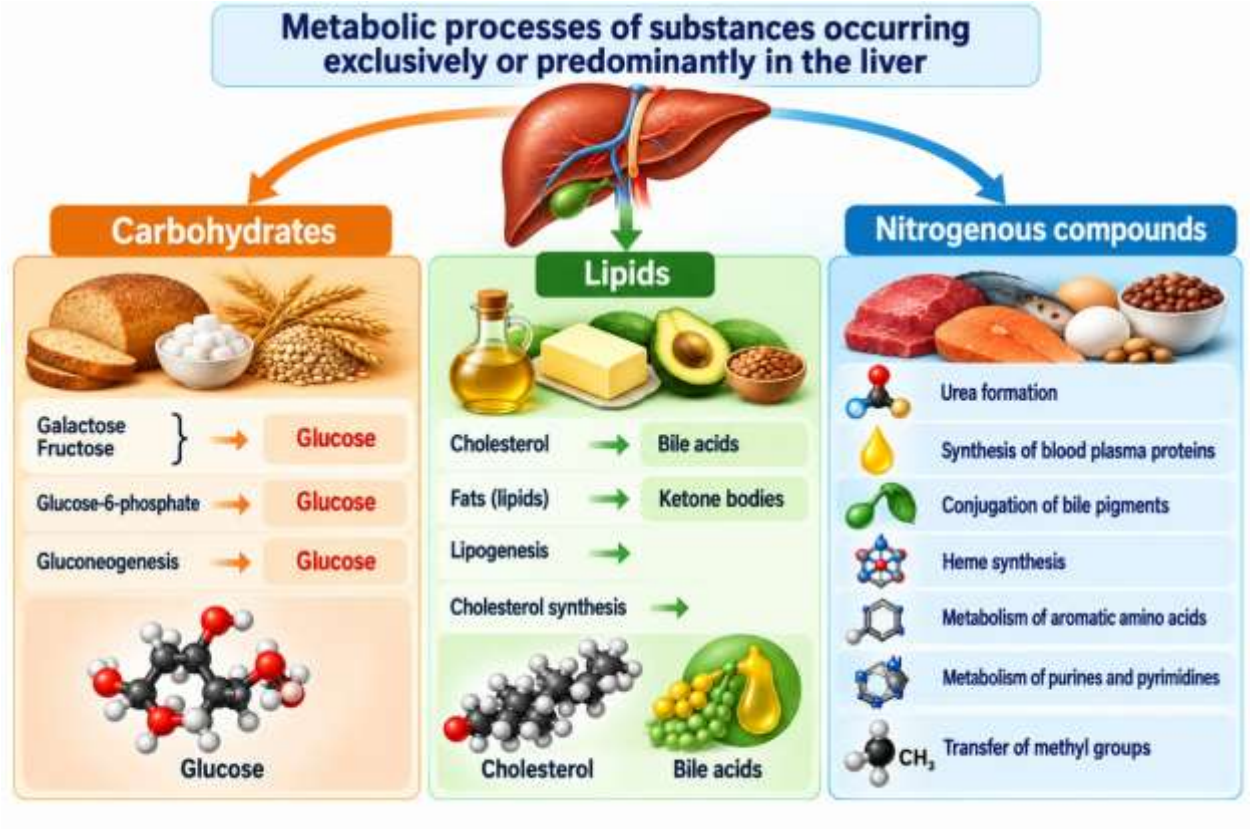
The exposure time is 5 minutes at each angle. The procedure can be performed several times a day.

When treating the pancreatic region, attention must be paid to the condition of its ducts. If any abnormalities are present, ultrasound examination is recommended, followed by the selection of an appropriate emitter (RC, RV, GI, or ZB) to restore normal function.

INTERRELATIONSHIP OF ORGANS AND TISSUES

In some cases, biochemical processes in cells are highly specialized, and their functions are quite limited. Erythrocytes are an example, as only anaerobic glucose catabolism occurs in them. In other cases, cells exhibit multipotency, meaning they can carry out a wide variety of enzymatic transformations. Hepatocytes, for example, participate in anabolism and catabolism, the interconversion of carbohydrates, fats, and proteins, and various other metabolic functions.

Metabolic processes occur primarily in the liver, although some take place in other organs and tissues. For example, glucose dephosphorylation and gluconeogenesis also occur, to a lesser extent, in the kidneys; lipogenesis occurs in adipose tissue; cholesterol synthesis takes place in the mucous membrane of the gastrointestinal tract; heme synthesis occurs in the reticuloendothelial system; and aromatic amino acid metabolism occurs in nervous tissue. Purine and pyrimidine metabolism, as well as the transfer of methyl groups, also takes place in certain other tissues.



All cells of an organism possess identical DNA molecules. At a certain stage in the life of each cell, this DNA is expressed through replication during cell division or through transcription during protein synthesis in the growth phase. As cells differentiate toward their final specialized forms within the organs of our body, they gradually lose, to varying degrees, the ability to express their genes, and their DNA progressively becomes, as it were, silent. In extreme cases, DNA may disappear completely, as occurs, for example, in erythrocytes. Another example is the loss of the ability to replicate, which is observed in mature neurons that no longer divide in adults.

In many cell types, only a portion of the total DNA undergoes transcription, thereby enabling the production of messenger RNA (mRNA) corresponding to the enzymes and other proteins characteristic of that particular cell. In other cell types, DNA cannot be transcribed to produce certain specific messenger RNA sequences unless a special substance known as a repressor is removed. The extent and timing of the action of these complex regulatory factors determine the course of the biochemical specialization of tissues and organ development.

As differentiated tissues partially lose their metabolic capabilities during specialization, they become dependent on other cell types for the delivery of essential metabolites and the removal of metabolic end products. Metabolism, beginning with the entry of nutrients into the body, involves the stages of digestion and absorption in the gastrointestinal tract.

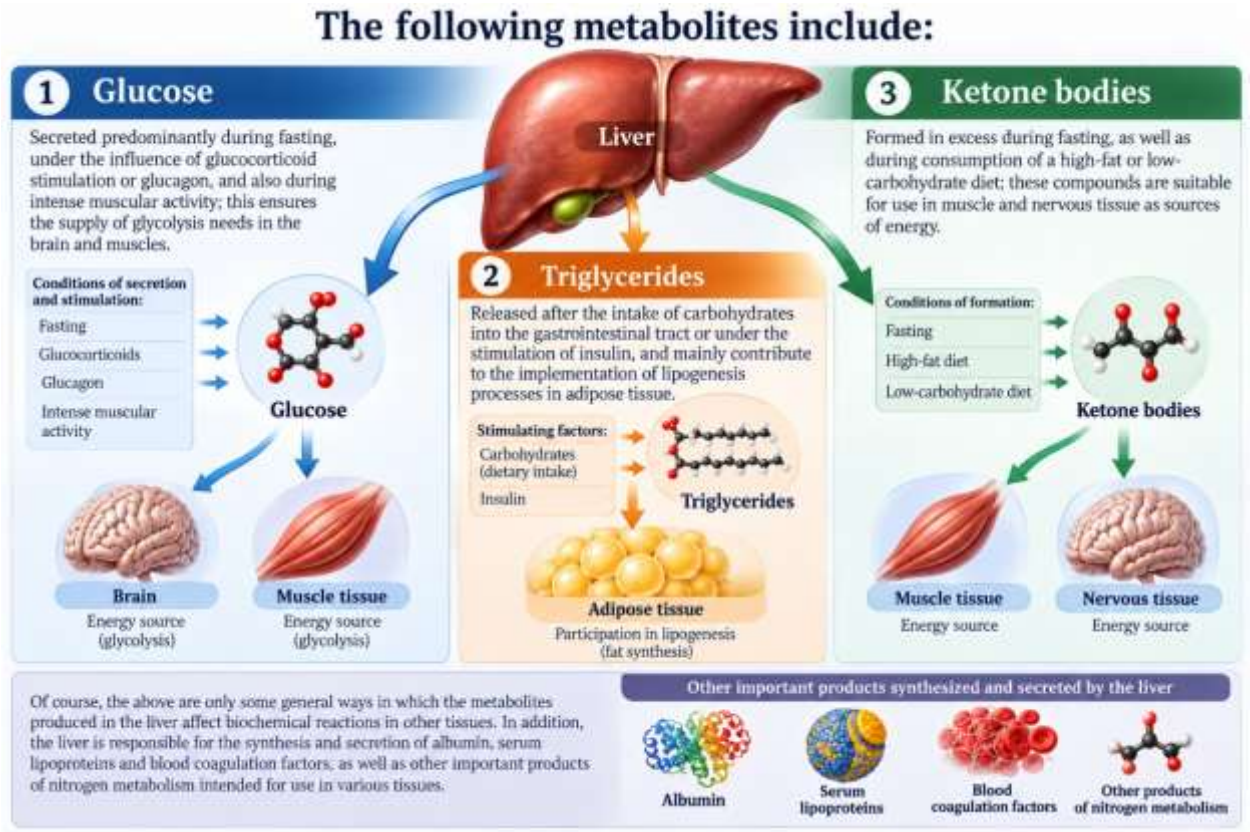
These processes are naturally followed by the transport of dietary components through the main “gateway”—appropriately named the portal vein—to the liver. The role of the liver in metabolism also deserves emphasis because of the high metabolic activity of this primary chemical factory. In terms of its diversity of functions and adaptability, no other organ can compare with the liver, where complex, interconnected metabolic processes take place that affect the entire body. Let us attempt to summarize these processes in relation to the functions of other organs.

