

Abstracts of papers presented
at the 2020 *virtual* meeting on

MECHANISMS OF AGING

September 22–September 25, 2020



Cold Spring Harbor Laboratory
MEETINGS & COURSES PROGRAM

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Arranged by

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EPIGENETIC MECHANISM OF PEPTIDE REGULATION OF GENE EXPRESSION AND PROTEIN SYNTHESIS

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Human life expectancy increase up to its species level (105-120 year) is an urgent priority of the modern biology and medicine. Human life biological reserve is not being fully realized due to the impact of various unfavorable factors such as stress, biorhythm disturbance, malnutrition, physical inactivity, poor environmental situation, exposure to electric and magnetic fields and other types of irradiation, etc. All above cause alterations in gene expression, protein synthesis shifts, disturbances in the functioning of the nervous, immune, endocrine, cardio-vascular and other systems of the human organism, thus decreasing the life quality and life expectancy. Application of peptide bioregulators appears to be one of the evidence based methods leading to the increase in human life span and improvement in the quality of life. The analysis of long-standing research on the influence of peptides in 17 species allowed us to put forward a concept on a single mechanism of peptidergic regulation of gene expression and protein synthesis in the living world. The peptides evidenced their ability to increase significantly an average animal life span and decrease the incidence of malignant tumors as compared to control. Old female rats treated with pineal peptides revealed restored reproductive functions. Old monkeys administered with pineal peptides showed melatonin secretion like young healthy animals, normalization of immune system and endocrine system functioning. The peptides induced heterochromatin activation in cell nuclei of senior people, increased telomerase activity and promoted telomeres elongation in human lung fibroblasts, facilitated stem cell differentiation, diminished the number of chromosome aberrations in bone marrow cells. The peptides restored brain neurons functions in neurodegenerative disorders in the models of Huntington's, Alzheimer's, Parkinson's Diseases. Molecular modelling confirmed the ability of some peptides to interact with the DNA thus pointing at an evolutionary mechanism of regulation of gene expression and synthesis of proteins participating in the life cycle metabolism. The capacity of short peptides to penetrate the nucleus of the cell and interact complementary with promoter regions of genes serves as a signal for transcription and translation. The chain of these processes results in normalization of various organs functions thus increasing the organism vital resource.