In-vitro Study of HIV-Derived Reverse Transcriptase Inhibition

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Abstract

HIV is a retrovirus, which has a reverse transcriptase (RT) enzyme to convert the HIV-RNA to DNA by reverse transcription. Approved therapeutic regimes include an important class of effective drugs which are non-nucleoside reverse transcriptase inhibitors (NNRTIs). NNRTIs directly and non-competitively attach to the pocket side of HIV-RT and inhibit its activity; these types of drugs inhibit its polymerase activity. We synthesized, characterized, and utilized five different hydrazine derivatives against HIV-derived reverse transcriptase to determine their quantitative inhibitory ability. For this purpose, RT-qPCR assay was followed and optimized for in-vitro study, commercially prepared recombinant HIV-RT was treated with experimental hydrazine derivatives, and after that, treated HIV-RT was used in RT-qPCR with HIV-RNA template, to determine reverse transcription activity/inhibition ability. The results showed viral load is decreased due to the inhibition of reverse transcriptase activity in comparison to pre-tested results transcribed by untreated RT. Out of 5 hydrazine-based compounds maximum HIV-RT inhibition aptitude was observed with 1 molar concentration of 4-N, N- dimethylamino benzaldehyde hydrazine (C₁₈H₂₂N₄) which decrease >90% HIV-RNA reverse transcription during RT-qPCR. There is a direct clue from the findings in this study that can be quantitatively evaluated through this in-vitro study design for HIV-derived RT inhibition assay to use the effective compound.

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