

Background

There is no data about observational cohort studies about combination antiretroviral treatment (cART) virological response and associated cofactors in Eastern Europe. Current study assess the virological response in Estonian HIV cohort study (E-HIV) a only prospective HIV positive database in Eastern Europe.

Objective

- To evaluate the virological response to first-line ART
- To determine factors influencing virological response

Material and Methods

Inclusion: all patients participating in the Estonian HIV cohort study (E-HIV) who initiated cART between 2000 to 2014 (Table 1).

Definitions:

- **Primary viral suppression (VS)** – two consecutive viral loads (VLs) below 400 copies/ml after initiation of cART.
- **Secondary virological failure (VF)** – two consecutive VLs over 400 copies/ml or major treatment regimen switch in patients with primary VS.

Statistics: hazard ratios (HR) calculated using Cox proportional hazard models.

Table 1. The characteristics of patients included into the study

Variables	Study population N = 3396
Male	2073 (61%)
Median year of HIV-1 diagnosis	2006 (IQR: 2003-2010)
Median age at ART initiation in years	30 (IQR: 26-31)
Route of transmission	
IDU	1590 (47%)
Non-IDU	1349 (40%)
Unknown	457 (13%)
Median HIV-1 VL at ART initiation in log ₁₀	4.9 (IQR: 4.3-4.8)
Median CD4+ T cell count at ART initiation in cell/μl	211 (IQR: 124-230)
HCV serostatus	
HCV-	818 (24%)
HCV+	2122 (62%)
Unknown	456 (14%)

Abbreviations. cART – combination antiretroviral treatment; CI – confidence intervals; HCV – hepatitis C virus; HR – hazard ratio; IDU – intravenous drug use; IQR – interquartile range; VF – virological failure; VL – viral load; VS – viral suppression

Results

In total of 4507 patients in E-HIV, 3396 (61% men) met the study criteria and were followed up for median of 2.4 years; in total of 7890 person-years.

Overall, 1325 persons were lost to follow-up.

Primary VS was achieved by 58% (95% CI 56%-60%) of patients (1967/3396). At month **6, 9 and 12 from cART initiation VS** was achieved by 40% (1363/3396), 46% (1567/3396) and 49% (1667/3396) of patients, respectively.

Secondary VF occurred in 25% of patients (492/1967) - 12% (236/1967), 21% (413/1967) and 24% (472/1967) at **year 1, 3, and 5, respectively** after primary VS.

Co-factors **decreasing** the probability to achieving **primary VS** in multivariate analysis (Table 2):

- intravenous drug use (IDU) (Figure 1A)
- higher VL at cART initiation
- HCV seropositivity (Figure 1B)
- earlier calendar year of HIV diagnosis
- younger age at cART initiation

Co-factors **increasing** the probability to **secondary VF** in multivariate analysis (Table 2):

- female gender (Figure 2A)
- IDU (Figure 2B)
- younger age at cART initiation
- earlier calendar year of HIV diagnosis

Table 2. Factors associated with primary viral suppression (VS) and secondary virological failure (VF) in multivariate Cox proportional hazard model

Variables	Outcome: Primary VS HR (95% CI)	Outcome: Secondary VF HR (95% CI)
Female vs male	0.90 (0.81-1.01)	1.84 (1.43-2.38)
Age at cART initiation in years	1.01 (1.00-1.02)	0.96 (0.94-0.97)
IDU vs non-IDU as transmission route	0.86 (0.76-0.98)	1.40 (1.04-1.90)
Year of HIV diagnosis	1.04 (1.03-1.05)	0.95 (0.91-0.98)
HIV-1 VL at cART initiation in log ₁₀	0.80 (0.77-0.84)	1.07 (0.96-1.19)
CD4+ T cell count at cART initiation in cell/μl	1.00 (1.00-1.00)	1.00 (1.00-1.00)
HCV+ vs HCV-	0.73 (0.65-0.84)	1.19 (0.87-1.63)

