

## HIV in 2018: It's Not Over Yet – What Every Physical Therapist Needs to Know

American Physical Therapy Association  
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## Learning Objectives

After course, participants will be able to:

1. Describe the basic disease process and impact of pharmacologic agents on HIV disease
2. Explain basic epidemiological profile of HIV disease
3. Identify HIV disease impact on multi-system involvement and associated PT-related impairments: integumentary, cardiovascular, musculoskeletal, neurological, chronic pain, and age-related impairments.
4. Incorporate PT interventions for common HIV-related impairments *and* evaluate typical PT diagnoses within the larger context of HIV disease.

## HIV/AIDS: Background and Musculoskeletal Considerations



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## HIV/AIDS definitions

- **HIV: Human Immunodeficiency Virus.**  
Progressive failure of the immune system that allows life-threatening opportunistic illnesses (cancers, PCP, toxoplasmosis) to thrive.  
Untreated, HIV progresses to AIDS.
- **AIDS: Acquired Immunodeficiency Syndrome.**  
Immune system is severely compromised and vulnerable to opportunistic illnesses.
- **PLHIV – People Living with HIV**

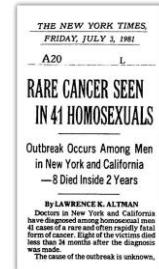
## HIV/AIDS definitions

- **CD4+ ("T-helper cell"):** type of white blood cell that fights infection. Measured in cells/mm<sup>3</sup>.
  - Move throughout the body identifying/destroying germs such as viruses and bacteria
  - HIV binds to and enters CD4 cells → makes copies of itself → gradual decline of CD4 cells and immune system
  - Healthy CD4+ is 500-1600 cells/mm<sup>3</sup>.
- **Viral load:** measurement of HIV copies in a blood sample. Measured in copies/mL
  - Declared "undetectable" if it is under 40-75 copies/mL, BUT person is still HIV+ and needs to stay on ART
- **Opportunistic Infections:** Infections associated with severe immunodeficiency, as they take advantage of a weakened immune system. I.e pneumocystis carinii pneumonia (PCP)

## HIV/AIDS Timeline

**1981:** 270 cases of "severe immune deficiency" among MSM. 121 of those individuals have died.

**1987:** First mention of HIV/AIDS by the current president. Cumulative known deaths from AIDS (1981-1987) → 20,436



## HIV/AIDS: historical overview

**1980s-1990s:** birth of grassroots organizations to fight HIV/AIDS and put pressure on government to recognize the crisis AND on the FDA to approve HIV drugs:  
"SILENCE= DEATH"

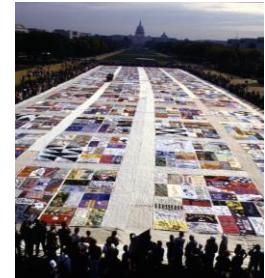


**1997** – highly active antiretroviral therapy (HAART/ART/ARVs) becomes primary treatment for HIV/AIDS

- AIDS-related deaths decreased by 47% from the year before (1996)

## History of HIV/aids

- **March 2012:** Report at Conference on Retroviruses and Opportunistic Infections (Seattle, WA)
  - Life expectancy with treatment once CD4+ reaches 500 cells/mm<sup>3</sup> = to HIV negative counterpart
- **July 2012** – FDA approves Pre-exposure Prophylaxis (PrEP)
  - One pill each day (same medication used to treat HIV)
  - Risk of HIV up to 92% lower for those who take the pill consistently

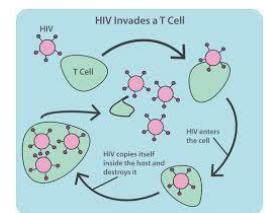


## Virological Profile

- **Infection:** the HIV virus attacks the immune system, while simultaneously destroying the CD4 (T-cells) that protect the body from illness. HIV then uses the CD4 cell to replicate.

## Virological Profile

- **Replication:** Once a person is infected with HIV, the virus begins to attack and destroy the CD4 cells.
- If HIV is not treated with antiretroviral treatment - prevents the virus from replicating - then the body is exposed to opportunistic infections which can cause serious illnesses.



## Stages of HIV Infection

### Stage I: Acute HIV Infection (weeks 2-4 post infection):

- Massive inflammatory response to initial viral exposure
- Develop severe flu-like symptoms
- Large amounts of HIV in the blood and immune system
  - Body produces HIV antibodies and cytotoxic lymphocytes
  - Greatest transmission risk

### Stage II: Chronic HIV Infection (aka clinical latency/asymptomatic infection):

- HIV reproduces at low levels
- People may be asymptomatic but still able to transmit
- Without treatment, usually progresses to AIDS in ~10 years

## Immune involvement

### AIDS – Final stage of HIV

- HIV has destroyed immune system
- CD4+ < 200 cells/mm<sup>3</sup> (normal CD4+ 500-1600 cells/mm<sup>3</sup>)
- 1 or more opportunistic illnesses such as: encephalopathy, tuberculosis, pneumocystis pneumonia (PCP), mycobacterium avium complex (MAC), lymphoma, herpes → AIDS-related death
- Life expectancy without treatment with AIDS diagnosis = 3 years
- CD4 count is no longer considered a criterion of when to start therapy. Current guidelines: Initiate ART in all HIV-infected adults who are willing/ready to start therapy.

## Pharmacological Profile

- Antiretroviral therapy (ART) is recommended for all individuals with HIV, regardless of CD4 count, to reduce the morbidity and mortality associated with HIV infection (AI)
- ART can't cure HIV, but HIV medicines help people with HIV live longer, healthier lives. HIV medicines also reduce the risk of HIV transmission.



## Pharmacological Profile

- People on ART take a combination of HIV medicines (called an HIV regimen) every day, comprised of medication from at least 2 different drug classes.
- Combination HIV Medicines contain two or more HIV medicines from one or more drug classes. Common names: Atripla, Genvoya, Stribild, Truvada (also used for PrEP), Combivir.

## ARVs: What PTs need to know

- Ask ALL HIV+ patients:
  - Which ARVs are you taking?
  - Taking as prescribed?
  - Any trouble paying for or getting ARVs?
- Most side effects from HIV medicines are manageable, but a few can be serious. The benefits of HIV medicines far outweigh the risk of side effects.
- Possible short-term side effects: fatigue, nausea, vomiting, diarrhea, headache, fever, myalgia, dizziness, insomnia

## ARVs: What PTs need to know

- Potential long-term side-effects: Kidney problems, including kidney failure, hepatotoxicity, heart disease, diabetes, hyperlipidemia, lipodystrophy, osteoporosis, Nervous system and psychiatric effects, depression, and suicidal thoughts
- If patient c/o side effects → advise them DO NOT stop medications or reduce dose. Contact ID provider. Stopping ARV allows HIV to multiply and can lead to drug resistance.

## Epidemiological Profile

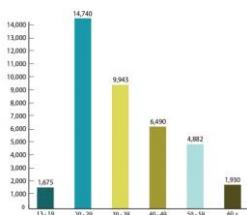
- An estimated 1,122,900 adults and adolescents were living with HIV at the end of 2015. Of those, 162,500 (15%) are **unaware** of their diagnosis.
- Young people are especially at risk of HIV transmission and HIV progression: Among people aged 13-24 who were living with HIV, an estimated 44% didn't know.
- In 2016, 18,160 people received an AIDS diagnosis

## Current HIV statistics: CDC

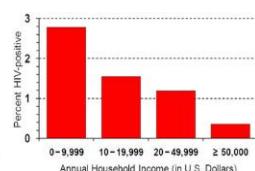
- Highest risk communities: economically disadvantaged urban areas in the U.S., MSM (men who have sex with other men) and African-Americans (12% of U.S. population; 41% of HIV infections).
- Southeastern U.S. bears the greatest geographical HIV burden. Cities with greatest HIV prevalence:
  1. Miami
  2. Baton Rouge, LA
  3. New Orleans, LA
  4. Jackson, Miss
  5. Atlanta, GA
- Geriatric population (55 or older) = 26% of all HIV infections in U.S.

## Current Statistics: Age and Income

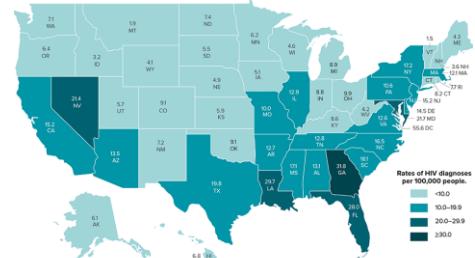
New HIV Diagnoses in the United States by Age, 2016



HIV Prevalence Rate, by Income



Rates of HIV Diagnoses Among Adults and Adolescents, 2016



## Physiological Profile

- HIV disease manifests itself in various physiological contexts
- Musculoskeletal
- Neurological/cognitive
- Psychiatric

## Triage of HIV-related impairments

- Infectious disease provider: initiate HAART, manage/screen for opportunistic infections
- Family medicine/Internal medicine outpatient management
  - referral for symptoms/side effects
- Orthopedics/**Physiatry/Physical therapy/neurology/psychiatry**
- Goals: increase functional independence, decrease/eliminate pain, independent self-management of impairments, improve QOL

## HIV as a Chronic Disease

- Effects from the disease itself and its pharmacological treatment can cause long-term and acute health complications.
- However - less than 1/3 of deaths among PLH are attributed to HIV-related causes ie Kaposi's sarcoma
- Increasing role of primary care in long-term management of HIV and non-HIV-related impairments
- Increasing role of physical therapy, occupational therapy, mental health providers
- Collaborative effort between disciplines and AIDS Service Organizations for comprehensive care

## HIV as Chronic Disease

- In the era of highly active anti-retroviral therapy (HAART/ART), people can increasingly live longer with HIV, delay or avoid opportunistic infections, and live with HIV as a chronic health condition
- However...research shows that quality of life decreases with age, mostly related to physical decline, lower levels of independence and poorer emotional wellbeing
- Chronic inflammation due to long-term HIV infection
  - Autoimmune dysfunction, cardiovascular disease, neurocognitive disease, osteoporosis/frailty, liver disease, kidney disease and some cancers

## Chronic HIV Infection

- Increased chronicity of HIV → increased life expectancy → increasingly experiencing common health problems seen in the general population that must be addressed.
- The treatment of HIV disease depends on :
  - Disease stage
  - Any concomitant opportunistic infections
  - Goal of treatment is to prevent the immune system from deteriorating to the point of opportunistic infections.
  - ART compliance

## HIV as a Chronic Disease

- Effects from the disease itself and its pharmacological treatment can cause long-term and acute health complications
- Greater prevalence calls for an increasing role for physical therapy in the continuum of care for PLWHA
- Studies highlight potential benefits of physical therapy for PLWHA:
  - Improve cardiovascular health, strength, weight, and psychological status and neurocognitive function
  - Enhance quality of life by decreasing pain and fatigue

## HIV as a Prevalent Disease

- Physical therapists may treat PLHIV of all ages and in various clinical settings
  - For example:
    - Pediatric patient in the NICU
    - Geriatric patient in an orthopedic outpatient clinic
- HIV/AIDS may be simply listed as a comorbidity, or the patient may have an HIV-related impairment as the primary diagnosis of referral

## Commission on Accreditation in Physical Therapy Education

- CAPTE requires each program's curriculum to include "content about the cardiovascular, pulmonary, endocrine, metabolic, gastrointestinal, genitourinary, integumentary, musculoskeletal, and neuromuscular systems...."
- The HIV/AIDS disease process affects all of the above listed systems
- Consistent incorporation of HIV/AIDS into a program's curriculum equips graduating students with the knowledge and skills to treat PLWHA

## Episodic disability

- "Episodic Disability" in HIV → described by O'Brien et al., as "episodic...health related consequences experienced as a result of HIV and its treatments" which can occur in multiple dimensions".
- Not necessarily a linear decline as we saw in pre-ART times
- Increased chronicity of HIV → increased disability

## What PTs Need to Know

- With proper therapy/treatment, HIV can be a chronic, survivable diagnosis
- HIV affects multiple systems and is best treated with a multidisciplinary approach
- ALL PLHIV should be followed by an infectious disease physician

## Physical therapists' management of the HIV-positive patient

**Key point:** Treating HIV-related comorbidities vs. treating "typical" PT diagnoses within the context of HIV disease.

- Some common HIV-related comorbidities are peripheral neuropathy (PN), avascular necrosis, and chronic pain.
  - Co-morbidities that are *direct result* of HIV
  - Important to know: viral load, ARV compliance, recent ARV changes, worsening symptoms

## PT Exam: Is it different for an HIV+ vs HIV- patient?

**PMH:** May include HIV in the chart; however, patient may not wish to disclose this information.

Ask patient if they have recently been hospitalized for any HIV-related issues ie. Pneumonias, MAC,

## "How do I ask about it?"

- Mention that you see it in their PMH, alongside other things. How would you ask about HTN? ("I see that hypertension is listed here in your chart...")
  - DO:* ask about medications: which ones, any side effects, any trouble with medication compliance, if they are followed by an infectious disease doctor
  - DO NOT:* ask how they were infected

## Secondary diagnoses

- PLWHA can have any and all of the same secondary diagnoses as non-PLWHA
  - Arthralgia
  - Myalgia
  - Osteoporosis
  - Low Back Pain
  - Neuropathy
  - Vestibular Dysfunction
  - Decreased Cardiovascular Endurance

## Mental health

- Increased prevalence of mental health disorders in PLH, especially depression, Alzheimer's, dementia, PTSD
- HIV proteins alter the response to stressors and cortisol production
- Exercise has emerged as a significant protective factor for HIV-related cognitive decline
- HIV-positive MSM who survived the 1980s have are likely to have lost 90% of their social group to AIDS**
- For this cohort, the majority have clinical symptoms consistent with PTSD diagnosis

## Social support

- This is especially important for PLWHA. It can affect both mental and physical health, including medication compliance.
- Stigma
- Past trauma re: receiving diagnosis.
- Long term survivors often have particular traumatic histories, including devastating losses of friends, partners, community.

