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Podcast Issue

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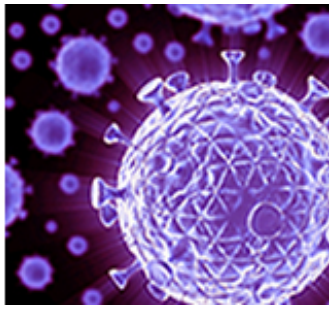

VOLUME 1 — ISSUE 6: TRANSCRIPT

Featured Cases: Bone Health, Vitamin D, and HIV

Our guest author is Todd Brown, MD, PhD, Associate Professor of Medicine, Division of Endocrinology and Metabolism at the Johns Hopkins University School of Medicine in Baltimore, Maryland.

After participating in this activity, the participant will demonstrate the ability to:

- Identify which HIV-infected patients should be screened for osteoporosis,
- Explain how to approach the management of an HIV-infected person with osteoporosis, and
- Describe the controversies surrounding vitamin D screening and treatment in HIV-infected patients.

This discussion, offered as a downloadable audio file and companion transcript, covers the important issues related to osteoporosis and vitamin D deficiency in HIV-infected patients, in the format of case-study scenarios, for the clinical practice. This program is a follow up to the Volume 1, Issue 5 *e*HIV Review newsletter — Bone Health, Vitamin D and HIV.

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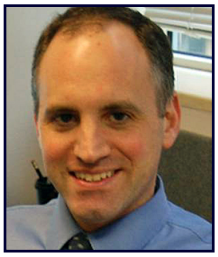

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Faculty Disclosure
Dr. Brown has disclosed that he has served as a consultant for ViiV Healthcare, Gilead, EMD-Serono, and Tibotec, and is a BMS Committee Member. He has also received grants and/or research support from Merck and GlaxoSmithKline.

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Next Issue: HIV-Associated Neurocognitive Disorder (HAND)

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STATEMENT OF NEED
Three central ideas emerged from our needs assessment. In order to provide optimal treatment to patients with HIV.

- Clinicians caring for patients with HIV need current information about: appropriate treatment and maintenance of care…guidance for treating comorbidities…and information about emerging findings for treating HIV-associated neurocognitive disorders (HAND)
- The need for more information on HIV topics including updated guidelines for HIV, treating older patients with HIV, managing patients with comorbidities and coinfections, treatment and sequencing strategies for maximizing future therapeutic options, and new and emerging agents for HIV
- Treating comorbidities in patients with HIV, especially among people older than age 50

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Pentium 800 processor or greater, Windows 98/NT/2000/XP/7 or Mac OS 9/X, Microsoft Internet Explorer 5.5 or later, 56K or better modem, Windows Media Player 9.0 or later, 128 MB of RAM, sound card and speakers, Adobe Acrobat Reader, storage, Internet connectivity, and minimum connection speed. Monitor settings: High color at 800 x 600 pixels.

MR. BOB BUSKER: Welcome to this *e*HIV Review Podcast.

*e*HIV Review is presented by The Johns Hopkins University School of Medicine. This program is supported by educational grants from Abbott Laboratories, Boehringer Ingelheim Pharmaceuticals, Inc., and Bristol-Myers Squibb.

Today's program is a companion piece to our Volume 1, Issue 5 eHIV Review newsletter: *Bone Health, Vitamin D, and HIV*.

Our guest today is that issue's author, Dr. Todd T. Brown, from The Johns Hopkins University School of Medicine.

This activity has been developed for infectious disease specialists, primary care physicians, nurse practitioners, and other health care practitioners whose practice includes treating HIV patients.

There are no fees or prerequisites for this activity.

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Learning objectives for this program are, that after participating this activity, the participant will demonstrate the ability to:

- Identify which HIV-infected patients should be screened for osteoporosis;
- Explain how to approach the management of an HIV-infected patient with osteoporosis; and
- Describe the controversies surrounding vitamin D screening and treatment in HIV-infected patients.

I'm Bob Busker, managing editor of eHIV review. Our guest today is Dr. Todd T. Brown, Associate Professor of Medicine and Epidemiology in the Division of Endocrinology and Metabolism at The Johns Hopkins University School of Medicine in Baltimore.

Dr. Brown has disclosed that he has received grants and/or research support from Merck and GlaxoSmithKline He has also served as a consultant for ViiV Healthcare, Gilead, EMD-Serono, and Tibotec and is a Bristol Myers Squibb Steering Committee Member. He has indicated that his presentation today will not include reference to the unlabeled or unapproved uses of any drugs or products.

