**45th Report of the
Austrian HIV Cohort Study**

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HIV / AIDS
in Austria

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1   Introduction

At the end of the year 2001, representatives of 5 Austrian HIV treatment centres (AKH Vienna, Penzing Hospital Vienna, Kepler Universitätsklinikum Med Campus III Linz, LKH Innsbruck and LKH Graz II West) have founded the **„Austrian HIV Cohort Study (AHIVCOS)"**. In 2008, two more centres (LKH Salzburg and LKH Klagenfurt), in 2016 Favoriten Hospital Vienna and in 2018 LKH Feldkirch joined the AHIVCOS. The responsibility for the medical and scientific coordination lies with Robert Zangerle from the Medical University of Innsbruck.

Aims of Austrian cohort study are:
1) Optimization of patient management
2) HIV surveillance
3) Research projects

A special software, the *"HIV Patient Management System (HIP)"* is used in all centres and has replaced the previous *HIV data base* in 2005. The input of data is (was) done peripherally in the HIV treatment centres which consistently use the data base for clinical care. The input of laboratory findings is mostly done electronically. Apart from nurses and doctors, additional professional groups are involved in data entry in some centres (social workers, psychologists). Before data can be merged, the cohort participants are made anonymous. Therefore, it is cumbersome to identify cohort participants who are/were treated in more than just one treatment centre. This cannot be done by the use of personal data such as initials, birthday or postal code, but with HIV specific data (date of the HIV test, CD4 cell counts etc.).

*HIV Patient Management System***:**
Designed as a client-server application, the *HIP* stores its data in a persistent SQL database. The software is based on the model driven architecture paradigm and has been implemented with Microsoft .NET technology. The company DI Heinz Appoyer (now called *network vita*) was entrusted with the development of the *HIP*. The required hardware is provided by the local IT departments in the centres. In terms of data protection the programme fully complies with the Austrian data protection act (DSG 2000, valid since 1.1.2000). Access to the data base in the centres is restricted to authorized users only.

On the one hand, the *HIP* fulfils complex tasks for the clinical management of HIV infected patients, and on the other hand it allows queries and analyses to be performed by the users without restrictions. However, to allow both individual patient management and scientific queries is an enormous challenge which scientific HIV cohorts in other countries have not had to deal with. In Austria, there was no acceptance for a purely scientific data base. While for the clinical patient management the focus is on readability of diagnoses and therapies, creation of medical reports, prescriptions (trade names!), print-out of results etc., scientific queries need precise coding and categorization. Furthermore, the optimization of individual patient management requires an ongoing adjustment to the progress of information technology, whereas purely scientific data bases do not have such technological renewal pressure.

Special challenges for the *HIV Patient Management System* are:
- Checking of plausibility of the data <u>after</u> entry in the database
- Meeting the requirements of both clinical patient management and scientific database
- Weak/ overburdened infrastructure in HIV treatment centres

