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Life Science nanotechnological approach in pathogenesis of post-aggressive reactions of human organism and critical conditions

(New-York, USA)

There is no real new medicine in treatment of patients not only in critical conditions, but we can observe overall stagnation in new drug development (we are not talking about number of new drugs on the market, but about their real efficacy). Such stagnation is based on lack of new technology in Life Science Industries. There are several objective reasons for this, but the facts speak for themselves.

Presented technological approach allows assembling specific compositions of Biologically Active Substances composing [NANO-COMPLEXES™] of nano-quantities (10^{-9}) of naturally existing in Human Organism bioactive substances. These bioactive substances are *stabilized and incorporated* into a specially developed NuCell-Direct™ Delivery System by means of Nanotechnological process.

Bioactive NANO-COMPLEXES™ targeting pathogenetical factor of specific disease / dysfunction / pathology, allows:

- enhance Adaptation Mechanisms to the post-aggressive reaction of the organism and critical conditions
- restore Self-Healing processes of the organism
- repair genetically determined chain of Biological Information Transfer

All the above mentioned advances can be achieved by moving from Singular Biologically Active Substance [singular drugs] to the technology allowing assembling from endogenous bioactive substances targeted to the pathogenesis Multicomponent Bioactive Systems [NANO-COMPLEXES™].

KeyWords: Lifescience, Nanotechnological approach, Pathogenesis, post-aggressive reactions, Critical conditions

LIFE SCIENCE INDUSTRY FACTS

Before presenting BIONOVA's technological approach and market opportunities, we would like briefly to describe a current critical situation in Life Science Industries.

After the end of the Cold War, there was a significant budget cut in all fields of the Fundamental Science on both continents. Industrial Companies from the Wall Street used this condition to acquire scientists from fundamental science and utilized their knowledge for commercialization of the appropriate products. The benefit of such cooperation between science and market driven companies brought Internet and Computer Science on a commodity level, improved telecommunication [wireless communication, cell phones], and overall, creating new, previously non-existing businesses with multi-billion operations.

At the same time, the Wall Street never took advantage of the power of the Fundamental Scientist in the field of Life Science Industries. The marketing companies in Life Science Industries never utilized the knowledge available from academician scientists. Why it happened is the subject of separate discussion, but the reality is here. For the last several decades there are not only no real breakthrough development in Life Science Industries, but also no any real technologically driven

products on the market.

Today, even high-tech professionals in the industrial field are expressing their concern of the status of future development. Nobel Prize Physicist Andre Geim in his recent article, in Financial Times, wrote: “Be afraid, very afraid, of the tech crisis”. In this article, he refers to upcoming crises in high-tech industries due to the lack of development in the fundamental science. We not only agree with this statement, but can add to this that the technological crisis and stagnation have already affected Life Science Industries.

Basic strategy of product development in Life Science Industries remains the same for the last several decades. The existing technologies reached its saturation and limits.

CURRENT MARKET CONDITION IN LIFE SCIENCE

To help understand how companies are aligning themselves for success, Deloitte Touche Tohmatsu [DTT], in collaboration with the Economist Intelligence Unit [EIU], has completed a research program ‘The Future of the Life Sciences Industries: Strategies for Success In 2015’. DTT and EIU professionals also conducted a global online survey of 193 senior executives of the Life Sciences Industries. In summary, this research identified the following shifts in shape and direction of the industry and key strategies for success:

- Over the next decade, Life Science companies will likely face a great deal of upheaval, and they will need to reinvent their strategies to succeed. Those companies that fail to respond to the new challenges will fade from the view.
- The future of the Life Sciences Industries will depend on products and services not yet found in their offerings.
- Emerging markets will play a major part in the future of the industries. Companies will have to significantly expand investment in emerging markets across a wide range of activities, including Research and Development (R&D).
- Traditional sales and marketing approaches will need to be modified.
- Significant revenue growth is unlikely to be achieved organically. Companies will need to leverage the fact that partnerships will be ubiquitous and may include cross-sector partnerships and tie-ups with payers (public and private) as well as academia. This will draw new players into the sector.
- Traditional commercialization strategies, based on reach frequency and saturation, will not be effective – companies will need to develop novel approaches toward the commercialization of products that engage users of products as well as regulators of the industry.
- The Life Sciences Industries are clearly poised for a period of massive shifts, and the most successful players in 2015 will be those whose strategies not only reflect these trends, but also adapt to and take advantage of them. To do so, Life Sciences companies must first clearly understand the forces that are changing the industries, and the issues that they will need to overcome in order to be successful in 2015.

