

Role of the immune system in AIDS-defining malignancies

João Maurício de Carvalho, Carla Pinto

Abstract: The Center for Disease Control and Prevention considers AIDS-defining illnesses Kaposi's sarcoma, non-Hodgkin's lymphoma and cervical cancer. These cancers have higher incidence in HIV-infected individuals than in the general population. Additionally, cancers' clinical courses in HIV-positive individuals are increasingly aggressive when compared to those in HIV-negative patients. It is thus compelling to further understand the dynamics of AIDS-related cancer growth. In this paper, we propose a non-integer order model to describe the role of the immune system in cancer cells' growth in a HIV-infected individual. The model incorporates anti-retroviral therapy and chemotherapy. Numerical simulations of the model are performed for different proliferation functions of the cytotoxic T lymphocytes (CTLs), and other relevant parameters, namely the HIV-infection rate, the elimination rate of infected T cells by CTLs, and the elimination rate of cancer cells by the immune system. The results are discussed from a physiological perspective. The order of the fractional derivative completes the discussion of the results.

¹⁾ João Maurício de Carvalho, M.Sc. (Ph.D. student): Faculdade de Ciências da Universidade do Porto, Rua do Campo Alegre, s/n, 4169-007 Porto, Portugal (PT), up200902671@fc.up.pt, the author presented this contribution at the conference in the special session "Advances in fractional order modelling and control" organized by C. Muresan, C. Pinto and E. Dulf.

²⁾ Carla Pinto, Ph.D.: School of Engineering, Polytechnic of Porto, Rua Dr. António Bernardino de Almeida, 431, 4249-015 Porto, Portugal (PT), cpinto@fc.up.pt.