## Musculoskeletal involvement

- The increased life expectancy of PLWHA increases the possibility of age-related arthritis, as well as other chronic musculoskeletal impairments as complications of HIV virus and/or because of expected age-related symptoms
- Recent research suggests that the probability of PLH developing osteoporosis is three times higher compared to their HIV-negative counterparts.

## HIV Sequela (Musculoskeletal)

- Four common HIV-specific syndromes:
  - HIV arthritis,
  - Painful articular syndrome,
  - Diffuse-infiltrative lymphocytosis syndrome (DILS)
  - Immune reconstitution inflammatory syndrome (IRIS).
  - It is currently unknown whether HIV causes its own primary arthritis.
  - Avascular necrosis and osteoporosis are common comorbidities of HIV.
- Walker-Bone Rheumatology*, Volume 56, Issue 10, 1 October 2017, Pages 1648–1661

## Musculoskeletal Involvement

- Literature suggests that musculoskeletal conditions will affect 72% of HIV-infected individuals during their lifespan.
- Musculoskeletal and orthopedic complications have emerged as potential results of the disease itself and/or the ART treatment regimen.
  - ie, low bone mineral density (BMD) has been associated independently with HIV disease itself and as a direct effect of ART

## Musculoskeletal Involvement

- Most commonly seen MSK impairments are myalgia, arthralgia, low back pain, osteoporosis, avascular necrosis of femoral head
- HIV virus affects bone remodeling → bone fragility
- PLH have a higher prevalence of fractures compared to HIV(-) peers
- Muscle wasting is now mostly seen in untreated, advanced disease → the changing face of the disease
- Lipoatrophy may be observed

## lipoatrophy



Source: US Department of Veterans Affairs, HIV/AIDS Image Library.

## Musculoskeletal considerations: surgery

- Orthopedic surgeries in HIV+ individuals are more likely due to increased chronicity of HIV
- Bone and joint infections account for ~67% of musculoskeletal infections in PLWHA
- HOWEVER: Recent findings → statistically insignificant differences in orthopedic postoperative complications of HIV-positive versus negative individuals\*
  - HIV status may not be a reason to delay/forego orthopedic surgery based on HIV status alone

### Musculoskeletal: bone mineral density screening

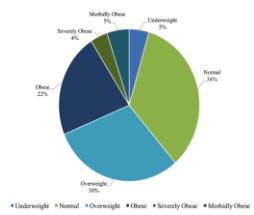
- People with HIV should be screened carefully for low BMD – especially those with a history of bone disease and “traditional” risk factors
- At present, dietary and exercise advice, and vitamin D and calcium supplementation are the main preventive strategies, while treatment of established bone disease is similar to that in the general population.

### Musculoskeletal considerations: surgery

- Orthopedic surgeries in HIV+ individuals are more likely due to increased chronicity of HIV
- Bone and joint infections account for ~67% of musculoskeletal infections in PLWHA
- HOWEVER: Recent findings → statistically **insignificant** differences in orthopedic postoperative complications of HIV-positive versus negative individuals\*
  - HIV status may not be a reason to delay/forego orthopedic surgery *based on HIV status alone*

### “the Changing face of AIDS”

- “from wasting to obesity” → changing face of AIDS: up to 70% of PLH on ARVs have central obesity
- Figure: Subjects in an urban AIDS clinic in the Southeastern U.S. (n=179) with chronic pain. (Pullen, 2016)



### Cardiovascular Consideration in People Living with HIV/AIDS

R. Sandoval PT PhD

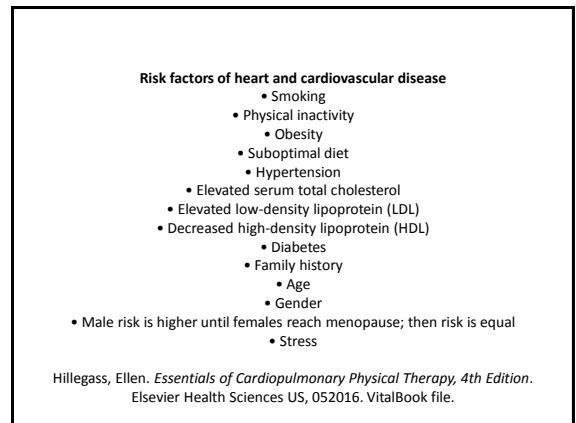
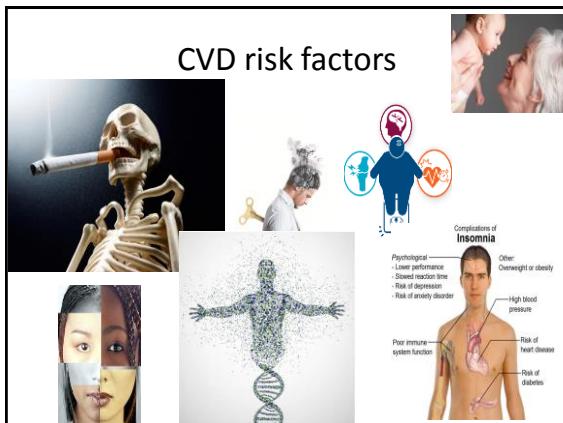
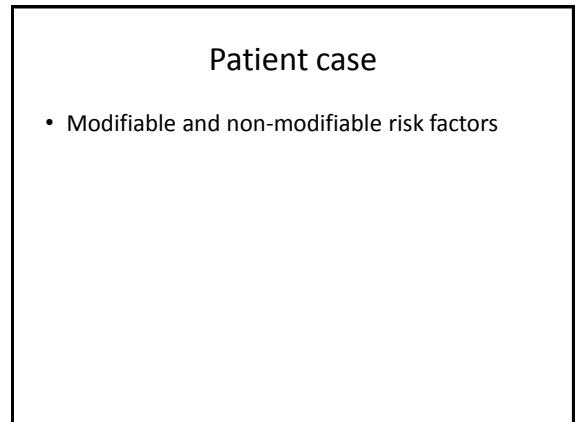
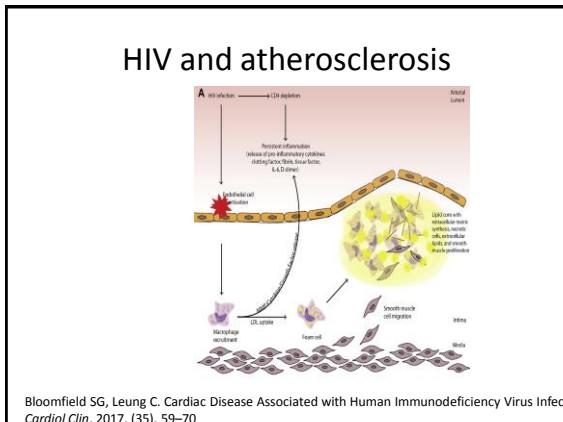
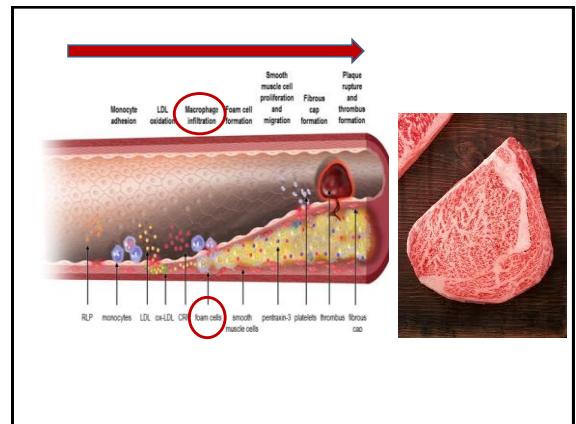
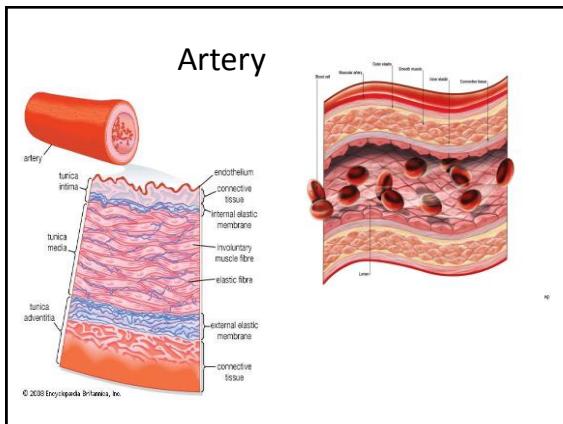
### Objectives

- Systems review check as part of the evaluation.
- CVD prevalence and risk factors in people living with HIV/AIDS
- Impact of lipid abnormalities
- Clinical screening recommendations
- Treatment recommendations

### Case



- 42 yo male
- HIV+ for 4 years
- VL: 4000 Rna copies/mm<sup>3</sup>
- CD4: 300 cells/mm<sup>3</sup>
- CD4 cell percentage: 12%
- Triglycerides: 200 mg/dl
- HDL: 38 mg/dl
- LDL: 135 mg/dl
- Cholesterol/HDL ratio: 5.0
- Ht: 5'10", wt 175 lbs
- BP at rest: 149/90
- HR : 85 bpm
- HIV meds: Stribild (Elvitegravir/cobicistat/tenofovir/efavirenz)
- Social: Smokes ½ pack day and drinks socially
- Hx of cocaine use in the past, has been clean for the past 7 years.



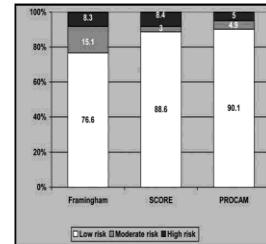
BOX 3-3 Risk factors associated with sudden death  
(HiHillegass, Ellen. *Essentials of Cardiopulmonary Physical Therapy*, 4th Edition. Elsevier Health Sciences US, 052016. VitalBook file.

Undiagnosed CHD population	Diagnosed CHD population
Age	Decreased left ventricular ejection fraction (LVEF) (<35%)
Systolic blood pressure (elevated)	
Left ventricular hypertrophy	
Intraventricular block on ECG	
Nonspecific ECG abnormalities	
Serum cholesterol (elevated)	
Heart rate (elevated resting HR)	
Vital capacity (low, especially a factor in females)	
Cigarettes consumed daily	
Relative weight	

## Patient case

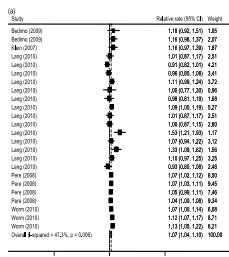
- Medication and classes of medications
    - Elvitegravir/cobicistat/tenofovir/emtricitabine
    - Or integrase inhibitor+p450 inhibitor+1<sup>st</sup> NRTI+2<sup>nd</sup> NRTI

## Relative risk for CVD in HIV populations



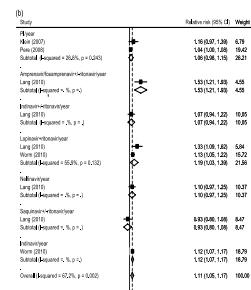
KNOBEL H, JERICÓ C, MONTERO M et al Global Cardiovascular Risk in Patients with HIV Infection: Concordance and Differences in Estimates According to Three Risk Equations (Framingham, SCORE, and PROCAM). *AIDS PATIENT CARE and STDs* 2007(21), 452-457

## ARV risk factor for CVD

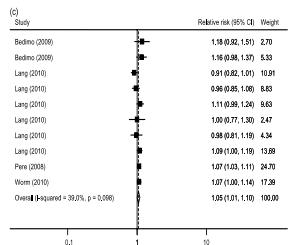


Islam FM, Wu J, Jansson J, Wilson DP. Relative risk of cardiovascular disease among people living with HIV: a systematic review. *HIV Med*. 2012;13(8):453-468.

