Title of Lecture:

INITIATIVE BIOKYBERNETIK - Mathematics and Control of Human Body System's Dynamics

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Abstract

Aims: Announced in Germany in 2014, "Initiative Biokybernetik" shall integrate systems research in engineering, informatics, mathematics, basic and clinical medicine, psychology, ecology and socio-economical sciences for complete modeling of human body as a functional system of complex dynamics that are under permanent impact from outside exposures and intervention. Focus is set on the largely unknown and least understood *system of functional management and control* of physiological dynamics, a *meta-organ* that can exist only in living body where it deserves a special denomination as body's *kybernetik system*. To establish algorithmic medicine as a future medical specialty, *Clinical Biokybernetik*, with *Patho-Biokybernetik* and *Interventional Biokybernetik* ramifications is the ultimate goal.

History: My first annual meetings in Germany in 2014 and, since 2016, with Faculty of Computational Mathematics and Cybernetics of Lomonosov Moscow State University had a focus on biomedical engineering and mathematical modeling of selected body functions, neurosciences and behavior; in 2018, BIOKYBERNETIKA – that third conference on *MultiScale BioMathematics: Coherent Modeling of Human Body System* – was upgraded to 'conference of MSU' by order of rector. Most recently, further conferences dedicated to impact from person's life-sphere surroundings on body-system's dynamics and to molecular health in variant populations across Eurasia supplemented BIOKYBERNETIKA with a wider community of systems-oriented scientists from clinical and basic medicine and health-related disciplines. In pursuit of such comprehensive understanding of human health and for testing implied concepts in wide spectrum of life conditions, a *theoretical core* is clearly mandated as a skeleton for guidance.

Current perspectives: To have a core theory as kind of 'motherboard' for integration of 'parts models' and dynamic impact from outside, an axiomatic biodynamics within hierarchical 'system functional architecture' was developed to lay a track in coherent multi-scale research. Based on the concept intensity functions in order to permit immediate interpretation in stochastic analysis with a bulk of modern statistical methodology for identification, circadian rhythms, functional learning and functional aging can be integrated in an axiomatic generic dynamics that are up-scalable in any structure of hierarchical cellular complexity; of note, integrated intensity functions relate to thermodynamic *entropy* in both Boltzmann's and Clausius' definitions via Linhart's chronodynamic interpretation.

Conclusion: The whole scheme makes a mission of lasting challenges for more than a generation of young talented and ambitious researchers across Eurasia – and *within* Eurasia; it is then referred to as EURASIA'S BIG BRAIN, and Russia's scientists appear to be best prepared for it.

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