BIONOVA's FUNDAMENTAL SCIENTIFIC KNOWLEDGE

BIONOVA has achieved exceptional advances in product development by combining R&D in the following fields:

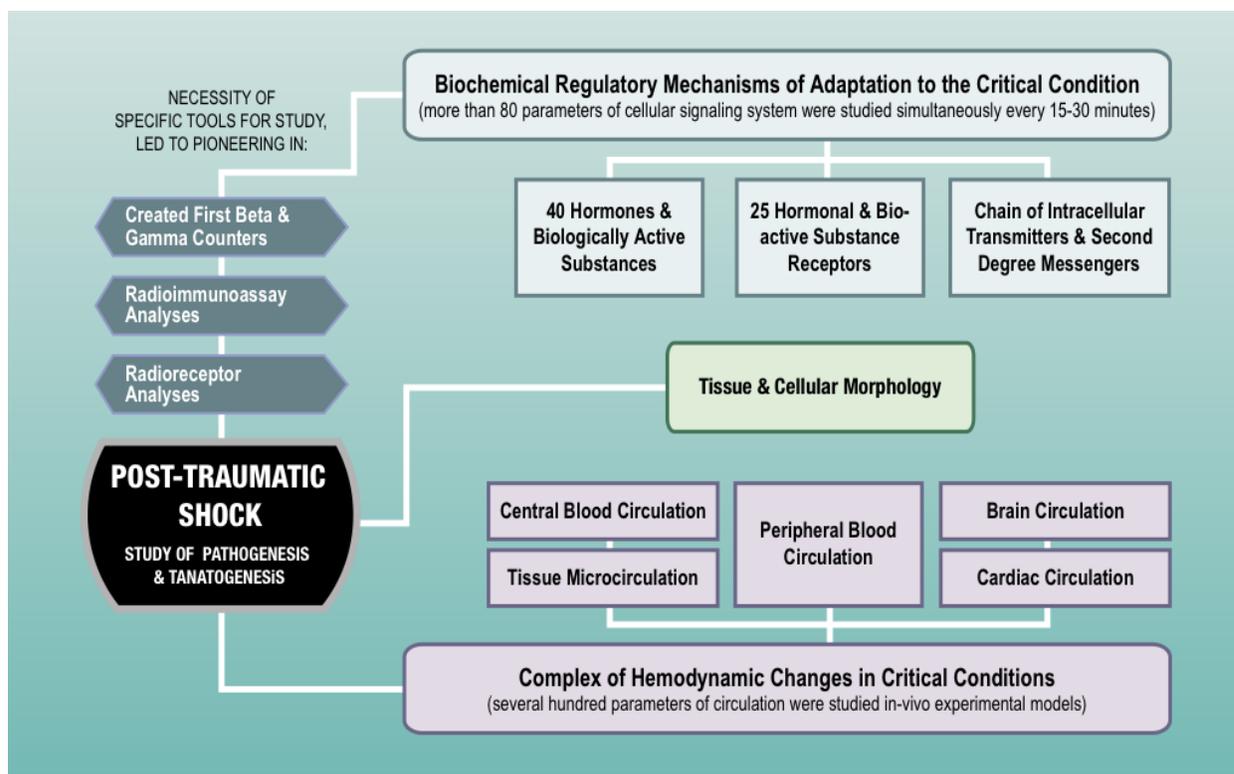
- Bio-Medical Science
- Life Science Nanotechnology
- Proprietary Web Engineering
- Proprietary Computer Software
- Custom Designed Production Process

FUNDAMENTAL SCIENTIFIC RESEARCH

BIONOVA's advanced technology is based on more than 20 years of experiments conducted in the Institute of Experimental Morphology Academy of Science Republic of Georgia.

