

Determinants of carotid intima media thickness (CIMT) in a Western Cape study population with and without HIV-infection

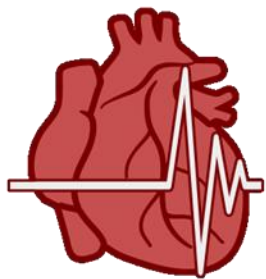


Presenter (PhD candidate): ***Sana Charania***

Supervisor: Prof Hans Strijdom

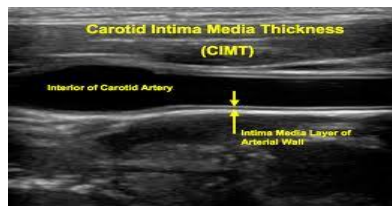
Introduction

- **Cardiovascular diseases (CVD) is the most common and leading cause of death worldwide**
- **South Africa (SA) has 2-3 times ↑ burden of CVD than developed countries**
- **Prediction: 41% ↑ in CVD mortality in SA between the year 2000 to 2030**



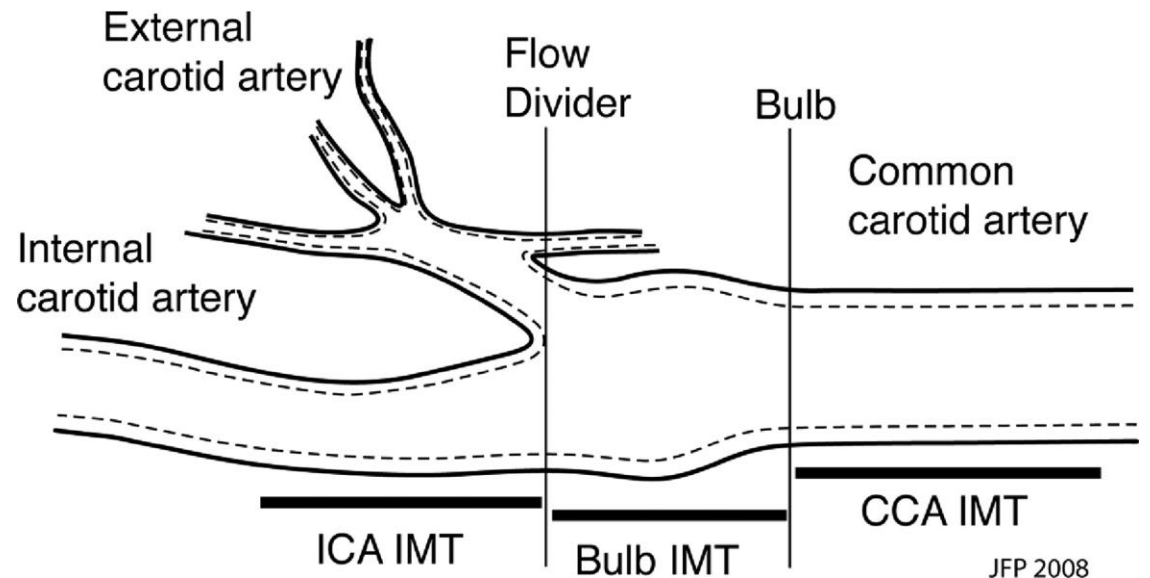
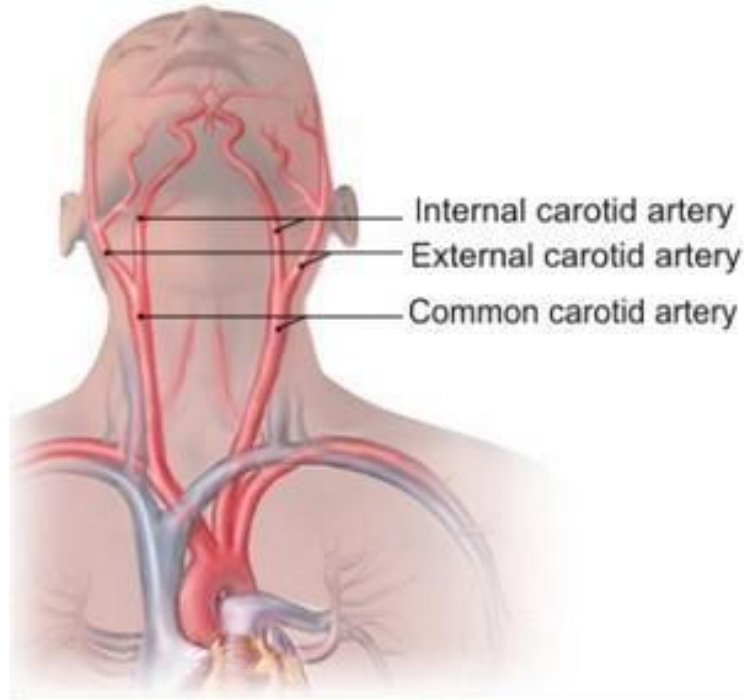
Measurement: Subclinical -atherosclerosis