LIVER

The liver functions as a gland with both exocrine and endocrine activities. Its exocrine product is bile, which the liver secretes into the gastrointestinal tract. Bile is a solution containing end products of metabolism, such as bile pigments, as well as important facilitators of fat digestion—bile acid salts. The latter are the principal products of steroid oxidation. The

reabsorption of bile acid salts from the gastrointestinal tract constitutes an important self-regulatory mechanism operating through negative feedback, since cholesterol oxidation in liver cells is inhibited by bile acid salts returning from the intestine. The level of cholesterol biosynthesis in the gastrointestinal tract is also significant. This process is likewise regulated by a negative feedback mechanism, because cholesterol biosynthesis is substantially inhibited by bile acid salts taken up by the cells of the intestinal mucosa.

The products of the liver's internal secretion (endocrine function) are not hormones but metabolites that are transported through the bloodstream and utilized by other cells, thereby altering their functions.



INTERRELATIONSHIP BETWEEN METABOLIC PROCESSES IN THE LIVER AND OTHER TISSUES

Extrahepatic tissues are characterized by a certain degree of metabolic autonomy. The principal energy-producing reactions (glycolysis, citric acid cycle reactions, oxidative phosphorylation, and fatty acid oxidation), as well as the most important biosynthetic processes (protein synthesis, nucleic acid synthesis, lipogenesis, and gluconeogenesis), take place in other cell types, although the activity levels of these reactions may vary. Nevertheless, the dependence of these tissues on liver metabolism is often of paramount importance for maintaining normal function and homeostasis. Therefore, it is necessary to discuss and summarize several fundamentally important examples of these relationships between the liver and other tissues.

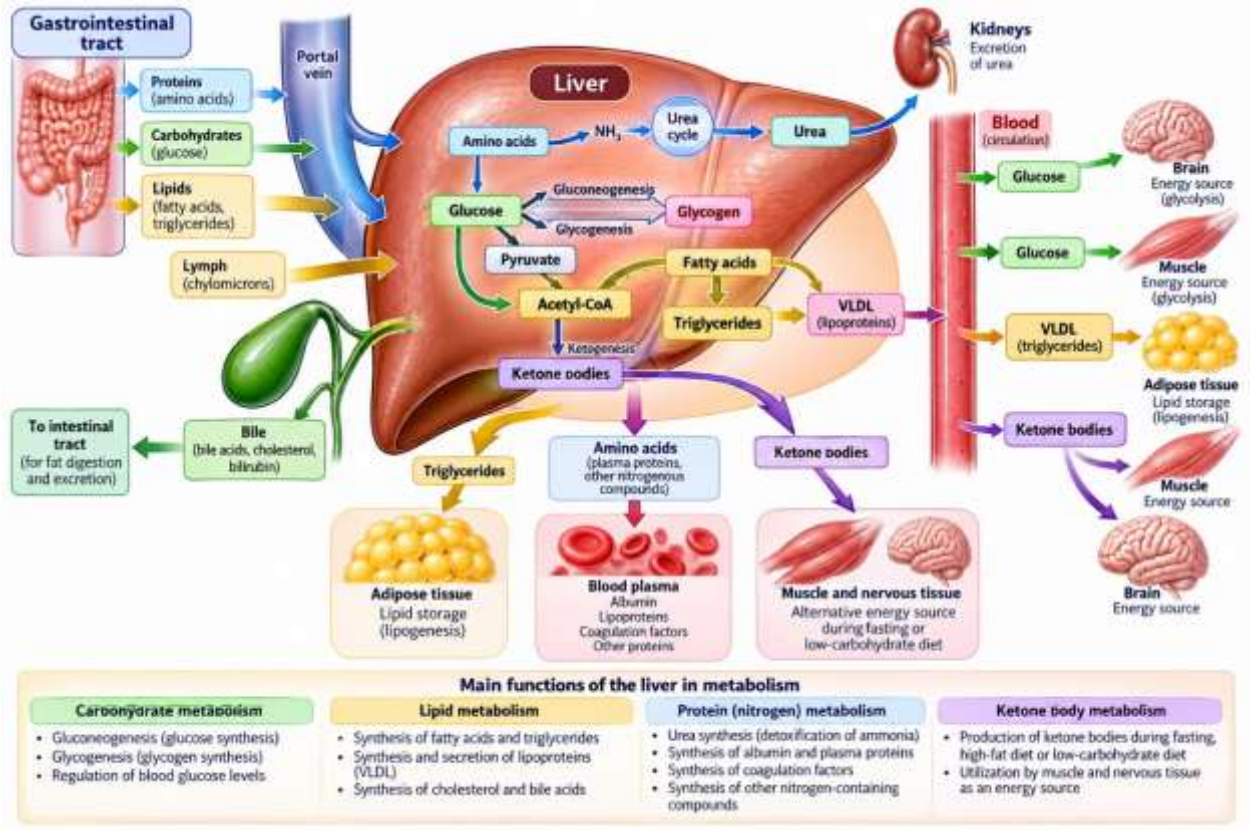
Adipose tissue and the liver

Fat metabolism in the liver and adipose tissue is closely interconnected. Triglycerides formed in liver cells serve as an important source of fat that accumulates in adipose depots.

Another source of these fats is newly synthesized triglycerides produced by adipocytes themselves. Since glucose provides the carbon atoms for the synthesis of fatty acids and glycerol

residues in adipose tissue, and since the liver plays a leading role in regulating blood glucose levels, lipogenesis in adipose depots depends on liver metabolism in two ways.

The flow of carbon atoms from liver cells to adipose tissue, characteristic of periods of abundant food intake, reverses when the body's energy supply decreases. At that point, activation of hormone-sensitive lipase in adipocytes leads to the release of glycerol and fatty acids into the bloodstream. These products of triglyceride breakdown help meet the liver's energy requirements during fasting, when fatty acid oxidation generates the NADH and ATP needed for gluconeogenesis. On the other hand, fatty acids can be used directly as an alternative to glucose in extrahepatic tissues such as muscle.



Muscles and the liver

The existence of a direct relationship between metabolic processes in muscle and liver tissue has been demonstrated at several levels. During periods of abundant food intake, both tissues remove glucose from the circulating blood, accompanied by the accumulation of excess glycogen. Intense physical activity, which is a major stimulus for glycogenolysis in muscles, promotes the breakdown of glycogen into lactate, which diffuses into the bloodstream. Reduced food intake is an important mechanism for activating glycogen breakdown in the liver, but in this case, glycogen is broken down into glucose, which is released into the bloodstream.

A similar difference between these two tissues is observed in the balance between glycolysis and gluconeogenesis. In muscle tissue, where phosphofructokinase and pyruvate kinase activities are high, but fructose-1,6-bisphosphatase, pyruvate carboxylase, and phosphoenolpyruvate carboxykinase activities are low, the balance is shifted toward glycolysis of incoming glucose, producing ATP and lactate. In liver tissue, where the relative enzyme activities are the opposite of those in muscle tissue, the balance is shifted toward gluconeogenesis. Using other intracellular sources of ATP, such as fatty acid oxidation, the liver can regenerate glucose from incoming lactate to meet the energy requirements of the muscles.