2 Organization of the Austrian HIV cohort study

The organization and further development of the HIV cohort study will stay complex, because some goals of the *Austrian HIV Cohort Study* are also of interest to health authorities and/ or institutions. The Federal Ministry of Labour, Social Affairs, Health and Consumer Protection (BMSGPK, Department VII/A/11, Dr.[in] Sigrid Kiermayr) is in charge of HIV, whereas some agenda of this responsibility has been shifted to the Agency for Health and Food Safety (AGES). In contrast, patient care has to be provided by the different federal states, and the social insurance companies bear the costs of the HIV medication. The IT departments in the hospitals have to provide the IT hardware as well as the service/ data security. Because of the support of BMG and AGES, the collaboration between the *Austrian HIV Cohort Study* and the hospitals, especially with the local IT departments (e. g. interfaces between HIP and local IT systems) is legitimized. For IT departments, HIP as an "isolated application" is seen as an additional liability. On the other hand, hospitals have also an interest in the *HIV Patient Management System* because tasks of quality management and standardization of care can be managed more efficiently by using HIP. The establishment of the *HIV Patient Management System* is a big advance in the management of patients with HIV/AIDS („Good Chronic Disease Practice").
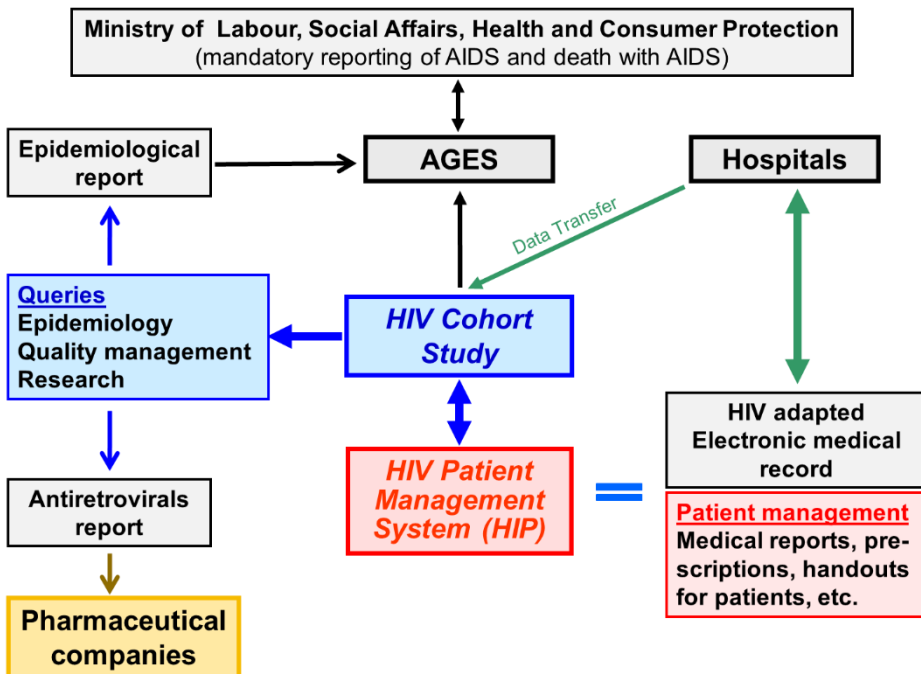
The development of the *HIV Patient Management System* incorporated the international standard format, the HIV Cohorts Data Exchange Protocol (HICDEP), so that data merging with networks of cohorts like ART-CC, EuroSIDA and RESPOND are greatly facilitated.

Centres of the Austrian HIV Cohort Study

AHIVCOS represents 64% of patients receiving ART (2022)

■	Vienna Penzing	Pulmonary Medicine
■	Vienna AKH	Dermatovenereology
■	Vienna Favoriten	Infectious Diseases
■	Graz	Infectious Diseases
■	Linz	Dermatovenereology
■	Salzburg	Oncology/Infectious Diseases
■	Klagenfurt	Oncology
■	Innsbruck	Dermatovenereology
■	Feldkirch	Oncology/Infectious Diseases

3   Funding

The Austrian HIV Cohort Study (AHIVCOS) will be financed until September 2022. The maintenance and the further development of the *HIV Patient Management System ("HIP")* as well as the provision of epidemiological reports *(e.g. „Report of the Austrian HIV Cohort Study")* are secured with the public sector (AGES, by order of the Federal Ministry of Health), international cohort collaborations (RESPOND, ART-CC), the partners in the pharmaceutical industry (all companies providing HIV drugs) and the participating hospitals (routine maintenance contracts).

4   Cohort participants

4.1   Definition of Cohort participants

The Austrian HIV Cohort Study has gained approval of the ethical committees of the HIV treatment centres. With this the Austrian HIV Cohort Study has been ready to join the international network of cohorts like ART-CC, CASCADE, COHERE and RESPOND.

Inclusion criteria:
- Patients living with HIV infection

Exclusion criteria:
- Physician's decision
- Patient withholds consent

Frequency of the monitoring („Follow-up"):
Cohort participants will be examined and findings/ results documented at regular visits (at least semianually), therefore no additional costs will arise.

Minimal dataset:
- Last negative, first positive HIV test, seroconversion illness, AIDS diagnoses, all cases of death
- First contact with the HIV centre
- Age, sex, mode of transmission of HIV
- CD4 count, HIV RNA, co-infections and co-morbidities
- Resistances to antiretroviral drugs
- Antiretroviral therapies (past and present)
- Co-morbidities
- Co-medication

Merger of data:
- Only indirectly personal data according to the data protection act
- Semiannual (March and September)