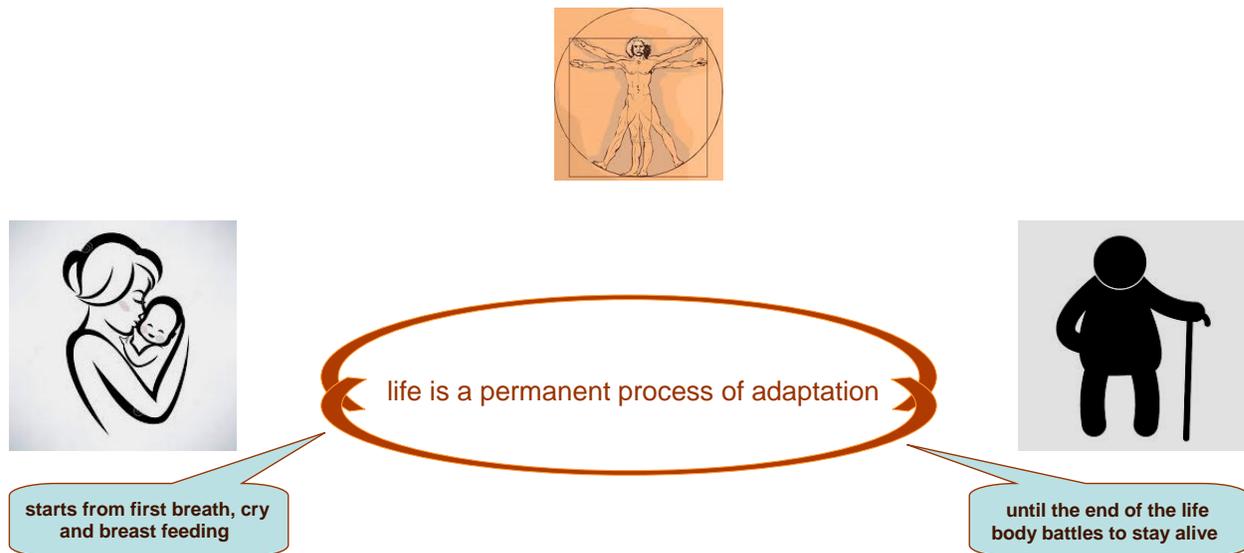
Below are newly developed tools and summarized test parameters conducted in the course of study of Pathogenic Mechanism of Post-Aggressive Reaction of the Organism and Critical Conditions:

- Development of new, previously non-existing equipment to study nano & pico-quantities of Biologically Active Substances in different fluids and tissues of the organism [Gamma & Beta Counters for Radioimmunoassay].
- Simultaneous study of 80 parameters of Cellular Signaling Systems with hundreds of Circulation Parameters in Post-Aggressive Reactions of the Organism (Critical Condition of Living System).
- Development of new methodology of Hormones and Biologically Active Substances analyses – (Radioimmunoassay)
- Development of new methodology of Cellular Receptors analyses (Radionuclide Microassays).



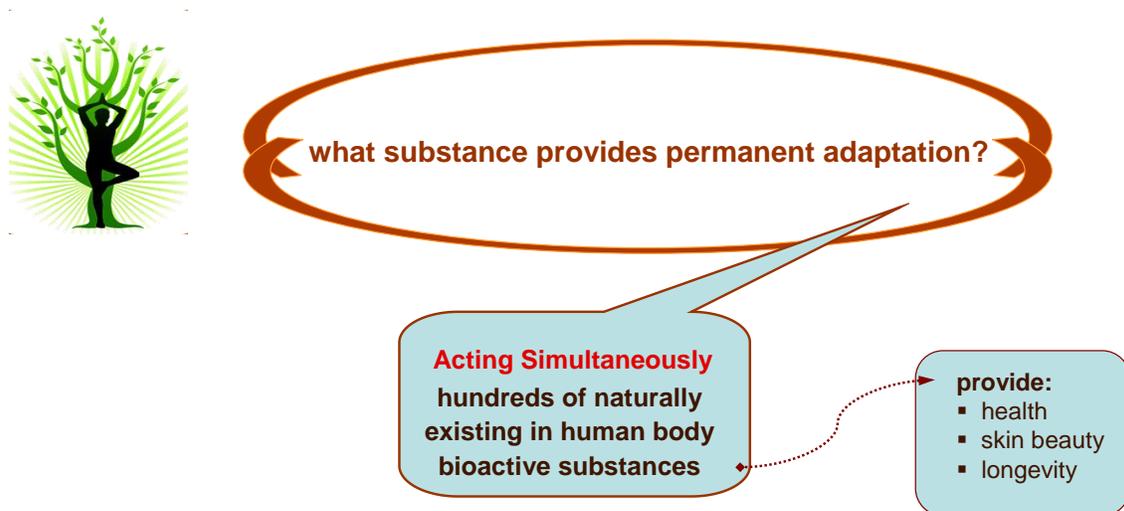
HOMO SAPIENS LIFE CYCLE

For better understanding of adaptation mechanism to the Critical Conditions of the Organisms, let's remind ourselves what is the major function of Homo Sapiens - it's not reproduction, it's not love, it's not a sexual activity, but constant adaptation to permanent changes in the environment, social life and immediate reaction to surrounding condition.