During prolonged fasting, when muscle proteins undergo catabolism, skeletal muscles convert substantial amounts of pyruvate into alanine through the transfer of amino groups. Alanine can then serve as a carbon source for hepatic gluconeogenesis instead of lactate. Both the liver and

skeletal muscles participate in this lactate–glucose cycle. It should be remembered that cardiac muscle is an aerobic tissue rich in mitochondria and equipped with a lactate dehydrogenase enzyme system that tends to consume lactate rather than produce it.

Both skeletal and cardiac muscles also depend on the liver for ketone bodies—beta-hydroxybutyrate and acetoacetate. Because the liver lacks the enzyme that activates acetoacetate by forming its CoA derivative, substantial amounts of ketone bodies enter the bloodstream when a person consumes a low-calorie, carbohydrate-poor, or fat-rich diet and the rate of fatty acid oxidation in the liver exceeds its capacity to clear acetyl-CoA.

Muscles, as well as the kidneys and certain other extrahepatic tissues, activate acetoacetate using succinyl-CoA and obtain energy by oxidizing the resulting acetyl-CoA. Even at rest, there is a continuous flow of acetoacetate and other ketone bodies from the liver to peripheral tissues, where they are used to generate a substantial proportion of energy, particularly heat. However, although cardiac and skeletal muscles depend on metabolites produced by the liver to support their activity, under normal conditions they meet a substantial proportion of their ATP requirements through the oxidation of fatty acids mobilized from adipose depots.

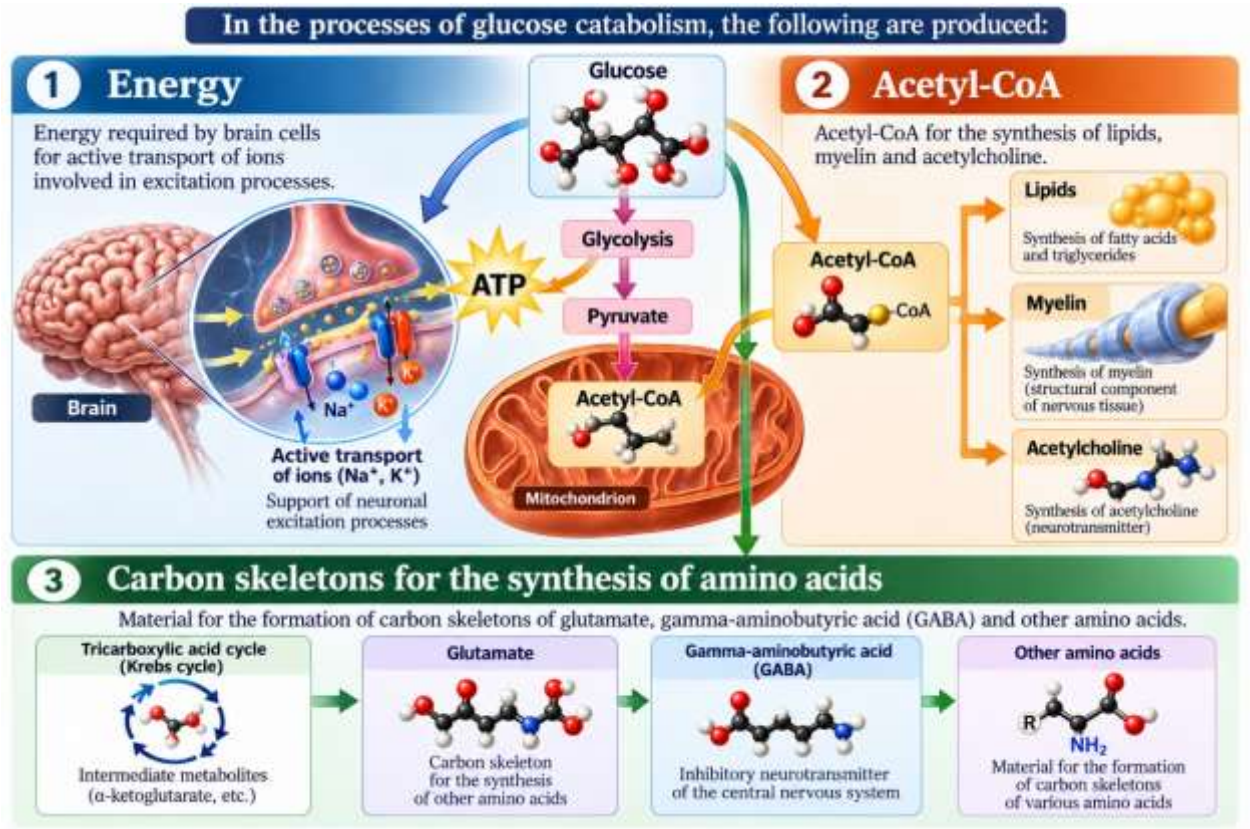
Kidneys and the liver

Gluconeogenesis takes place in both the kidneys and the liver, but the kidneys generate only a small proportion of the total glucose (approximately one-tenth). However, when liver function is impaired or under conditions of acidosis accompanied by increased breakdown of amino acids into alpha-keto acids, which serve as precursors for glucose production in the kidneys, their contribution to gluconeogenesis increases significantly.

The kidneys depend on the supply of glutamine from the liver, which serves as a source of ammonia required to neutralize excreted hydrogen ions. Conversely, liver function depends on the excretory function of the kidneys, which ensures the removal of urea and other metabolic end products from the circulating blood while retaining liver-produced substances such as glucose, amino acids, and proteins.

Brain and liver

Finally, metabolic processes in brain tissue and the liver are also closely interconnected. First and foremost, nervous tissue depends entirely on an uninterrupted supply of glucose, which is provided by the liver.



Since amino acid metabolism is highly active in brain tissue, and the brain is particularly sensitive to the toxic effects of ammonia, effective protective mechanisms have evolved to ensure the binding of NH_3. This occurs primarily through the formation of glutamate and glutamine. Ultimately, the liver removes NH_3 from brain tissue and other peripheral tissues by converting it into urea. Impaired liver function or metabolic disturbances affecting the reactions of the urea cycle can seriously affect brain development and, consequently, higher nervous activity. This is precisely because the brain depends on the liver to eliminate ammonia and other metabolic end products that are toxic to nervous tissue.

SPINAL COLUMN

Any form of intoxication, whether associated with infection, toxins, metal ions, gases, stress, and so on, leads to disturbances in the circulatory system due to vascular obstruction and hormonal imbalance. The spine is affected by this process first and foremost. The inability to transport structural and energy substrates, as well as O_2, to cells, organs, and tissues leads to hypoxia of the brain, particularly the cerebral cortex. This, in turn, disrupts the systems responsible for regulation, nourishment, and the removal of metabolic waste products from organs.

The spine plays a key role in human life. It forms the foundation of the skeleton, gives the body its shape, maintains its upright posture, and keeps all vital organs in their proper positions. The spine consists of 24 small vertebrae. Each vertebra has two parts: a body and an arch. The upper and lower surfaces of each vertebral body are covered with cartilage. Between the bodies of two adjacent vertebrae lies an elastic intervertebral disc, which consists of two hyaline cartilage plates, a nucleus pulposus, and a surrounding annulus fibrosus. The nucleus pulposus contains chondrin, a small number of cartilage cells, and collagen fibers that provide elasticity. The annulus fibrosus consists of dense connective tissue bundles interwoven in various directions.

The discs allow the spine to move in different directions and absorb impacts, while the vertebral arches form a canal containing the spinal cord, which serves as a control center for an extensive and complex network of nerves distributed throughout the body. This innervation originates from 31 pairs of spinal nerves, each of which serves specific parts of the body and

organs. All reflexive and automatic organ functions are controlled by the spinal cord, except those regulated by the brain. A pathological process in the spine can compress nerve fibers and disrupt the function of the organs they innervate.

Only 1 in 150 middle-aged people has a flexible—and therefore healthy—spine. Occurring primarily in people aged 30 to 50, spinal disorders are a major cause of prolonged incapacity for work and, in some cases, disability.