- The underlying cause of CVD such as ischaemic heart disease & stroke is atherosclerosis
- It can be very useful to measure atherosclerosis:
 - Predict cardiovascular risk in patient
 - Measure sub clinical atherosclerosis as changes in the arterial wall occur well before the clinical signs and symptoms of CVD
- Measurements represent the overall risk exposure which may be beneficial in refining CVD risk stratification and therapeutic strategies
- Non-invasive technique to measure subclinical atherosclerosis- **Intima media thickness (IMT)**- used in the study



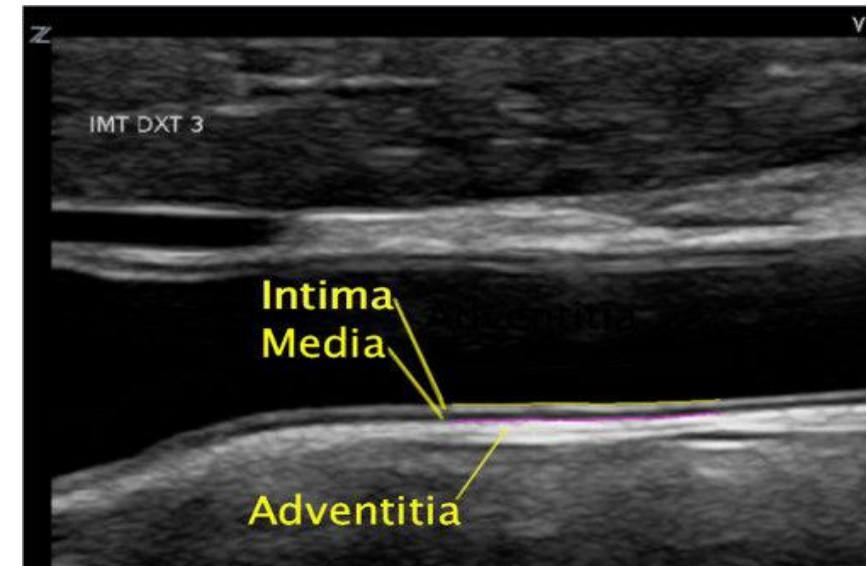
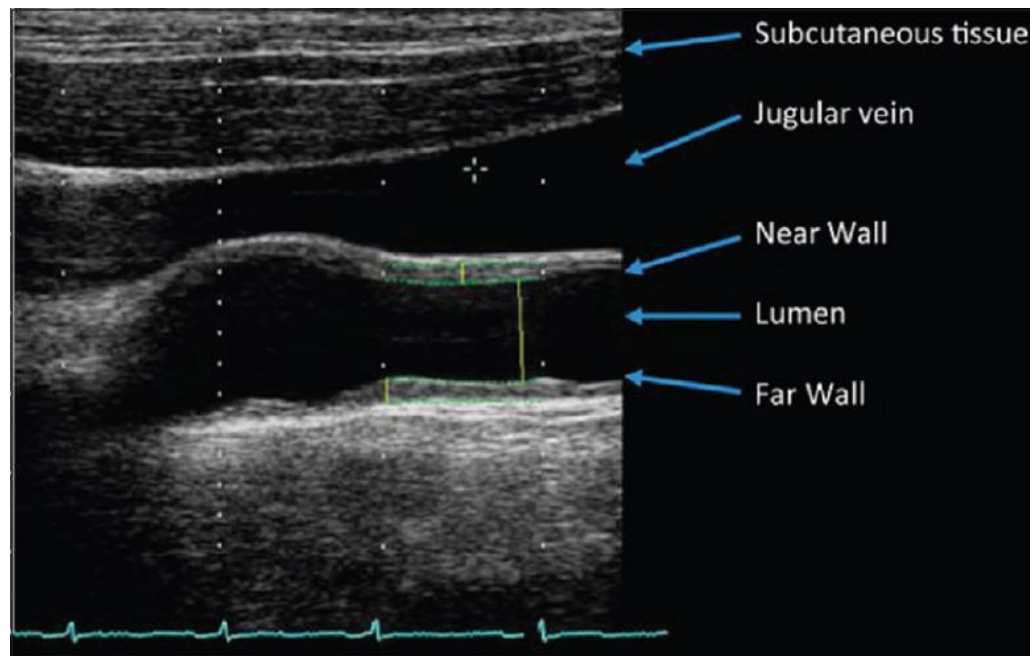
IMT- Intima media thickness

- Sensitive and reproducible
- Relatively Inexpensive
- This study measured the right and left common carotid artery (CCA) IMT



IMT...