Dr. Brown, welcome to this eHIV Review Podcast.

DR. TODD BROWN: Happy to be here.

MR. BUSKER: In your newsletter issue, Doctor, you presented information on recent studies that addressed important aspects of bone disease and vitamin D deficiency in HIV-infected individuals. What I'd like to do is translate some of that information into clinical practice. So if you would, please, start us off with a patient presentation.

DR. BROWN: So the first case is a 57-year-old white male who comes in for a routine appointment in the HIV clinic. He was diagnosed with HIV in 1997 and has been maintained on various antiretroviral therapy since that time, with an excellent virologic response. Most recently, his CD4 cell count was 650 with an HIV RNA less than 50 copies on a regimen of tenofovir, emtricitabine, and efavirenz. His course has been complicated by COPD, he does have a past history of heavy cigarette smoking, he also has hypogonadism on testosterone treatment and mixed lipodystrophy. He has never had a fracture, but his mother had a hip fracture at age 79. He has not had any recent falls.

MR. BUSKER: Summarize for us, please, the pertinent factors about this case.

DR. BROWN: Well first and foremost is this patient's age. So he is 57 years old and he is quite representative of the kind of patients that we're seeing in clinic nowadays, that is we're seeing a real graying of the HIV population largely due to the effectiveness of antiretroviral therapy where people are living a long time with HIV as a chronic condition. And not surprisingly, many of these patients have multiple comorbidities, and some of them are related to the aging process. And one of these comorbidities is osteoporosis, and this patient does have several risk

factors for osteoporosis, including his age, his history of previous smoking, his history of COPD, his history of hypogonadism, and he also has a family history of fracture.

MR. BUSKER: His HIV infection and his antiretroviral therapy — what role do those play in his risk of fracture?

DR. BROWN: So we are just trying to tease that apart now, chronic infection with HIV is associated with systemic inflammation. And in other diseases like rheumatoid arthritis, this inflammation is thought to contribute to the pathogenesis of low bone density and fracture. There are relatively few data to look at this at this point, but there is a lot of active investigation going on to try and understand whether or not HIV itself is associated with fracture risk.

One thing that we do know from multiple studies is that the initiation of antiretroviral therapy is associated with bone loss on the order of about 2 to 6% loss over the first 48 to 96 weeks of therapy. And this has been seen very consistently across pretty much all the studies that have examined this question. And so there are a lot of questions regarding this effect of antiretroviral initiation on bone density and it wouldn't necessarily be predicted based on the fact that often a person's body weight and lean body mass does increase during this time of antiretroviral initiation, which should be good for the bones, and also the fact that inflammation does decrease precipitously during this period of antiretroviral initiation, and this also should be good for the bones. Nevertheless, we do see this drop, regardless of which regimens are used.

Now some specific antiretroviral therapies may be worse than others. So this patient is on a tenofovir-containing regimen and we know that from randomized clinical trials that have compared tenofovir to non-tenofovir NRTIs, that tenofovir is associated with about a 1 to 2% greater loss versus these comparators. And there is also recent data from the Veterans Administration showing that cumulative tenofovir exposure in HIV infected patients is associated with an increased risk of fracture.

MR. BUSKER: Let me ask you, Doctor Brown — in your opinion, should this patient be screened for osteoporosis?

DR. BROWN: So when we think about whether or not a person should be screened for osteoporosis, or any other disorder for that matter, I always go back to the guidelines in the general population. And for osteoporosis, the most respected guidelines are those from the National Osteoporosis Foundation. And according to these guidelines, male patients 70 years and older should be screened for osteoporosis. For women, it's 65 and older.

Now for men between 50 and 70 and postmenopausal women who are younger than 65, it depends on their risk factors for fracture. And if they have one or more other risk factors for fracture, they should get earlier screening.

Now for this patient, if you look at the NOS guidelines, the patient would qualify based on his COPD, but not based on his HIV. And there is evidence accumulating that HIV and/or its treatment is an independent risk factor for fracture and for low bone density. Most people would recommend that he should indeed be screened for osteoporosis, even though his age is not 70 or greater.

MR. BUSKER: Thank you for clarifying that, Doctor. Let me ask you now to present a second patient to us, if you would, please.