Osteochondrosis ranks first among spinal disorders and most frequently affects the lumbosacral region. This selective vulnerability is probably related to the anatomical and functional characteristics of the lumbosacral region, which developed as humans adopted an upright posture, unlike their ancestors. This change substantially increased the load on the spinal column, particularly the lumbar region. The strain is further aggravated by heavy lifting, physical inactivity, and an inadequate diet.

Degenerative processes in the intervertebral disc begin with damage to the gelatinous nucleus, which dries out, loses its turgor, and undergoes necrosis. The fibers of the annulus fibrosus are then destroyed from the center toward the periphery, resulting in fragmentation, primarily of its inner layers. Degeneration of the nucleus pulposus leads to a sharp increase in the load on the annulus fibrosus. Its outer portions become unevenly stretched at points where resistance to protrusion is weakest. This protrusion, in turn, causes narrowing of the intervertebral foramen. The disc decreases in height, and the vertebra above approaches the vertebra below, shifting slightly backward in the process. The spinal segment becomes unstable. The vertical dimensions of the intervertebral foramina also decrease. In osteochondrosis, narrowing of the intervertebral foramina may become significantly more severe if the remnants of the nucleus pulposus protrude through tears in the annulus fibrosus, forming a herniation.

Narrowing of the intervertebral foramina, together with the development of edema and aseptic inflammation in these areas, leads to irritation and subsequently compression of the spinal nerve roots and nerve tracts, causing localized radicular symptoms.

Patients suffering from osteochondrosis usually seek medical attention because of the development of pain syndromes. The pain is generally localized in the lumbosacral region (lumbago, lumbalgia) and along the peripheral nerves originating from the lumbosacral plexus, most commonly along the sciatic nerve (lumbomyalgia). The pain may be unilateral or bilateral, may occur acutely—often when lifting heavy objects or making a sudden movement—or may develop gradually. It can also be triggered by exposure to cold. The disease usually begins with a lumbago syndrome. The chronic course is characterized by pronounced radicular symptoms.

The pain may be sharp, dull, aching, crushing, shooting, or sometimes burning, and it intensifies markedly when the patient attempts active movement. The pain causes reflex tension in certain muscles, resulting in stiffness and the adoption of protective, antalgic postures.

When the spinal nerve roots and nerve tracts become involved, the disease manifests as hypotrophy of the corresponding muscles, reduced muscle strength, and sensory disturbances. Damage to elements of the sympathetic nervous system is accompanied by a decrease in skin temperature, trophic disturbances, and the formation of trophic ulcers.

In severe, pronounced osteochondrosis accompanied by herniation of an intervertebral disc toward the spinal canal, the pain syndrome may become persistent.

TREATMENT OF SPINAL DISORDERS

To reduce inflammation and normalize metabolic processes in the affected area, a combined treatment (“pair”) using GI + KL emitters is prescribed for 20 minutes daily. Afterward, massage is recommended using ZB or ZK lamps with a tube, along the spine following the paravertebral lines and, below the inferior angle of the scapula, along the scapular line (linea scapularis).

In cases of scoliosis, spinal massage is performed on both sides along the spine using a ZB emitter, with gentle circular movements consisting of 10 rotations at each point. Finger pressure

must not be excessive, as strong pressure can cause inflammation and block microcirculation in the vessels supplying the spine. According to the described method, spinal alignment during this massage occurs through normalization of blood flow, softening of the intervertebral discs, and removal of metabolic breakdown products. The patient's own muscles are used to achieve symmetrical alignment.

In cases of lordosis or kyphosis, massage is performed separately on each side, first on one side and then on the other. The patient's muscles are said to begin pulling the spine into alignment, first from one side and then from the other, thereby straightening it. According to the authors of this method, no other treatment can restore the spine in this way, because all forms of traction are unable to normalize blood flow and restore disc elasticity.

Normalization of blood flow along the spinal column reduces the load on the nervous system, reportedly allowing acute processes to be relieved within minutes and blood flow to be normalized in many organs, while several treatment sessions may eliminate chronic conditions.

Massage is recommended 2–3 times during each treatment session.

1. In cases of spinal pathology, treatment should include correction of intestinal function using GI + ZB lamps for 20 minutes daily to normalize the intestinal microflora.
2. To normalize metabolic processes, KL and ZB emitters are recommended for application to the pancreas for 5 minutes from three angles over a period of 5–7 days.
3. To eliminate toxins from the body and cleanse the blood vessels, a Z-series lamp is used for 20 minutes every other day in combination with a KL(b) lamp to facilitate the body's natural elimination of toxins.
4. To stimulate the “miraculous meridians” of the spinal column, it is recommended to use the GI + KL combination in the ST installation during the final week of treatment, so that the radiation initially passes through the coccyx and travels along the spine.
5. An essential condition is the restoration of balance between the sympathetic and parasympathetic divisions of the autonomic nervous system.

MAINTENANCE OF A STEADY STATE

A healthy adult organism exists in equilibrium with its surrounding environment. This equilibrium requires the timely suppression of growth processes, which is just as essential for life as the ability of cells to grow and divide. Disruption of normal inhibitory mechanisms can lead to gigantism, obesity, or the uncontrolled, anarchic growth of malignant cells. It is entirely possible that, in the future, we will understand the mechanisms of malignant transformation not by studying the specific causes of the rapid growth and aggressiveness of malignant cells, but by investigating why normal cells lack these properties.

In adults, the principal factor determining the normal balance of metabolic processes is the relationship between food intake and energy expenditure. Insufficient nutrition rapidly leads to the reversible mobilization of the body's energy reserves. However, prolonged nutritional deficiency or starvation causes irreversible tissue breakdown. Systematic overeating can likewise result in a pathological condition—obesity—due to the overfilling of tissue energy stores. Before discussing these two extreme manifestations of metabolic imbalance, let us examine the mechanisms that maintain the constancy of organ and tissue composition, as well as the properties of regulators that influence the enzymes involved in anabolism and catabolism.

ANABOLIC HORMONES

These agents enhance the growth-promoting effects of excessive food intake.

Growth hormone is a polypeptide secreted by the anterior pituitary gland that stimulates RNA and protein biosynthesis in virtually all cells. This generalized increase in the accumulation of nitrogen-containing compounds is accompanied by enhanced uptake of amino acids from the

circulating blood. One factor that promotes growth hormone secretion is an increase in blood amino acid levels, so the maximum stimulation of tissue protein anabolism occurs when large quantities of precursors are available.

Insulin is secreted by the pancreas in response to elevated blood glucose or amino acid levels. It stimulates the uptake of glucose and amino acids by tissues. In addition, insulin promotes increased utilization of glucose for glycogen synthesis, lipogenesis, and glycolysis, while simultaneously limiting gluconeogenesis in the liver and inhibiting lipolysis in adipose depots. This hormone enhances tissue protein anabolism while suppressing amino acid catabolism.

Thyroxine, secreted by the thyroid gland in response to thyroid-stimulating hormone (TSH) from the anterior pituitary gland, stimulates tissue growth and differentiation. This effect is manifested primarily through increased protein synthesis, particularly the enhanced production of mitochondrial oxidative enzymes. Thus, thyroid hormones exert a regulatory influence on oxygen consumption and the overall rate of tissue metabolism.

Specific anabolic functions are more characteristic of steroid hormones, particularly estrogens. These are produced in the female body by the ovaries and stimulate RNA and protein synthesis in certain target cells, such as those of the uterus. Male steroid hormones, known as androgens, are synthesized in the testes and produce a similar acceleration of RNA and protein anabolism in many tissues, including skeletal muscles.

CATABOLIC HORMONES

Many hormones are involved in regulating processes that compensate for increased energy expenditure during stress or nutritional deficiency.

Glucagon is a polypeptide secreted by the pancreas in response to a sharp decrease in blood glucose levels; it therefore counteracts the hypoglycemic effect of insulin. Glucagon specifically increases glycogenolysis in the liver, resulting in an increase in glucose levels in the circulating blood. In addition, glucagon stimulates gluconeogenesis and lipolysis in the liver.

Fatty acids released through the action of lipase serve as another energy source and contribute to gluconeogenesis.

Catecholamine hormones—norepinephrine, released when sympathetic nerve endings are stimulated, and epinephrine, secreted by the adrenal medulla—have effects that resemble those of glucagon to some extent. However, their influence extends beyond the liver to other tissues. They activate glycogenolysis in muscles and the liver and stimulate lipolysis in adipose tissue, thereby increasing glucose and fatty acid levels in the plasma.

