**GENETIC LEVEL OF BIOPROCESSES REGULATION AND BIOSYSTEMS IN EXTREME CONDITIONS.**

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Scientific and technical progress alters conditions of human life: physical and chemical characteristics of environment rhythm and mode of life are changed. Because of high level of acceleration of this process a number of organisms lose their ability for adaptation to new conditions.

Most of specific problems in current medicine (increases in the incidence of oncological, allergic, immunodeficit diseases and myocard infarction ) and problems of human viability under new conditions when developing of space and ocean depth, etc., concern exactly with extreme affects of environmental factors.

There are two approaches to the solution of problems of such kind:

1. to change external factors affecting the human organism;
2. to find organisms own reserves, to increase it’s adaptivity and resistance, to find methods for correction of organism extreme condition.

Development of the models for interrelationship between variousbiosystem organization levels and environment when external parameters deviate from it’s normal values on the basis of experimental and theoretical investigations would permit:

1. to forecast the dynamics of the main organism processes under extreme conditions;
2. to find parameters informative for estimation of adaptive mechanisms tension level and conditions extremity degree;
3. to determine limits for external parameters (pressure, temperature, accelerations, concentrations of pollutants, ets.);
4. to find methods of correction of extreme conditions of organism;
5. to find adaptogens, increasing organism resistance under extreme conditions;
6. to develop systems for preliminary adaptation (training systems) to various influences which extend range of organism viability under extreme conditions.

Organism’s response on conditional changes depends on:

1. external factors (their quantity and quality, values and rate of change of environmental parameters);
2. internal factors:
   * genetic predisposition of organism to live under the present conditions,
   * structural realization of genetic predisposal during ontogenesis, readiness of organism to exist either under present conditions or under other conditions closed to present with the same mechanisms of adaptation,
   * structural and energetic reserves of organism,
   * provision of transition from present organism conditions to changed one according new circumstances on the genetic level,
   * genetic and structural adaptation to stress (in the case when adaptation is impossible stress reaction is "turned out" or don’t "turn in" at all, permitting to avoid "adaptation diseases" which significantly aggravate extremal conditions of organism,
   * reparation system activity (organisms with cells bearing multiple DNA disturbances for structural enzymatic providing of adaptation processes and for resynthesis of structural and enzymatic systems after finishing of catabolic influence of stress-reaction,
   * pathological processes in this organism.

General mechanisms of organism extremal conditions phases are well-known now: from non-specific stress-reaction to specific mechanisms of responses to certain influences (hypoxy, toxic effects, physical load, etc.), but genetic mechanisms are not known.

Most of existing models are intended for "average" organism and do not take into account individual characteristics of organisms (genetic and morphological), latent genetic variability being revealed just under extreme conditions.

According to N.A. Kolchanov and I.N. Shindyalov, "revelation" of variability masked by regulatory outlines take place only as result of changed environmental factors on the number of generations. Under such conditions destabilizing selection on the genetic level eliminates "outdated", regulatory outlines baneful for organism. However, this condition is realized for human population in the most of biogeocenoses. So, we can ascertain dramatic increase in variations of "physiological norm" and potential abilities of the number of organisms in population at the expense of "revealed variability".

Unfortunately, mathematical models in the field of destabilizing selection are too simplified yet. They do not take into account possibility of changes in regulated by feedback outline parameter values due to internal organism mechanisms possibility of existence of whole class of feedback outlines, which ether "turn in" or form on the basis of genome under influence of certain external circumstances. (Such possibilities can be confirmed by existence of wide range of adaptative responses and stationary states of organism). Besides, it is not obvious that catabolic effects of stress-reaction does not "turn out" most of feedback outlines. Thus, changes in environment are enough for realization of latent variability. As to genetic base of non-useful new conditions for potential feedback outlines, during evolution they could be lost, but not necessarily eliminate.

Taking into account the great variability of manifestations of "material" investigated it is necessary to develop not the model of "average" organism but systematized number of models, possessing it’s own set of mechanism for bioprocesses regulation and it’s own degree of "viability" under changed conditions of environment.

During evolution percent of organisms appropriate to any of these models will change under conditions of external destabilization selection would stabilize variability.

For practical application stochastic models of population adaptive possibilities with various rates of environmental parameters changes and on various intervals of evolution from this changes can be useful. These models could be able to produce probability estimations of present organism adaptivity on different stages of evolution.