DR. BROWN: The second case is a 61 year old white male with a history of longstanding HIV which is well controlled on a regimen of tenofovir, emtricitabine, atazanavir, and ritonavir, and he is found to have low bone mineral density on a recent dual energy x-ray absorptiometry test, that is DEXA. His lumbar spine T score is -2.4, femoral neck T score is -2.3, and total hip T score is -2.3. He has no history of fractures, he continues to smoke half a pack a day, he has no family history of fracture, and according to the FRAX algorithm, his 10-year risk of having a major osteoporotic fracture is 10%, and his 10 year risk of having hip fracture is 4.1%.

MR. BUSKER: You described his bone density scan numbers. Tell us more about how those should be interpreted.

DR. BROWN: Sure, so the way to diagnose osteoporosis is with a DEXA scan, and this measures bone mineral density at three sites, two sites in the hip, that is the total hip, and then a special part of the hip called the femoral neck, which is the site most

susceptible to fracture. The second site that's measured is the lumbar spine. So the vertebral bodies between L1 and L4 are measured for their bone mineral content.

So to diagnose osteoporosis, we look at the number of standard deviations that the patient's bone mineral density is away from the mean of a young, normal population, generally around age 30. And so the definition of osteoporosis is less than -2.5, that is 2.5 standard deviations less than the average bone density in a healthy population around age 30. And each standard deviation in bone mineral density or each T score decrease away from the mean, is associated with about a one- to threefold increased risk of fracture.

So for this gentleman, he has not quite reached the cutoff for osteoporosis; that is, his bone mineral density is greater than -2.5, but his bone mineral density is not normal either. So T scores between -1.0 and -2.5 are considered osteopenia.

Now it's important to recognize that DEXA tells you a lot about bone mineral density, but doesn't tell you everything about bone mineral density. So while it's a good tool to understand someone's bone density and fracture risk, only about half of fracture risk is explained by DEXA scores. So there is another whole 50% that is not related to DEXA scores at all but is related to other features of bone that aren't picked up by DEXA, such as bone quality or some of the other properties of bone, and also other important factors that are related to fracture that are not related to bone such as risk of falling.

MR. BUSKER: So based on what you just said, what additional assessments does this patient need?

DR. BROWN: So we know that this patient has low bone density but we're not exactly sure why. He does, indeed, have risk factors for low bone density and fracture, including his smoking history and his age, and he also is HIV infected on antiretroviral therapy. But we need to investigate other secondary causes of low bone mineral density, because these are very common, and identification of these causes can lead to specific treatments.

Now there is some debate as to what is the best secondary workup to look for these problems. And as a minimal workup, I generally recommend in a male a morning free testosterone to look for hypogonadism, a thyroid stimulating hormone level to look for subclinical hyperthyroidism, a 25-hydroxy vitamin D to look for vitamin D deficiency, a parathyroid hormone level to look for primary or secondary hyperparathyroidism, and a calcium level to look for hypercalcemia, and also a simultaneous measurement of urine and serum creatinine and phosphate to get an idea of whether or not he's wasting phosphate in his urine.

Now there are some other rarer diseases can be associated with osteoporosis or low bone mineral density, and an investigation of these causes should be undertaken if the clinical picture is suggestive. So, for example, if the gentleman has back pain, anemia, and renal insufficiency, there should be some consideration for multiple myeloma and an SPEP and a UPEP should be done. If the person has central adiposity, a buffalo hump and moon facies, then some assessment for Cushing's Syndrome should be undertaken.

I think it's important to highlight in particular two secondary causes of low bone mineral density, and that's severe vitamin D deficiency and phosphate wasting. So both of these conditions can be associated with low bone mineral density, but in some cases they're not related to osteoporosis, but rather to osteomalacia, which is a decrease in mineralization of the bone. The bone matrix is there, but it's just not mineralized.

The importance of identifying these two conditions is that their treatment is quite different than osteoporosis. For severe vitamin D deficiency, the treatment is replacing vitamin D and giving enough calcium to remineralize. In the case of phosphate wasting, the treatment is to give phosphate back as well as calcium so that the person can remineralize and take them off any agent that might be leading to phosphate wasting, such as tenofovir.

So before any specific treatment is done for low bone density, it's very important to investigate these secondary causes.

MR. BUSKER: I want to go back to your case presentation, where you used the phrase "FRAX algorithm." What is FRAX, and how can it aid in clinical decision making?

DR. BROWN: FRAX is an equation that was developed in the last five years or so to understand a person's absolute risk of fracture based on clinical risk factors as well as bone mineral density. So this is akin to the Framingham Risk Equation for cardiovascular disease, but this gives an idea of someone's 10-year risk of having a fracture, either all osteoporotic fracture, and that means either at the wrist, upper arm, spine, or hip, or the hip fracture, in particular.

