Taking into account the exceptional value for world science and the wish to study all aspects of thyroid carcinomas, the countries affected by the Chornobyl accident (Ukraine, Belarus, and Russia) - with the support of the European Commission, WHO, National Cancer Institute of the USA, and the Sasakawa Foundation, Japan - have established an international bank of post-Chornobyl tumor tissues and nucleic acids, isolated from these tumors.

Among the main fundamental areas, the crucial issue is how to find the «portrait» of radiation cancer using combined pathologic, immunohistochemical, molecular-biological, and molecular-genetic studies. This concerns, first of all, rearrangements in specific genes, presence or absence of different mutations in these. Pathologic and molecular-biological studies aimed at identifying markers of malignancy, are also essential to improve the quality of diagnostic and prognostic criteria.

It should be stressed that with increasing time elapsed after the Chornobyl accident, the structure and behaviour of papillary carcinomas occurring in exposed patients is changing, which may be due to the increasing age of the subjects exposed, or to increasing latency. That is why in subsequent studies it is of paramount importance to analyze adequate groups of the same age and having the same place of residence at the time of the accident, and to compare these with age matched unexposed patients with papillary carcinoma. Only this approach would help to answer the question whether there are some features inherent to radiation cancer only.

Particular importance in this context should be paid to comparing carcinomas in exposed patients with those detected in subjects from the regions around Chornobyl, but born after the Chornobyl accident, who, as they share the same ethnic and environmental characteristics are a particularly valuable control group, of spontaneous cancers. Follicular carcinomas should not be ignored. These tumors may have a longer latent period of development compared to papillary carcinomas, so that a rise in this pathology in the future cannot be ruled out.

Thus, it is clear that radiation induced thyroid cancers are continuing to occur in those exposed to fallout from the Chornobyl accident, and that it remains important to Ukraine and to the world as a whole that Ukrainian scientists should receive the support necessary for them to continue their studies and continue their international collaboration.

RADIATION EFFECTS AS MOLECULAR PATTERNS FOR HUMAN PATHOPHYSIOLOGY AND ETIOLOGY OF DISEASES

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Ionizing radiation (IR) was primordial background and archetypal environmental stress-factor for the life origin and evolution. Physiological norm/pathology dichotomy and borderline states, and the nature of organism’s systems disorders and diseases with respect to IR effects is a matter of boundaries-thresholds-gain/penalty-compensation-adaptation-disoptimization phenomena and perturbations of organism systems dynamic homeostasis at subtle molecular level. Investigation of IR effects on human organism is unique opportunity for novel theoretical and experimental insights into molecular nature of complex imminent mechanisms and gene-environment interactions underlying human physiology and pathophysiology, aging processes, disorders and diseases. Having in essence free-radical nature and mechanisms, IR effects encompass all conceptual, experimental, and clinical
implications and manifestations connected with free-radical paradigm in pathophysiology, aging, disorders, diseases, and ways of intervention. In this context subtle perturbations in free radicals dynamic redox homeostasis with alterations of spatiotemporal adaptationally controlled level of ROS/RNS/RSS/RCS (being nonlinear function of dose) and their mutual biochemical/physiological complementarity, in responsive redox signaling cascades, gene expression, transcription and apoptosis, mitochondrial and steroidogenesis, dynamics of membranes permeability, neurotransmission, telomere-telomerase balance, hemispheric biochemical dominance, etc having fundamental impact on processes of general and brain aging, neurodegeneration, CNS, immune system disorders, cerebro- and cardiovascular pathology, cancer-aging dichotomy, etc can be especially adequately modeled by IR effects. In given conceptual framework unique Chernobyl accident clinical and dosimetric data, and dynamic molecular genetic, oxidative, free-radical, neurophysiological, etc biomarkers with possibility for selection of variable specific exposure characteristics and subjects group allow to investigate, conceptualize, and illustrate modeling pathophysiology and diseases etiology phenomena by IR effects. Specific model IR impact on human organism accelerates, enhances, and condenses in time, effect, scale, and plausibly reflects at all hierarchy levels – molecular, cellular, subsystem (axis), system/organ, whole organism – basic gene-environment interactions, stress responses, adaptation, and normal and pathophysiological mechanisms and trends of pathologies, disorders, and diseases processes allowing to study them in «pure state».

CHRONIC FATIGUE SYNDROME AS CHORNOBYL AFTERMATH: AETIOBIOMEDICAL DIMENSIONS

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Chronic Fatigue Syndrome (CFS), a modern epidemic with «thousand» different faces and names, the complex cluster fluctuant clinical symptomatology of chronic illnesses affecting a quarter of relevant populations, remains a poorly understood disease with various theories of its elusive etiology, fuzzy pathophysiology and strange vague conventional general case definition – «fatigue must be unexplained, debilitating, and present for at least 6 months ». Several possible causation-illustrations factors have been incriminated with a particular emphasis on various chemical agents, multiple vaccines, viruses, radioactive (especially, depleted uranium (DU) substances), and others, contributing to the broad scope of clinical manifestations. Among several hundred thousand veterans deployed in the operation «Desert Storm», 15-20% have reported sick and about 25,000 died. DU, a low-level radioactive waste product of the enrichment of natural uranium with U-235 for the reactor fuel or nuclear weapons, has been considered a possible causative agent in the genesis of Gulf War Syndrome. It was used in the Gulf and Balkan wars as an armor-penetrating ammunition. In the operation «Desert Storm», over 350 metric tons of DU was used, with an estimate of 3-6 million grams released in the atmosphere. Internal contamination with inhaled DU has been demonstrated by the elevated excretion of uranium isotopes in the urine of the exposed veterans 10 years after the Gulf War and causes concern because of its chemical and radiological toxicity and mutagenic and carcinogenic properties. Polarized