Reduced bone density and HIV

Many studies have found that some HIV-positive people tend to have bones that are not as thick or dense as they ought to be. Such bones have reduced bone mineral density, as minerals such as calcium have been removed, rendering the bones more porous and weak.

Osteopenia is a relatively mild form of reduced bone mineral density and osteoporosis is the more severe form. People with osteopenia or osteoporosis are at heightened risk for breaking bones when they have accidents or fall. Osteopenia and osteoporosis can even lead to damage in the absence of accidents as the spine and hips slowly degrade under the burden of bearing the body’s weight.

There are many risk factors for developing reduced bone mineral density among HIV-negative people and these same factors are at play among HIV-positive people. While some of these factors can be changed, some cannot, as the following lists show:

Risk factors that cannot be changed:
- history of fractures among parents, brothers or sisters
- personal history of fractures
- being a woman – bone density decreases during the transition to menopause
- being elderly

Risk factors that can be changed:
- use of corticosteroids
- excess intake of alcohol
- smoking tobacco
- use of street drugs such as crystal meth, heroin and related substances
- deficiency of the hormone estrogen in women
- insufficient exercise
- less-than-ideal body weight
- insufficient intake of calcium

Some HIV-positive people may have additional risk factors, including:
- deficiency of vitamin D (needed to absorb calcium and other minerals used for bone building)
- being depressed
- deficiency of the hormone testosterone in men
- chronic inflammation
- co-infection with hepatitis C virus (HCV)

Chronic inflammation is a consequence of HIV infection. Although use of potent combination anti-HIV therapy (commonly called ART or HAART) can greatly reduce inflammation, because ART does not cure HIV infection some residual inflammation remains.

Impact of ART

In general, after a person begins to take ART bone density may continue to decrease by 1% to 4% for several years, then stabilize and even increase.
**Tenofvir and bones**

Several studies have found that the use of the drug tenofovir (Viread, and in Truvada, Atripla and Complera) as part of ART may temporarily accelerate bone thinning in a minority of HIV-positive people. However, in such studies the loss of bone mineral density associated with the use of this drug tends to stabilize over time in most people. Moreover, results from randomized clinical trials comparing different treatments have not found an increased risk for fractures among people who use tenofovir or tenofovir-containing drugs.

Reports have emerged from studies of a different design, specifically observational or cohort studies, of an increased risk of either kidney dysfunction or an increased risk for fractures among some participants who used tenofovir. A future issue of TreatmentUpdate will review and explain those findings.

Tenofovir may cause kidney dysfunction in a small proportion of participants in randomized clinical trials, and this dysfunction may affect the kidneys’ ability to regulate calcium or phosphorus levels. These minerals are used to maintain bone mineral density. In most cases when kidney dysfunction has occurred in tenofovir users in randomized clinical trials it was usually temporary.

Tenofovir has been widely used for the past decade in high-income countries. For the vast majority of tenofovir users, the drug is safe and effective when used as directed.

**Concern about efavirenz**

Use of efavirenz (Sustiva, Stocrin and in Atripla) is associated with having lower-than-normal levels of vitamin D in the blood of some HIV-positive people. This vitamin helps to absorb calcium and phosphorus from food, and reduced levels of vitamin D may affect the ability to maintain bone mineral density.

**Other drugs**

Drugs that have the potential to affect kidney health, impact the functioning of bone cells or interfere with the body’s processing of vitamin D, if taken over the long term or frequently, may also have the potential to affect bone mineral density. Such drugs can include the following:

- antibiotics – Bactrim/Septra (trimethoprim-sulfamethoxazole)
- antiviral agents – acyclovir (Zovirax) and valacyclovir (Valtrex), foscarnet (Foscavir), cidofovir (Vistide)
- antifungal agents – amphotericin B
- antiseizure drugs – phenytoin, carbamazepine, valproic acid
- antidepressants – lithium
- anti-inflammatory drugs – ibuprofen (Advil, Motrin), naproxen (Naprosyn), acetaminophen (Tylenol), indomethacin (Indocid)
- opiates – codeine, morphine, methadone and related substances

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**REFERENCES:**

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