CANOC

Trends in Combination Antiretroviral Therapy Use and Treatment Response from 2000 to 2016 in the Canadian HIV Observational Cohort Collaboration (CANOC)

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Background

Changes in combination antiretroviral therapy (cART) treatment guidelines have occurred over time. By 2015, all people living with HIV (PLWH) should be prescribed cART regardless of CD4 count. **Objective:** this study examined trends in cART use, CD4 counts, and viral loads among PLWH from 2000 to 2016.

Figure 1. Yearly categorized mean CD4 cell count (cells/mm^3; left) and viral load (copies/mL; right) and cART regimen categorized by 3rd agent class for CANOC participants.

Methods

The Canadian HIV Observational Cohort (CANOC) includes individuals living in Canada, ≥18 years, with at least one viral load and CD4 count within 12 months of initiating cART as ART-naïve between Jan 1, 2000 and Dec 31, 2016. Those with known sex at birth and 6 months of follow up were included.

- Individuals' annual mean CD4 was calculated and categorized as <200, 200-350, 351-500, >500 cells/mm^3
- Individuals' annual mean viral load was calculated and categorized as suppressed (<50), low (50-199), or high detectable (≥200 copies/mL)
- Classification of cART regimens were based on the agents which made up the highest proportion of days per patient per year

Table 1. Baseline characteristics (n= 13 040).

| Characteristics	BC N	BC col %	SK N	SK col %	ON N	ON col %	QC N	QC col %	NL N	NL col %
Sex at birth										
Male	4848	81	318	60	3020	83	2523	90	93	87
Female	1122	19	213	40	611	17	269	10	14	13
Ethnicity										
White	1835	31	135	25	2011	55	1371	49	99	93
African-Caribbean-Black	136	2	31	6	673	19	274	10	7	7
Indigenous	698	12	305	57	89	2	12	0	-	-
Asian (East/South)	278	5	<5	-	240	6	62	2	-	-
Hispanic	125	2	-	-	166	5	178	6	-	-
Mixed	99	2	<5	-	169	5	18	1	-	-
Other	-	-	<5	-	70	2	52	2	-	-
Unknown	2799	47	53	10	219	6	826	30	<5	-
IDU										
No	2072	35	217	41	2731	75	2455	88	89	83
Yes	1959	33	308	58	371	10	207	7	15	14
Unknown	1939	32	8	2	535	15	131	5	<5	-
MSM										
No	2245	38	473	89	1117	31	565	20	33	31
Yes	1784	30	52	10	1985	55	2153	77	71	66
Unknown	1941	33	8	2	535	15	75	3	<5	-
Baseline ADI										
No	5160	86	514	96	2928	81	2510	90	85	79
Yes	810	14	3	1	351	10	224	9	14	13
Unknown	-	-	3	1	358	10	43	2	8	7
Era of cART initiation										
2000-2003	1132	19	10	2	587	16	464	17	9	8
2004-2007	1378	23	33	6	818	22	566	20	15	14
2008-2011	1790	30	139	26	1181	32	920	33	27	25
2012-2016	1670	28	351	66	1051	29	843	30	56	52
	median (Q1, Q3)		median (Q1, Q3)		median (Q1, Q3)		median (Q1, Q3)		median (Q1, Q3)	
Age at baseline (years)	41 (33, 48)		37 (30, 45)		38 (31, 46)		39 (32, 46)		41 (33, 47)	
Follow up time (months)	70 (31, 115)		43 (17, 68)		75 (37, 117)		70 (34, 109)		40 (15, 86)	
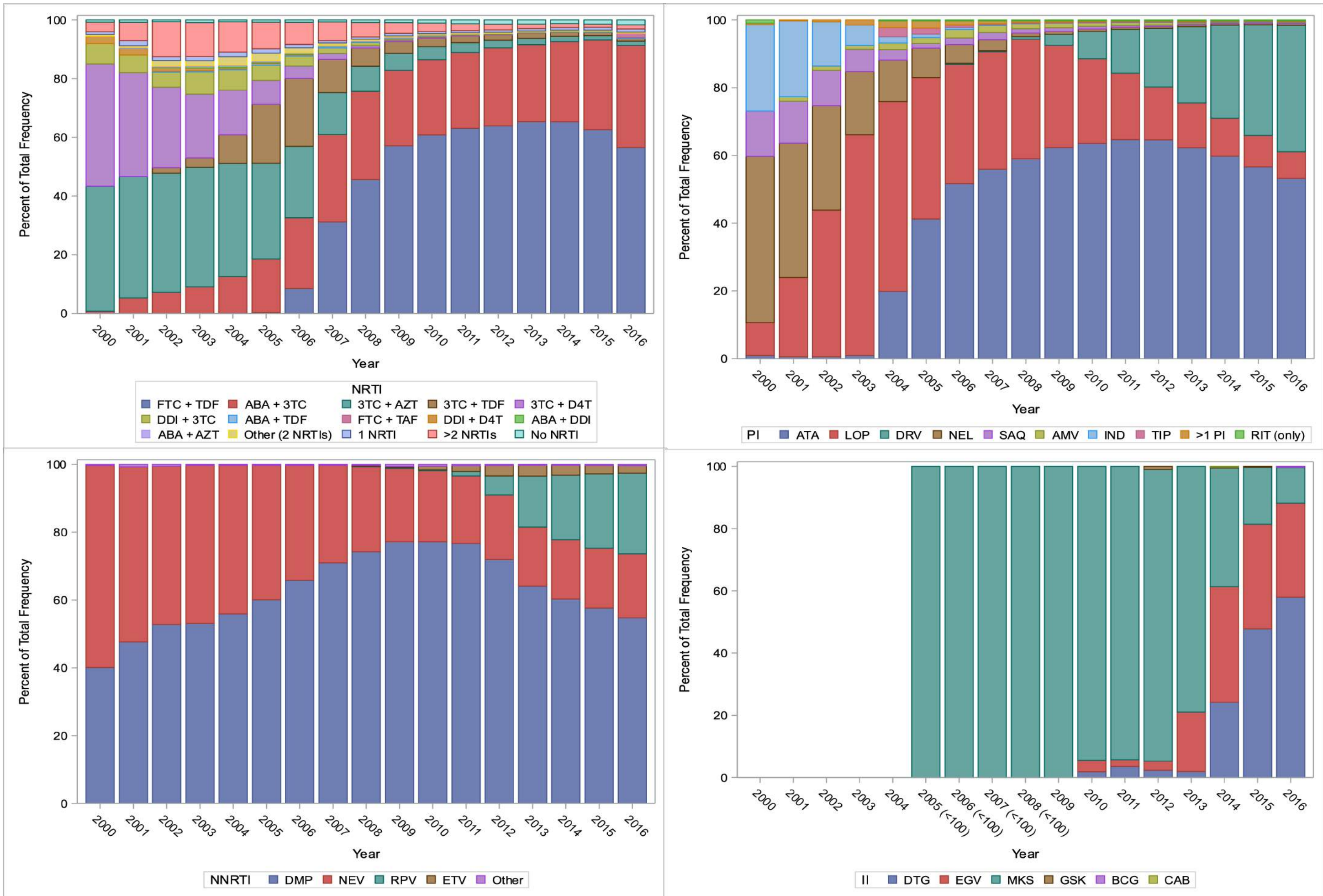
Figure 2. Yearly summary of cART regimens by nucleoside reverse transcriptase inhibitors (top left), protease inhibitors (top right), non-nucleoside reverse transcriptase inhibitors (bottom left), and integrase inhibitors (bottom right).

