TETRAD Institute of Complex System Dynamics
presents

Medicine and Public Health Under Stress

13 Seminars for Public Presentation

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release version 1.0 17.October.2021

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Preface

These are seminars which can be delivered onsite at a host institution with online capabilities. There are generally one or at most two presenters in each seminar. The seminars involve an integration of lecture-presentation and open discussion with ample opportunities for participants to present lines of questioning as well as areas of relevant similar research and clinical experience. Each seminar can be customized to adapt to special circumstances, interests, needs of the host institution. Here are very brief summaries, and the contents can be described in greater detail for the benefit of hosts and sponsors. Typically these seminars will be from 60 to 90 minutes in duration with options for extension and also continuation into subsequent sessions for interested groups and institutions.

1. PHE – Constructive Solutions to Socioeconomically Sustained Health Disparities

Examination of the causes and progressions of public health inequities among diverse segments of the population in different historical periods and particularly in the present. Critical examination of genetic, environmental (including climatic) and socioeconomic factors. Presentation of a program for addressing present and future inequities that is focused upon genetic, epigenetic and cultural factors including ongoing present-era environmental and climate change. Special attention directed to stress-sustained disorders of cardiovascular, gastrointestinal and neurological natures. Mechanisms for use of geospatial intelligence data modeling and mining are presented as part of the underlying toolset for improving outreach and outcomes for populations at risk.

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2. Waves Spiraling into Conflict, Chaos and Rogues – the Dysautonomic Roots of Cardiac Arrhythmias

An overview of research in the wave dynamics involved in the origin and manifestation of cardiac neural pathology leading to tachycardia, atrial fibrillation, and related myocarditis, focusing upon signal patterns that may be identifiable and measurable as precursors to onset of intermittent episodes and longer-duration or permanent behaviors which then require radical response including ablation procedures or other countermeasures. Examination of catalytic neural events within other functions of the autonomic nervous system that contribute to these formations and methods for multi-target therapeutics.

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3. New Approaches and Models for Understanding and Treating Autoimmune, Inflammatory and Dysautonomic Disease

Examination of research in sustained electrochemical stressor environments leading to degradation of neural vitality and the triggering of pathological pathways of transmission leading to chronic conditions such as arrhythmia, POTS and AFIB. Focus is upon etiology and the role of stress sources within contemporary industrialized society, with attention to prevention practices rather than solely or exclusively post-incidence response. Discussion is directed toward methods for improving education and innovation among both providers and patients.

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4. VESID – Viral Entry Structural Integrity Disruption: Concepts in Topological Virology and a Model for Prophylactic Tools to Reduce Infectious Disease Transmission

Overview of the virological research based upon topological integrity models for different viruses including SARS-CoV-2 (COVID-19). Presentation of methods and results in identification of suitable non-prescription-capable chemical agents that will degrade viral envelope structures critical for cell entry and replication. Overview of the methodology for development of an oral/nasal prophylactic capable of self-administration and general use in conjunction with distancing, masking, and other fundamental hygiene. The model for such preventive medicine specifically addresses COVID-19 as the initial target of investigation but there are applications possible for several other respiratory-tract infections. Discussion is directed also toward the challenge of introducing new models of preventive therapy within the medical profession and for overcoming population-segment resistance to preventive hygiene practices.

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5. ANCES and the Hidden Pandemic of Dysautonomic Disorder and Disease – SVT, POTS, MALS and More: Disruption of Autonomic Control Functions through Informational Storm Events Triggered by Chronic Sustained Stressor Agents

