Why Women and Men Have Differences in Disease Progression

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A study, published July 13 online in *Nature Medicine*, has discovered why HIV-positive women have faster disease progression than HIV-positive men with the same viral loads. The answer may be greater levels of immune inflammation.

Though taken as a whole, women do not appear to have faster disease progression than men, it is well known that their viral loads and CD4 counts may differ from what is common in men. Women's immune systems bring virus levels under better control than men's systems soon after becoming infected with HIV. However, researchers have also discovered that when women and men with the same viral loads are compared, women generally progress faster. Until now, no one has proved why this is the case.

Angela Meier, MD, PhD, from the Ragon Institute, associated with Massachusetts General Hospital (MGH), Harvard University and the Massachusetts Institute of Technology (MIT), set out to solve this mystery. In the study, which is explained in more detail in an MGH press release, Meier's team looked at immune cells in a cohort of HIV-positive men and women.

First, the team looked at a cell—called a dendritic cell—that is key in first detecting foreign pathogens. They found that women's dendritic cells produced more of an immune-signaling protein called interferon alpha than men. Interferon alpha stimulates the production of CD8 cells. Though CD8 cells do help control the virus, they can lead to immune system burnout if they are chronically overstimulated.

The team next looked at whether the female sex hormone progesterone was linked to higher CD8 levels. Sure enough, postmenopausal women who produce extremely low levels of progesterone had roughly the same number of CD8 cells as men of a similar viral load level. Premenopausal women, however, with normal progesterone levels, had many more CD8 cells. The higher the level of progesterone, the greater the number of CD8 cells.

The researchers conclude that because the immune system seems is more inflamed in premenopausal women, and since chronic inflammation may hasten disease progression, this may explain the sex differences in disease progression at similar viral loads. Though further research is needed to confirm that differences in disease progression are linked to sex hormone–induced CD8 production, the authors conclude that their study results open a new avenue of research.

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