Neural progenitor cells as reservoirs for HIV in the brain

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Impaired brain function is a prominent and still unsolved problem in AIDS . Shortly after an individual becomes infected with HIV, the virus can invade the brain and persist in this organ for life. Many HIV-infected individuals experience disturbances in memory functions and movement, which can progress to serious dementia. How the virus causes brain disease is still unclear.

Dr. Ruth Brack-Werner and her team at the Institute of Virology of the German Research Center for Environmental Health previously demonstrated that HIV invades not only brain macrophages but also astrocytes. Astrocytes are the most abundant cells in the brain. They perform many important activities which support functions of nerve cells and protect them from harmful agents. HIV-infected astrocytes normally restrain the virus and prevent its production. However, various factors can cause astrocytes to lose control over the virus, allowing the virus to replicate and to reach the brain. There HIV can infect other brain cells as well as immune cells that patrol the brain and may carry the virus outside the brain.

Thus astrocytes form a reservoir for HIV in infected individuals and represent a serious obstacle to elimination of the virus from infected individuals. Whether this also applies to other types of brain cells was unclear until now. In a study recently published in AIDS, Dr. Brack Werner, together with Ina Rothenaigner and colleagues present data indicating that neural progenitor cells can also form HIV reservoirs in the brain. Neural progenitor cells are capable of developing into

different types of brain cells and have an enormous potential for repair processes in the brain.

Dr. Brack-Werner's team used a multi-potent neural progenitor cell line, which can be grown and developed to different types of brain cells in the laboratory, for their studies. After exposing these neural progenitor cells to HIV, they examined the cultures for signs of virus infection for 115 days. HIV was found to persist in these cultures during the entire observation period. The cultures released infectious HIV particles for over 60 days and contained information for production of HIV regulatory proteins- Tat, Rev and Nef- for even longer. Dr. Brack-Werner and her team also examined neural progenitor cell populations cells with persisting HIV for differences from uninfected cells. They found that HIV persistence had an influence on the expression of selected genes and on cell morphology, but did not prevent their development to astrocytes. Thus HIV persistence has the potential to change neural progenitor cells.

Dr. Brack-Werner's summarizes, "Our study indicates that neural progenitor cells are potential reservoirs for HIV and that HIV persistence has the potential to change the biology of these cells." In future studies the researchers are planning to investigate the influence of HIV infection on important functions of neural progenitor cells. These include migration to diseased regions of the brain and development of different types of brain cells. Subsequently they will investigate how HIV changes neural progenitor cells and, importantly, how to protect neural progenitor cells from harmful effects of the virus in HIV infected individuals.

Source: Helmholtz Zentrum München