- Longitudinal scanning of a 1 cm segment of the common carotid artery (CCA) is recorded
- 5 mm proximal to the dilatation of the carotid bulb which allows for visualization of the lumen-intima and media-adventitia interfaces of the far arterial wall



HIV

- SA has the **largest HIV-infected population in the world**
- Today, **SA has the largest government sponsored ART rollout programme globally**



Literature

Success of ART

Mechanisms underlying CVD risk in HIV is complex

Increased lifespan

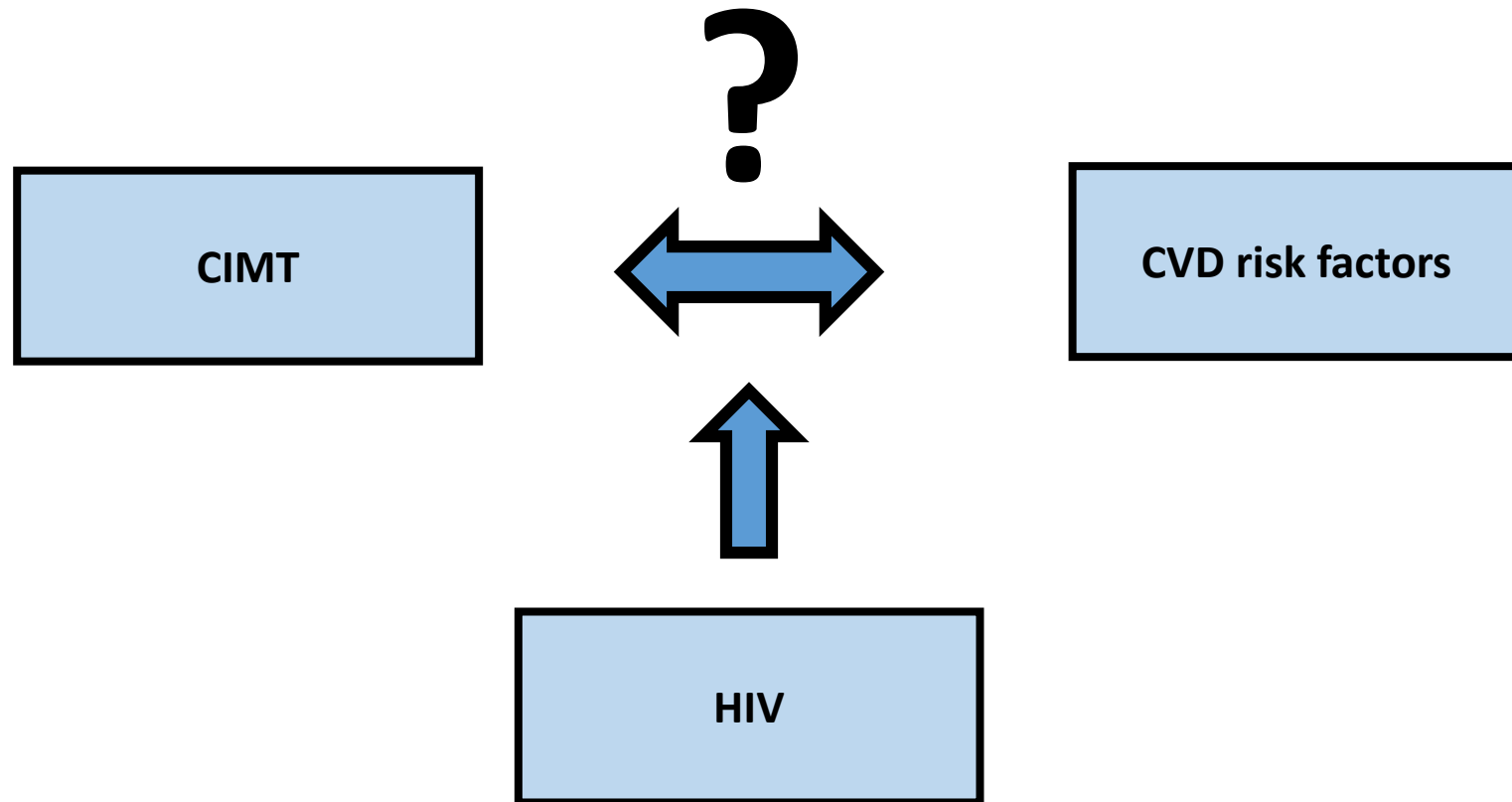
Direct effects of virus

**Adverse effects of
ART**

- **Studies suggest that HIV + individuals are at a ↑ risk of developing CVD in comparison to HIV- individuals**
- **Data from developed countries show increased CIMT in HIV+ individuals in comparison to HIV- individuals**
- **HIV correlates with premature atherosclerosis (CIMT) in the absence of detectable viremia and ART**
- **HIV appears to be an independent risk factor**
- **Data is inconclusive in a South African context**

