



# **Mortality and Causes of Death Among HIV/HCV Co-Infected Persons in the Eastern European Country of Georgia**

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# Background: HIV and HCV in Georgia

## HIV

- Estimated prevalence: 0.4%
- Estimated number: 10 500
- Progress towards 90-90-90:
  - 48% diagnosed
  - 81% of diagnosed on ART
  - 89% virally suppressed

## HCV

- HCV in general population:
  - Anti-HCV+: 7.7% (208 000 persons)
  - HCV RNA+: 5.4% (150 000 persons)
- HCV in PLHIV
  - Anti-HCV+: 40% (4 200 persons)
  - HCV RNA+: 34% (3 500 persons)

In April 2015, in partnership with US CDC and Gilead Sciences, Georgia launched the world's first **National Hepatitis C Elimination Program**



# Standard of Care in Georgia

- Universal access to ART since 2004; ART regardless of CD4 cell count for HIV/HCV since 2013 and for all since 2015
- anti-HCV screening at the entry into HIV care
- HCV RNA testing for anti-HCV+
- HCV genotyping and liver fibrosis assessment for HCV RNA+
- HCV Treatment
  - 12.2011-05.2015: PEG/RBV
  - 06.2015-03.2016: SOF/PEG/RBV; SOF/RBV weeks
  - Since 03.2016: SOF/LDV ± RBV for 12 or 24 wks
  - Since 11.2018: SOF/VEL ± RBV



# Objective

- Evaluate impact of universal availability of HCV treatment on mortality and causes of death among people living with HIV in Georgia



# Methods

- **Population:**
  - Adult (age  $\geq 18$  years) HIV-infected individuals diagnosed from 2004 through 2016 followed until December 31, 2017
- **Data source:**
  - National AIDS Health Information System (AIDS HIS)
- **HIV/HCV co-infection**
  - HIV positive persons with anti-HCV+
- **Statistical analysis:**
  - Mortality rates per 100 person-years of follow-up were calculated
  - Predictors of mortality were assessed in Cox proportional hazards regression model
  - Causes of death were classified according to Coding of Death in HIV (CoDe) protocol



# Study Population

	All (n=4560)	anti-HCV+ (n=2058)	anti-HCV- (n=2502)	p value
<b>Age, median years (IQR)</b>	36.6 (30.0-43.8)	39.0 (33.7-44.7)	33.9 (27.1-42.3)	<0.0001
<b>Sex, n (%)</b>				
Men	3343 (73.3)	1823 (88.6)	1520 (60.8)	<0.0001
Women	1217 (26.7)	235 (11.4)	982 (39.2)	
<b>Mode of HIV transmission, n (%)</b>				
Injection drug use	1864 (40.9)	1575 (76.5)	289 (11.6)	<0.0001
Heterosexual contact	2150 (47.2)	420 (20.4)	1730 (69.1)	
Sex between men	485 (10.6)	48 (2.3)	437 (17.5)	
Other	61 (1.3)	15 (0.7)	46 (1.8)	
<b>HBV infection, n (%)</b>				
HBsAg+	247 (5.4)	116 (5.6)	131 (5.2)	0.55
HBsAg-	4323 (94.6)	1942 (94.4)	2371 (94.8)	
<b>Baseline CD4 cell count, n (%)</b>				
<350	2481 (54.4)	1261 (61.3)	1220 (48.8)	<0.0001
≥350	2079 (45.6)	797 (38.7)	1282 (51.2)	
<b>History of ART, n (%)</b>				
Never started ART	630 (13.8)	285 (13.8)	345 (13.8)	0.95
Ever started ART	3930 (86.2)	1773 (86.2)	2157 (86.2)	