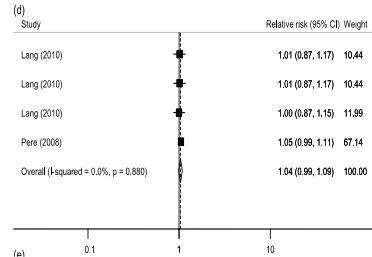
#### 'D risk associated with PI's



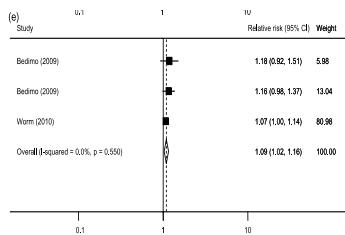
## CVD risk associated with NRTI's



## CVD risk associated with NNRTI's



## CVD risk associated with Ziagen™ (Abacavir, NRTI)



Islam FM, Wu J, Jansson J, Wilson DP. Relative risk of cardiovascular disease among people living with HIV: a systematic review. *HIV Med.* 2012;13(8):453-468.

## Patient case

- Lipid profile in labs
  - Triglycerides: 200 mg/dl
  - HDL: 38 mg/dl
  - LDL: 135 mg/dl
  - Cholesterol/HDL ratio: 5.0
  - Ht: 5'10", wt 175 lbs

## ARV and their impact on lipids

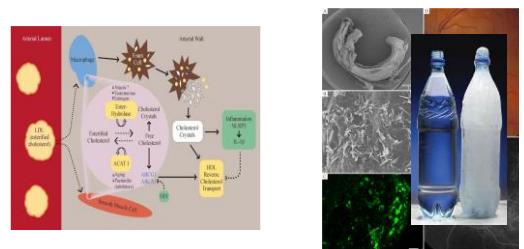
Table 1 Antiretroviral therapy effects on selected serum lipids				
Drug	HDL-c	LDL-c	TG	TC
PIs				
Non-nucleoside boosted PIs	↑	↑	↑↑	↑↑
Lopinavir/ritonavir	↑	↑	↑↑↑	↑↑↑
Fosamprenavir/ritonavir	↑	↑	↑↑↑	↑↑↑
Darunavir/ritonavir	↑	↑	↑↑	↑↑
Atazanavir/ritonavir	↑	↑	↑↑	↑↑
Nelfinavir	↑↑		↑	↑
Saquinavir	↑↑		↑	↑
NRTIs				
Efavirenz	↑↑↑	↑↑↑	↑↑↑	↑↑↑
Nevirapine	↑↑↑	↑↑↑	↑↑↑	↑↑↑
Zidovudine	↑↑↑	↑↑↑	↑↑↑	↑↑↑
Abacavir	↑		↑	↑

Abbreviations: HDL-c, high-density lipoprotein cholesterol; LDL-c, low-density lipoprotein cholesterol; NRTIs, non-nucleoside reverse transcriptase inhibitors; NRTs, nucleoside reverse transcriptase inhibitors; TC, total cholesterol; TG, triglycerides.

\*Refers to no change in lipid levels.

Bloomfield SG, Leung C. Cardiac Disease Associated with Human Immunodeficiency Virus Infection. *Cardiol Clin.* 2017, (35), 59-70

## Cholesterol management



Ghanem F<sup>1</sup>, Vodnala D<sup>2</sup>, K Kalavakunta J<sup>3,4</sup>, Durga S<sup>3</sup> et al.

Cholesterol crystal embolization following plaque rupture:

a systemic disease with unusual features.

*J Biomed Res.* 2017 Jan;19(2):82-94

## Lipid management options

Table 2 Metabolism and dosing precautions of select lipid level-lowering therapies			
Drug	Hepatic Metabolism	Use with PIs	Note
Statins			
Atorvastatin	CYP3A4	Start with low dose	Consider higher dose
Fluvastatin	CYP2C9; CYP2A4 (minor)	Consider higher dose	Consider higher dose
Lovastatin	CYP3A4	Contraindicated	Consider higher dose
Pravastatin	CYP2C9	Start at usual dose	Start at usual dose
Rosuvastatin	CYP2C9<10%	No P450 interactions	First line; consider higher dose
Rosuvastatin	CYP2C9>10%	Consider higher dose	Consider higher dose
Simvastatin	CYP3A4	Contraindicated	Consider higher dose
Fibrates			
Boravate® <sup>a</sup>	No P450 interactions; fenofibrate: glucuronidation with renal elimination	No known interactions with PIs or NRTB; gemfibrozil interacts with statins	
Gemfibrozil			
Cholesterol Absorption Inhibitor			
Ezetimibe	No P450 interactions	Use with statins, or alone if statin not tolerated	
PCSK9 Inhibitors			
Aflacanabat	No P450 interactions	No known interactions with PIs or NRTB	
Evolcanabat			

Abbreviations: CYP, cytochrome P450; PCSK9, proprotein convertase subtilisin/kexin type 9.

<sup>a</sup> Available in the United States as an investigational drug.

## Clinical Presentation

- Similar to general population except
  - <50 years of age
  - Higher risk if associated with dyslipidemia, HTN and DM
  - Soft plaques are more prevalent in HIV+ individuals (more prone to rupture/thrombus formation)
  - No chest pain or pain with exertion
- Additional behavioral risk factors
  - Cocaine use
  - Tobacco use



Bloomfield SG, Leung C. Cardiac Disease Associated with Human Immunodeficiency Virus Infection. *Cardiol Clin*. 2017, (35), 59–70

BOX 3-3 Risk factors associated with sudden death  
(Hillegass, Ellen. *Essentials of Cardiopulmonary Physical Therapy*, 4th Edition. Elsevier Health Sciences US)

Undiagnosed CHD population	Diagnosed CHD population
Age	Decreased left ventricular ejection fraction (LVEF) (<35%)
Systolic blood pressure (elevated)	
Left ventricular hypertrophy	
Intraventricular block on ECG	
Nonspecific ECG abnormalities	
Serum cholesterol (elevated)	
Heart rate (elevated resting RR)	
Vital capacity (low, especially a factor in females)	
Cigarettes consumed daily	
Relative weight	

## Patient Client Management

## Screening recommendations BP

	Systolic Blood Pressure (mm Hg)	Diastolic Blood Pressure (mm Hg)
Normal	<120	<80
Prehypertension	120-139	80-89
Stage 1 hypertension	140-159	90-99
Stage 2 hypertension	≥160	≥100

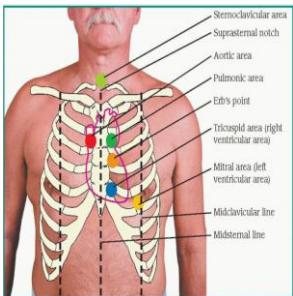
Classification of Blood Pressure for Adults  
(Goodman 575)  
Goodman, Catherine, Kenda Fuller. *Pathology: Implications for the Physical Therapist*. W.B. Saunders Company, 122014. VitalBook file.

## CVD Heart Disease Prevention Target Measurements

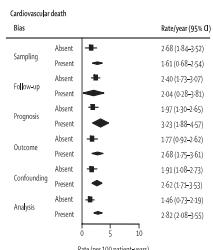
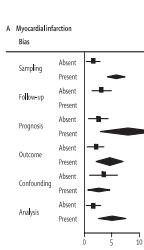
Risk Factors	Targets
<b>Body Measurements</b>	
• Body mass index (BMI): multiply your weight in pounds by 700, then divide that number by the square of your height in inches	18.5-24.0
• Waist-to-hip ratio (WHR): divide your waist measurement in inches by your hip measurement in inches	≤0.8
<b>Lipids, Lipoproteins</b>	
• Total cholesterol	<200 mg/dL
• HDL cholesterol	≥40 mg/dL (men) <sup>↓</sup>
• LDL cholesterol	≥50 mg/dL (women) <sup>↓</sup>
• Triglycerides	≤129 mg/dL (optimal: 100 mg/dL; <70 mg/dL for women at high risk for heart attack or stroke)
• Total cholesterol/HDL ratio	≤2.0 (men); <1.5 (women) <sup>↓</sup>

Goodman, Catherine, Kenda Fuller. *Pathology: Implications for the Physical Therapist*. W.B. Saunders Company, 122014. VitalBook file.

## Auscultation



## Carotid artery



**Carotid bruits as a prognostic indicator of cardiovascular death and myocardial infarction: a meta-analysis**  
Pickett, Christopher A et al. *The Lancet*, Volume 371 , Issue 9624 , 1587 - 1594

## Exercise recommendations (Geriatrics)

Exercise mode	Machines are preferred for safety and ease of use. Primarily use single-joint exercises, and progressing to multi-joint exercises.
No. of exercises	6 to 10 exercises covering all major muscle groups of the body.
Frequency	Circuit weight training should be done at least twice per week, and could be implemented with resistance training.
Volume	1 – 3 sets (30 – 50 min).
Intensity	Resistance (load) should begin with 18 – 20RM (40 – 60% of 1RM), and progressing to 6RM (85% of 1RM), 1:1 (30/30 s), and progressing to 2:1 (30/15 s).
Work to rest ratio	Avoid extended breath holding and straining (Valsalva maneuver) during weight training to minimize exaggerated blood pressure response.
Precautions	

Romero-Arenas S<sup>1</sup>, Martinez-Pascual M, Alcaraz PE. Impact of resistance circuit training on neuromuscular, cardiorespiratory and body composition adaptations in the

## Treatment recommendations

### Circuit training

- Focusing initially on local muscular endurance (if severely deconditioned) or hypertrophy adaptations
- Shifting focus to strength adaptations (low volume/higher loads)
- Introduce power activities (ballistic/pliometrics) later in the program

### Cardio

- Moderate training intensity ~80% of predictive max HR for age or when using Karvonen formula

## Moderate Cardio training impact

Table 2: ANCOVA test and groups mean $\pm$ SD for pre-test and posttest values (N=30)

Variables	X $\pm$ SD		P values
	Exercise pretest	Exercise posttest	
SBP (mmHg)	149.20 $\pm$ 5.33	123.17 $\pm$ 7.56	138.93 $\pm$ 4.20
DBP (mmHg)	91.60 $\pm$ 3.06	80.33 $\pm$ 3.06	75.20 $\pm$ 6.58
VO <sub>2</sub> max (ml/kg/min)	23.00 $\pm$ 2.54	20.87 $\pm$ 3.37	24.00 $\pm$ 2.54
CD4 count (cells/mm <sup>3</sup> )	516.00 $\pm$ 256.49	656.27 $\pm$ 189.17	402.27 $\pm$ 229.88

\*Significant at 0.05. SD=Standard deviation; SBP= Systolic blood pressure; DBP= Diastolic blood pressure; VO<sub>2</sub> max= Maximum oxygen uptake

Ezema CI, Onwuneli AA, Lamina S<sup>1</sup> et al. Effect of aerobic exercise training on cardiovascular parameters and CD4 cell count of people living with human immunodeficiency virus/acquired immune deficiency syndrome: a randomized controlled trial. *Niger J Clin Pract*. 2014;17(1):103-107.