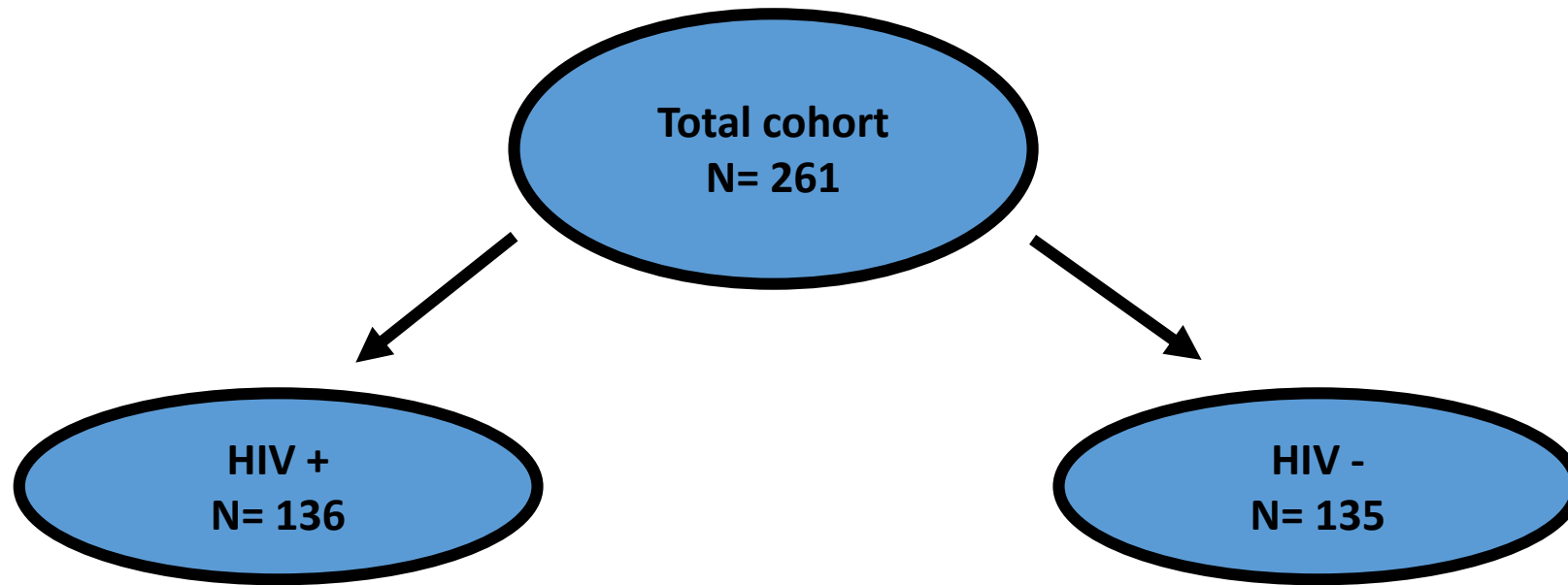
AIM

To investigate the relationship between CIMT and an array of cardiovascular risk factors and other control variables in study participants with and without HIV-infection



Study Design and Method

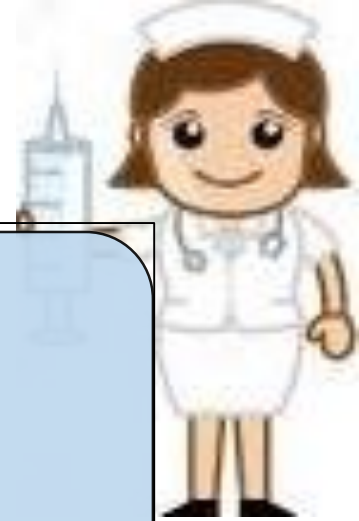
- **Cross-sectional study design**
- **Sub study within the EndoAfrica study**
- **Ethics Reference Number: N13/05/064B & N12/12/086**
- **Participants for the study:**
 - **Adult, non pregnant patients**
 - **Visiting community health care clinics in Cape Town and Worcester areas of the Western Cape Province**



- **First line ART regime: FDC of Tenofovir + emtricitabine or efavirenz**



Procedure



Clinical Investigations

- Participant's Medical History
- Anthropometric data
 - Height, weight (BMI) and hip and waist (WHR)
 - Blood pressure taken in triplicate
- Intima media thickness (IMT)