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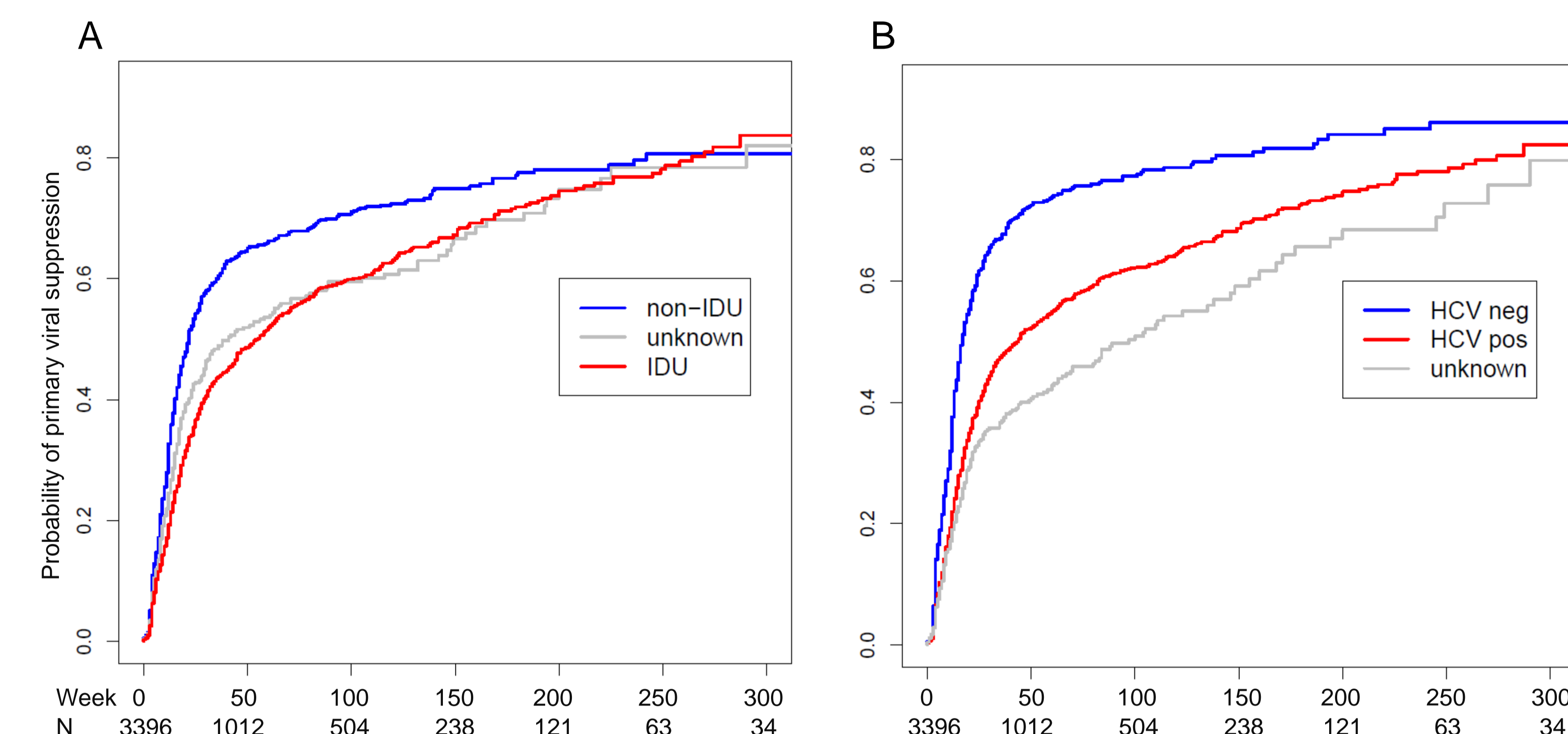


Figure 1. Kaplan–Meier curves of primary viral suppression by co-factor: (A) possible route of transmission and (B) HCV serostatus. Note. The time is presented in weeks from cART initiation. The hazard ratios are presented in Table 2.