NRTI: FTC emtricitabine; TDF tenofovir disoproxil; DDI didanosine; ABA abacavir; AZT azidothymidine; 3TC lamivudine; tenofovir alafenamide fumarate; D4T stavudine; PI: ATA atazanavir; LOP lopinavir; DRV darunavir; NEL nelfinavir; SAQ saquinavir; AMV amprenavir; IND indinavir; TIP tipranavir; RIT ritonavir; NNRTI: DMP efavirenz; NEV nevirapine; RPV rilpivirine; ETV etravirine

Results

All CANOC participants were included (Table 1).

CD4 count and viral load
- The proportion of individuals' with a mean CD4 count categorized as >500 cells/mm^3 increased over time from 16% in 2000 to 66% in 2016
- The proportion of individuals' with a mean viral load ≥ 200 copies/mL decreased from 67% in 2000 to 11% in 2016

cART
- From 2000-2003 and 2014-2015, non-nucleoside reverse transcriptase inhibitors (NNRTI) were the most common 3rd agent class
- Protease inhibitors (PI) were most common from 2004-2012
- By 2016, integrase inhibitors (II) became the most common
- Among NRTI, tenofovir disoproxil/emtricitabine dominated from 2007 to 2016
- Atazanavir was the most common PI from 2006 onward
- From 2002 to the end of the study period, the most common NNRTI was efavirenz
- Raltegravir was the most common II from market entry until 2015

Discussion

Among a national cohort, there have been substantial improvements in immunological and virologic responses from 2000 to 2016. These findings are in line with evolving guidelines. Also in accordance with recommendations and the release of new treatments, 3rd agent cART class and specific agent use evolved over time.

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Investigators

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