Biochemical analysis

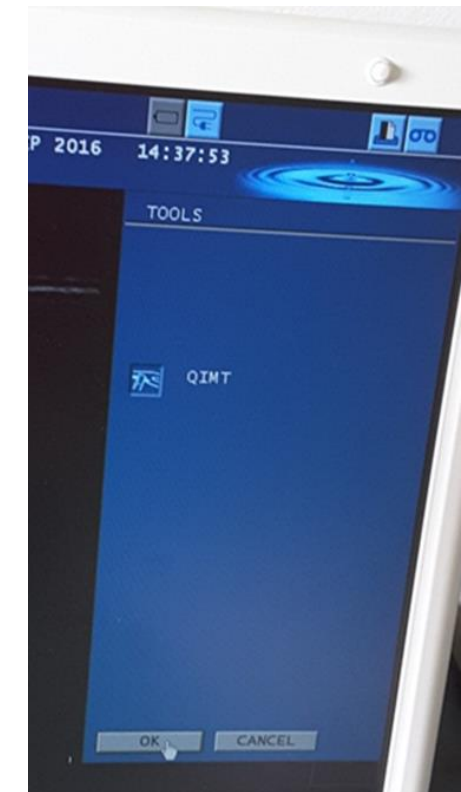
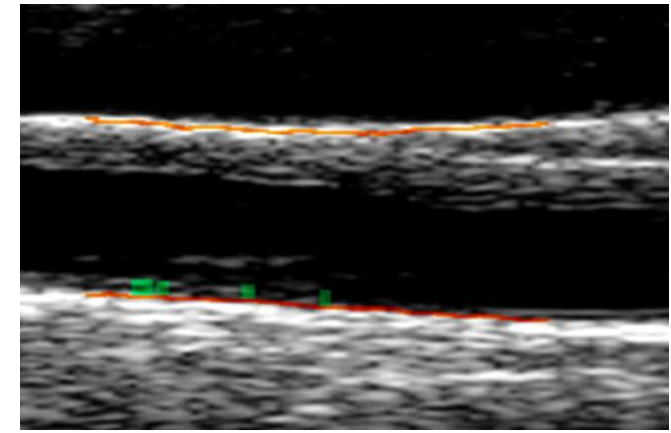
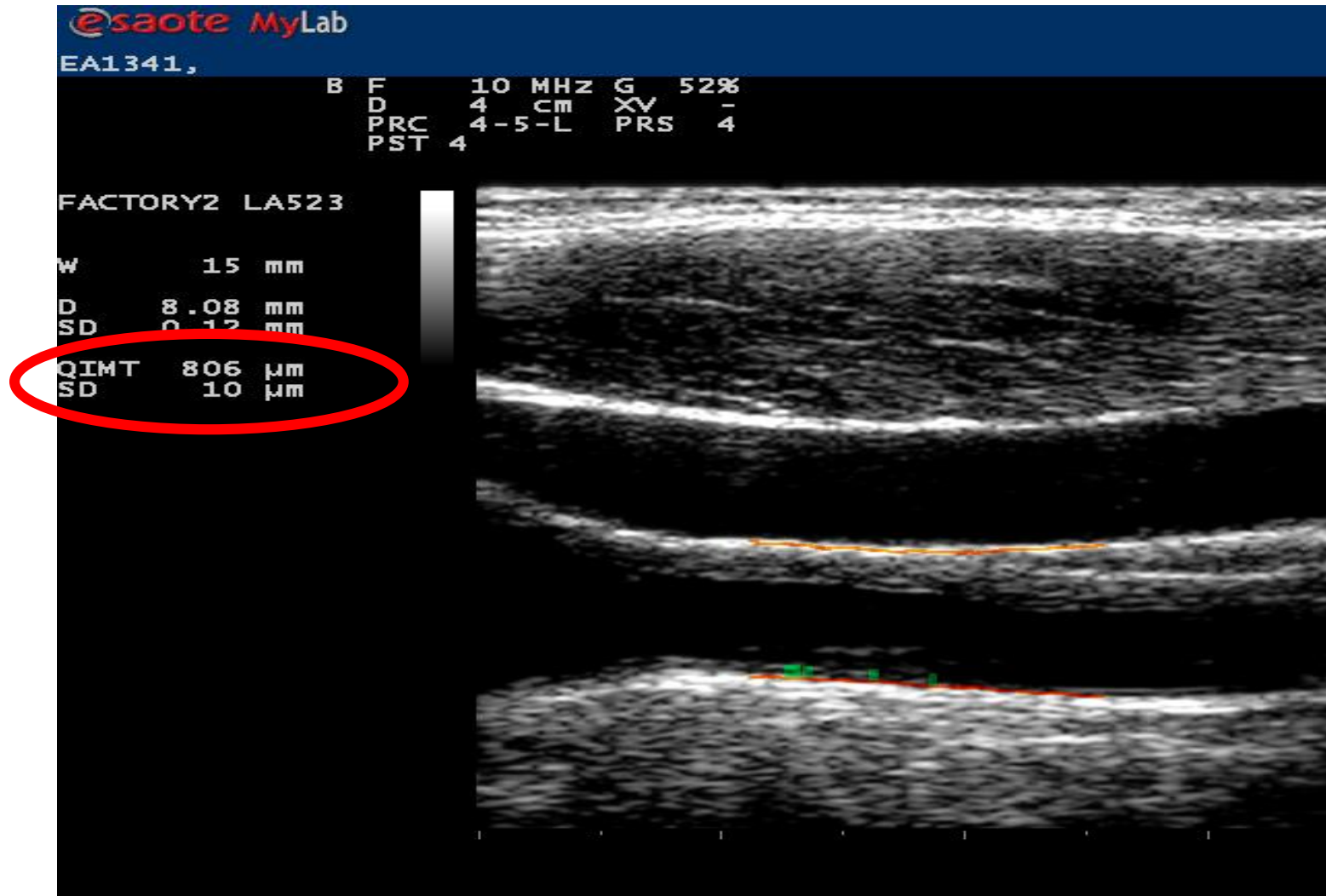
- Fasting Lipid profile
 - serum triglycerides
 - High density lipoprotein (HDL-cholesterol)
 - low density lipoproteins (LDL-cholesterol)
 - Total cholesterol (total-cholesterol)
- Fasting Glycated haemoglobin (HbA1c) and glucose levels.
- High sensitivity C-reactive protein (CRP)
- CD4 count
- Viral load