Glucocorticoid steroid hormones such as cortisol are secreted by the adrenal cortex in response to ACTH (adrenocorticotropic hormone) from the anterior pituitary gland. Cortisol counteracts many of insulin's effects by blocking cellular glucose uptake and its conversion into fats, as well as inhibiting protein synthesis in peripheral tissues. At the same time, it stimulates the production in the liver of enzymes involved in amino acid catabolism and gluconeogenesis. As a result, protein reserves in extrahepatic tissues become depleted because protein hydrolysis continues while protein synthesis is suppressed. Consequently, amino acids flow from peripheral tissues toward the liver, increasing both the amount of carbon directed toward glucose production and the amount of nitrogen used for urea synthesis.

BODY DEPLETION

By starvation, we mean a disruption in the supply of essential substances required for the body's metabolic processes (for example, a deficiency of proteins despite an overall excess of food due to carbohydrates or fats, or a deficiency of trace elements, vitamins, and other biologically active substances).

Protein depletion can very often result from an improper diet in which essential proteins and fatty acids are not supplied to the body, even though food is consumed in sufficient quantities

in terms of caloric content, mainly in the form of carbohydrates. In such cases, we can speak of protein starvation, which may be accompanied by obesity. It is possible to obtain all the necessary components in the required quantities and still suffer from protein depletion. This is usually associated with an imbalance in the composition of the intestinal microflora, which supplies us with structural and energy substrates, vitamins, nutrients, antibiotics, and so on. If it cannot ensure the absorption of these substances, then even when the foods consumed contain an excess of essential amino acids, we will still experience a pronounced deficiency of them in the body.

When classifying the manifestations of nutritional deficiency, two conditions are distinguished: kwashiorkor, which is caused mainly by consuming food low in protein, and marasmus, a condition associated with overall protein-calorie deficiency. In classic cases, kwashiorkor occurs in children aged 1 to 3 years and is characterized by edema, fat accumulation (especially in the liver, which becomes markedly enlarged), flabby skin, sparse hair lacking pigment, apathy, and irritability. In marasmus, growth retardation is already pronounced between the ages of 6 months and 1 year. Unlike children with kwashiorkor, who often appear swollen and round-faced because of edema, children with marasmus seem to “shrink”: their muscles atrophy, and body fat is absent. In typical cases of marasmus, damage to the liver, skin, and hair is not observed. Such a child is restless and responsive but not irritable. Numerous intermediate forms exist between these two extremes. In practice, they are difficult to distinguish, but from a treatment perspective, it is important to determine what the child's diet lacked: protein, calories, or both.

The fundamental principle underlying all these phenomena is based on the concept that energy from different classes of nutrients is equivalent to the energy supplied by tissue components. When the total caloric intake from the main types of “fuel” (carbohydrates and fats) becomes lower than energy expenditure, the breakdown of proteins begins in the body, including both proteins supplied by food and the body's own proteins. This leads to general depletion affecting the muscles and other organs, as observed in marasmus. Thus, starvation can be regarded as a condition in which the body “devours itself” to meet its energy needs. Before this severe, often fatal condition develops, a series of changes occurs in metabolic processes, depending, of course, on nutritional conditions during the period preceding starvation.

Let us consider the processes that occur in a healthy, well-nourished adult if food is suddenly withheld. Blood glucose levels immediately decrease, leading to reduced insulin secretion and increased glucagon secretion by the pancreas, as well as stimulation of glycogenolysis in the liver. If no food is consumed for 24 hours, hepatic glycogen stores become largely depleted; by the second day, other mechanisms must come into play. Thus, prolonged glucagon secretion activates hormone-sensitive lipase, releasing more fatty acids that are oxidized in the liver. Similarly, ACTH, catecholamines, and other hormones released in response to stress stimuli reaching regulatory centers help activate lipase in adipose tissue. The mobilization of fatty acids from fat stores supplies energy to peripheral tissues, the liver, and other internal organs. Unlike the short-term energy supply provided by hepatic glycogen stores, triglycerides in adipose tissue can provide the body with sufficient amounts of ATP for several weeks.

As the body adapts to prolonged starvation over the first few weeks, the amount of ketone bodies produced by the liver increases sharply because fatty acid oxidation predominates, while the supply of pyruvate and oxaloacetate decreases, preventing an adequate flow of metabolites through the citric acid cycle. After several weeks, organs such as the heart and, eventually, the brain adapt to meeting a substantial proportion of their energy requirements using these ketone bodies. However, if ketone body production exceeds their utilization, metabolic acidosis develops. The body attempts to compensate for it through both the respiratory system (elimination of CO_2) and the kidneys (excretion of NH_4^+). At the same time, as the body shifts toward the mobilization and oxidation of fatty acids, adipose tissue and the liver gradually deplete the enzymes involved in fatty acid biosynthesis: acetyl-CoA carboxylase, fatty acid synthase, and the enzyme that cleaves citrate.

If starvation continues, tissue proteins are mobilized and used as energy sources. Paradoxically, the first proteins to be mobilized are the labile proteins of the gastrointestinal tract

and the digestive enzymes of the pancreas, which impairs the utilization of the small amount of food that enters the gastrointestinal tract. Subsequently, the breakdown of proteins in internal organs (the liver and spleen) begins, followed by functional muscle proteins and, finally, proteins of the nervous system. This sequence of utilization corresponds to the rates of protein turnover in the steady state described above. Amino acid catabolism, stimulated by increased glucocorticoid secretion and decreased insulin secretion, serves as a direct source of ATP for peripheral tissues and provides carbon for glucose production in the liver and kidneys.

During the first few weeks of starvation, despite the overall increase in protein catabolism, the hepatic levels of enzymes involved in gluconeogenesis increase significantly. These include aminotransferases, phosphatases, and enzymes that catalyze the conversion of pyruvate to phosphoenolpyruvate. During prolonged starvation, when the brain meets a greater proportion of its energy requirements from hydroxybutyrate than from glucose, the rate of gluconeogenesis gradually decreases. At the same time, muscle mass, overall body activity, and consequently energy expenditure also declines. Finally, when all fat reserves have been depleted, the body begins to consume even vital proteins from the heart, lungs, blood cells, and other tissues. Death from circulatory collapse then follows.

GLUCOCORTICOIDS

In response to irritation (infection, psychoemotional stress, trauma, or food intake), the body responds by producing various active substances, including hormones, enzymes, and so on.

Glucocorticoids are hormones produced by the body that perform an anti-inflammatory function.

Under normal conditions, the body itself adequately increases glucocorticoid synthesis and converts them from an inactive state to an active one. The magnitude of the increase in secretion in response to a stimulus ranges from 1/50 to 1/200 of the daily dose.

What factors influence glucocorticoid levels and secretion?

Cholesterol is necessary for glucocorticoid synthesis. Its concentration in the blood is determined by the ratio of high-density and low-density lipoproteins. Insufficient levels of low-density lipoproteins contribute to a decrease in blood cholesterol levels, which may lead to inadequate glucocorticoid synthesis.

On the other hand, glucocorticoids may be produced by the body in sufficient quantities but remain in an inactive, bound state.

Resonant infrared emitters can be used to bring their concentration back to normal. A special GI/ZB emitter has been developed for this purpose.

When this emitter is applied to the area of the gallbladder and bile ducts for 1 minute, it is claimed to reduce inflammation, improve bile duct patency, dissociate lipoprotein complexes, and release free cholesterol.

Applying the emitter to the adrenal gland area for the same duration is claimed to convert hormones from an inactive state to an active (free) state and stimulate their synthesis from free cholesterol. These procedures are repeated 3–5 times. The total exposure time is 6–10 minutes. The procedure may be repeated every 2 hours throughout the day.

These procedures are claimed to restore the necessary balance between high-density and low-density lipoprotein levels and promote the dissolution of gallstones. They must be performed strictly in sequence and without interruption.

