Monkey Study Suggests Radiation Didn't Cure 'Berlin Patient' of HIV

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A small primate study has suggested that the radiation element of the leukemia treatment that the famed "Berlin patient" received was not what functionally cured him of HIV, Medical News Today reports. Publishing their findings in PLOS Pathogens, researchers harvested blood stem cells from three antiretroviral-treated macaque monkeys that were infected with SIV, HIV's simian cousin. Next the scientists ablated the monkeys' blood and immune cells with radiation, and then transplanted the animals' own stem cells (which were SIV free) back into their bodies so that those cells could replenish the body with blood and immune cells.

The Berlin patient, whose real name is Timothy Ray Brown, was functionally cured of HIV after his 2007 treatment for leukemia was conducted with a transplant of bone marrow taken from a donor who lacked the CCR5 gene, which gives rise to a receptor on the surface of CD4 cells that HIV uses to infect the immune cells.

This new study sought to shed light on whether the radiation Brown received was responsible for functionally curing him. Two other elements of his bone marrow transplant may have been the crucial factors in his functional cure. The first element is the fact that the bone marrow he received lacked the CCR5 gene; any HIV emerging from a viral reservoir that had evaded destruction by the radiation would not have been able to infect new immune cells. The second element is a phenomenon known as graft versus host disease, in which transplanted cells and the cells to which they give rise recognize the cells of their new host as foreign and launch an attack. The process may have attacked and destroyed anything that remained of the viral reservoir post-radiation.

The radiation that the monkeys received killed 94 to 99 percent of their existing blood and immune cells. The transplant of their own harvested stem cells regenerated their supply of blood and immune cells in three to six weeks. There was no observed graft versus host disease, which was as expected because the stem cells were not foreign to the body.

The researchers then stopped ARV treatment in the three monkeys that received the transplants and in three control monkeys that did not. The virus rapidly rebounded in the controls. Two of the other monkeys also experienced a rapid viral rebound. The third developed kidney failure two weeks after stopping ARVs and was euthanized. Although the monkey still had an undetectable viral load at the time of its death, a post-mortem analysis showed that there were low levels of viral DNA in various tissues. This suggests that, while the radiation did significantly shrink the size

of the viral reservoir in blood cells, none of the three monkeys that received a transplant was cured and that this is likely not the reason Brown was cured either.

In July 2013, early results from a study of two men in Boston suggested that graft versus host disease may have led to a functional cure of their HIV infections. But by December of that year news emerged that the virus had rebounded in both men.

To read the study, click here.

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