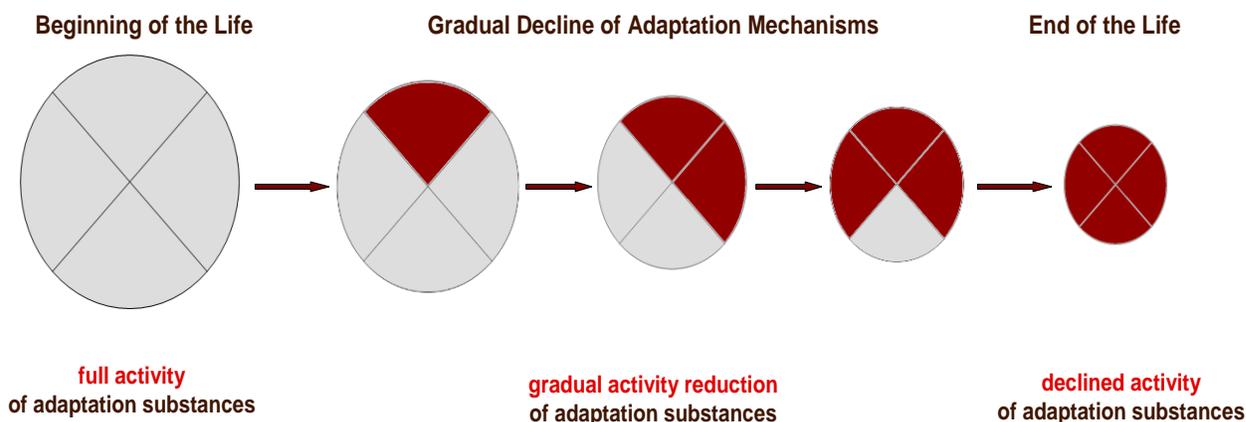
SUBSTANCE PROVIDING HEALTHY LIFE CYCLE

What are the mechanisms providing such complex constant adaptation of the Living Organism? Only synergistic action hundreds of Biologically Active Substances (hormones, neurotransmitters, intracellular transmitters, etc.) provides immediate adaptation to Post-Aggressive Reaction of the Organisms and Critical Condition.



DETERIORATION OF ADAPTATION SUBSTANCES IN LIFE CYCLE

During the course of the Human Life Cycle the adaptation mechanisms gradually declining. This is the result of steady decline of genetically determined Biological Information Transfer, which supports adequate adaptation to the critical conditions of the organisms.



WHAT WAS THE ULTIMATE GOAL OF MEDICINE

Question 1: What was the ultimate goal of medicine [life science industries] during the history of Humanity?

Answer 1: Enhance the Self-Healing ability of Human Organism to maintain full activity of adaptation substances essential for healthy life cycle.

Question 2: What was the attempt of medicine to achieve the healthy life cycle?

Answer 2: Starting from alchemical 'Elixirs of Youth' and finishing with thousands of Drugs (containing Singular Bioactive substances) developed by modern Pharmaceutical, Nutritional, and Beauty industries.

Question 3: Do we have real progress in Enhance the Self-Healing ability of Human Organism?

Answer 3: No.

The real achievement of modern Life Science relates to the attempt to treat specific pathologies, but not to Enhance Self-Healing Processes of Human Body.

WHAT SHOULD BE THE ULTIMATE GOAL OF FUTURE LIFE SCIENCE?

Question 1: Development of New Drugs to Treat the Disease?

Answer 1: No

Question 2: Development of New Vaccines for Bio-Defense or Epidemics?

Answer 2: No

Question 3: Development of more Me-too Personal Care Products?

Answer 3: No

Question 4: Development of more Hope-in-a-Jar Skincare Products?

Answer 4: No

*The primary target of future Life Science should be encompassed on Healthy Body Functioning and Longevity through **increase of Endogenous Self-Healing Properties of Human Organism.***

WHAT IS EXACTLY NANOTECHNOLOGY PLATFORM IN LIFE SCIENCE?