CHOLESTEROL METABOLISM

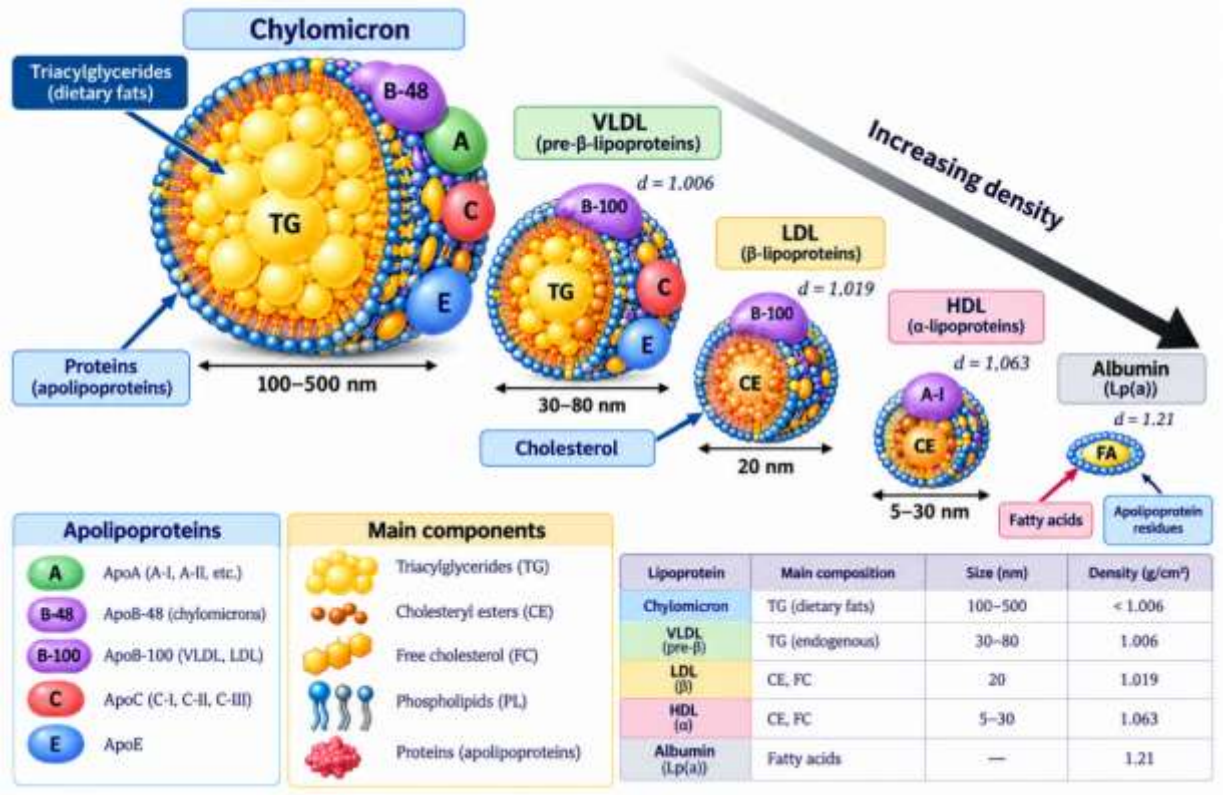
Cholesterol (Ch) occupies a special place among biological compounds. It is a component of tissues, cells, and cell membranes, regulating their permeability. It is a precursor of steroid hormones and bile acids. Cholesterol is an alcohol capable of forming esters with acetic, benzoic, stearic, and other acids. The intermediate metabolism of cholesterol occurs in the liver, and it is

excreted in its free form with bile. Cholesterol biosynthesis takes place in all organs and tissues, but bile plays the principal role.

Cholesterol enters the gastrointestinal tract through two routes: with food and as part of intestinal juice and bile. The absorbed fraction of cholesterol, known as the absorption coefficient, is an important physiological indicator. Cholesterol is excreted through the intestines, where it is converted into coprostanol. Cholesterol that enters the body is transported into the lymphatic system as part of chylomicrons and very-low-density lipoproteins (VLDL).

Cholesterol then enters the plasma, where it is found in lipoproteins divided into four classes according to their density:

- Very-low-density lipoproteins (VLDL),
- Low-density lipoproteins (LDL),
- High-density lipoproteins (HDL),
- Very-high-density lipoproteins (VHDL).



Lipoprotein	Main composition	Size (nm)	Density (g/cm³)
Chylomicron	TG (dietary fats)	100–500	< 1.006
VLDL (pre-β)	TG (endogenous)	30–80	1.006
LDL (β)	CE, FC	20	1.019
HDL (α)	CE, FC	5–30	1.063
Albumin (Lp(a))	Fatty acids	—	1.21

VLDL transport triglycerides from the intestines into the bloodstream, LDL are involved in delivering cholesterol into the blood, and HDL remove cholesterol from the body. The main supplier of cholesterol to the blood is the liver, where it is synthesized. The liver also serves as the first barrier for VLDL and intestinal chylomicrons. What matters is not the absolute cholesterol concentration in plasma (the average concentration is 1.9–2.1 g/L), but its ratio in LDL and HDL, as these lipoproteins transport cholesterol across blood vessel walls. Therefore, an imbalance in the ratio of these lipoproteins leads to the development of various diseases.

Another problem associated with cholesterol is gallstone disease. Bile supersaturation with cholesterol invariably leads to the formation of stones (most often cholesterol stones) in the gallbladder and its ducts. In this case, what matters is not so much the total cholesterol content in bile as changes in its phase composition.

Bile is a lipid complex consisting of phospholipids, cholesterol, and bile acids, including cholic acid in adults.

Under normal conditions, cholesterol is kept dissolved in bile by phospholipids and bile acids. When liver function is impaired, the ratio of bile components changes, and inclusions form in the bile in the form of fat droplets and cholesterol esters. Cholesterol crystallization also begins.

Lipid swelling may lead to the formation of liquid crystals. If bile is maintained in this state, cholesterol may crystallize out of it; thus, bile stasis also contributes to stone formation.

Hypercholesterolemia (above 2.6 g/L) is often associated with atherosclerosis and cardiovascular disease. However, a decrease in plasma cholesterol concentration (below 1.5 g/L) can lead to conditions such as hypothyroidism, Addison's disease, cachexia, and nervous system asthenia. Hypocholesterolemia may occur in liver diseases such as cirrhosis, infectious hepatitis, and others. Hypercholesterolemia can be primary (familial, associated with genetic factors) or secondary, caused by external factors such as obesity, overeating, physical inactivity, and so on.

The role of cholesterol in LDL and HDL is often associated with their size. It is believed that LDL increases the concentration of cholesterol in blood plasma because its molecules are larger than those of HDL. However, they may also be the same size. In our opinion, the difference between them lies in their degree of cholesterol saturation. LDL contains significantly more cholesterol, whereas HDL contains less. According to the laws of solubility, cholesterol will be released into the surrounding medium (blood) when its concentration exceeds that of the medium. Conversely, cholesterol will move into HDL because it is not saturated with cholesterol.

THE CONCEPT OF ACUTE AND CHRONIC PROCESSES

Any chemical processes occurring in the body involve the transfer of electrons, which allows us to speak of the existence of an electrical charge on the surface of any organ, part of an organ, or cell. In other words, all chemical processes are electrical in nature. This can be represented schematically as follows. If we define the electrical structure of an organ in simplified terms, each point on its surface has a specific charge (potential) that ensures the organ's normal metabolic and other functions. At the same time, an equal or similar (coordinated) potential exists on the opposite side of the membrane. The development of a pathological process is accompanied by a change in the potential level. If the pathological process does not involve surrounding organs and tissues, whether closely or loosely connected, their surface charges remain unchanged. In other words, processes in other organs change only slightly. A pathological process in which functional changes occur in only one organ can be considered acute.

Recovery in these cases occurs within a short period.

During the course of a disease, the potential may also change on the opposite side of the membrane or even on the membranes of other organs functionally connected to the affected organ. This leads to the involvement of other organs in the pathological process, with corresponding changes in their electrical potentials. In other words, metabolic processes in other organs also undergo substantial changes. A pathological process involving several interconnected organs and altering their normal functions is chronic.

The connections between organs may be not only anatomical but also functional.

Treatment in these cases takes longer, with shorter exposure times for the emitters, and should include repeated, sequential treatment of all organs involved in the pathological process, rather than being limited to the organ exhibiting clinical manifestations of the disease.

