ANALYSIS OF A CLASS-AGE-STRUCTURED HIV/AIDS MODEL WITH INFECTION-CONTROL STRATEGIES

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Since no effective vaccine is available for HIV/AIDS, the most effective way to control AIDS is infection-control strategy, which is targeted at infected-individuals (I-control). This paper discusses an class-age-structured HIV/AIDS model with infection-control strategies. We first discuss the control strategy of the model, get an optimal infection-control policy, which depends on one-infection-age or two-infection-age, and then study impulsive infection-control strategy, obtain the condition in which HIV/AIDS individuals will been driven to extinction.

Keywords. Infection-control policy; Impulsive infection-control policy; Infection age; Disease age; Impulsive period.

AMS (MOS) subject classification:92D25; 92D30

1   Introduction

For HIV/AIDS, the effective ways are to use drug-treatment strategies for HIV individuals. Antiretroviral drugs keep the levels of HIV in body at a low level, so that the immune system is able to recover and work effectively. Antiretroviral drugs enable many HIV positive people to live long and healthy lives. Standard antiretroviral therapy (ART) consists of the use of at least three antiretroviral (ARV) drugs to maximally suppress the HIV virus and stop the progression of HIV disease. Huge reductions have been seen in the rates of death and suffering when use is made of a potent ARV regimen[1,2].

The disease-control strategy is targeted at susceptible individuals (S-control)[3]or infected individuals (I-control). For HIV/AIDS transmission, since no vaccines is available, the target of HIV/AIDS control must be the infected individuals. In the paper, disease control strategies include continuous infection-control policy and impulsive infection-control policy.

For HIV/AIDS model with disease-control policy, we follow the approach of previous papers [4-7] that discussed optimal policies for harvesting and vaccination models. We obtain optimal policy that is one-infection-age or two-infection-age policy for HIV/AIDS model.