Now the utility of this is really seen for this patient who doesn't have osteoporosis; that is, he has osteopenia. So we're not sure whether or not he warrants a pharmacologic intervention for his low bone density, so we use the FRAX to help us make that decision to understand whether or not his fracture risk is high enough to warrant a pharmacologic intervention. And by convention it's been agreed upon that if the person has a 10-year risk of all osteoporotic fracture 20% or greater, or a risk of hip fracture that is 3% or greater, then that person should be considered for pharmacologic treatment.

In the case that was presented, his 10-year risk of a major osteoporotic fracture is 10%; however, his risk of a hip fracture is 4.1%, and therefore over the 3% threshold. So this identifies someone who is at a high risk of fracture in whom a pharmacologic intervention would be warranted.

MR. BUSKER: Let's focus on potential pharmacologic interventions — what should this HIV-infected patient be treated with?

DR. BROWN: So the first-line therapy for osteoporosis is bisphosphonate medications, and these medications can either be given orally or IV. So the medications in the general population decrease fracture risk by about 30% to 40%. in HIV infected patients, they improve bone mineral density and clinical trials have shown this, but no trial has been big enough to show that they decrease fracture risk. But the improvements in bone mineral density are similar to what we see in the general population, so I would assume that these medications will be equally efficacious in reducing fracture risk in HIV patients compared to the general population.

Now with bisphosphonates there are a few things to consider. Generally these medications are quite well tolerated. The oral medications are given at intervals, either a month or weekly, and can be associated with esophageal irritation. For that reason they are taken with a full glass of water and the person must remain upright for half an hour after taking the medication. In addition, the bioavailability of these medications is low, so it's very important that they not take any food within a half an hour of taking the medication or else very little of the medication will be resorbed.

Now these medications are very effective at decreasing bone turnover and decreasing the bone resorbing cells; that is, the osteoclast's function. The long-term down sides of these medications are beginning to be better understood now, so this very efficacious decrease in bone turnover and bone resorption may have a down side in that it has been associated somewhat paradoxically with atypical fractures of the femur. So we rely on the bone turnover to repair microfractures that occur with regular wear and tear of the bone, and by decreasing bone turnover, we may not be able to repair these microfractures, which can paradoxically lead to fragility. This syndrome of atypical fractures in the proximal femur is a rare side effect of chronic bisphosphonate use, but nevertheless an important one.

The other potential long-term side effect that is also rare is osteonecrosis of the jaw, and this is death of the jawbone. Fortunately, this is very rare, but it's also thought to be related to this long-term effect on bone turnover.

So with bisphosphonates, and really with any medication, we're always weighing the risks and benefits of treatment. Someone with a high enough fracture risk such as this gentleman presented in the case, probably will benefit from bisphosphonate therapy. But for someone with a lower fracture risk, the risks of therapy may outweigh the potential benefits.

So if for some reason bisphosphonates are not tolerated or a person is failing bisphosphonates, there are other treatments available, and these should be discussed with an expert in osteoporosis, either an endocrinologist or a rheumatologist.

MR. BUSKER: What about non-pharmacological interventions? What can be done there to decrease his fracture risk?

DR. BROWN: So this is a very important issue because there are some important things that can be done. So

in this case the patient does currently smoke, and his fracture risk is yet another reason why he should stop. We know that smoking is an independent risk factor for fracture, and it's associated with low bone density, so by stopping smoking we can improve bone mineral density and decrease fracture risk. This is just a critical area to improve this gentleman's overall health.

We know that calcium and vitamin D are also important for this patient. Vitamin D should be given, probably supplemented, between 800 IU and 2,000 IU daily. Calcium should be given to get a total of 1,000 milligrams of calcium in his diet — it is best for most of the calcium, if possible, to come from diet rather than supplementation.

Also important in osteoporosis and decreasing his fracture risk is his level of physical activity. Any pull on the bone causes the bone to stabilize and to become stronger, so whatever physical activity he likes to do and can do, he should do.

MR. BUSKER: I think a lot of clinicians listening now would want to ask you: Should his HIV regimen be changed? Your response?

DR. BROWN: So this is a controversial area. We know that tenofovir is associated with lower bone mineral density, but we have fewer data showing that discontinuing tenofovir will improve his bone mineral density and decrease his fracture risk.