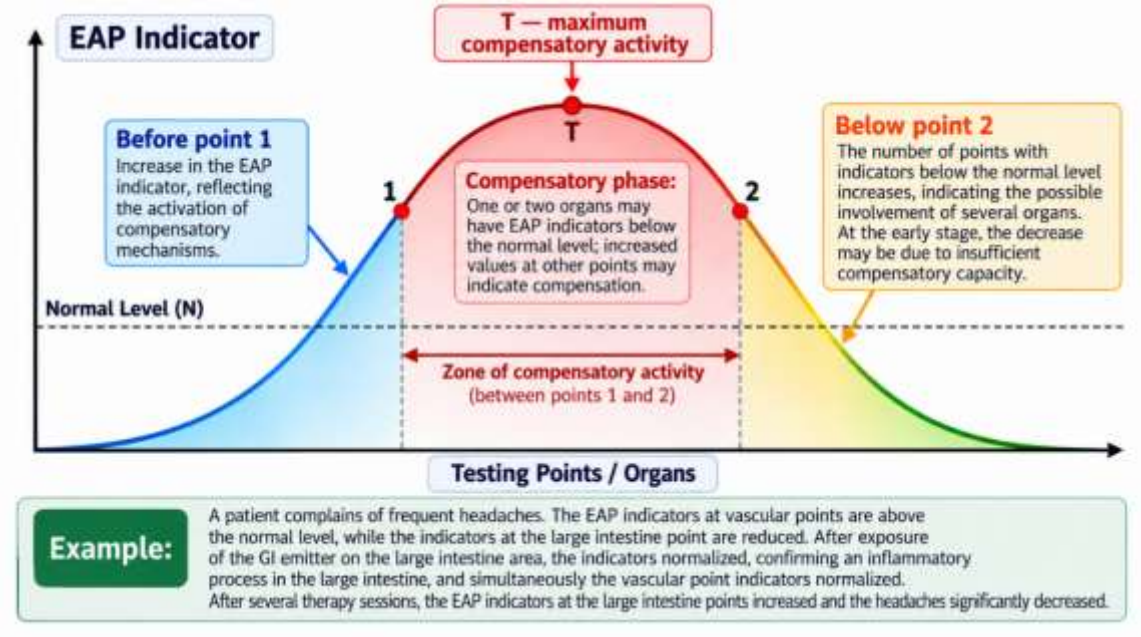
Acute process. The functions of the affected organ are altered, but the functions of the organs connected to it remain intact. In this case, restoring the function of the affected organ is sufficient to resolve the disease. The functions of the other organs contribute to the recovery process.

Chronic process. The functions of the affected organ are altered. The functions of the surrounding organs have also changed. Restoring the affected organ does not restore the functioning of the other organs. The altered functions of these other organs contribute to disease recurrence. In such cases, all functionally interconnected organs must be fully restored.

To illustrate the concept of a chronic process, the following model is useful: replace the diseased organ with a healthy one, taking into account the altered potentials of the other organs functionally connected to it. Under the influence of the altered potentials of these interconnected organs, the potential of the healthy organ will change, and its functions will become impaired.

PHASES OF THE COURSE OF A PATHOLOGICAL PROCESS

Three main phases are distinguished in the development of any pathological process.



In this phase, reversible processes occur (i.e., only minor external intervention is required to normalize them).

During Voll testing, most patients have readings above 75. The body's processes are compensated, and all organs and tissues cope with the load and attempt to bring the body into a state of dynamic equilibrium.

Example: During Voll testing, a patient has below-normal readings at the control point of the renal cortex. The patient reports no pain in the kidney area, and urinalysis results are normal. The GI, AF, and RV emitters do not test positive at the renal cortex point, indicating the absence of a pathological process in this organ. The ZB emitter is found to be effective at the arterial point; its application improves the readings at the renal cortex points. Therefore, the primary pathological process is localized in the blood vessels. As a result, although the kidneys are not yet involved in the pathological process, they cannot cope with the workload because of impaired blood flow. An inflammatory process may subsequently develop in the kidneys, at which point the GI-series emitter will test positive at the kidney points.

Interval from Point 1 to Point 2

In this phase, one or two organs are identified with EAF readings below normal. Readings at the remaining points are within the normal range. Readings above normal may indicate a compensatory increase in functional activity caused by a pathological process in an organ with low EAF readings.

Example: A patient complains of frequent headaches. EAF readings at the vascular points are above normal, while readings at the large intestine point are low. When testing emitters at the large intestine points, the readings normalize after exposure of the large intestine area to the GI emitter, indicating the presence of an inflammatory process in the intestine. At the same time, the readings at the vascular points also normalize. After several sessions of infrared therapy using the GI emitter applied to the intestinal area, EAF readings at the large intestine points increase, and the vascular readings return to normal. The headaches are significantly reduced.

Below Point 2

Patients complain of pain in various organs. The number of points with below-normal EAF readings increases, indicating an increase in the number of organs involved in the pathological

process. In the initial stages, however, a decrease in the bioelectrical potential of the organs may result not from a pathological process but from insufficient compensatory capacity.

GENERAL PRINCIPLES OF OPERATION AND SELECTION OF IR EMITTERS

- The choice of emitter depends on the diagnosis established after examination, as well as on the toxins, infections, and organ functions identified through EAF testing. The appropriate emitter type can also be determined during EAF diagnostics.
- To select the correct IR emitter, it must be positioned over the affected organ while simultaneously measuring, with a Voll device, the biopotential at the point reflecting the condition of that organ or its part, the control point on the SPED meridian, or the point on the SPED meridian corresponding to the affected level. If the initial EAF readings are above or below normal, a correctly selected emitter will cause the readings to decrease or increase, respectively, toward normal values. If, after 15–20 seconds of exposure to the affected area, the readings on the Voll device do not change or deviate even further from normal, the emitter has been selected incorrectly.
- The exposure time of the emitters depends on the patient's condition, the body's resistance and adaptive capacity, and the extent of the pathological process (its stage and severity, which can be assessed using EAF).
- The sequence in which the lamps are used in the treatment protocol is determined by the type, stage, and phase of the pathological process.
- General and local types of emitters can be used simultaneously (under the supervision of a Voll device).
- Treatment should begin after:
    1. Balancing the sympathetic and parasympathetic divisions of the autonomic nervous system (by applying KL/KH emitters to the hypothalamus) and assessing the body's resistance and adaptive capacity.
    2. Normalization of intestinal function.
    3. Normalization of fat metabolism.
    4. Normalization of adrenal gland function
- In the presence of infections, inflammatory processes, circulatory disorders, and other conditions, a general course of therapy is prescribed depending on the patient's condition:

Day of Treatment	Exposure Time with GI(b), min	Exposure Time with KL(b), min	Exposure Time with ZB(b), min
1	20	10	—
2	25	10	—
3	30	10	—
4	35	10	—
5	40	10	—
6	45	10	—
7	—	10	5

Примечание: общий курс может составлять 1–3 недели, время воздействия ZB на 2-ой неделе – 10 мин, на третьей – 15 мин (время воздействия увеличивается постепенно для того, чтобы не вызвать резкую интоксикацию организма).

COMBINING IR THERAPY WITH DRUG THERAPY

Due to habits acquired through many years of experience, physicians often feel inclined to prescribe antibiotics to alleviate a patient's condition. In the absence of resonant IR emitters, such actions may be justified, as they can often provide real help to patients and, in many cases, even save their lives. When treating patients with resonant IR emitters, antibiotics are considered unnecessary, and their use may even lead to certain harmful consequences. The reason is that the normal intestinal microflora supplies the body with substances essential for normal metabolism, including structural and energy substrates, vitamins, nutrients, antibiotics, and so on. The use of antibiotics can substantially alter the composition of our microflora. The intestinal microflora is also referred to as the “cradle of immunity.” Changes in its composition can significantly reduce immune function and the body's ability to resist external and internal destabilizing factors. Therefore, it is preferable to avoid using antibiotics during treatment with the IR therapy method.

A study published in New Scientist on June 12, 1999, reported that researchers led by Lynda Chin, MD, of Dana-Farber, had created a strain of mice with a biological “switch” that turns the development of skin melanoma on and off.

When the animals received a widely used antibiotic in their drinking water, it activated a cancer-causing gene, resulting in the development of melanoma tumors within two to three months. When the antibiotic was no longer added, the process was switched off and the tumors shrank.

Antibiotics (chloramphenicol, actinomycin D, and others) and hormones (methyltestosterone, progesterone, prednisolone, and others) can often be causes of malignant tumor formation.