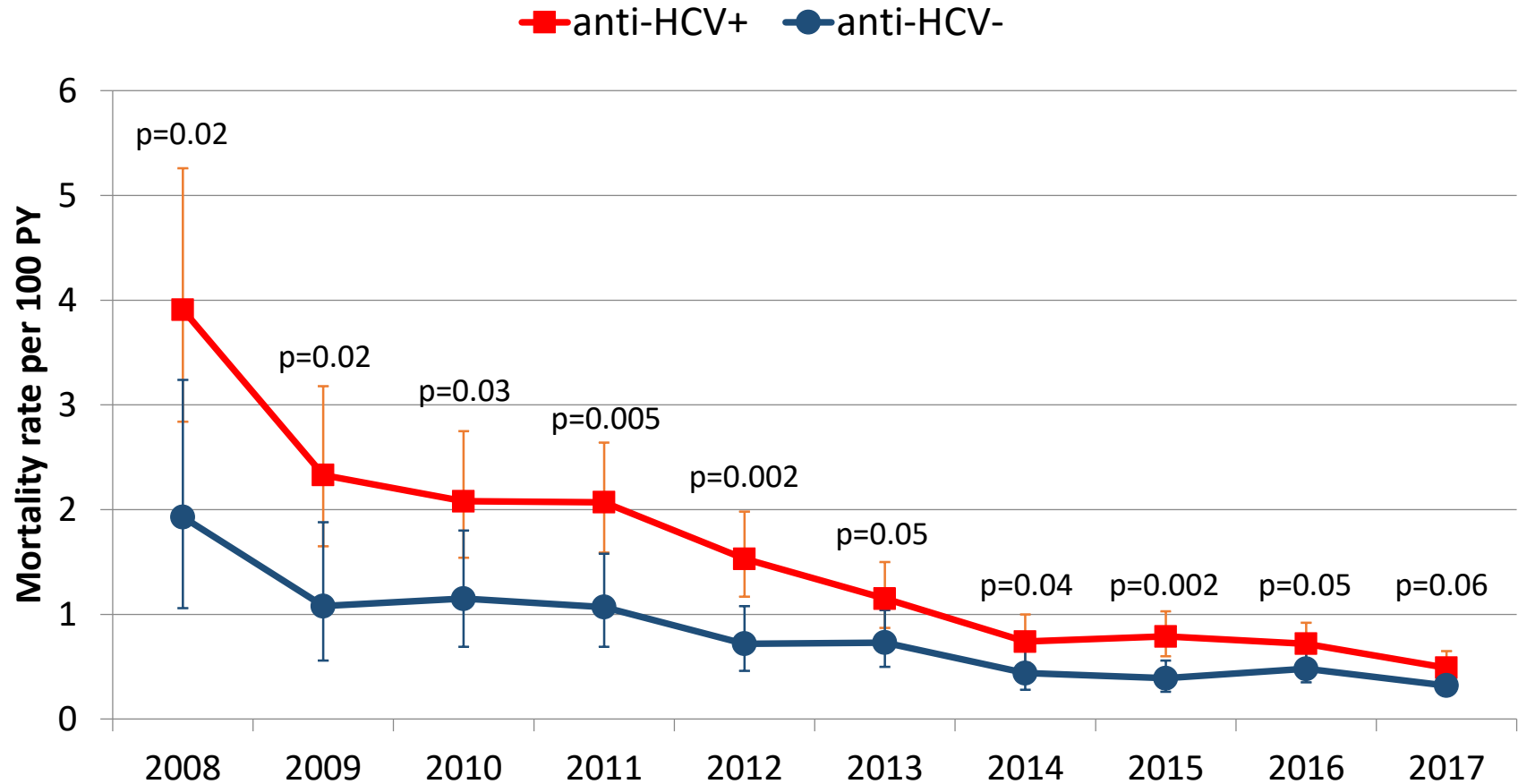
# Mortality

- After the median 4.1 years of follow-up 20.9% (954/4560) persons died, including:
  - 29.9% (615/2058) among HIV/HCV co-infected persons and 13.5% (339/2502) among HIV mono-infected persons ( $p < 0.0001$ )

	All	Anti-HCV+	Anti-HCV-	<i>p</i> value
Mortality per 100 PY	4.27	5.76	2.91	<0.0001