Barriers of Entry into Life Science Nanotechnology

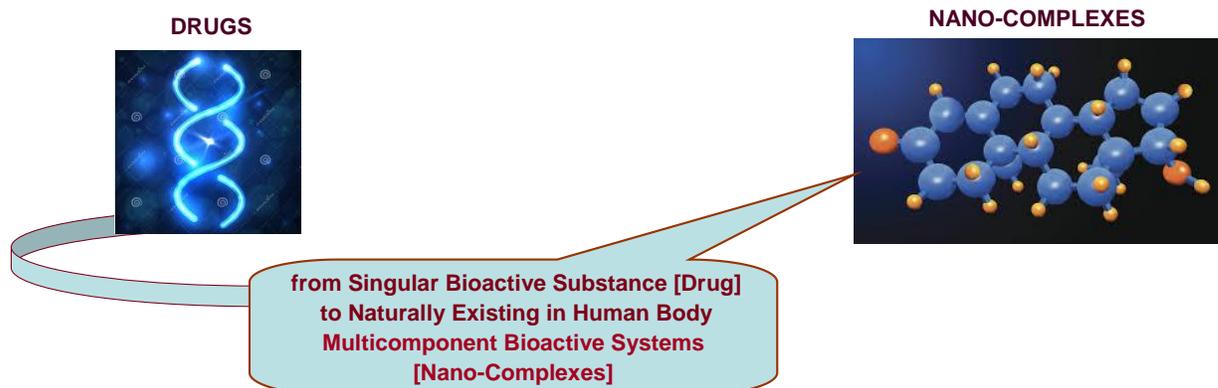
Life Science Nanotechnology has a high barrier of entry and requires the following objectives:

- Deep scientific requisite knowledge base
- Strong intellectual property platforms
- Very high equipment cost

HOW TO ENHANCE ENDOGENOUS SELF-HEALING PROPERTIES OF HUMAN ORGANISM?

The restoration of Self-Healing processes is possible only by imitation of Naturally Existing in Human Body Biologically Active Complexes [Nano-Complexes™], thus supporting Normal Biological Information Transfer.

The repair of genetically determined chain of Biological Information Transfer can be achieved by moving from Singular Biologically Active Substance [singular drugs] to the technology allowing assembling from endogenous bioactive substances targeted to the pathogeneses Multicomponent Bioactive Systems [NANO-COMPLEXES™].



WHAT IS THE NANO-COMPLEXES™?

NANO-COMPLEXES™ is an imitation of Biologically Active Substances composition naturally existing in Living Organisms.

NANO-COMPLEXES™ triggers Adaptation System of the Human Body through Enhancement of Self-Healing properties.

NANO-COMPLEXES™ sustains normal physiological processes within the Living Organism and in comparison with Drugs not interfering with its normal function.

NANO-COMPLEXES™ BASIC PRINCIPLES

- Biologically Active Complexes [NANO-COMPLEXES™] possess unavailable for Singular Substance [drug] biological effects through Enhancement of Self-Healing processes.
- NANO-COMPLEXES™ support activation of Adaptation System of Human Organism
- roviding protection / prevention / treatment of multiple diseases.
- NANO-COMPLEXES™ composed of the Bioactive Substances naturally existing in a Living Organisms with strong and predictable results, without any side effects.
- The usage amount of Biologically Active Substance used in assembled NANO-COMPLEX™ should be in the same quantities, naturally found in a Living Organisms - in nano (10^{-9}) and pico (10^{-12}) quantities.
- Delivery System: biologically active substances used in billions & trillions of the gram requires new generation of delivery system being able to:
 - a) **stabilize** really unstable biologically active substances
 - b) **delivery** of bioactive systems to the targeted places.

TECHNOLOGY BEHIND NANO-COMPLEXES – LIFE SCIENCE NANOTECHNOLOGY

- NANO-COMPLEXES™ concept required development of a new previously unavailable technology related to Life Science Nanotechnology.
- NANO-COMPLEXES™ is a science of Assembling Biologically Active Complexes from nano-quantities of singular biologically active substances to imitate physiological processes occurring in a Human Body.
- The usage amount of individual biological active substances in NANO-COMPLEXES™ are from hundreds to thousand times less than in currently available Drugs, Nutritional and Beauty products.

Note: currently used amount of bioactive substances in drugs create multiple side effects and abnormal pathways of normal biological information transfer.

