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COST-EFFECTIVENESS OF STATIN USE IN HIV-POSITIVE PERSONS IN THE USA; the D:A:D Study

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INTRODUCTION

- People living with HIV (PLHIV) have an elevated risk of atherosclerotic cardiovascular disease (CVD) compared to people without HIV
- Expanding statin use may help alleviate this burden, especially given their anti-inflammatory properties. However, the choice of statin in the context of antiretroviral therapy (ART) is challenging
- Pravastatin and pitavastatin improve cholesterol levels in PLHIV without interacting substantially with ART but pitavastatin is more expensive than most statins

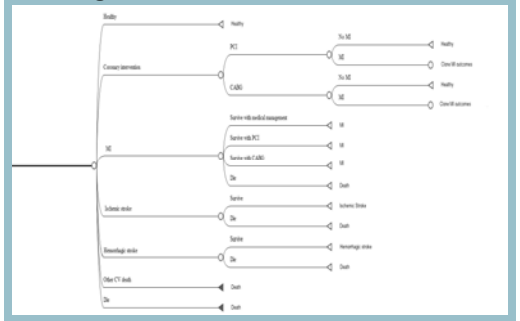
OBJECTIVE

- **Evaluate the cost-effectiveness of pravastatin and pitavastatin for the primary prevention of CVD among PLHIV in the US who are not currently using lipid-lowering therapy**

METHODS

- We developed a model that randomly selected (with replacement) individuals from the The Data Collection on Adverse events of Anti-HIV Drugs (D:A:D) cohort aged 40-75 years, receiving ART, and not using lipid-lowering therapy. The model simulated individual's probability of experiencing CVD (**Figure 1**)
- We evaluated:
  1) treating no one with statins
  2) treating everyone with pravastatin 40mg/day (drug cost $236/year)
  3) treating everyone with pitavastatin 4mg/day (drug cost $2,828/year)
- Medical costs and quality-adjusted life-years (QALYs) were assigned in annual cycles and discounted at 3% annually. We assumed the US healthcare sector perspective and a 20-year time horizon

Figure 1: Core Model Structure



MI, myocardial infarction
CV, cardiovascular
PCI, percutaneous coronary intervention
CABG, coronary artery bypass graft

Table 1: ICERs

Strategy	MI, per 1,000 person-years	Ischemic stroke, per 1,000 person-years	Fatal CVD, per 1,000 person-years	Total cost, $	Inc. cost, $	QALYs	Inc QALYs gained	ICER, $/QALY gained^
Base-case analysis								
No statin	6.5	3.5	2.7	370,721	-	10.739	-	-
Pravastatin 40mg	5.5	3.0	2.3	372,916	2,195	10.767	0.028	79,000
Pitavastatin 4mg	5.2	2.8	2.2	399,780	26,864	10.776	0.008	3,160,000
Scenario 1) Treat only PLHIV with >1% risk of CVD in the next 5 years								
No statin	7.2	3.8	2.9	366,502	-	10.541	-	-
Pravastatin 40mg	6.1	3.2	2.4	368,654	2,152	10.572	0.031	70,000
Pitavastatin 4mg	5.6	3.0	2.3	394,970	26,316	10.583	0.010	2,526,000
Scenario 2) Treat only PLHIV with >5% risk of CVD in the next 5 years								
No statin	12.5	6.5	5.0	336,374	-	9.278	-	-
Pravastatin 40mg	10.6	5.7	4.4	337,990	1,616	9.322	0.044	37,000
Pitavastatin 4mg	10.0	5.3	4.1	360,570	22,580	9.339	0.017	1,363,000

Incremental cost-effectiveness for each strategy was measured relative to the next best strategy in terms of QALYs gained (i.e. pravastatin versus no statin, and pitavastatin versus pravastatin); **MI**, myocardial infarction; **CVD**, cardiovascular disease; **QALY**, quality-adjusted life-year; **ICER**, incremental cost-effectiveness ratio; ^Rounded to nearest thousand

RESULTS

- PLHIV receiving **pravastatin** accrued 0.028 additional QALYs compared with PLHIV not receiving a statin, at an incremental cost of $2,195, giving an incremental cost-effectiveness ratio (ICER) of **$79,000/QALY gained** (**Table 1**)
- PLHIV receiving **pitavastatin** accumulated 0.008 additional QALYs compared with PLHIV using pravastatin, at an additional cost of $26,864, giving an ICER of **$3,160,000/QALY gained** (**Table 1**)
- Findings were most sensitive to the quality-of-life decrement associated with taking an additional daily pill, statin costs and statin efficacy
- **Figure 2** shows the results of a two-way sensitivity analysis where we varied our estimates of pravastatin price and CVD preventative efficacy
- In probability sensitivity analyses, no statin was optimal in 35.2% of simulations at a willingness-to-pay of $100,000/QALY gained, pravastatin was optimal in 64.8% of simulations, and pitavastatin was never optimal (**Figure 3**)
- In scenario analyses, whereby the treatment strategies were only administered to PLHIV at higher risk of CVD, our ICERs improved but did not alter the main conclusions (**Table 1**)

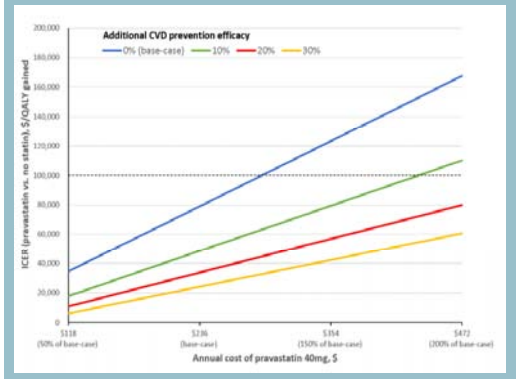
LIMITATIONS

- D:A:D contains both US and European data
- Many parameter estimates from general population
- Unclear impact of new ART e.g. Integrase inhibitors

CONCLUSION

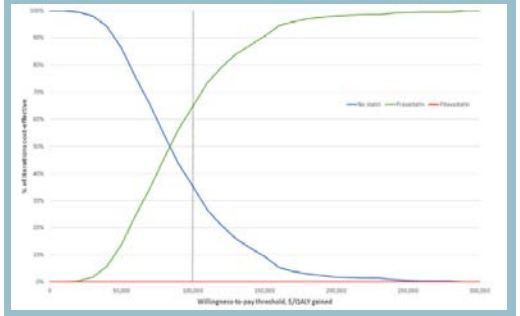
- **Expanding pravastatin use to PLHIV aged 40-75 years and not currently using lipid-lowering therapy was projected to reduce the risk of CVD events and mortality (i.e. QALYs were gained) and to be cost-effective (at a willingness-to-pay threshold of $100,000/QALY gained)**

Figure 2: Two-Way Sensitivity



The base-case probability of CVD while using pravastatin was reduced by various percentages to account for the possibility of preventative efficacy associated with the anti-inflammatory properties of statins; Horizontal dashed line represents an incremental cost-effectiveness ratio of $100,000/QALY gained; **ICER**, incremental cost-effectiveness ratio; **CVD**, cardiovascular disease; **QALY**, quality-adjusted life-year

Figure 3: Acceptability Curve



Vertical dashed line represents willingness-to-pay threshold of $100,000/QALY gained; **QALY**, quality-adjusted life-year

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