## Summary

- CVD prevalence and risk factors
- Impact of lipid abnormalities
- Clinical screening recommendations
- Treatment recommendations
- Questions or comments:  
[RSandovalPTPhD@outlook.com](mailto:RSandovalPTPhD@outlook.com)



## Chronic Pain

and

## Peripheral Neuropathy

in People Living with HIV (PLHIV)

Dave Kietrys, PT, PhD, OCS, FCPP

Associate Professor; Assistant Vice-Chair, Rutgers School of Health Professions

[kietrydm@shp.rutgers.edu](mailto:kietrydm@shp.rutgers.edu)

## Chronic Pain in PLHIV

- Prevalence estimates of chronic pain in PLHIV range from 39% to 55%.
- Higher prevalence and severity of pain in indigent population
- Concurrent psychiatric illness → 40% more likely to have pain
- Concurrent substance abuse → higher pain severity and disruption of daily function

Merlin, J. S., Zindzi, A., Norton, W. E., Rithlis, C., Saag, M. S., Margavio, M. J., ... Hooten, W. M. (2013). A conceptual framework for understanding chronic pain in patients with HIV. *Pain Practice*, 14(3), 207-216.

Milaskewski, C., Penko, J. M., Guzman, D., Mattison, J. E., Bandengro, D. R., & Kushel, M. B. (2011). Occurrence and characteristics of chronic pain in a community-based cohort of indigent persons living with HIV. *American Journal of Public Health*, 101, 207-212.

Tsoo, J. C., & Sozo, T. (2009). Pain in persons living with HIV and comorbid psychologic and substance use disorders. *Clinical Journal of Pain*, 25(4), 307-312.

Tsoo, J. C., Dobalian, A., & Stein, J. A. (2005). Illness burden mediates the relationship between pain and illicit drug use in persons living with HIV. *Pain*, 119(1-3), 124-132.

## Chronic Pain in PLHIV

- Associated with decreased quality of life
- Often underestimated and undertreated
- PLHIV and pain 87% less likely to be adherent to ART

Lauw, F., Fontaine, A., & Colleau, S. M. (1997). Underestimation and undertreatment of pain in HIV disease: multicentre study. *BMJ*, 314(7073), 23-28.

Berg, K. M., Cooperman, N. A., Newville, H., & Arntzen, J. H. (2009). Self-efficacy and depression as mediators of the relationship between pain and antiretroviral adherence. *AIDS Care*, 21(2), 244-248.

## Issues in Dealing with Chronic Pain

- Stigma
- Provider Bias
- Substance Use Disorders

## Disparities in Chronic Pain Management

Less attention (by providers) given to inquiry about chronic pain and treatment of chronic pain to:

- Non-Caucasian
- Women
- Poor
- Incarcerated
- Immigrants
- Disability
- Multiple Chronic Conditions

Deamant, C., & Nathan, S. (2016). Disparities and barriers in management of chronic pain among vulnerable populations with HIV infection. In Merlin, J. S., Sehdev, P. A., Treisman, G. J., & Giovannillo, A. G. (2016). *Chronic Pain and HIV: A Practical Approach*. West Sussex, UK: Wiley Blackwell.

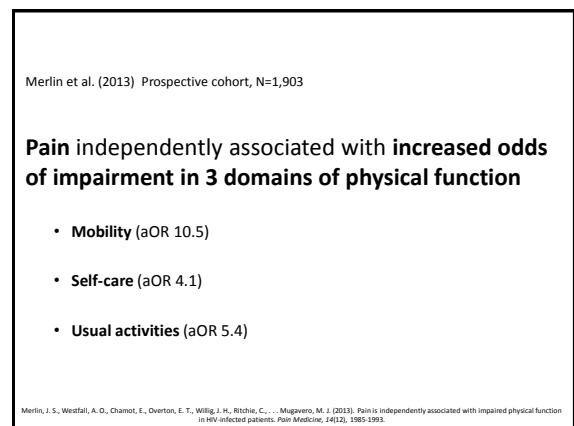
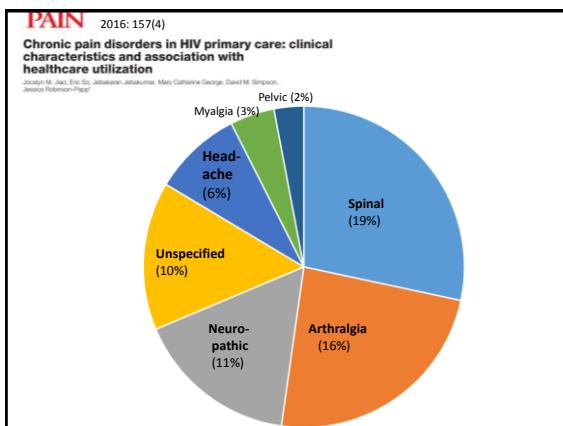
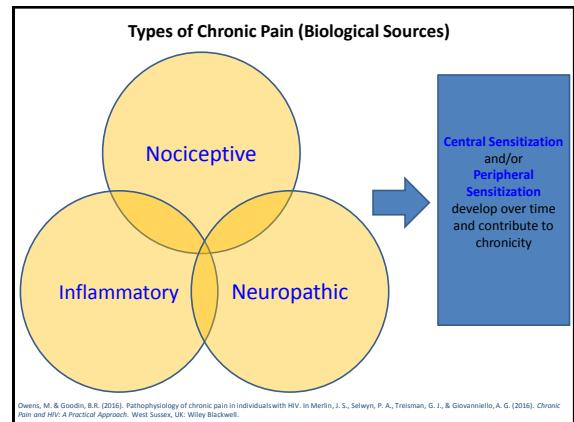
## Multifactorial Etiology of Chronic Pain in PLHIV

- Direct effects of HIV infection
- Chronic inflammation and immune activation
- Side-effects of ART drugs or other drugs
- Neurologic mechanisms
- Comorbidities / Multi-morbidity
- Opportunistic infections
- Aging
- Psychosocial influences
- Prescription opioid misuse and heroin use
- Gender and ethnic differences in perception & expression of pain

Fuchs, L. M., & Borodjorg, F. M. (2009). Pain and pain treatment in AIDS patients: a longitudinal study. *Journal of Pain & Symptom Management*, 19(5), 339-347.

Overton, A. K., Nguyen, T. D., Robinson, A. C., Hornet, P. T., & Mitchell, M. M. (2013). Pain Symptoms Associated with Opioid Use among Vulnerable Persons with HIV: An exploratory study with implications for palliative care and opioid abuse prevention. *Journal of Palliative Care*, 31(4), 228-233.

Merlin, J. S. (2013). Chronic Pain in Patients With HIV Infection: What Clinicians Need To Know. *Topics in Antiviral Medicine*, 23(3), 120-124.



## Risk Factors for **Disability** Associated with Chronic Pain

- Anxiety
- Catastrophizing
- Compensation dependency
- Functional limitations
- Depression
- Fear-avoidance behaviors
- High levels of initial pain
- Age
- Poor Health

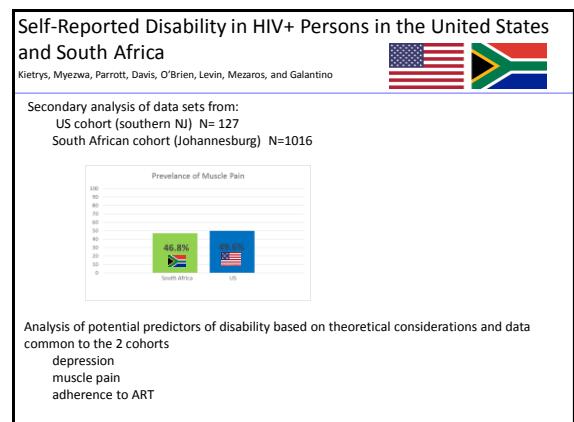
**Chronic Pain in PLHIV**  
10X > odds of impaired physical function and disability

Hanass-Hancock, J., Mylrea, H., & Carpenter, B. (2015). Disability and living with HIV: Baseline from a cohort of people on long term ART in South Africa. *PLOS ONE*. DOI:10.1371/journal.pone.0143916.

Lucy, B. P., Clifford, D. B., Creighton, J., Edwards, R. R., McArthur, J. C., & Haythornthwaite, J. (2011). Relationship of depression and catastrophizing to pain, disability, and functional impairment in HIV-infected patients. *AIDS*, 25(22), 2895-2901.

Merlin, J. S., Westfall, A. O., Chamot, E., Overton, E. T., Willig, J. H., Ritchie, C., ... Mugavero, M. J. (2013). Pain is independently associated with impaired physical function in HIV-infected patients. *Pain Medicine*, 14(12), 1985-1993.

Gilkes, K. K., Sacks, D. B., & Merlin, J. S. (2013). Measuring disability experienced by adults living with HIV: assessing construct validity of the HIV Disability Questionnaire using confirmatory factor analysis. *BMC Open*, 4(8), e005456.



### What factors were related to presence of disability?

- **Gender**
  - Female gender: 61% more likely to report disability
- Number of **years living with HIV**
  - 3.5% increase in odds of reporting disability with EACH additional year living with HIV
- **Muscle Pain**
  - 82% more likely to report disability if experiencing muscle pain
- **Depression**
  - 67% more likely to report disability if depressed

### What **DOESN'T** work for management of chronic pain

Opioid "Pain Killers"
Not efficacious for chronic pain
Risk of:
Side-effects
Dependency
Addiction
Overdose
Paradoxical hyperalgesia
Synergistic effect with ETOH
Drug-drug interactions

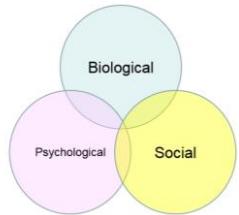
Becker, W.C., & Edelman, E.J. (2016). Potential benefits and harms of prescription opioids in HIV. In Merlin, J.S., Selwyn, P.A., Treisman, G.J., & Giovannella, A.G. (2016). Chronic Pain and HIV: A Practical Approach. West Sussex, UK: Wiley Blackwell.

Many HIV+ patients with a history of chronic pain have been taking prescription opioids for a long time, and may have developed tolerance and/or physical and/or emotional dependency, and yet still have chronic pain.

### What do we do?

### Biopsychosocial Model of Chronic Pain

- **Biological**
  - Tissue pathology (e.g. neuropathy, AVN of bone, chronic myalgia)
  - Co-morbidities
  - Central and peripheral sensitization
  - Substance Use
- **Psychological**
  - Fear
  - Fear Avoidance of Activity
  - Anxiety
  - Depression
  - Trauma
- **Social**
  - Stigma
  - Environmental Stressors



### A Conceptual Framework for Understanding Chronic Pain in Patients with HIV

Jessica S. Merlin, MD, MBA<sup>\*†</sup>; Anne Zinski, PhD<sup>\*</sup>; Wynne E. Norton, PhD<sup>‡</sup>; Christine S. Ritchie, MD, MSPHP<sup>‡</sup>; Michael S. Saag, MD<sup>\*</sup>; Michael J. Mugavero, MD, MHSc<sup>\*</sup>; Glenn Treisman, MD, PhD<sup>§,¶</sup>; W. Michael Hooten, MD<sup>\*,\*</sup>

Pain Practice, Volume 14, Issue 3, 2014 207–216  
<http://onlinelibrary.wiley.com/doi/10.1111/papr.12052/epdf>

### When working with patients who have chronic pain, communication is key

- **Trust**
- **Therapeutic Relationship**
- **Shared Medical Decision Making**
  - **Goal Setting**
  - **Motivational Interviewing**

## Assessment of Chronic Pain

- Interview
  - Onset
  - Alleviating or provoking factors
  - Quantitative and qualitative descriptions
    - Severity
    - Location(s) Radiating?
  - Timing
  - Current management strategies including pharmaceuticals
  - Work and activity status
- Self-report instrument
  - Brief Pain Inventory

### Brief Pain Inventory

Permission required. <http://www3.mdanderson.org/depts/symptomresearch/>  
Widely used in study of cancer, **HIV disease** and **neuropathic pain**.

Mean severity score (items 3-6)      Mean Interference score (items 9A-9G)

Keller, S., Barron, C. M., Dodd, S. L., Schein, J., Mendoza, T. R., & Cleveland, C. S. (2004). Validity of the brief pain inventory for use in documenting the outcomes of patients with noncancer pain. *Clinical Journal of Pain*, 19(3), 310-315.



