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Long-term viral suppression during initial antiretroviral therapy in Hanoi, Vietnam

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BACKGROUND

Achieving viral suppression is one of the key elements of the global "90-90-90 strategy" toward the end of HIV epidemic. However, the levels of viral suppression from a long-term observation have yet to be described in many resource-limited settings.

METHOD

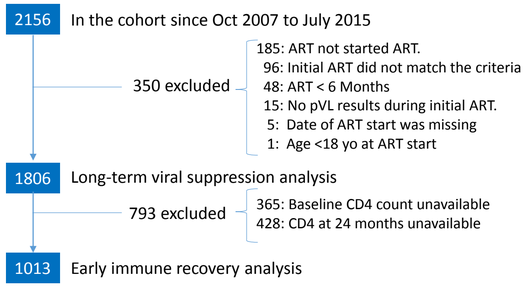
Analyses were conducted with a longitudinal dataset from the Hanoi HIV Cohort Study, which was established in October 2007 in two large hospitals in urban Hanoi, Vietnam, namely National Hospital of Tropical Diseases (NHTD) and Bach Mai Hospital (BMH); both of these hospitals are teaching and referral hospitals and provide free ART programs.



The time to treatment failure from ART initiation was analyzed using two endpoints: (1) virologic failure (VF) defined as plasma HIV viral load (pVL) ≥ 1000 copies/ml, and (2) a combined clinical endpoint that included death, loss to follow-up, and a change in antiretroviral drugs due to lack of efficacy of the initial drug or VF (whichever occurred first after 6 months of first-line ART).

We analyzed the risk factors for early VF by using the Cox proportional hazards model, and a logistic regression model was used to analyze the failure of early immune recovery, which was defined as not achieving an increase in CD4 counts of 100 cells/mm3 at 24 months.

Figure 1. Study participants



RESULTS

Table 1. Characteristics of study participants

Type of analysis	Total
Number of participants	1806
Age at starting ART, median (range)	31 (18-75)
<30 years old, n (%)	668 (37)
30-39 years old, n (%)	845 (47)
≥40 years old, n (%)	293 (16)
Male sex, n (%)	1156 (64)
HIV risk factor, multiple choice	
Sexual contact, n (%)	1334 (74)
Injection drug use, n (%)	583 (32)
Other/unknown, n (%)	126 (7)
HBs antigen, n (%)	
Positive	242 (14)
Negative	1507 (86)
Missing	57
Anti-HCV antibody, n (%)	
Positive	737 (45)
Negative	897 (55)
Missing	172
AIDS before ART, n (%)	307 (17)
CD4 count at baseline, median /mm^3 (range)	113 (1-850)
<100	751 (47)
100-199	404 (25)
≥200	438 (28)
Missing	213
Time on ART, median months (range)	50 (6-152)
Year of ART initiation, n (%)	
2008 or earlier	514 (29)
2009 to 2010	518 (28)
2011 or later	774 (43)
NRTI, n (%)	
AZT + 3TC or FTC	832 (46)
d4T + 3TC or FTC	608 (34)
TDF + 3TC or FTC	366 (20)
NNRTI, n (%)	
NVP	958 (53)
EFV	848 (47)