If he were to have phosphate wasting, which as we talked about before can be seen with tenofovir exposure, if the patient has phosphate wasting, then this would be an indication to switch him off tenofovir.

The question comes up whether patients should be switched off tenofovir, even with osteoporosis or those who have increased fracture risk, even if they don't have phosphate wasting, and this is more of a controversial issue. I think we're seeing more and more data about this issue. For example, recent study that was presented shows that substituting raltegravir for tenofovir is associated with an improvement in bone mineral density. I think this is an important issue and a critical one for future research.

MR. BUSKER: And we'll return with Dr. Todd Brown in just a moment.

DR. MICHAEL MELIA: Hello. I'm Michael Melia, Associate Professor of Medicine in the Division of Infectious Diseases and Associate Fellowship Program Director at The Johns Hopkins University School of Medicine. I'm one of the Program Directors of *e*HIV Review.

*e*HIV Review is a combination newsletter and podcast program delivered by email to subscribers. Newsletters are published every other month. Each issue reviews the current literature in areas of importance to infectious disease specialists, primary care physicians, nurse practitioners, and other health care practitioners whose work or practice includes treating HIV patients

Bimonthly podcasts are also available as downloadable transcripts, providing case-based scenarios to help bring that new clinical information into practice in the exam room and at the bedside.

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MR. BUSKER: Welcome back to this eHIV Review podcast. I'm Bob Busker, managing editor of the program. Our guest is Dr. Todd T. Brown from the Division of Endocrinology and Metabolism at The Johns Hopkins University School of Medicine. And our topic is Bone Health, Vitamin D, and HIV.

We've been discussing identification and management of osteoporosis in HIV-infected patients. I'd like to focus now on the controversies surrounding vitamin D. So if you would, Doctor — let's begin another patient.

DR. BROWN: Sure, the last case is a 54-year-old, HIV infected, African-American female who is on stable antiretroviral therapy with tenofovir, emtricitabine, and efavirenz. who was found to have a 25-hydroxy vitamin D level of 16 ng/mL. She is otherwise healthy except for hyperlipidemia and hypertension, for which she takes atorvastatin and hydrochlorothiazide, respectively. She is obese with a BMI of 32. She has no osteoporosis and no history of fracture, and she has no history of falls. Her Framingham risk score is 11%.

MR. BUSKER: Let me start out with a very basic question: how is vitamin D deficiency defined?

DR. BROWN: So this is a controversial area. Most people would say that a vitamin D level above 30 is considered sufficient, between 20 and 30 is insufficient, less than 20 is deficient, and then severely deficient is variably defined as less than 12 or less than 10. Although the cut points will change depending on who is doing the recommending, the new Institute of Medicine recommendations suggest that a level greater than 20 should be considered sufficient.

The interesting thing about vitamin D is that, unlike a lot of things that are measured in the blood, it is not based on a normal distribution. Typically with any kind of analyte you have a mean and a bell curve around that mean in the form of a normal distribution. In contrast, vitamin D deficiency is defined at a level when parathyroid hormone begins to increase, suggesting that the body is physiologically responding to the low vitamin D levels.

With these criteria, a vast number of patients, both HIV infected and uninfected, have vitamin D deficiency. Whether this is associated with health risk is another question.

MR. BUSKER: In the patient you presented — what are her risk factors for vitamin D deficiency?

DR. BROWN: She has multiple risk factors for vitamin D deficiency. She is older, and that connotes an increased risk of vitamin D deficiency. She is African-American, so we rely on the skin for vitamin D synthesis. Patients with darker skin have a decreased synthesis rate because of the melanin in the skin.

She also has a BMI of 32, and those with obesity also have a tendency for lower vitamin D levels. This is thought to be related to the fact that vitamin D is a fat soluble vitamin that can be sequestered in adipose tissue. So all of these, of course, are operative in the general population, but in HIV infected patients, it can have additional risk factors for vitamin D deficiency. In particular, multiple studies have shown that efavirenz is associated with vitamin D deficiency. The mechanism is thought to be related to the induction of enzymes which catabolize 25-hydroxy vitamin D into its inactive form of 24/25 di-hydroxy vitamin D.

The clinical implications of this effect of efavirenz is unclear and is currently being investigated.

MR. BUSKER: This patient presented with a low vitamin D level. Should she have been screened for vitamin D deficiency at that time?