Pain Medicine 2012; 13: 209-214

### PRIMARY CARE & HEALTH SERVICES SECTION

#### Original Research Article

#### Pain Self-Management in HIV-Infected Individuals with Chronic Pain: A Qualitative Study

Jessica S. Merlin, MD, MBA,<sup>1,2</sup>  
Monica Walcott, DrPH,<sup>1</sup> Robert Kenna, PhD,<sup>1,2</sup>  
Monica Walcott, DrPH,<sup>1</sup> Robert Kenna, PhD,<sup>1,2</sup>  
Katherine L. Burgess, PhD,<sup>1,2</sup>  
and Janet M. Eason, PhD, MPH<sup>1,2</sup>

#### What have our patients been doing to deal with their chronic pain?

- Physical activity
- Cognitive and spiritual strategies
- Spending time with family and friends (social support)
- Avoidance of physical and social activity
- Medication-centric pain management
- Substance use

Merlin, J. S., Bulls, H. W., Vucovich, L. A., Edelman, E. J., & Starrers, J. L. (2016).

### Pharmacologic and non-pharmacologic treatments for chronic pain in individuals with HIV: a systematic review.

*AIDS Care*, 28(12), 1506-1515.

- 11 studies included; most low or very low quality
- 7 studies of pharmaceuticals
  - gabapentin
  - pregabalin
  - capsaicin
  - analgesics including opioids
- 4 studies of non-pharmaceutical
  - cognitive behavioral therapy
  - self-hypnosis
  - smoked cannabis

The only controlled studies with positive results were of capsaicin and cannabis.

## Non-pharmaceutical Management of Chronic Pain

A multidisciplinary / multi-modal approach may include:

- **Physical Therapy**
  - Exercise
  - TENS
  - Manual Therapy
- Self-Management Programs
- Diet / Nutrition
- Counseling (Cognitive Behavioral Therapy)
- Pharmaceuticals
- Surgery (for specific conditions for which surgery is indicated)
- Complementary and alternative therapies

Complementary and alternative therapies that may be considered in the management of chronic pain

- Mindfulness or other forms of meditation
- Yoga
- Acupuncture
- Yoga
- Hypnosis
- Biofeedback
- Massage
- Marijuana
- Topical Capsaicin (for neuropathic pain)

Atkinson, J.H., Patel, S., & Keltner, J.R. (2016). Pharmacologic and Non-Pharmacologic treatment approaches to chronic pain in individuals with HIV. In Merlin, J.S., Selyan, P.A., Treisman, G.J., & Giovannetti, A.G. (2016). *Chronic Pain and HIV: A Practical Approach*. West Sussex, UK: Wiley Blackwell.

Kertes, D.M., Gilgallon, P.M., Galantano, M.L. (2002). Contemporary issues in rehabilitation of patients with HIV disease – part I: The team approach to rehabilitation of

currently underway .....

Systematic Review of RCTs on **Non-Pharmaceutical Interventions for PLHIV and Chronic Pain**  
Kietyrs, Foster, McMormick, Million, Nguyen, Ottstadt Rutgers School of Health Professions

**9 RCTs or pilot studies** to date (not included in review: cannabis; topicals)

- **Exercise** (aerobic and strengthening) (Parker et al., 2016)
  - No between group differences in pain, but exercise group showed a decrease
- **Self-management Program** (pilot study - Gifford et al., 1998)
  - No between group difference in pain, but self Mx group did experience decrease in pain over time.
- **Patient Education** (Nkhomha et al. 2015)
  - Improvements in pain compared to control
- **Reiki with music** (Bremner et al. 2016)
  - Improvements in pain within treatment group (? clinical meaningfulness)

- **Cognitive Behavioral Therapy** (Lechner, 2003; Doerfler & Goodfellow, 2016; Uebelacker et al., 2016)
  - Mixed results across 1 RCT and 2 pilot studies

• **Vibration** (foot platform) (Paice et al., 2000)

- No between group differences in pain, but vibration group did experience decrease in pain over time.

• **Night splints** (feet / for neuropathic foot pain) (Sandoval et al., 2016)

- No between group differences in pain, but splint group did experience decrease in pain over time.

Bremner, M. N., Baker, S. J., Wagner, S. M., & Piroozi, S. M. (2016). Effects of Reiki With Music Compared to Music Only Among People Living With HIV. *Journal of the Association of Nurses in AIDS Care*, 27(5), 436-447. doi:10.1016/j.apnc.2016.04.004  
 Doerfler, R. E., & Goodfellow, L. (2016). Brief Exposure to Cognitive Behavioral Therapy Reduces Side-Effect Symptoms in Patients on Antiretroviral Therapy. *Journal of the Association of Nurses in AIDS Care*, 27(5), 448-455. doi:10.1016/j.apnc.2016.04.005  
 Gifford, A. L., Lauritsen, D. D., Gonzales, V. M., Cheshire, M. A., & Long, K. R. (1998). Pilot Randomized Trial of Education to Improve Self-Management Skills of Men With Symptomatic HIV/AIDS. *Journal of Acquired Immune Deficiency Syndromes*, 18(3), 242-247.  
 Lechner, S. C., Antoni, M. H., Lytleton, D., Laperrière, A., Uebelacker, J., & Weiss, S. (2003). Cognitive-behavioral interventions improve quality of life in women with AIDS. *Journal of Psychosocial Research*, 55(1), 1-10. doi:10.1016/j.jpr.2003.09.001  
 McManus, K., & Doerfler, R. (2016). An Educational Intervention to Reduce Pain and Improve Pain Management for Maternal People Living With HIV/AIDS and Their Family Caregivers A Randomized Controlled Trial. *Journal of Pain and Symptom Management*, 50(1), 85-90.  
 Paice, J. A., & Parker, R. H. (2000). Foot Platform Vibration as a Viscutatory Stimulus for the Relief of HIV-associated Neuropathic Pain. *Pain*, 84(2), 291-298.  
 Parker, R. H., & Stein, D. J. (2000). Managing Pain in Women Living With HIV/AIDS. *The Journal of Clinical Issue and Research in HIV/AIDS*, 24(4), 472.  
 Sandoval, R., Rodriguez, J. P., & Paice, J. A. (2016). Randomized Trial of Night Splints for Neuropathic Foot Pain in People Living With HIV/AIDS. *Pain*, 157(1), 242-247.  
 Sandoval, R., Rodriguez, J. P., & Paice, J. A. (2016). Night Splints for Neuropathic Foot Pain in People Living With HIV/AIDS. *Journal of the International Association of Physicians in AIDS Care*, 15(3), 348-351.  
 Uebelacker, L. A., Doerfler, R. E., & Goodfellow, L. (2016). A Pilot Randomized Trial of Collaborative Behavioral Treatment for Chronic Pain and Depression in Persons Living With HIV/AIDS. *AIDS and Behavior*, 30(6), 1675-1681.

## HIV-related Peripheral Neuropathy

### Distal Sensory Polyneuropathy (DSP)

- The most common neurological comorbidity in PLHIV
- Prevalence: 30-60% in PLHIV
- Bilateral involvement at the extremities
- Clinical presentation:
  - Decreased DTR at the ankle
  - Decreased sensation
  - Usually without significant strength loss
  - No significant range of motion deficits
  - Paresthesias and/or numbness
  - Painful night cramps

Dredkin, R. H., et al. (2003). *Arch Neurol*, 60(11), 1524-1534.  
 Marin, C., Persson, P., Osterberg, A., Sonneborg, A., & Hansson, P. (1999). *CMAJ*, 160(3)101-106.  
 Moore, R. D. et al. (2000). *AIDS*, 14(3), 273-278.  
 Wulf et al. HIV: Advances in research and therapy, Dec 1998. [http://www.iapac.org/clinmgmt/ns/wulf\\_han83.html](http://www.iapac.org/clinmgmt/ns/wulf_han83.html). Accessed, Nov. 1999

Individuals with HIV-related DSP typically experience **pain, numbness, paresthesia, reduced quality of life compromised function, and episodic disability**.

Antiretroviral therapy may increase intensity and frequency of neuropathic symptoms.

- Pathophysiology of DSP is not fully understood, but has been related to:
  - Peripheral nerve damage related to HIV infection
  - Toxic effects of certain anti-retroviral drugs
- Risk factors for DSP in people with HIV disease include
  - Advancing age
  - Past exposure to certain anti-retroviral drugs
  - Longer duration (history) of HIV infection
  - Advanced HIV disease
  - Substance abuse
  - Low CD4 nadir
- The impact of DSP on QoL and function in individuals with HIV disease needs to be elucidated

Braggins & Riedl. Peripheral neuropathy and quality of life of adults living with HIV/AIDS in the Ruhr district of Rwanda. *Sahara J*. 2012;9(2):88-94.  
 Braggs, R., & Riedl, M. (2012). Peripheral neuropathy and quality of life of adults living with HIV/AIDS in the Ruhr district of Rwanda. *Sahara Journal of Social Science*, 9(2), 88-94. doi:10.1016/j.sjss.2012.03.002  
 Elisa RL et al. Continued high prevalence and adverse clinical impact of human immunodeficiency virus-associated sensory neuropathy in the era of combination antiretroviral therapy: the CHARTER Study. *Arch Neurol*. 2010;67(10):1252-1258.  
 Ghochikyan, L., Cheshniyan, J., & Janzen, J.P. Epidemiology of HIV-related neuropathy: A systematic literature review. *AIDS Research and Human Retroviruses*. 2014; 30: 195-210.  
 Heale, A., Comblath, DR. Peripheral neuropathies in human immunodeficiency virus infection. *Supt Clin Neurophysiol*. 2012; 57: 195-210.  
 Heale, A., Comblath, DR. Peripheral neuropathies in human immunodeficiency virus infection. *Supt Clin Neurophysiol*. 2012; 57: 195-210.  
 Nichols et al. Prevalence, self-care behaviors, and self-care activities for peripheral neuropathy symptoms of HIV/AIDS. *Nursing & Health Sciences*. 2010;12(1):119-126.

Elisa RL, Rosario, D., Clifford, D.B., et.al. (2010). Continued high prevalence and adverse clinical impact of human immunodeficiency virus-associated sensory neuropathy in the era of combination antiretroviral therapy: the CHARTER Study. *Arch Neurol*, 67(10), 1252-1258.  
 Heale, A., Comblath, DR. Peripheral neuropathies in human immunodeficiency virus infection. *Supt Clin Neurophysiol*. 2012; 57: 195-210.  
 Heale, A., Comblath, DR. Peripheral neuropathies in human immunodeficiency virus infection. *Supt Clin Neurophysiol*. 2012; 57: 195-210.  
 Nichols et al. Prevalence, self-care behaviors, and self-care activities for peripheral neuropathy symptoms of HIV/AIDS. *Nursing & Health Sciences*. 2010;12(1):119-126.

**Physical impairments and functional limitations due to neuropathy are seen clinically and have been reported in the literature**

<b>In patients with peripheral neuropathy</b>	<b>In patients with HIV-related neuropathy</b>
<ul style="list-style-type: none"> <li>Manor et al. (2009)           <ul style="list-style-type: none"> <li>Reduced gait performance</li> <li>Impaired standing balance</li> </ul> </li> <li>Manor et al. (2008)           <ul style="list-style-type: none"> <li>increased walking variability and local instability</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Galantino, Kietrys, et al. (2014)           <ul style="list-style-type: none"> <li>Lower self-reported LE function</li> <li>Lower physical health related QoL</li> </ul> </li> <li>Sandoval et al. (2014)           <ul style="list-style-type: none"> <li>Moderate to severe pain, sleep disturbances, and limited ambulation distances</li> </ul> </li> </ul>

Manor, E., & Li, L. (2009). Characteristics of functional gait among people with and without peripheral neuropathy. *Gait & Posture*, 30(2), 253-256.

Manor, E., Wohlgemuth, P., & Li, L. (2008). Faster walking speeds increase locomotor instability among people with peripheral neuropathy. *Journal of Biomechanics*, 41(11), 2787-2792.

Leiberman, L., Brault, M., Menkes, P., Deslaurier, F. A., Breyne, M., Girelli, C., ... Group of Epidemiologie Clinique et de Recherche sur les Maladies Infectieuses et Tropicales à l'Hôpital Saint-Louis. (2014). Decline in locomotor functions over time in HIV-infected patients. *AIDS*, 28(10), 1441-1446.

Sandoval, R., Roddy, T., Glensman, T. P., Mihnev, K., & Kelley, C. (2014). Pain, sleep disturbances, and functional limitations in people living with HIV/AIDS-associated distal sensory peripheral neuropathy. *Journal of the International Association of Providers of AIDS Care*, 15(6), 389-394.