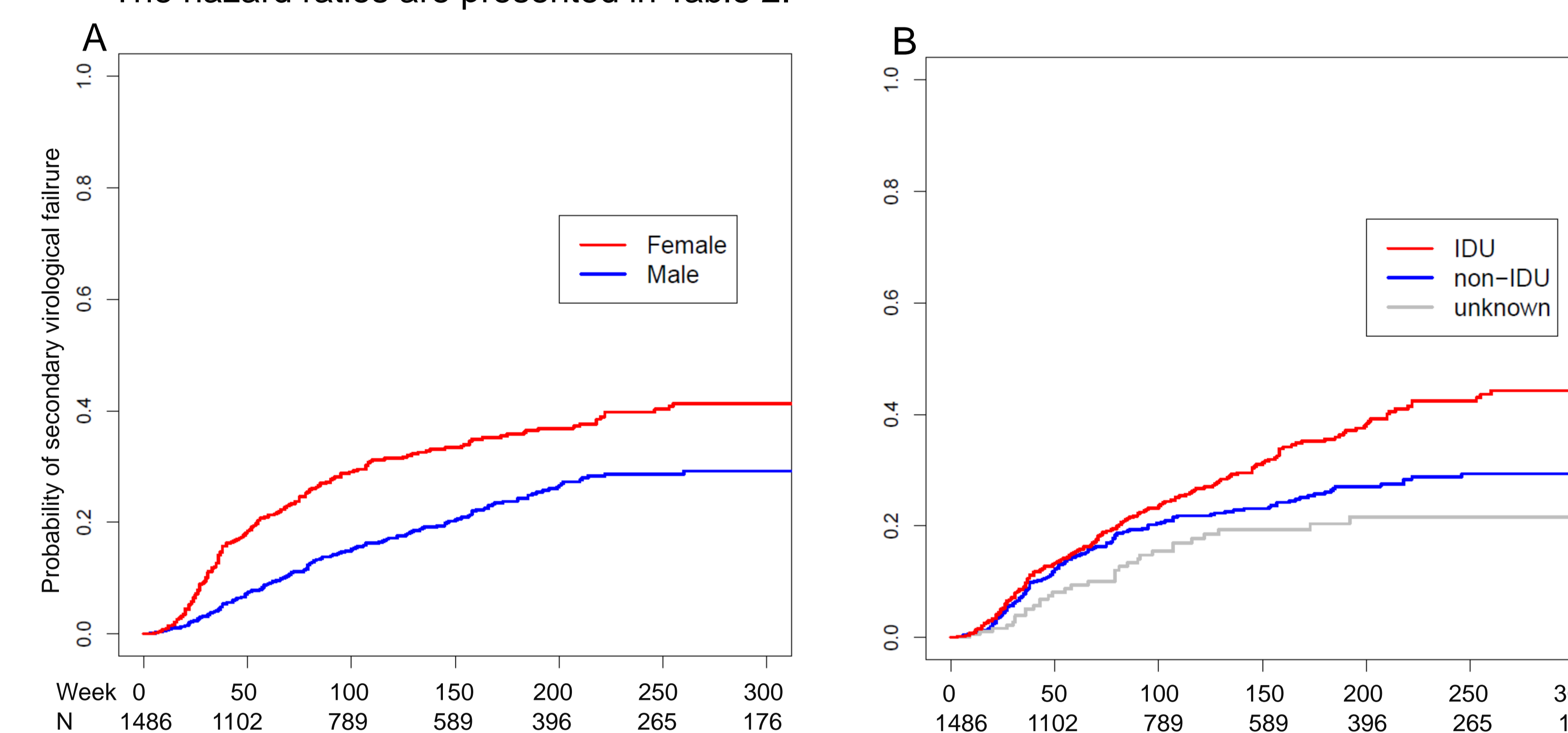


Figure 2. Kaplan–Meier curves of secondary virological failure by co-factor: (A) gender, (B) possible route of transmission. Note. The time is presented in weeks from primary viral suppression. The hazard ratios are presented in Table 2.

Conclusions

- In the first large cohort study in Eastern European HIV epidemic, the overall virologic response to cART is comparable to that of in the western countries
- Special strategies are needed for younger age groups, HCV co-infected, females and IDUs in order to reduce cART failure