DIFFERENCE BETWEEN LIFE SCIENCE & INDUSTRIAL NANOTECHNOLOGIES NANO-QUANTITIES vs. NANO-PARTICLES

- Nanotechnology is at crossroads. Multiple regulatory organizations (ISO, FDA, OSHA, EPA, UNESCO) are trying to come up with unified definition and create a policy for nano-materials.
- High-tech companies and government officials are focusing their attention on definition and regulation for nano-particles with the size of the matter from 1nm to 100nm.
- Today, nano-particles concept from Industrial Nanotechnology [electrochemical, electro-engineering, physicochemical, computer science] has been mechanistically transformed into Life Science Industries. This tendency will have long-term negative consequences, which is imperceptible today, but will have long term negative effect.

Note: This is not about the semantics, but about fundamental differences between Industrial and Live Science Nanotechnologies.

- Life Science Industries have nothing to do, or at least very minimum, with nano-particles. While Industrial Nanotechnology is focused on nano-particles manipulation, Bio-Medical researches should focus their attention on nano-quantities of biologically active substances used in newly developing products with specific biological [physiological] effects.

WHAT IS COMMON IN INDUSTRIES RELATED TO LIFE SCIENCE NANOTECHNOLOGY

Question: What is common between?

- Pharmaceutical Industry
- Personal Care Industry
- Nutritional Market
- Beauty Industry
- BioDefence

Answer: The common relevance of all those industries are related to the same object – HUMAN ORGANISM

- Marketing professionals and government officials segmented products related to Human Body to different industries and to different ruling.
- Newly developed technological approach [NANO-COMPLEXES™] can serve as a Nanotechnological Platform for new product development related to HUMAN ORGANISM, regardless of industry.
- The outcome of nano-quantities modus operandi in Life Science Nanotechnology have a physiological impact on and as a result the Highest Efficacy Products, without side effects.

TRENDS IN LIFE SCIENCE NANOTECHNOLOGY

The future trends in Life Science Nanotechnology are Personalization of Drugs & Nutritional supplements.

Regardless the industry, the basic strategy is:

- (a) adjust product biological activity to each customer profile, or
- (b) to make products for a group of customers with more or less similar dysfunctions; thus moving from ‘one general product for everybody’ to products with more ‘targeted biological effects for a specific group of people with similar dysfunctions.

***NOTE:** Today, personalization factor of health care products has already begun attracting attention in the investment community. Multiple prominent investors have started allocating significant resources into personalized cancer genomic analyses to address customized treatment drugs. Much of these personalized drugs make good headlines but are still quite remote from an average consumer.*

If such personalization approach takes only first steps in the clinical practice, BIONOVA has already finalized R&D and successfully introduced its first Customized products.

Development of personalized products is only possible by employing new and previously unavailable technologies.

Today, only BIONOVA’s Life Science Nanotechnology based on Modular Production Process has real technological capacity to create new generation of products and to imitate physiological processes occurring in a living organism.