4.2 HIV, AIDS and Death in AHIVCOS per calendar year
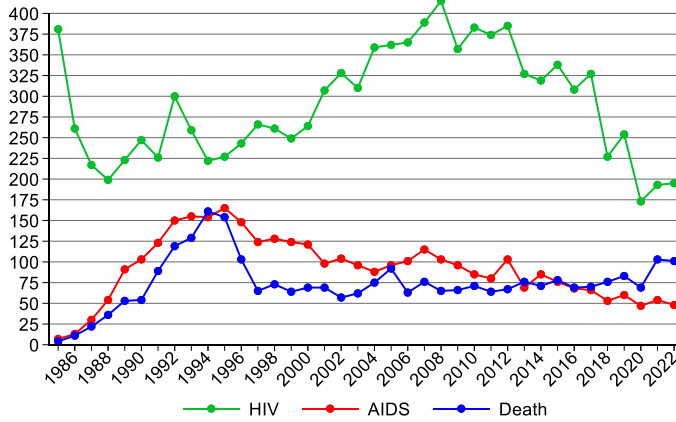
Year	HIV	AIDS	DEATH
1985	381	7	4
1986	261	13	11
1987	217	30	22
1988	199	54	36
1989	223	91	53
1990	247	103	54
1991	226	123	89
1992	300	150	119
1993	259	155	129
1994	222	154	161
1995	227	165	154
1996	243	148	103
1997	266	124	65
1998	261	128	73
1999	249	124	64
2000	264	121	69
2001	307	98	69
2002	328	104	57
2003	310	96	62
2004	359	88	75
2005	362	96	92
2006	365	101	63
2007	389	115	76
2008	415	103	65
2009	357	96	66
2010	383	85	71
2011	374	80	64
2012	385	103	67
2013	327	69	76
2014	319	85	71
2015	338	76	78
2016	308	68	69
2017	327	66	70
2018	227	53	76
2019	254	60	83
2020	173	47	69
2021	193	54	103
2022	195	48	101
2023	114	29	30
Total	**11154**	**3510**	**2859**

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4.3 Who initiated, offered and performed the HIV test?

Who initiated, offered and performed the HIV test for HIV-positive individuals entering the Austrian HIV cohort study in recent years? Data to answer this questions is very incomplete, however the treatment centres in Linz, Salzburg, Innsbruck and Graz provide important findings.
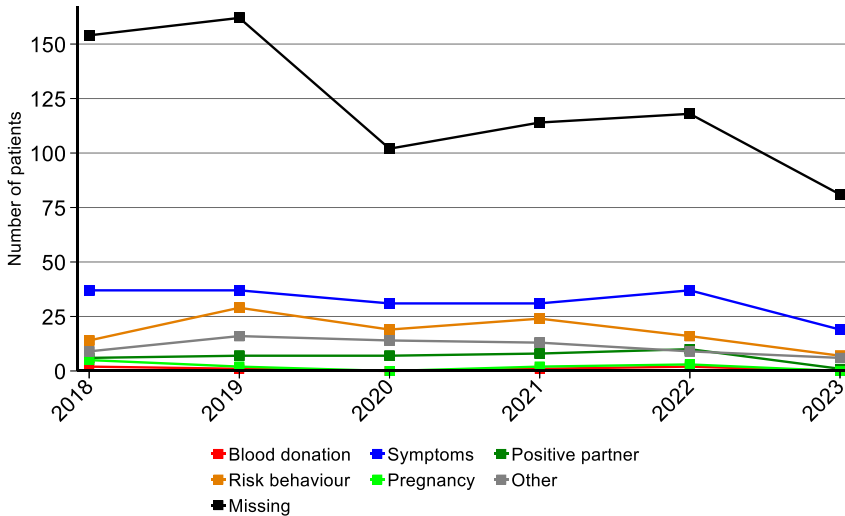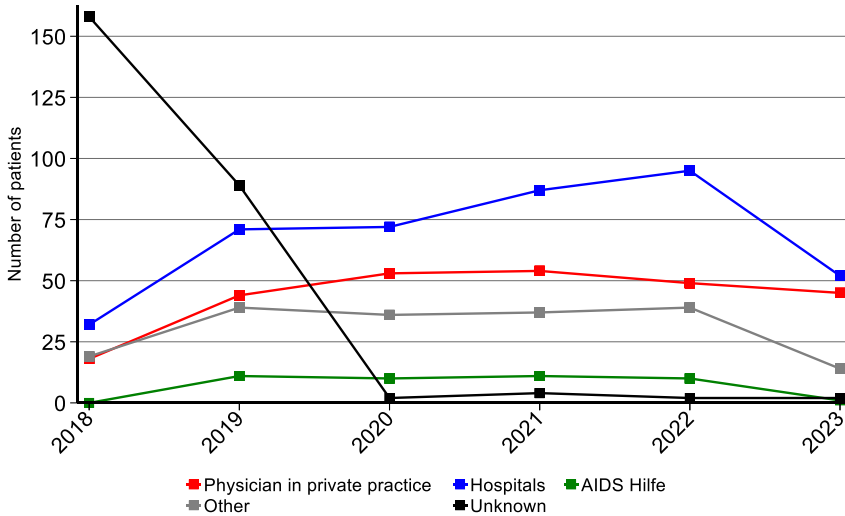
4.4 Recruitment and follow-up of cohort participants

So far, 11154 HIV infected patients providing 126768.05 years of follow-up have been recruited into the cohort study. We assume that there were more than 2859 deaths, but data entry from patients with loss of follow-up or last contact a long time ago is incomplete. Most centres do not have enough resources to enter data retrospectively.

