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Effect of Antibodies on an HIV Positive Patient

After the viral count of an hiv positive patient reaches a set point, the patient stays asymptomatic for a number of years. During this period, his viral count slowly goes up, while his CD4 + T - cell count comes down slowly, very slowly. If there is no intervention from antiretroviral drugs, after about ten years or so, his CD4 + T cell count comes down to below a critical level and his immune system is no more able to fight the opportunistic infections. The patient is now terminally sick and usually dies in a couple of years. We develop a Mathematical model to explain this phenomenon and speculate that the viral count goes up (and CD4+ T cell count comes down) because of the virus mutation. The hiv virus is extremely prone to mutation and the mutated virus is not as well recognized by the immune system as the wild type virus, to which type the immune system was initially designed to fight. This leads to the immune system being progressively less efficient which leads to the virus count slowly going up and the CD4+ T cell count slowly coming down. In time, the immune system is "defeated" by the virus. This is when the virus count of the patient shoots up and he/she develops AIDS.