IMT

- Ultrasound is used in supine position
- Neck slightly hyperextended and tilted 45° to the opposite side of the carotid artery
- **Lateral angle** will be recorded



QIMT™

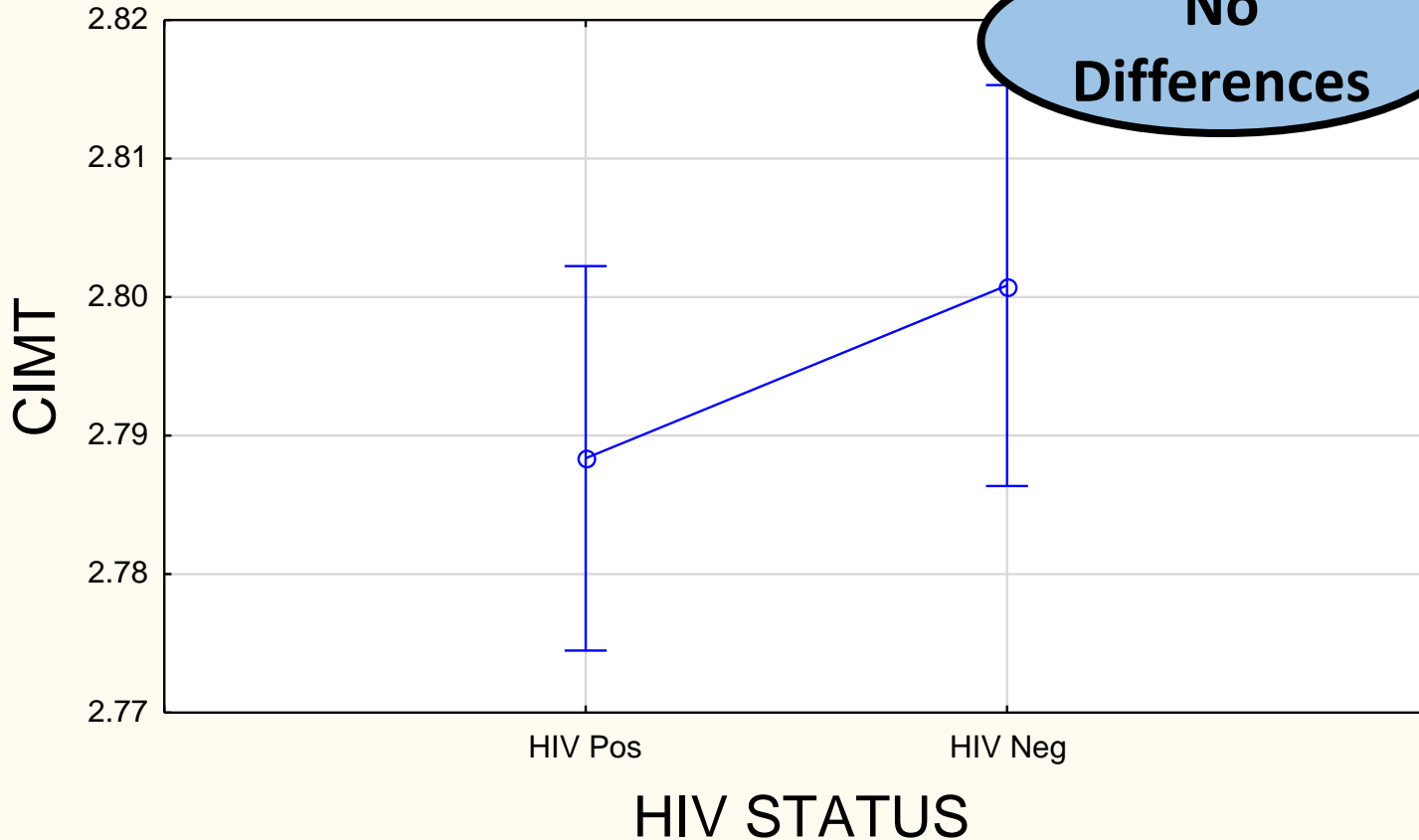


Results: Descriptive stats

p < 0.05

HIV STATUS; LS Means

Current effect: $F(1, 259)=1.5017, p=.22152$
 Effective hypothesis decomposition
 Vertical bars denote 0.95 confidence intervals



No Differences

Demographic parameter
Sample Size
Gender (Male % / Female %)
Age (Years); Mean ± S.D.
