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BOOK OF ABSTRACTS

Effective current approaches in anti-aging medicine and gerontology

PEPTIDE REGULATION OF CELL SENESCENCE

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Relevance: Di-, tri- and tetrapeptides are biologically active molecules with a physiological mechanism of action. Short peptides increase life expectancy, reduce tumors incidence, restore functions of organs and tissues in case of age-related pathology. The aim of the work is to study molecular mechanisms of the biological activity of short peptides in cell cultures during their aging.

Methods: The pluripotent cells from Xenopus Laevis frog, embryonic bone marrow cells, the pancreas and human bronchial epithelium, the primary cultures from the thymus, vessels, retina, skin of Wistar rats were used. The expression of proliferation, differentiation and apoptosis markers was studied by immunofluorescence microscopy and morphometry.

Results: AEDG peptide in pluripotent cells stimulated emergence of the nerve tissue, KE peptide – that of the retina. AEDG, KED, KE peptides induced differentiation of human embryo bone marrow CD34+ stem cells to CD14+ cells, CD3+ precursors of T-lymphocytes to CD4+ T-helpers and to CD8+ cytotoxic T-lymphocytes. KEDW peptide stimulated differentiation of acinal (Pdx1, Ptfla) and insular (Pdx1, Pax6, Pax4, Foxa2, NKx2.2) cells of the pancreas. AEDG, KED, KE, AEDL peptides reduced the expression of proapoptotic protein p53, p21, p16 caspase-3 and strengthened the expression of Ki67 proliferative markers in skin fibroblasts, renal cells, bronchial epithelium, thymocytes, endothelial cells. KE and AEDG peptides induced differentiation of embryonic retina cells into neurons (Brn3, Prox1, Vsx1, Pax 6).

Conclusion: Short peptides stimulate differentiation, proliferation and decrease cell apoptosis during aging. General molecular mechanisms of peptidergic regulation of cell differentiation, proliferation and apoptosis underlie peptide effect on vitality and life span.

Reference list:

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