# Annual Mortality Rates by HCV Status





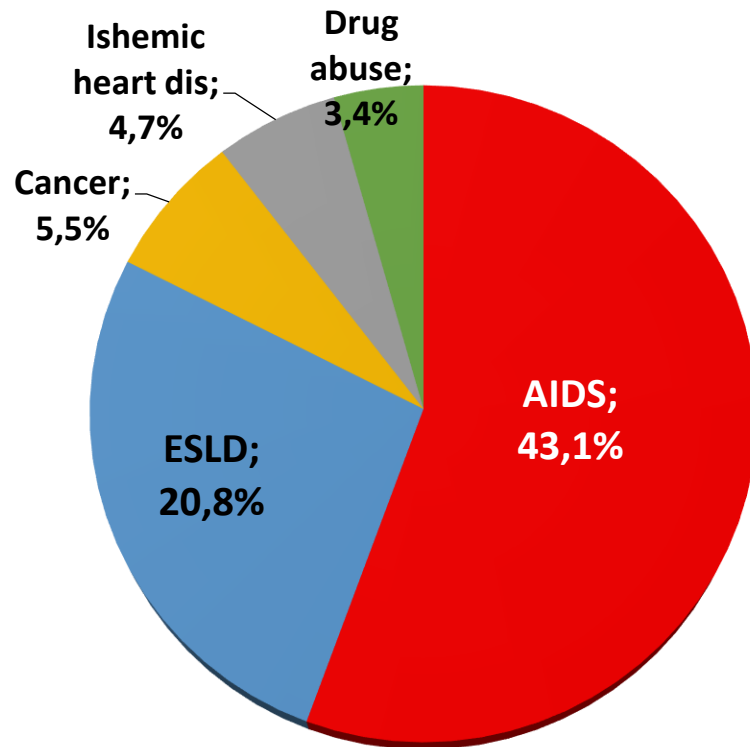
# Factors Associated with Mortality

	HR (95% CI)	p value
<b>anti-HCV+</b>	<b>1.33 (1.13-1.57)</b>	<b>0.0006</b>
Age per year increase	1.03 (1.02-1.04)	<0.0001
Men	1.33 (1.07-1.66)	0.01
Injection drug use vs. MSM	3.77 (2.40-5.93)	<0.0001
Heterosexual contact vs. MSM	2.55 (1.61-4.03)	<0.0001
HBsAg+	0.74 (0.53-1.04)	0.08
Baseline CD4 cell count <350	1.89 (1.64-2.17)	<0.0001
Never started ART	5.55 (4.82-6.40)	<0.0001

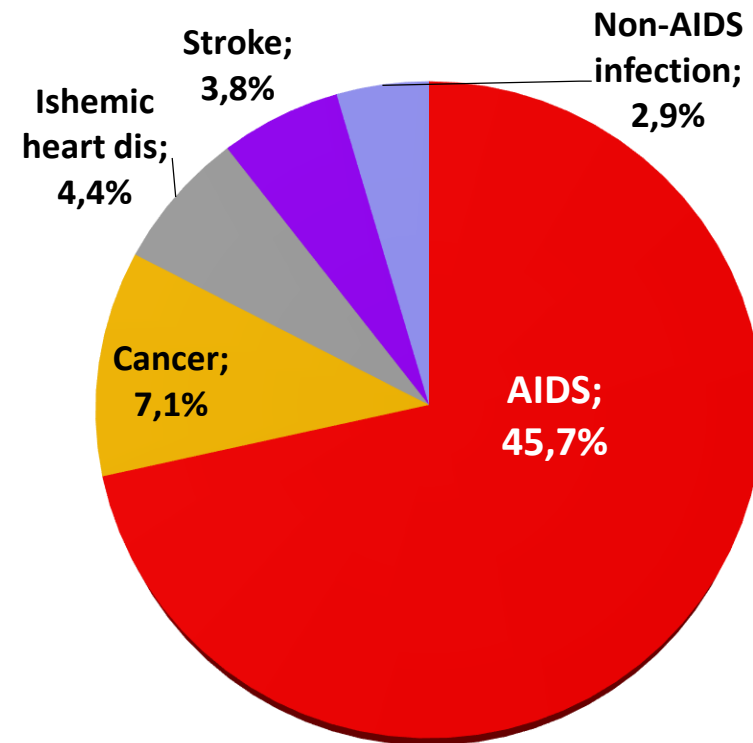


# Top 5 Causes of Death

## anti-HCV+



## anti-HCV-



AIDS remained leading cause of death before and after availability of HCV treatment



# Conclusions

- Wide availability of ART and anti-HCV therapy translated into significant decline in mortality including due to liver related causes
- HIV/HCV co-infected persons continue to have higher mortality
- AIDS is the leading cause of death because of high rates of late diagnosis
- Improving earlier diagnosis will decrease excess AIDS-related mortality among HIV/HCV co-infected persons.



# Acknowledgement



All Care Provider Centers