Ethnicity (Black % / Mixed %)
Cardiometabolic parameter
Smoking (%)
Waist Circumference (cm)
SBP (mmHg); Mean ± S.D.
DBP (mmHg); Mean ± S.D.
LDL-cholesterol (mmol/L)
HDL-cholesterol (mmol/L)
CRP (mg/L); Median (IQR)
HbA1c (%); Mean ± S.D.
Vascular parameter
CIMT (mm); Median (IQR)

HIV-
135
M:34%/ F:66%
40.09 ± 11.64
%/ M=81%/ W: 0%
68%
89.74 ± 17.90*
123.72 ± 20.07
85.03 ± 13.12
2.54 ± 0.84
1.41 ± 0.48
.65 (270- 1443)
5.37 ± 0.81

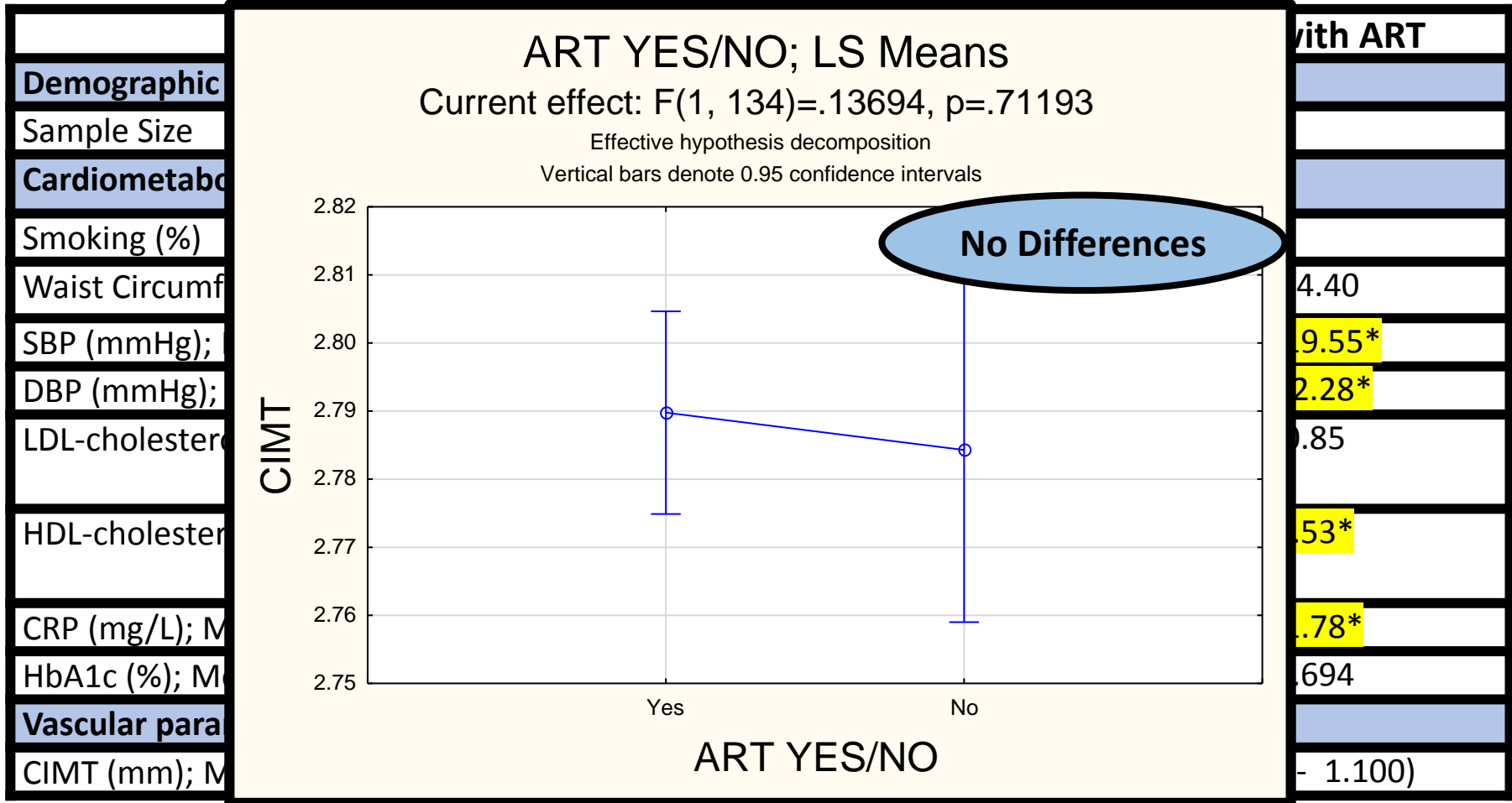
0.625 (0.559- 0.699)