**Self-Reported Disability in HIV+ Persons with and without HIV-related Distal Sensory Polyneuropathy**

Kietrys, Galantino, Parrott, Davis, Levin, O'Brien & Tran

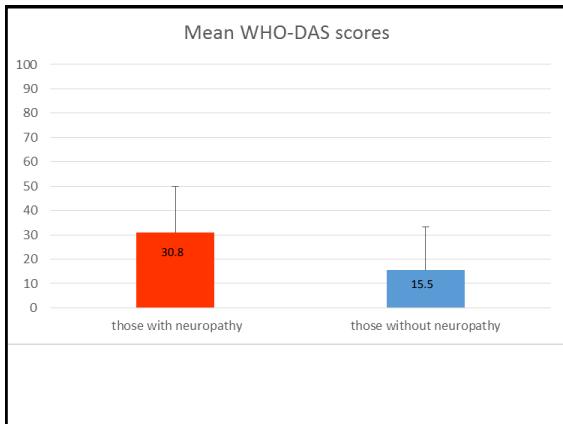
**Prevalence of Neuropathy in our current study**

As evidenced by reporting **current** pins & needles OR numbness in the feet and/or legs on the **Subjective Peripheral Neuropathy Scale**: YES 43-45%

Category	Percentage
Never	30%
Past	45%
Current	25%

Category	Percentage
Never	25%
Past	45%
Current	30%



**Many tests available to *screen for presence* of neuropathy**

**Brief Peripheral Neuropathy Screen**  
[http://www.hiv.va.gov/ovir/ovir/manual\\_primary\\_care/peripheral\\_neuropathy\\_tool.asp](http://www.hiv.va.gov/ovir/ovir/manual_primary_care/peripheral_neuropathy_tool.asp)

**Total Neuropathy Score**  
[http://www.hiv.va.gov/ovir/ovir/manual\\_primary\\_care/peripheral\\_neuropathy\\_tool/tns.pdf](http://www.hiv.va.gov/ovir/ovir/manual_primary_care/peripheral_neuropathy_tool/tns.pdf)

**Michigan Neuropathy Screening Instrument (MNSI)**  
[http://www.michiganmedicine.org/documents/mnsi\\_patient.pdf](http://www.michiganmedicine.org/documents/mnsi_patient.pdf)

**Single Question Neuropathy Screen**

- “Do you experience tingling, burning, or numbness in your feet or hands?”
- Sensitivity 96%; specificity 80% in HIV+ patients in Zambia

**DN4 Questionnaire**  
[http://www.cbmphn.uh.edu/Ukraine/Pain\\_Management\\_-\\_Screen\\_Ostree/NeuropathicPainDiagnosticQuestionnaireDN4.xls.aspx](http://www.cbmphn.uh.edu/Ukraine/Pain_Management_-_Screen_Ostree/NeuropathicPainDiagnosticQuestionnaireDN4.xls.aspx)

**S-LANSS**  
<http://www.bspqr.org.nz/BPJ/2016/5/May/docs/s-lanss.pdf>

Corriveau, D., Weiss, J., Andri, C., Brinkley, G. L., Price, R. W., Balkin, I. A., ... Meyer, A. C. (2010). Utility of quantitative sensory testing and screening tools in identifying HIV-associated peripheral neuropathy in Western Kenya: pilot testing. *PLoS ONE*, 5(10), e14256.

Di Palo, G. A., Chiaravalloti, N. D., Lee, S. H., Sivaprakasam, J. C., Meara, M., & Aszkenasy, T. (1999). Total neuropathy score: validation and reliability study. *Neurology*, 53(9), 1680-1684.

Ellis, R. J., Evans, S. R., Collins, B. J., Rutter, M., & Cooper, A. C., et al. (2005). Clinical validation of the NeuropScreen. *Journal of Neurology*, 248(5), 563-563.

Feldman, E. L., Russell, J. W., Sullivan, K. A., & Gallooy, D. (1999). New insights into the pathogenesis of diabetic neuropathy. *Curr Opin in Neurology*, 12(5), 563-563.

Frese, J. C., Johnson, J. M., & Brinkley, G. L. (2010). Evaluating the diagnostic accuracy of single question neuropathy screen (S-QNS) in HIV-positive Gambian adults. *Journal of Neurology, Neurosurgery & Psychiatry*, 81(12), 1380-1381.

Gruber, V., Margolis, R., D'Amato, C., Grasso, C., Cacciatore, F., & Marlia, G. A. (2012). Validation of DN4 as a screening tool for neuropathic pain in purified diabetic polyneuropathy. *Diabetic Medicine*, 29, 378-385.

Holland, J. H., Smith, B. H., Torrance, N., & Potter, J. (2005). The S-LANSS score for identifying pain of predominantly neuropathic origin: validation for use in clinical and postal research. *Journal of Pain*, 6(2), 140-145.

**Subjective Peripheral Neuropathy Screen (SPNS)**

- 6 sections; all self-report
- Quick and inexpensive
- Validated in HIV+ patients

Manhart, J. H. (1999). The reliability and validity of the subjective peripheral neuropathy screen. *Journal of the Association of Nurses in AIDS Care*, 10(2), 30-34.

Example: “Mitch” is a 72 year old male with HIV and peripheral neuropathy

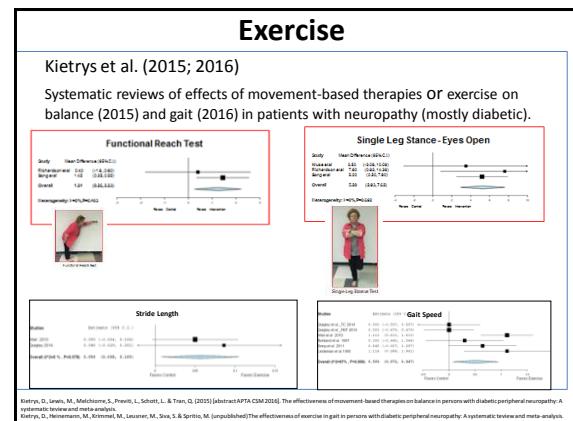
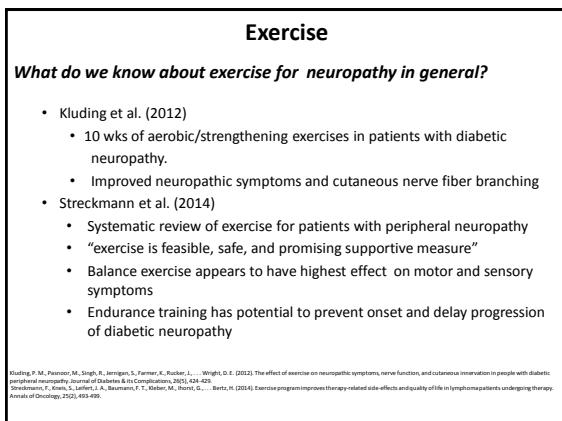
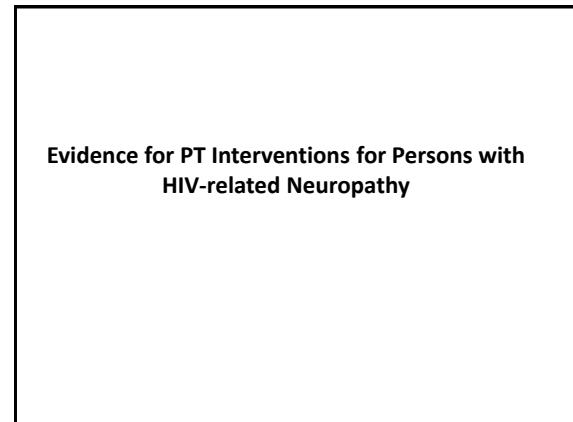
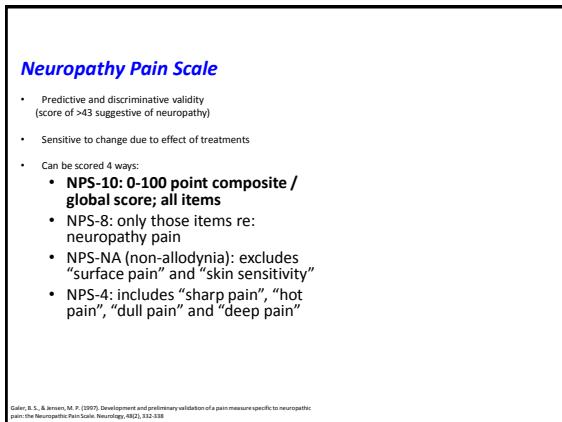
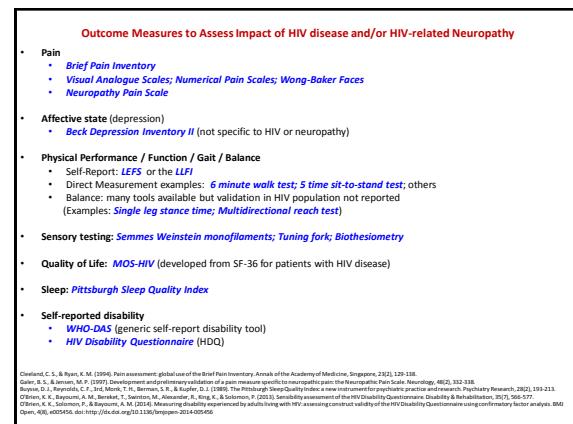
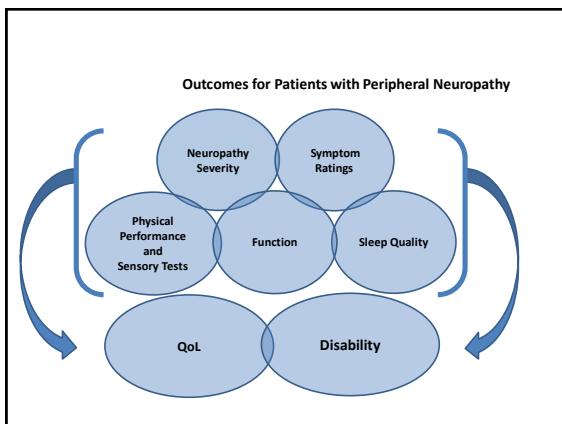
**Impairments in body structure or function**  
Poor endurance, leg weakness, poor balance, foot pain

**Activity limitations (functional activity limitations)**  
unable to walk without cane  
unable to climb more than 3 stairs (using cane and handrail)

**Participation restrictions**  
unable to attend church services  
difficulty with getting out of house to socialize

**Environmental factors**  
church entrance has 12 stairs with no handrail

**Personal factors**  
lives alone; sedentary and solitary lifestyle



## TENS

### for patients with HIV-related neuropathy

- Galantino & Mc Reynolds (1995)
  - Case series using microcurrent
  - Reduced or absent pain in 97% of patients; improved gait in 76% of patients
- Gale (2003)
  - 2 cases, bundled PT Tx including microcurrent
  - (to be summarized on a later slide)

### What do we know about TENS for diabetic neuropathy?

Jin et al. (2014) Systematic review and meta-analysis of 3 RCTs

- Reductions in mean pain score were significantly greater in TENS group than in placebo TENS group in 4 weeks and 6 weeks follow-up (4 weeks., but not in 12 weeks follow-up)
- TENS therapy was associated with significantly subjective improvement in overall neuropathic symptoms in 12 weeks follow-up [WMD=0.18, 95% CI (-0.32, -0.65)]
- No TENS-related adverse events were registered in TENS group
- TENS therapy may be an effective and safe strategy in treatment of symptomatic DPN.
- Due to small sample and short-term treatment duration, large multi-center RCTs are needed to further evaluate the long-term effect of TENS on DPN

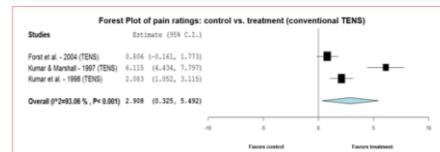
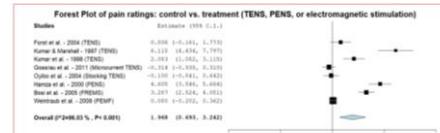
Galantino, M. L., & Mc Reynolds, M. A. (1995). Physical therapy management of HIV disease: a retrospective study. *Journal of the International Association of Physicians in AIDS Care*, 2(1), 15-18.

Gale, J. (2003). Physiotherapy intervention in two people with HIV or AIDS related peripheral neuropathy. *Physiotherapy Research International*, 8(4), 200-205.

Jin, D. M., Xu, Y., Geng, S. F., & Yan, B. B. (2014). Effect of transcutaneous electrical nerve stimulation on symptomatic diabetic peripheral neuropathy: a meta-analysis of randomized controlled trials. *Diabetes & Vascular Disease Research*, 11(1), 5-12.