We examine the balance between sympathetic and parasympathic control networks and the effects of deregulation brought on by chaotic signal conflict and a “double bind” bifurcation syndrome, contributing to noise and informational heat dissipation. This complex of conflicting and negating signal action compounds a signal weakness effect that operates at the level of energy transfer propagated as biosolitons through protein chains, in turn affecting adversely protein conformational dynamics and the geometrical behavior of DNA helical structures within protein sheaths. Further, we explore the role of both neurochemical and bioelectromagnetic stressor agents as the principal class of factors responsible for the mechanics of such neurosystem disruption. We introduce an

explanation for the biophysics by which such stressors directly and adversely affect biosoliton signal propagation in proteins and nucleic acids, demonstrating a causal path from such stressors (both external stimuli and internal psychological triggers) to what can be termed “informational storms” within the autonomic neural networks. Such storms, analogous to cytokine storms within the context of infectious disease, encode and reinforce cycles of behavior including the emergence of chronic positive feedback loops related to the informational storm events and signal weakness effects. We explore how these cyclical, “chreode-like” formative processes thereby create and reinforce epigenetic effects of activation and deactivation for particular immediate-early expression genes that are centrally responsible for control of both FF (fight-or-flight) and RR (relaxation response) systemic behaviors, principally through regulation of cortisol and DHEA metabolism and homeostasis. We present the basis for long-term deregulation and loss of efficient signaling, and for positive feedback loops that result. This is a strong model for explanation of the neurodynamics involved in a number of disorders of the autonomic nervous system, leading to significant pathologies of the cardiovascular, gastrointestinal and endocrine systems. We show how a combination of psychological and physiological behaviors, supported by appropriate pharmacological agents but strongly resting upon techniques including exercises to develop conscious control of several generally-considered autonomic functions, can lead to long-term control that dampens and subdues the signal weakness and informational storm phenomena sufficiently to reverse the observed positive feedback loops and create an effective pathway to reduce the overall dysautonomic behaviors.

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6. Topological Information Processes in Viral-Host Interaction and Membrane Penetration: common natural biocomputation processes underlying certain contagious and autoimmune diseases and adaptive mutation and the process leading to Signal Confusion, Modulation and Noise Cancellation: The Body Is an Electromagnetic Organism

A model incorporating principles of topological order and efficiency shows utility for demonstration of a mechanism present in both viral entries for certain agents including coronavirus, influenza and filovirus types such as ebola, and also in non-infectious disorders and diseases associated with autoimmune reactions, particularly within the brain and central nervous system. This process can be described as a type of natural biocomputation involving extensive molecular surfaces. It appears to fit with observations of surface protein changes within viral envelopes and primary structures involved in entry to target host cells, and it involves an iterative changes within viral protein conformation and surface topography that can be associated with underlying mutations within the viral strain. Similar processes appear to be present in the phenomenologically distinct and non-viral initial inflammatory stages of neurons affecting axons, both myelin sheaths and interior microtubule chains, leading to neuronal degeneration that triggers subsequent normative engagement of the immune system response. The apparent computational process is similar to certain non-Turing quantum computing models and leads to consideration of an underlying common mechanism within certain biological structures that involves the interaction among non-smooth manifolds and the optimization of surface-

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fitting that is consistent with Ricci Flow models for deformation and maintainability of topological consistency.

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7. Psychosocial Factors as Consequences and Enhancers in Inflammatory and Systemic-Pathology Communicable Diseases – COVID-19 as a Contemporary Example

The impact of COVID-19 is unique and unparalleled in human history with a phenomenology that extends beyond that of a traditional epidemiological event. The pandemic that began in spring of 2020 provides a demonstration of several points involving psychosocial integrity that are critical to the future resilience of humans as individuals and as social groups with respect to similar pandemic-type events where catastrophes impact entire societies for extended periods wirth uncertain terminations. Such events include those that may originate from non-biological causes and yet lead into consequences, including neurophysiological debilitation, that open pathways for extensive and heightened infectious diseases such as COVID-19. These consequences may include similar ranges of effects in terms of multi-system pathologies in the human organism, involving neurological and cardiovascular diseases, multi-organ inflammations, intensified cytokine storm events and deficiencies in huyman immune response and control, and overall long-term behavioral debilitation. The health of humans as individuals and groups involves a complex array of social communications that play roles in providing a reduction of internal tension, conflict and angst. These include behaviors customarily understood as leisure, relaxation, diversion, and play. Severe and prolonged disruption of customary behavioral cycles and social engagement/interaction between individuals and among groups is shown to create, accelerate and intensify stressor effects within particularly the autonomic nervous system and the immune system. Enhancement of inflammatory reactions, particularly to viral infections, and the onset of certain neurological autoimmune disorders, is shown to increase probabilities of both primary and secondary infectious diseases and intensification of the diseases within multiple organ systems, particular cardiovascular and central nervous systems. A variety of prophylactic and responsive measures are discussed for mitigating these highly adverse “positive feedback loop” processes in the future.