Cumulative number of all cohort participants

	Penzing Vienna	AKH Vienna	Favoriten Vienna	Linz	Salz-burg	Inns-bruck	Feld-kirch	Graz	Klagen-furt	Total
01.09.2023	2798	3337	286	1286	574	1525	158	858	332	**11154**

Last contact with HIV treatment centre and alive or not known to be dead			
	Follow-up within the last 12 months	Living/moved to care abroad	Lost to follow-up	**Total**
Penzing Vienna	834	64	750	**1648**
AKH Vienna	1350	421	913	**2684**
Favoriten Vienna	196	11	72	**279**
Linz	694	28	159	**881**
Salzburg	329	54	142	**525**
Innsbruck	752	247	100	**1099**
Feldkirch	122	4	24	**150**
Graz	488	30	213	**731**
Klagenfurt	227	11	60	**298**
Total	**4992**	**870**	**2433**	**8295**

	Death		
	Death within the last 12 months	Death since more than 12 months	**Total**
Penzing Vienna	9	1141	**1150**
AKH Vienna	25	628	**653**
Favoriten Vienna	1	6	**7**
Linz	5	400	**405**
Salzburg	2	47	**49**
Innsbruck	15	411	**426**
Feldkirch	0	8	**8**
Graz	7	120	**127**
Klagenfurt	1	33	**34**
Total	**65**	**2794**	**2859**

Risk factors for no follow-up within the last 12 months

Persons with residency abroad were excluded from this analysis.

All centres	Frequencies		%	Univariable logistic Regression			Multivariable logistic Regression		
Variable	2433	7425	32.77%	OR	(95%CI)	p-value	OR	(95%CI)	p-value
Demographic characteristics									
Age at last contact									
< 30	436	639	68.23%	10.66	[8.79,12.92]	0.000	9.47	[7.69,11.66]	0.000
30-50	1505	3853	39.06%	3.18	[2.83,3.57]	0.000	2.95	[2.60,3.34]	0.000
> 50	492	2933	16.77%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
HIV transmission category									
Male IDU	244	654	37.31%	1.11	[0.93,1.32]	0.234	0.99	[0.82,1.20]	0.931
Female IDU	107	298	35.91%	1.05	[0.82,1.34]	0.722	1.00	[0.76,1.31]	0.991
Male hetero	346	1268	27.29%	0.70	[0.61,0.81]	0.000	0.88	[0.74,1.03]	0.118
Female hetero	357	1359	26.27%	0.67	[0.58,0.77]	0.000	0.68	[0.58,0.80]	0.000
Other	213	503	42.35%	1.37	[1.13,1.66]	0.001	1.08	[0.86,1.35]	0.495
MSM	1166	3343	34.88%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
Population size of residence area									
Vienna	1493	3349	44.58%	2.82	[2.55,3.12]	0.000	2.74	[2.46,3.05]	0.000
Missing	47	48	97.92%	165.00	[22.73,1197.56]	0.000	73.30	[9.81,547.74]	0.000
Outside Vienna	893	4028	22.17%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
Nationality									
High prevalence	291	698	41.69%	1.63	[1.39,1.92]	0.000	1.49	[1.22,1.81]	0.000
Low prevalence	500	1498	33.38%	1.14	[1.01,1.29]	0.034	0.86	[0.75,0.99]	0.036
Missing	81	109	74.31%	6.60	[4.27,10.18]	0.000	3.03	[1.84,4.97]	0.000
Austria	1561	5120	30.49%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
Stage of disease									
AIDS									
Yes	409	1550	26.39%	0.68	[0.60,0.77]	0.000	0.93	[0.81,1.07]	0.303
No	2024	5875	34.45%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.