## The Effectiveness of TENS, PENS, and Electromagnetic Stimulation for Reducing Lower Extremity Pain Due to Diabetic Peripheral Neuropathy A Systematic Review and Meta-analysis

Kietrys DM, DaTorre J, Gandhi C, Kaczka K, Kline M, Lopez A, Wills D



## Manual Therapy

### For patients with HIV-related neuropathy

- Gale (2003)
  - 2 cases; soft tissue massage and joint mobilization as part of combination therapy
  - (to be summarized on a later slide)

### What do we know about manual therapy for diabetic neuropathy?

- Chatchawan et al. (2015)
  - Thai foot massage (3x/wk for 2 wks) compared to control
  - Improved balance; improved sensation; improved knee, ankle and toe range of motion

Connigham, J. E., Kelechi, T., Starba, K., Barthélémy, N., Fallowik, P., & Chin, S. H. (2011). Case report of a patient with chemotherapy-induced peripheral neuropathy treated with manual therapy (massage). *Supplementary Therapies in Cancer*, 17(1), 10-13.

Chatchawan, U., Engangnichayakul, W., Pardine, P., & Yamashita, J. (2015). Effects of foot massage on balance performance in diabetic patients with peripheral neuropathy: a randomized parallel controlled trial. *Medical Science Monitor Basic Research*, 21, 68-75.

## HIV-related neuropathy

### Night Splints

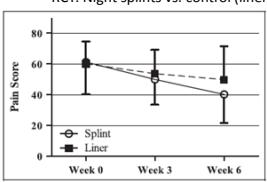


Figure 3. Pain scores.

Proposed mechanism:  
Peripheral inhibition of external stimuli.

Sandoval, R., Robbie, T., Gondwe, T. P., Attwells, K., & Bellis, C. (2016). Randomized Trial of Lower Extremity Splinting to Manage Neuropathic Pain and Sleep Disturbances in People Living with HIV/AIDS. *Journal of the International Association of Providers of AIDS Care (JAPAC)*, 15(2), 240-247.

## Multi-modal Physical Therapy for HIV related neuropathy (Gale, 2003)

### 2 patients with HIV related neuropathy

#### STM + joint mobilization + stretching exercise + microcurrent + home program (stretching and towel desensitization)

- Joint mobilization to foot and toes
- Stretching of any tight musculature in ankle/foot
- Micro-current to multiple LE points, 0.5 Hz X15 min.

Intervention dose: 2-4 X / month plus home program for 12 or 18 months

- Case 1: decreased pain and numbness; improved stride length and ambulation tolerance
- Case 2: decreased pain; able to return to work despite progressive atrophy of foot intrinsic muscles at around 12 months

Gale, J. (2003). Physiotherapy intervention in two people with HIV or AIDS related peripheral neuropathy. *Physiotherapy Research International*, 8(4), 200-205.

## YOGA FOR PERSONS WITH HIV-RELATED NEUROPATHY: A CASE SERIES

Kietrys, Galantino, Logan, Gould-Fogerite, O' Brien, Cohen, Jermyn, & Parrott  
in press, *Rehabilitation Oncology*

### Inclusion Criteria

- Age 18-65 years, HIV+ with controlled HIV disease status
- Clinical diagnosis of DSP in the feet
- Average foot pain at least 4/10
- Stable pharmacologic management of pain
- Able to ambulate independently for 6 minutes

### Yoga Intervention:

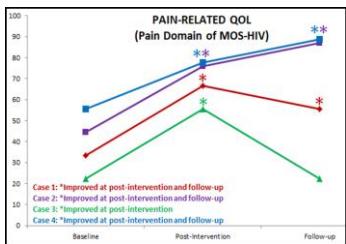
- 4 weeks of twice-weekly 90 minute yoga classes
- home yoga practice on non-class days



Examples of asanas used: Extended Side Angle Pose (left); Runner's Stretch (center); Tree Pose (right).

### **YOGA FOR PERSONS WITH HIV-RELATED NEUROPATHY: A CASE SERIES**

Kietrys DM<sup>1</sup>, Galantino ML<sup>2</sup>, Logan K<sup>3</sup>, Gould-Fogerite S<sup>1</sup>, O' Brien K<sup>2</sup>, Cohen ET<sup>1</sup>, Jermyn R<sup>4</sup>, Parrott JS<sup>1</sup>  
<sup>1</sup>Rutgers, <sup>2</sup>Stockton University, <sup>3</sup>University of Toronto, <sup>4</sup>Rowan University



Participants had improvements in several gait parameters (step length, stride length, stride velocity, walking velocity, and double limb support time) after the intervention, but persistence at 4-week follow-up was inconsistent.

### **Evidence-Based Recommendations for Patients with HIV-related neuropathy**

#### **Recommended with reservations**

##### **Night splints** (based on a single RCT)

**Exercise** (based on expert opinion and extrapolation from research on pts with diabetic neuropathy)

**Combined Physical Therapy treatments** (soft tissue massage, joint mobs, stretching, microcurrent, and desensitization) (based on a single case series)

##### **Electro-acupuncture** (based on a single case series)

Galantino, M.L., Ete-Okoko, S.T., Findley, T.W., & Cendrowski, D. (1999). Use of noninvasive electroacupuncture for the treatment of HIV-related peripheral neuropathy: a pilot study. *Journal of Alternative & Complementary Medicine*, 5(2), 121-142.

##### **Yoga** (based on a single case series with mixed findings)

## HIV and Aging



Mary Lou Galantino, PT, PhD, MSCE  
 Professor, Stockton University  
[MaryLou.Galantino@stockton.edu](mailto:MaryLou.Galantino@stockton.edu)

## Mortality and Lifespan



- People with with HIV are living longer with the success of ART.
- In 2012, 40% of people living with HIV were greater than 50 years of age in the US. In 2015, 50% were greater than 50.
- Mortality rate has fallen and life expectancy has increased for people living with HIV.
- Despite these improvements, there is still a difference between the life expectancy of a HIV+ and HIV- individual.



## Impact of Antiretroviral Therapy (ART)



- Antiretroviral Drugs or ART is a type of combination therapy that utilizes three or more drugs to treat HIV. This combination therapy is paramount because of HIV's ability to multiply forming many copies that may possess mutations.
- This medical treatment does NOT cure HIV but will inhibit the growth of the virus.
- Hinder the growth of HIV will subsequently slow down the disease itself.

(What is Antiretroviral Therapy (ART)?, 2014)

## HIV+ individuals are at an Increased Risk of Comorbidities :



- Cardiovascular disease and stroke
- Osteoporosis and fracture
- Metabolic syndromes and diabetes mellitus
- Renal disease
- Neuropathy
- Malignancies
- Geriatric syndromes and frailty

## Comorbidities in HIV Disease



Compared to the general population, PLWH have a 2-fold higher risk of CV disease, a 3-fold increased risk of fracture, and a risk of kidney disease that is comparable to that in diabetes.

(Van Epps et. al, 2017)



Frailty in HIV



Frailty is recognized by a decrease in the ability to perform basic day to day activities and a reduced functional capacity

- Encompasses physical weakness and increased vulnerability because of increased age.
  - Negative consequences include: increased hospitalization risk, increased risk of falling, depression, and a decreased ability for self-care.

**Frailty** entails multiple negative health outcomes, affects more women than men, and is linked with people of lower income and those who are in current poor health conditions.

- Present in 4-10% of all PLWH patients and about 50% of PLWH over the age of 50.

(Willig, Overton, and Saaq, 2016)

## Frailty and Fall Risk



- Used a 4-m walk, grip strength, and self-reported weight loss, exhaustion, and low physical activity and classified into 3 categories based on their results: frail, pre-frail, and non frail.
  - Aging HIV-infected pre-frail and frail individuals are at significantly increased risk of falls.**
  - Incorporation of frailty assessments or simple evaluations of walk speed or grip strength in clinical care may help identify individuals at greatest risk for falls.**
  - Peripheral neuropathy further increases fall risk among frail persons, defining a potential target population for closer fall surveillance, prevention, and treatment.**

(Tassiopoulos et al., 2017)

FRP

HIV infection is strongly correlated with the frailty-related phenotype (FRP)

HIV infection is associated with an earlier occurrence of a phenotype that resembles the phenotype of frailty in older adults without HIV infection.

(Desquillet et al. 2007)

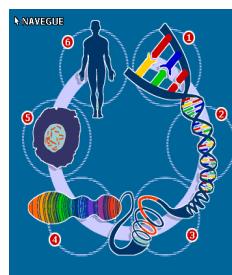


## Impact on Cognitive Function



Frail individuals have higher risk of cognitive impairment; however, it is not known if early-onset frailty in those infected by HIV could also increase the risk of cognitive impairment.

(Zamudio et al., 2017)



## Further Research



- Phenotypes (dimensions of behavior, closely related to fundamental mechanisms, may be more informative than chronological age)
  - Comorbid aging and cognitive aging, though other phenotypes (i.e., disability, frailty, accelerated aging, successful aging)
  - Conclusions:
    - *Phenotypes, comorbid aging and cognitive aging, are distinct from each other, yet overlapping*
    - *Associative relationships are the rule in HIV for comorbid and cognitive aging phenotypes*
    - *HIV behavioral interventions for both comorbid aging and cognitive aging have been limited.*

(Staff et al. 2017)



## Assessment and Early Intervention

- Emphasis on:
  - Early diagnosis and treatment
  - Prevention of comorbidities
  - Improvement of quality of life
- Management should increasingly focus on geriatric concerns.

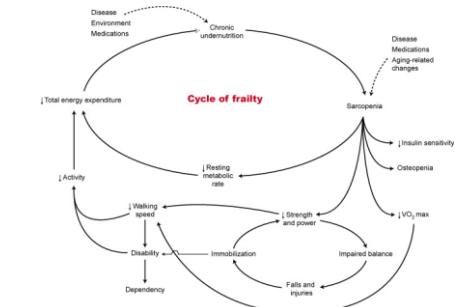


## Physical Therapy Interventions and Nutritional Considerations



## Physiology of Frailty

- Cycle of Frailty – sarcopenia, decreasing metabolic rate and decreased total energy expenditure
- 1) molecular and genetic (mitochondria, genetics senescence, autophagy) 2) physiology (high IL-6, CRP, WBC clotting, angiotensin, glucose intolerance) 3) syndrome 4) outcomes
- Key stress response systems underlie vulnerability (inflammation, SNS, HPA axis and angiotensin system which relates to the inflammatory process)
- IL-10 inflammation managed – without, age quicker with skeletal muscle and mitochondrial decline



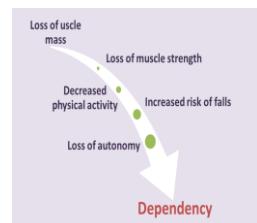
## Goals for Frailty Intervention

1. Target Specific biological processes that drive frailty (inflammation/RAS)
2. Prevent worsening chronic disease and functional decline



## Clinical Scales to Assess Frailty

- Frailty Phenotype
- Edmonton Frail Scale
- Frailty Index



## Edmonton Frailty Scale



Frailty domain	Item	0 point No errors	1 point Minor lapsing errors	2 points Other errors
Cognition	Please imagine that the pre-drawn circle is a stick I would like you to draw a straight line from the top to the bottom. Then place the hands to your sides and close your eyes. In the past year, how many times have I forgotten things?	1-2	3-9	
General health & ability	In the past year, how many times have I been unable to do what I wanted to do because I was too tired?	0-4	5-8	
Functional independence	With how many of the following activities do you require help? Feeding yourself, getting dressed, using the telephone, housekeeping, laundry, preparing meals, taking medications.	0-4	5-8	
Social support	When you need help, can you count on your family or friends to help you?	Always	Sometimes	Never
Meditation with doctor	Do you take one or more different prescription medications on a regular basis?	No	Yes	
Nutrition	At times, do you forget to take your medicine?	No	Yes	
Mood	From your recent self-weight scale, did you feel better (or worse) than usual?	No	Yes	
Convenience	Do you often feel tired or exhausted after doing what you used to do without difficulty?	No	Yes	
Functional performance	Do you feel you will not be able to walk at a safe and comfortable pace for the next month? If so, when you feel this way, return to the chair and sit until you feel better.	0-10 n	11-20 n	One of 'I feel I am not able to walk at a safe and comfortable pace for the next month' responses
Total	Total score is the sum of column totals			

### Scoring:

- 0-5= not frail
- 6-7= vulnerable
- 8-9= mild frailty
- 10-11= moderate frailty
- 12-17= severe frailty

## Dosage of Exercise, Medication & Nutrition



Total time spent for exercises should be **prescribed to prevent adverse effects**; however, *it remains unclear what type of exercise, and at what dose, is most appropriate and feasible to treat and/or prevent frailty in older adults with HIV.*

**Polypharmacy (5+ medications)** has been shown to increase frailty in HIV-negative populations. This finding suggests that ART medication could contribute to the development of fragility but further research is needed to confirm this relationship.