Table 2. Factors associated with each clinical endpoint

n=1806	Virologic failure						Combined clinical endpoint						Impaired immune recovery					
	Univariate, HR (95%CI), p			Multivariate, HR (95%CI), p			Univariate, HR (95%CI), p			Multivariate, HR (95%CI), p			Univariate, OR (95%CI), p			Multivariate, OR (95%CI), p		
Age (years old)																		
<30	1.00			1.00			1.00			1.00			1.00			1.00		
30-39	**0.63**	**(0.47-0.83)**	**0.001**	**0.69**	**(0.49-0.99)**	**0.04**	0.70	(0.55-0.90)	0.004	0.76	(0.56-1.03)	0.08	1.21	(0.83-1.76)	0.33	1.36	(0.90-2.06)	0.15
≥40	0.64	(0.42-0.98)	0.039	0.70	(0.41-1.21)	0.20	0.90	(0.65-1.25)	0.53	1.01	(0.66-1.55)	0.97	1.30	(0.79-2.13)	0.30	1.30	(0.73-2.28)	0.38
Male sex	1.11	(0.84-1.47)	0.45	0.83	(0.55-1.25)	0.38	**1.38**	**(1.08-1.76)**	**0.01**	0.87	(0.66-1.32)	0.68	**1.50**	**(1.04-2.16)**	**0.03**	**1.86**	**(1.19-2.93)**	**0.007**
IDU*	**1.44**	**(1.11-1.88)**	**0.006**				**1.59**	**(1.28-2.00)**	**<0.001**				1.43	(1.00-2.02)	0.046			
HBs Ag	0.64	(0.40-1.01)	0.058	0.58	(0.31-1.06)	0.07	**0.72**	**(0.50-1.05)**	**0.09**	0.77	(0.49-1.21)	0.25	0.66	(0.38-1.15)	0.14			
Anti-HCV Ab	**1.42**	**(1.09-1.87)**	**0.01**	**1.64**	**(1.06-2.12)**	**0.015**	**1.59**	**(1.26-2.01)**	**<0.001**	**1.74**	**(1.24-2.43)**	**0.001**	**1.46**	**(1.03-2.07)**	**0.03**	**1.89**	**(1.22-2.92)**	**0.004**
AIDS	1.00	(0.70-1.43)	0.99				1.07	(0.80-1.44)	0.64				0.71	(0.46-1.12)	0.14			
Baseline CD4 (/mm^3)																		
<100	1.00						1.00			1.00			1.00			1.00		
100-199	1.03	(0.73-1.45)	0.87	0.99	(0.69-1.43)	0.97	0.89	(0.66-1.20)	0.45	0.90	(0.66-1.24)	0.53	**2.95**	**(1.97-4.41)**	**<0.001**	**2.95**	**(1.90-4.60)**	**<0.001**
≥200	**0.56**	**(0.34-0.93)**	**0.03**	0.63	(0.37-1.07)	0.09	**0.56**	**(0.37-0.86)**	**0.008**	0.71	(0.46-1.10)	0.13	**3.53**	**(2.30-5.42)**	**<0.001**	**3.48**	**(2.15-5.65)**	**<0.001**
NRTI																		
AZT	1.00			1.00			1.00			1.00			1.00			1.00		
d4T	**1.35**	**(1.03-1.78)**	**0.03**	**1.40**	**(0.99-1.97)**	**0.06**	**1.39**	**(1.10-1.76)**	**0.006**	**1.51**	**(1.12-2.03)**	**0.007**	**0.45**	**(0.29-0.67)**	**<0.001**	**0.52**	**(0.33-0.83)**	**0.003**
TDF	0.80	(0.48-1.34)	0.40	1.15	(0.61-2.16)	0.66	0.90	(0.59-1.37)	0.63	1.00	(0.60-1.66)	0.99	0.86	(0.53-1.39)	0.53	1.30	(0.74-2.28)	0.37
NNRTI																		
NVP	1.00			1.00			1.00						1.00			1.00		
EFV	**0.72**	**(0.55-0.96)**	**0.025**	0.77	(0.52-1.14)	0.19	0.99	(0.79-1.24)	0.93				**0.59**	**(0.42-0.84)**	**0.003**	**0.44**	**(0.28-0.70)**	**<0.001**

*HCV-antibody positivity was strongly associated with IDU history (p<0.001) with 83% concordance. Considering many of the injection drug users may not have been able to disclose their drug use experience, HCV-antibody positivity could be more sensitive to previous experiences of sharing needles than to self-reported IDU history. Therefore, we included HCV-antibody in the multivariate model rather than IDU.

Figure. 2 Time at virologic failure (pVL≥1000)

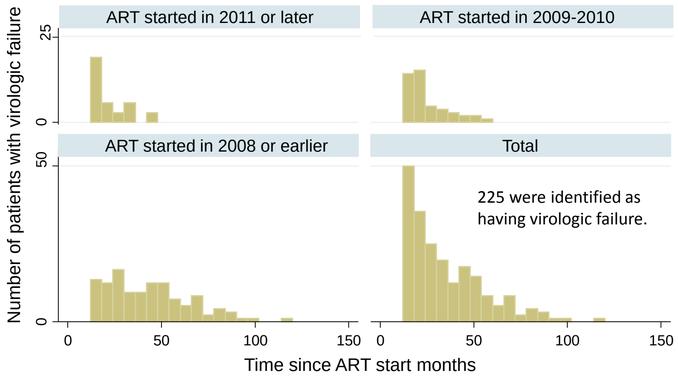
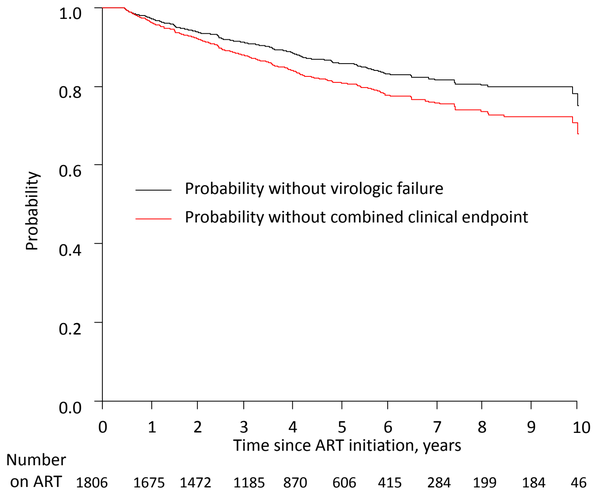


Figure 3. Time to virologic failure during the initial ART.



KEY FINDINGS

Viral suppression rate at 12 months was 95.5%.
The probability of being without virologic failure had been above 90% until 42 months.

Younger age, HCV-antibody positivity (IDU), lower baseline CD4 count and d4T- or NVP-regimen were associated with higher risk for early virologic failure. Male gender, HCV-antibody positivity (IDU), and AZT- or NVP- regimen were associated with higher risk of impaired CD4 increase at 24 months.

CONCLUSION

Durable high rate of viral suppression was noted in the cohort. Our results support the achievability of the 90% target of viral suppression in Vietnam.

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