0.598 (411- 1100)

0.649 (270- 1443)

HIV ART naive vs HIV with ART

NRTIS & NNRTIs ?



$p < 0.05$

Correlations between CIMT and Cardiovascular parameters and risk factors

Total population

	Age	Waist C	SBP	DBP	LDL	HBA1C	S-Hpt	D-Hpt	High LDL
CIMT	R=.4003	R=.1378	R=.1973	R=.1596	R=.1737	R=.1473	F= 7.748	F =7.39	F= 7.28
	p=<0.01	p=.026	p=.001	p=.010	p=.005	p=.017	p= .005	p= .037	p=.005

HIV - Group

	Age	SBP	DBP	LDL	HBA1c	S-Hpt	High LDL
CIMT	R= 0.3986	R= 0.1824	R=.1531	R=0.1308	R=.1356	F=4.700	F=10.489
	p=.000	p=.004	p=.016	p=.040	p=.033	P= 0.03	P<0.01

SBP, systolic blood pressure; DBP, dystolic blood pressure; LDL, low-density lipoprotein; S-Hpt, systolic hypertension; D-Hpt, dystolic hypertension; HS-CRP, high sensitivity C-reactive protein.

HIV+ Group

	Age	HS-CRP	Sex (Male)
CIMT	R= 0.5524	R=-0.2409	F=6.1890
	P= 0.000	P= 0.014	P= 0.0143



Grau 1970

Jiang 2015

Kablak-Ziembicka
et al 2005

Regression analysis- total cohort

Multiple regression model

CIMT R^2 ; Adjusted R^2	Total population 0.187; 0.161	
	β (95% CI)	p
AGE	0.367 (0.242- 0.491)	<0.01
Log Waist C/C	0.001 (-0.129- 0.131)	0.988
Log SBP	0.015 (-0.219- 0.251)	0.894
DBP	0.071 (-0.159 -0.301)	0.541
LDL-CHOL	0.103 (-0.015- 0.221)	0.086
HIV status	-0.039 (-0.112- 0.189)	0.611
ART status	-0.0170 (-0.134- 0.167)	0.824
SEX (female)	-0.067 (-0.187- 0.052)	0.269
Smoking	0.027 (-0.094- 0.148)	0.656

Age was independently associated in all regression models after adjusting for gender, smoking, ethnicity, HIV & ART status and blood pressure

Regression analysis: HIV group

Multiple regression model

CIMT R^2 ; Adjusted R^2	HIV+ Group 0.4074; 0.353	
	β (95% CI)	p
Age	0.595 (0.414-0.775)	<0.01
Female Gender	-0.106 (-0.303-0.09)	0.31
Ethnicity (mixed race)	-0.08 (-0.384- 0.212)	0.568
ART status	-0.06 (-0.2578-0.126)	0.499
ART duration	-0.076 (-0.258- 0.107)	0.41
Viral load	0.200 (0.09 – 0.015)	0.03
Systolic blood pressure	-0.068 (-0.410- 0.273)	0.69
HS-CRP	-0.209 (-0.396- -0.0231)	0.028

-Age was independently associated in all regression models after adjusting for gender, smoking, ethnicity, HIV & ART status and blood pressure.

-Viral load was also significantly associated with CIMT in the HIV population

Conclusion

- **CIMT** values are associated with **cardiovascular risk factors**, independent of HIV related factors
- **HIV status & ART treatment** were not associated with CIMT
- **Viral load** was associated with CIMT in the HIV group
- **Age** appeared as the strongest **independent predictor** of sub clinical atherosclerosis

Schoffelen et al 2015

Hsue et al 2009

Lekakis et al. 2008

Acknowledgements

- Prof Hans Strijdom
- EndoAfrica team

Thank You!!!