Alterations to dietary factors have only been studies in a limited amount of clinical trials. Nutrition effectiveness to address frailty in the context of HIV infection remains unknown.

(Willig, Overton, and Saag, 2016)

## Exercise & Neurocognitive Function



- 80 HIV+ subjects ages 50-79
- Neurocognitive & physical activity assessments
- Findings:
  - Moderate physical activity is associated with less executive dysfunction among older HIV+ adults
  - Physical activity may directly impact frontal systems (e.g. neurogenesis), or may work indirectly via reduction of risk factors for neurocognitive impairment (e.g. vascular comorbidities)

(Fazeli et. al., 2015)

## Aerobic and Resistance Exercise in Men with HIV

- A 2006 study by Fillipas et al, examined the effects of supervised, aerobic and resistance exercise, twice weekly, in men living with HIV over a 6 month period
- At the end of six months, the experimental group had improvements in self-efficacy, in cardiovascular fitness, and in 2 dimensions of QOL

(Fillipas et. al., 2006)

## Progressive Resistive Exercise



- A 2008 systematic review reported that PRE or a combination of PRE and aerobic exercise may lead to statistically significant increases in body weight and arm and thigh girth.
- Notes progressive resistive exercises appears to be safe and may be beneficial for medically-stable adults living with HIV.

(O'Brien, Tyanan, and Glazier, 2008)

## Aerobic Exercise

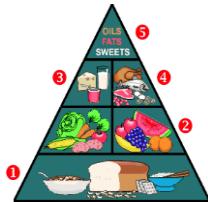


- Concerns about aerobic exercise increasing the body's metabolic rate and thus increasing additional muscle loss can be overcome with a balanced high-calorie diet and incorporating a sound nutritional program.
- The key determinant of weight loss in HIV infection-related wasting they concluded was **reduced energy intake, not increased energy expenditure.**



## Nutrition

- Proper caloric intake must set the standard for each type of exercise to meet the energy expenditure required for the activity.



## Nutrition

- WHO recommendations on micronutrient requirements:**
  - Balanced, healthy diet is strongly encouraged
  - Intake of micronutrients at RDI may be insufficient to correct nutritional deficiencies
  - Evidence shows some supplements, vitamin A, zinc, and iron, can have adverse effects in people infected with HIV/AIDS
  - Safe upper limit of daily intake micronutrients has not been defined

(Polo et. al., 2007)

## Nutrition Guidelines for People with HIV

- Most importantly, eat more because extra muscle weight will help individuals fight HIV.
- Eat starches, proteins and moderate amount of fats.
  - Proteins help build and maintain muscle.
  - Carbohydrates gives a person energy.
  - Fats provide extra energy.
- A moderate exercise routine will help the body turn food into muscle.
- Drinking plenty of fluids is another important factor.
  - Extra water can help reduce the side effects of medications.

(InfoNet, 2014)

## Wasting, Obesity, and Frailty

The pathogenesis of poor nutrition in HIV-infected patients depends on caloric intake, intestinal nutrient absorption/translocation & resting energy expenditure, which are features seen in all chronic diseases.

Optimal nutrition is an important part of HIV care to support the immune system, limit HIV-associated complications as well as maintain better QOL and survival.

Patients with HIV have presented in three ways over the past 30 years as changes to diet have been altered: wasting syndrome, lipodystrophy and frailty.

(Mankos & Kotler, 2014)

## Optimal Protein Intake

- An evidence-based study done by Bauer et al. shows that older population require more dietary protein than do younger populations.
- Increase in protein intake is paramount in maintaining proper function in activities and to mitigate various illnesses.
- The European Union Geriatric Medicine Society performed a review on dietary protein needs (>65):

*Recommended a range of 1.0-1.2 grams of protein per kilogram of body weight.*

*Resistance and endurance exercises; however with increased physical activity there will need to be slightly higher protein intake levels.*

(Bauer et al., 2013)

## Case Study

Lena is a 70-year-old woman with end-stage-renal disease (ESRD) from hypertension on dialysis, chronic obstructive pulmonary disease (COPD) on 2L oxygen with recurrent pulmonary Mycobacterium Avium Intracellulare (MAI) infection failing past therapies, coronary artery disease s/p stent placement 1 year prior with congestive heart failure (ejection fraction of 40%), right hip osteoarthritis and HIV well-controlled on ART. Patient is in your clinic with her daughter who is her health care proxy for a pre-operative assessment of an elective ventral hernia repair. The daughter tells you the surgeon mentioned that Lena looks frail and wants her optimized before the surgery.

Questions to Consider:

- How do you determine if this patient is frail?
- How is frailty different in HIV-infected individuals compared to the general population?
- What is the effect of frailty on health outcomes?

## Case Study Continued...

Lena lost 20 lbs in the past 3 months due to recurrent MAI infections in her lungs. She spends most of her time at home due to weakness and fatigue, except on dialysis days when she gets transported to the dialysis center. She is unstable on her feet and usually holds on to other people when she walks outside her apartment.

Lena feels depressed due to her decline in health and her dependence on dialysis, although she denies suicidal or homicidal ideation. She does not have pain related to the hemia or her other medical conditions. On exam, her pulse was 78, BP 120/65, oxygen saturation 90% on 2L. Her 6MWT distance was 300m. Her albumin was 3.0 g/dL.

Questions to consider?

1. Is Lena frail? What frailty measure would you use to answer this question?
2. What would you do to optimize Lena for her upcoming surgery?
3. How would you counsel Lena's daughter regarding the prognosis?

## HIV Care Model: The Grady Ponce de Leon Center, Atlanta, GA

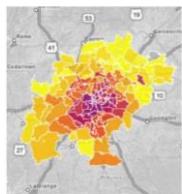
**Grady Ponce de Leon Center**  
A Publicly Funded, Tertiary HIV Care clinic



## Atlanta HIV cluster

- 60% of all PLH in Atlanta live in a 4-county radius
- Rate of HIV in the cluster is 1.34 % → World Health Organization's description of a "generalized epidemic" (>1 %).
- More than 70% of HIV-infected patients who live in Atlanta live within two miles of the Ponce clinic

HIV Distribution in Atlanta- by Zip code



## HIV care model: The Grady Ponce de leon center

- Most comprehensive facility dedicated to the treatment of advanced HIV and AIDS in the U.S. 7-story, 90,000 square-foot building
- Developed through the Grady Health System, Emory Department of Medicine (Division of ID)
  - Over \$50M of NIH funding
  - Associated with NIH Center for AIDS Research
- >6200 adult patients enrolled, ~ 90% ethnic or racial minority groups.
- Primary adult care, family clinic, psychiatry, urgent care, dermatology, neurology, oncology, ophthalmology, **palliative care**, oral health, infusion therapy, nutrition, physical therapy and case management.

## Ponce center: HIV Palliative Care program

- Palliative Care Program: address the symptomatic and psychosocial effects of disease often missed by routine clinical care, termed "early" palliative care
- **Why does it work??**
- Truly multidisciplinary approach, "one-stop shopping", real-time conversation *with and between* providers
- Early palliative care may narrow gap between providers' and patients' perceptions of needs through targeting barriers, such as housing instability, which may increase adherence
- Highlighted a need for ongoing care to address physical symptoms of long-term HIV disease
  - Physical therapy services

## Future directions

- Multi-disciplinary collaboration to ensure that needs of this diverse population are met.
  - Palliative care model
- HIV management in primary care
- HIV Prevention and screening at all life stages
  - PrEP
  - Screening older patients for sexual health-related risks
  - National study: adults > age 50 *at risk for HIV* are 80% less likely to be tested for HIV than younger people

## Future directions

- Continued vaccine research
- More federal research/funding
  - Effects of stigma on physical/emotional health
  - Effects of ARV on aging adults
  - Effects of HIV on aging adults
- Public health campaigns targeting older adults and minority MSM for prevention, screening and interventions
- Treatment of long-term effects of HIV by multidisciplinary teams including rehab medicine/PT

## Q & A



## References

- Bauer, J., Bello, G., Goldstein, T., Gruber, M., Cruz-Sancho, J. L., Mooney, J. E., ... & Wiedermann, R. (2011). Evidence-based recommendations for optimal dietary protein intake in older people: a position paper from the PROT-AGE Study Group. *Journal of the American Medical Directors Association*, 12(8), 542-550.
- Desai, L., Jacobson, L. P., Fried, L. P., Phair, J. P., Jamison, C. D., Holloway, M., & Margolis, J. B. (2007). HIV-1 infection is associated with an earlier occurrence of a phenotype related to frailty. *The Journal of Gerontology Series A: Biological Sciences and Medical Sciences*, 62(11), 1279-1286.
- Falanga, V., & Hwang, S. (2006). Frailty in elderly patients with diabetes. Physical activity is associated with better neurocognitive and everyday functioning among older adults with HIV disease. *AIDS and Behavior*, 19(8), 1430-1437.
- Filipas, S., Oldmeadow, B., Bailey, M., Cherry, C., A six-month supervised aerobic and resistance exercise program improves self-efficacy in people with human immunodeficiency virus. *Journal of Clinical Pharmacy and Therapeutics*, 31(2), 218-226.
- Galarino, M. L. A., Kietrys, D. M., Parrish, J. S., Stevens, M. E., Stevens, A. M., & Condoluci, D. V. (2014). Quality of life and self-reported lower extremity function in adults with HIV-related distal sensory polyneuropathy. *Physical therapy*, 94(10), 1455-1464.
- Gruber, M., & Wiedermann, R. (2010). Position paper of the PROT-AGE study group on protein nutrition in older adults. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2888388/>
- Morad, P. K., & Kotler, D. P. (2014). From weight loss to death: changes in nutritional outcomes in HIV/AIDS. *Endocrinology and Metabolism Clinics*, 43(3), 647-663.
- O'Brien, K., Tytla, A. N., Nixon, S., Glazner, F., ... Effects of progressive resistive exercise in adults living with HIV/AIDS: systematic review and meta-analysis of randomized trials. *AIDS Care*, 2010, 20(5):631-633.
- Poly, A., & Wiedermann, R., Morales, C et al. Recommendations from SPNS/GEAM/SENPE/ADEN/SEDOCA/GESIDA on nutrition in the HIV-infected patient. *Nutr Hosp*. 2007;23(2):229-243.
- Sangaralingam, A. R., Appelbaum, J. (2015) Frailty, Aging and Aging. Retrieved from <http://hiva-ago.org/wp-content/uploads/2015/07/HIVAAGO-Frailty-Aging-and-Aging.pdf>
- Sarkis, D. M., Goris, J. A., Jitkaew, J., & Margolis, J. B. (2007). Frailty in older adults with HIV/AIDS. *American Journal of AIDS Research*, 14(3), 194-199.
- Tsatsopoulou, K., Abdo, M., Wu, K., Koleris, S. L., Palilia Jr, F. J., Kalayjian, A., ... & Flanigan, K. M. (2017). Frailty is strongly associated with increased risk of recurrent falls among older HIV-infected adults. *Aids*, 31(15), 2287-2294.
- Van Lypen, P., & Kalayjian, R. C. (2017). Human Immunodeficiency Virus and Aging in the Era of Effective Antiretroviral Therapy. *Infectious Disease Clinics of North America*.
- What is Antiretroviral Therapy (ART)? - Fact Sheet 403. (2014) Retrieved from [http://www.aidsinfo.nih.gov/fact\\_sheets/view/403](http://www.aidsinfo.nih.gov/fact_sheets/view/403)
- Willig, A. L., Overton, E. T., & Saag, M. S. (2016). The State of Frailty and Aging with HIV. *Total patient care in HIV & HCV*, 21(1), 6.
- Zamolo, A. et al. Cognitive impairment among older adults living with HIV/AIDS and Frailty. *2017;23(3):638-647*.