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8. Averting runaway positive-feedback inflammatory cycles in a society under “Sturm und Drang” Stress and Disruption of Social Equilibrium

Intensification of both contagion and severity of infection within the COVID-19 pandemic has varied extensively among different social groups and nations. The vast majority of attention has been directed to topics concerning the physical factors of microbial (in the case of COVID, viral) infection

and conventional analysis of methods of diagnosis and treatment. We introduce the importance of other factors that can be linked with increased or diminished immune strength and response as well as resilience within an infection cycle for individuals and close groups. These factors include self-perception and the resilience to informational signal/noise conflict, including a bifurcation phenomenon within psychological processes that bears examination for neurophysiological consequences at the cellular and molecular biological levels. We introduce concepts from fundamental models of signal processing and mechanics to open a new avenue for identifying causal factors involved in the reduction of systemic resistance and integrity in defense against diseases that affect the basic structure of human social life in home and occupational environments. These investigations point to the role of social interaction and its disruption as being potentially among the most significant but thus-far ignored factors in the wide differentiation and disparity among many demographic elements in terms of infection and severity including lethality. We examine several avenues for reducing the most impactful factors, through a combination of protocols including new models for personal and environmental antimicrobial bioprotection, public hygiene and nutrition education, resource management for diagnostics and therapeutics including medication, and methods for reducing significantly the amount and intensity of misinformation and confusion in a society that is highly dependent upon mass-media and social network communications.

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9. From CommonHealthNet to CRAIDO to MedAtrium to PHE: an Evolutionary Two Decades in Public Health Equity Design and Development

A critical review of several projects and programs at private, regional, national and international levels for increasing availability, responsiveness and accuracy in mobile, emergency, *ad hoc* diagnostics and treatment for a variety of medical conditions and particularly for epidemic/pandemic type infectious diseases. Presentation of technologies, methods, systems, and the socioeconomic barriers to implementation, distribution and provision of access to the general population. Focus is directed to the challenges of doing so and doing better now in a post-COVID world which is also undergoing the multiple impacts from novel diseases, chronic and comorbidity illnesses in large segments of the population, and the consequences of climate change. A proactive model of cooperative and mutually supportive patient+provider education and communication that employs the strengths and attractiveness of internet-based social media communication (the OASIS model and paradigm) is presented with a view to how these tools can be extended and made more accessible to larger segments of the world's population.

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10. ANCES, TSD, PTSD and Now CTSD - How the human body and species is Mal-Adapting: the emergence of the psychosocial "meme viruses" and effects on Population Health Equity and increases in comorbidity dispositions

This seminar provides an overview to the closely interwoven relationships between the autonomic nervous system and psychologically traumatic experiences including those experienced indirectly and implicitly or virtually through social media communications and the internet as a primary form of information gathering and communication exchange within contemporary society. The concept of a "meme virus" and consequence epidemic and pandemic forms of "infection" is explored, with discussion oriented to the effects from such contemporary information dependence and emotional inputs upon individual health stamina and immune system vitality and strength.

