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Mmathematical models for study of stem cells dynamics of neurological disorders and some cancer computational models, based on nanobiotechnology

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Abstract

Cell therapy as a viable therapeutic strategy, has been improved for treating of neurological diseases, [1] and cancer. Many neurological disorders, characterized by the loss of neural tissue, has been established in research. Development of cell implantation therapy, as a real option to replace, repair and regenerative damaged brain tissue, turned out to be a very successful one. Almost a century ago, early indentation experiments on living cells employed “the use of glass microneedles which were slowly inserted into many cell types to estimate viscosity” has been presented. A nanoscale operation in which an AFM (atomic force microscopy) tip modified with a nanoneedle has been used into nucleus of living cells, [3].There exist many early clinical trials for animal and human derived sources of tissue, which has been validated for transplantation of neural cells for rare diseases. The aim of the work, presented could be formulated as follows: to give some mathematical models, for study of Stem Cells Dynamics and cancer treatment too. A significant amount of models at of Hematological Diseases have been attracted the attention of a number of researchers. Also, important and modern tools for these studies, has been established nanotechnology and biotechnology. On the basis of nanotechnology and gold nanoparticles, have been discovered new methods and mechanisms for treatment of cancer diseases, [3,4].

Other periodic hematological diseases (for example- cyclical neuropenia, periodic chronic myelogeneus leukemia), involve very long periodic dynamics (weeks to months). Background and mathematical assumptions for mathematical decisions of the hematological (blood’s cancer) diseases, has been described in the work, also. Stochastic Analytical of Tumor Stem Cells has been analyzed as well. Following [5], we could find a simple mathematical model for investigation of the implications of the concept, mention above. This idea, developed could be described by the fact that many tumors derive from the transformation of normal stem cells into cancer stem cells that retain self-renewal capacity, regarding the evolution of tumors in the hematopoietic system. A computational model for study of adult stem cells, by classical mathematics and mechanics theories has been presented. Numerical algorithms and numerical FORTRAN programs, designed by author, have been given as well. By numerical simulations conducted graphics, reflecting the effects of parameters of model, on the mechanical behavior of adult stem cells has been proposed. Comparison by the experiments in literature and numerical results, obtained shows a very good agreement.