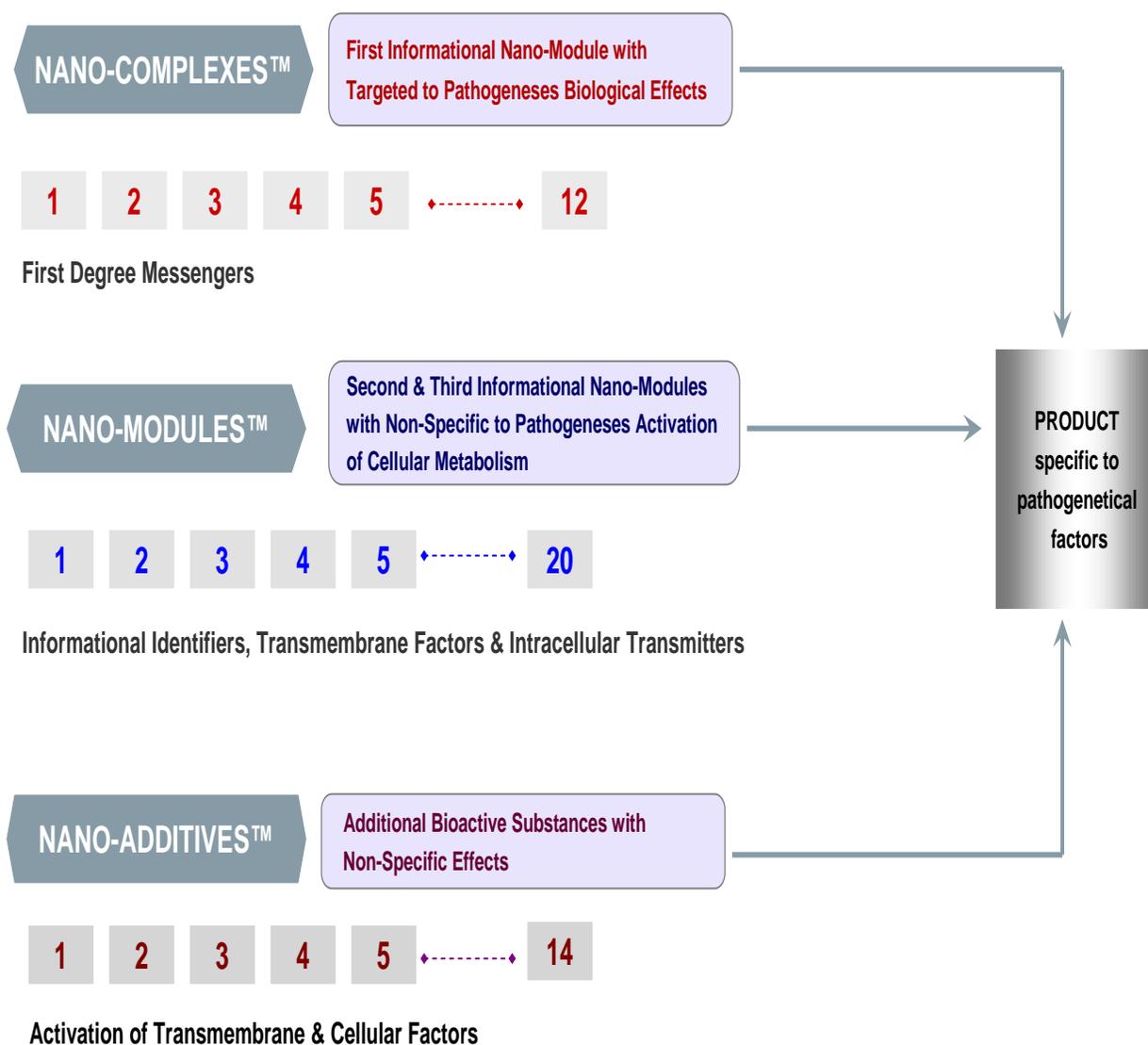
NANO ERA BEGINS

BIONOVA has achieved exceptional advances in product development by combining R&D in the following fields:

- Bio-Medical Science 40 years of fundamental scientific research and establishment of a new Scientific Concept
- Life Science Nanotechnology development of Nanotechnological Platform for Life Science Industries
- Custom Designed Production Process development of new generation of Nanotech Products
- Proprietary Web Engineering
- Proprietary Computer Software

BIONOVA's NANOTECHNOLOGICAL MODULAR PRODUCTION PROCESS

for development of new generation of treatment products with targeted biological effects



მ.მ.დანიელოვი

სიცოცხლის მეცნიერების ნანოტექნოლოგიური კვლევები ადამიანის ორგანიზმის პოსტაგრესიული რეაქციების და კრიტიკული მდგომარეობების დროს (ნიუ-იორკი, აშშ)

წარმოდგენილია ბიოლოგიურად აქტიურ ნივთიერებათა (ნანოკომპლექსები TM) კომპოზიციების შეკრებისა და წარმოების ნანო-რაოდენობების პრინციპზე დაფუძნებული ტექნოლოგია. ეს ნივთიერებების ტაბილიზებულია და ინკორპორირებულია "NuCell-DirectTM" ნანოტექნოლოგიურ სისტემაში. ბიოაქტიური ნანო-კომპლექსები მიზანდასახულადაა შედგენილი შესაბამისი პათოლოგიის პათოფიზიოლოგიური მექანიზმების გათვალისწინებით. ისინი საშუალებას იძლევიან გააძლიერონ ორგანიზმის საადაპტაციო მექანიზმები პოსტ-აგრესიული რეაქციების და კრიტიკული მდგომარეობების დროს; ამასთან აღადგენენ ორგანიზმის თვით განკურნების პროცესს და აკონტროლებენ გენეტიკურად დეტერმინირებული ბიოლოგიური ინფორმაციის გადაცემის თანამიმდევრობას.