DR. BROWN: This is a very controversial area, not only among HIV infected patients, but in the general population: who should be screened for vitamin D deficiency? The most recent Institute of Medicine guidelines in the general population argue against a screening approach but recommend universal supplementation with 800 IU of vitamin D daily. This approach assumes that a vast majority of the patients are going to be vitamin D deficient, and that 800 IU would get most people up above the 20 ng/mL threshold.

This is in contrast to the Endocrine Society, which recommends screening people who are at high risk of vitamin D deficiency, including those on chronic antiretroviral therapy such as this patient. My personal approach follows more along the lines of the Institute of Medicine guidelines; that is, I think that universal supplementation is probably a more cost effective approach, but I think that the dose that the Institute of Medicine recommends is somewhat low, particularly in a person on efavirenz such as this patient, who has increased catabolism of vitamin D. Therefore, I would recommend more on the order of 1,000 to 2,000 IU daily.

I don't screen for vitamin D deficiency unless the patient has a condition where it is known that vitamin D supplementation has a definite effect. This is most seen for osteoporosis and bone disease, but is also seen for the risk of falling. So if a person has a history of falls, vitamin D supplementation, screening and supplementation are also warranted, in my view.

MR. BUSKER: Speaking specifically about this patient, should she get supplementation, and if so, how much?

DR. BROWN: Now that we know she is vitamin D-deficient with a 25-hydroxy vitamin D of 16, I would probably give supplementation. This is a very controversial area, and as far as how to go about supplementing patients, as there is really little evidence base to support one approach over another.

For a patient who has a low vitamin D level — that is, if she is below 20, and certainly she is more around 15 — I would give her high dose vitamin D supplementation in the form of ergocalciferol, a short-term course to fill up the tank. I generally give 50,000 units weekly for eight weeks, and then after that I give daily cholecalciferol at a dose of 1,000 to 2,000 IU a day. Because she is on efavirenz, I would give her 2,000 IU a day to maintain her level of vitamin D. I would then probably retest her in three to six months to be sure that her vitamin D level is not back down to 16.

MR. BUSKER: Assuming you get her vitamin D level into the target range, would you expect that to decrease her risk of adverse health events?

DR. BROWN: This is really the million dollar question. We know that low vitamin D levels in epidemiologic studies have been associated with all kinds of adverse health outcomes, not only fractures, but cardiovascular disease, with diabetes, with cancer, but what we don't have good evidence about is whether replacing people's vitamin D levels will decrease the risk of these adverse health events.

Currently some large trials are going on to address this question, but we don't really have an answer yet. So it's going to be critical in the future to address this question to see how much we should be screening for vitamin D deficiency and how aggressively should it be replaced.

MR. BUSKER: Dr. Brown, thank you for those case discussions. I'd like to wrap things up now by summarizing what we talked about today in light of our learning objectives. So to begin: identifying which HIV infected patients should be screened for osteoporosis.

DR. BROWN: In general, older HIV infected patients should be screened, and what the cut point is in terms of age when screening should start is a matter of debate. In the general population women above 65 and older, men 70 and older should be screened. Because HIV and its therapy are associated with low bone density and fracture, the age threshold should be decreased to all postmenopausal women and men 50 and older.

MR. BUSKER: And the management approach to an HIV infected patient with osteoporosis?

DR. BROWN: The first step in the approach to management is to identify any secondary causes of low bone mineral density. Next, you want to assess the person's risk of fracture using the FRAX equation to determine whether pharmacologic treatment is warranted. Third, it's important to address nonpharmacologic strategies to decrease fracture risk, such as smoking cessation, increasing physical activity, and reducing fall risk.

MR. BUSKER: And finally, the controversies surrounding vitamin D screening and treatment in HIV infected patients.

DR. BROWN: We know that vitamin D deficiency is quite common among HIV infected patients as it is in the general population. We know that there are risk factors that are specific to HIV infected populations such as the use of efavirenz. What is not known in HIV infected patients or the general population is what's the best approach regarding screening, what's the best approach for supplementation. It's also important to know whether supplementation can decrease the risk of adverse health events.

MR. BUSKER: Dr. Todd Brown, from the Division of Endocrinology and Metabolism at The Johns Hopkins University School of Medicine, thank you for participating in this eHIV review podcast.

DR. BROWN: Thanks for the invitation to join you today, it was a pleasure to speak to you.

MR. BUSKER: This podcast is presented in conjunction with the *e*HIV Review Newsletter, a peer-reviewed, CME certified literature review e-mailed monthly to clinicians whose work or practice includes treating HIV patients.

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