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11. Impact of Environmental, Ecological, and Socioeconomic Changes in Early 21st Century on Viral and other Microbiological Disease, Epidemiology, Public Health Response and the Pharmaceutical Development Practices

Changes Afoot in the Kingdom: New Epidemiological Dynamics - the Confluence of Climate, Socieconomics, and Global Patterns upon Future Drug Discovery, Design, Testing, Trials and Implementation

We address the underlying causes for why recent (2002+, particularly) epidemics and pandemics have decisively different characteristics that bear important, even critical, consequences for human health and social stability. In so doing we show certain relationships active between such phenomena as viral mutation, new infectious vectors, novel routes and accelerations of transmission, higher virulence and the general-population disposition to more severe complications in personal and social health management for certain infectious diseases. We show connectivity between hemifusion, endocytosis and other forms of viral entry, viral replication, consequent systemic over-reactions including cytokine storm inflammation, and also connectivity and common elements between these pathogenic processes and certain foundations for autoimmune reactions and related pathologies in signaling, communication and recognition that lead to autoimmune reactions and prolonged cellular component degradation in both neural and non-neural cellular types. We describe how certain fundamental processes are biomolecular manifestations of a generalizable type of non-Turing computational paradigm, one which can be employed in both models, simulations and the design of corrective therapies, including pharmacological design and implementation, and also in an architecture for synthetic computation algorithms and machines designed and constructed along principles similar to those employed within the biology of viruses, bacteria, cells, and complex multi-cellular and autonomous-behaving organisms.

Several very closely coupled behavioral changes on international, transcontinental and global scales have converged within recent decades, all of which involve greater movement, displacement and

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interfacing of different species of organisms which include humans, livestock breeding animals, and a variety of microorganisms that have high potential for infectious disease. These changes are closely coupled with population rise and density in close-habitation urban metropolis regions, greater affluence and resulting travel, both short-range frequent commuter distances and long-range commercial and leisure travel, especially by air. This set of changes in the underlying ecosystem and in socioeconomic patters can be linked to an increased variety and virulence within certain infectious disease agents. The overall changes are unpredicted and unexpected in most current models influencing healthcare planning and in particular public health including epidemiological management, that have emerged within the current two decades. These encompass and bring together mutual effects and often nonlinear impacts, attributable to the new dynamics of climate change, agriculture and food industry, transportation of good and movement of people, as well as interpersonal proximity, contact and exchange of personal physical media. The consequences are enormous for not only basic epidemiological models and response to epidemic and pandemic-potential infectious diseases, but also the fundamental models, systems, regulations and actual practices involved in drug research and discovery, design, testing and trials and product introduction and implementation within both institutional and private uses. We introduce some of the observed factors, relations and consequences, and we identify new pathways by which the medical establishment – public and private – including the pharmaceutical industry as a community – can more effectively prepare and establish the type of resilience necessary for reducing the personal and socioeconomic destructive impacts of epidemic and pandemic outbreaks, while simultaneously advancing the overall health of all segments and diversities of the global population.

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12. Real Quantum Biology and Implications and Applications to Real Medicine and Healthcare

A presentation covering the basic principles and recent experimental verification of theoretical models concerning the role of quantum-physical processes within living systems, suitable for non-physicists. Primary consideration is given to what is being conducted in research and what is seen as practical for introduction into medical practices in manners that will be gainful steps forward in a number of healthcare issues, particularly in the areas of cardiac medicine and inflammatory disease.

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13. From RTD to TBD to TND and PSD – Topological Orders, Structures in Biology, Brain and Society, and Pathways for Medicine

An overview of the foundations of reflexive topological dynamics (RTD) as a process theory and evolutionary model within physics and biology, with illustrations of how the topological approach within the life sciences can lead to new understanding of brain mechanisms of learning and memory

and to innovative practices for health sustainability and viable medicine. Among medical technologies discussed are several in practice successfully within wound therapy, immune system reinforcement and psychiatry which employ electromagnetic and acoustic treatments demonstrating a range of benefits but as yet inadequately understood with respect to biological mechanisms. This seminar addresses the gaps between what works and why, and points to new directions of application, particularly for autoimmune and neurological disease including variations of dysautonomia.

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