The same can be said about the use of hormonal medications. Throughout our work with the IR therapy method, there has not been a case in which treatment could not be carried out without hormonal medications. Patients who had already been taking such medications before beginning our treatment gradually discontinued them as they recovered, because they were no longer considered necessary.

THE CONCEPT OF DRAINAGE AND ITS POSSIBLE MANIFESTATIONS

Drainage is the elimination of all types of toxins from the body. Physiologically, it occurs through urine, feces, sweat, and the respiratory tract. In women, it also occurs during menstruation. During treatment sessions, large quantities of toxins and breakdown products from microbes, viruses, connective tissue, tumors, atherosclerotic deposits in blood vessels, and other substances simultaneously enter the bloodstream.

The body's normal protective response is to eliminate foreign substances as quickly as possible. As a result, cardiac output increases, and the patient's blood pressure rises and pulse accelerates. When adaptive capacity is high, the body copes with this load, and toxins generated as a result of exposure to the emitters are readily eliminated from the bloodstream. In this case, the patient's general condition remains unchanged. However, if the body's resistance is low and it cannot eliminate the toxins effectively, intoxication increases. This may manifest as worsening weakness, drowsiness, headache, nausea, vomiting, diarrhea, skin rashes, increased urine output, and possible exacerbation of an existing or previously experienced disease. If the body's protective mechanisms (its adaptive capacity) are sufficient, patients tolerate these symptoms relatively well and do not require adjustments to IR emitter treatment.

Appropriate IR emitters are prescribed to increase the body's resistance. To reduce intoxication, patients are advised to drink plenty of fluids, such as green tea, juice, and water. Fluids should be consumed slowly, in small sips (one glass over 15 minutes). On average, one glass of fluid per hour is sufficient, amounting to approximately 1–2 liters per day. Fluid intake should be reduced or stopped 2 hours before bedtime. If symptoms of intoxication persist,

intravenous detoxification solutions are administered (Ringer's solution, Hemodez, Reopoliglyukin, Acesol, or Disol).

In cases of severe intoxication, in addition to standard measures, a rapid reduction in the intoxication response may be achieved by simultaneously activating the general-purpose RC and ZB emitters. The first is intended to sharply reduce the level of free radicals, while the second is intended to promote the rapid elimination of breakdown products from the body. A 10-minute exposure is usually considered sufficient to relieve the intoxication response and its associated symptoms. The same approach is reported to produce excellent results in cases of intoxication caused by factors unrelated to treatment.

Patients with low adaptive capacity tolerate even minor changes in homeostasis poorly. In such patients, drainage may manifest as clinical symptoms of various diseases. For example, if drainage occurs predominantly through the kidneys, patients may notice cloudy urine and increased urine output. Urinalysis must be monitored closely to prevent undesirable complications, such as the appearance of red blood cells, casts, or protein in the urine.

When the vascular system is affected, changes in pulse or blood pressure may be pronounced. Patients with hypertension may experience an increase in blood pressure. In patients with cardiac rhythm disturbances or tachycardia, even a slight increase in pulse rate may lead to a marked deterioration in their condition and the development of arrhythmia. If such symptoms occur, the duration of the procedure should be reduced, and the functional state of the adrenal glands, pancreas, and sympathetic and parasympathetic divisions of the autonomic nervous system should be monitored. Exposure time and emitter type are determined only through EAF testing and monitoring of pulse and blood pressure.

Patients may develop an elevated body temperature. This is explained by the fact that, due to a lack of oxygen, the body increases the proportion of anaerobic energy metabolism, which is significantly less efficient (in this case, only 2 molecules of ATP are synthesized from one molecule of glucose, whereas aerobic metabolism produces 38 molecules). If the temperature does not exceed 38°C, fluid intake should be increased and a cleansing enema administered. If the temperature rises above 38°C and the patient tolerates it relatively well, antipyretic medications should not be used. Antipyretic drugs are used when the patient's condition is severe.

Skin manifestations take the form of various eruptions (vesicles, papules, pustules, and urticaria). In people suffering from skin diseases, exacerbations of the skin condition are observed because drainage in these individuals occurs predominantly through the skin.

Joint pain intensifies due to the release of toxins into the blood vessels and the resulting deterioration in blood supply to the joints.

It is practically impossible to describe all manifestations of drainage because each patient's response is individual. If any symptoms indicating a deterioration in the general condition appear, readings at the points corresponding to the adrenal glands, the sympathetic and parasympathetic nervous systems, the pancreas, and carbohydrate, protein, and fat metabolism must be measured.

As mentioned above, one of the liver's main functions is to eliminate toxins and breakdown products. The liver is connected to the intestine only through the gallbladder.

Based on this, it can be concluded that drainage is possible only when the gallbladder has good passage capacity. The functions of the small and large intestines must also be normal. For example, in cases of constipation, the intestinal drainage system functions poorly. In addition, the liver cannot supply the brain with sufficient glucose, which is also essential for brain function. As a result, the kidneys increase glucose synthesis, leading to their dysfunction.

In recent years, sugar consumption has increased sharply. Sugar is absorbed by the body too quickly and converted into fat, which forms low-density lipoproteins. Blood cholesterol levels rise, microcirculation deteriorates, and the passage capacity of the gallbladder decreases sharply. As a result, the elimination functions of the liver and kidneys are impaired, the concentration of breakdown products in the blood increases, and oxygen levels decrease. Consequently, the heart and brain receive insufficient oxygen. There is a high probability that oxygen will be utilized in

the form of superoxide. As already mentioned, this significantly increases the risk of cardiovascular diseases and cancer.

If we go back 100 years, physical labor was predominantly manual. Tractors and other machinery did not exist. For example, mowing consumed approximately 7,000 kcal per day. No more than 5,000 kcal could be replenished. In such circumstances, to prevent the body from becoming depleted, it was necessary to consume foods high in simple carbohydrates, which would allow the energy balance to be restored quickly.

The relationship between lifestyle and the body's condition will be discussed in subsequent publications.

CONCLUSION

Disease is a complex process that affects interconnected systems of the body and is accompanied by a disruption of dynamic equilibrium, or homeostasis. The material presented in this book highlights the importance of the immune system, nervous and endocrine regulation, intestinal microflora, microcirculation, and metabolism in maintaining normal bodily functions. Particular attention is given to the role of the liver as a central organ of metabolic regulation, ensuring the interconnection of carbohydrate, fat, and protein metabolism, as well as meeting the energy needs of other organs and tissues. The author considers the elimination of the root cause of a pathological process and the coordination of the functioning of various body systems to be important conditions for restoring physiological functions.

The book presents the author's approach to infrared therapy, based on the concept of interrelationships between biochemical, energy, and regulatory processes. It discusses the proposed mechanisms by which infrared emitters of various series affect inflammatory responses, blood circulation, metabolism, and tissue restoration, as well as their use within the method developed by Professor R. Kh. Rakhimov. The concepts presented combine information on physiology and biochemistry with the author's practical observations. At the same time, the mechanisms and therapeutic effects described require evaluation from the perspective of modern evidence-based medicine, including controlled studies of the efficacy, safety, and scientific validity of the proposed exposure protocols.

Thus, the central idea of the book is the need to view the body as an integrated, interconnected system in which changes in the function of one organ can affect the condition of other organs and the overall metabolic balance. Understanding these interrelationships is important for studying the mechanisms underlying the development of diseases, developing comprehensive approaches to restoring physiological functions, and further investigating the potential applications of infrared therapy.

List of Abbreviations

ATP	Adenosine triphosphate
ACTH	Adrenocorticotropic hormone
DNA	Deoxyribonucleic acid
IR	Infrared
HDL	High-density lipoproteins
LDL	Low-density lipoproteins
VLDL	Very-low-density lipoproteins
VHDL	Very-high-density lipoproteins
NADH	Reduced form of nicotinamide adenine dinucleotide
RNA	Ribonucleic acid
pH	Hydrogen potential, an indicator of the acidity of a medium
US	Ultrasound examination
Ch	Cholesterol (abbreviation used in the book)
EAF	Electroacupuncture functional diagnostics

SPED	Abbreviation used in the book to designate a meridian;
R_1OOR_2	Organic peroxide (general formula used in the book)
$R_1OO•$	Peroxyl radical
O•	Atomic oxygen radical