4.5 Patients currently in care

4.5.1 Overall (12 months)

Patients were seen as currently in care when they had at least one contact to an HIV centre within the previous 12 months.
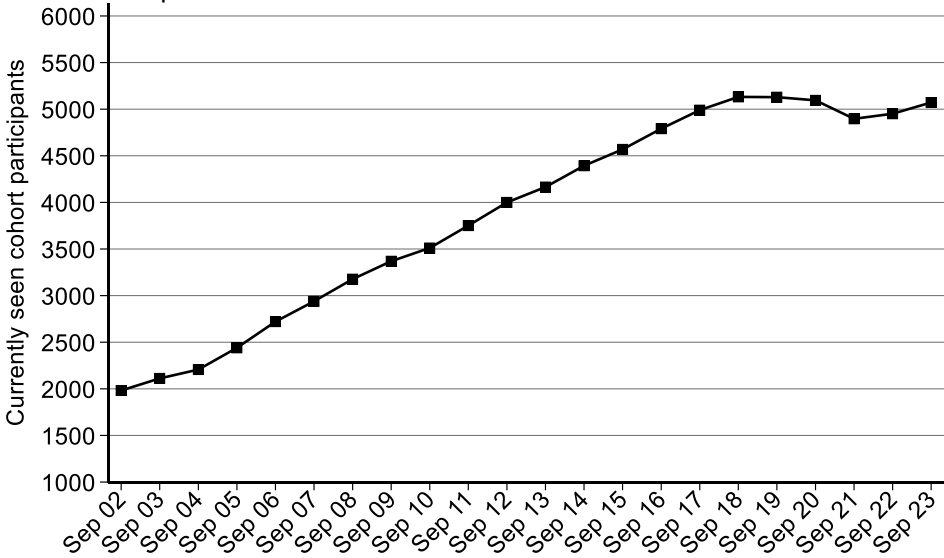
Number of patients currently in care

	Penzing Vienna	AKH Vienna	Favoriten Vienna	Linz	Salz-burg	Inns-bruck	Feld-kirch	Graz	Klagen-furt	Total
01.09.2023	844	1366	201	700	336	777	123	493	232	**5072**
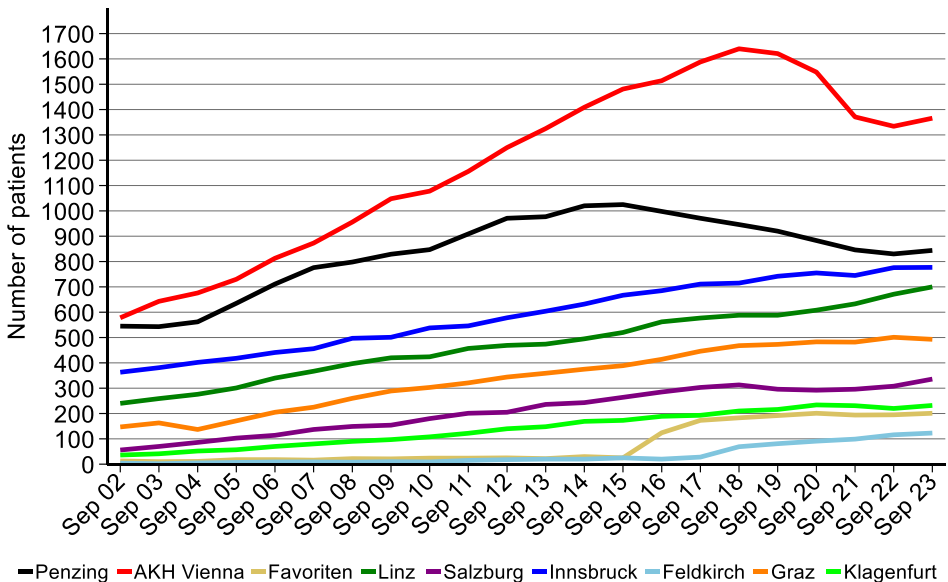
Number of currently seen patients by residence

	HIV-centre									
	Penzing Vienna	AKH Vienna	Favoriten Vienna	Linz	Salz-burg	Inns-bruck	Feld-kirch	Graz	Klagen-furt	**Total**
Burgenland	21	29	10	0	0	3	0	16	0	79
Carinthia	0	0	0	3	6	7	0	16	224	256
Lower Austria	190	262	18	49	1	2	0	2	0	524
Upper Austria	1	5	1	623	29	5	0	1	0	665
Salzburg	0	1	1	6	254	32	1	1	0	296
Styria	3	7	1	5	8	4	0	449	3	480
Tyrol	0	0	0	1	3	572	0	1	0	577
Vorarlberg	1	0	0	1	0	121	121	0	0	244
Vienna	623	1055	166	9	1	8	0	5	1	1868
Foreign/missing	5	7	4	3	34	23	1	2	4	83
Total	**844**	**1366**	**201**	**700**	**336**	**777**	**123**	**493**	**232**	**5072**

4.5.2 Number of patients currently on antiretroviral therapy

4978 patients (98.2%) were on antiretroviral therapy in the 9 HIV treatment centres. Of the 94 patients not on treatment 55 had received antiretroviral treatment at an earlier point in time (women who were on ART to prevent mother-to-child transmission, patients who received transient ART during/ after the acute HIV infection, etc.).

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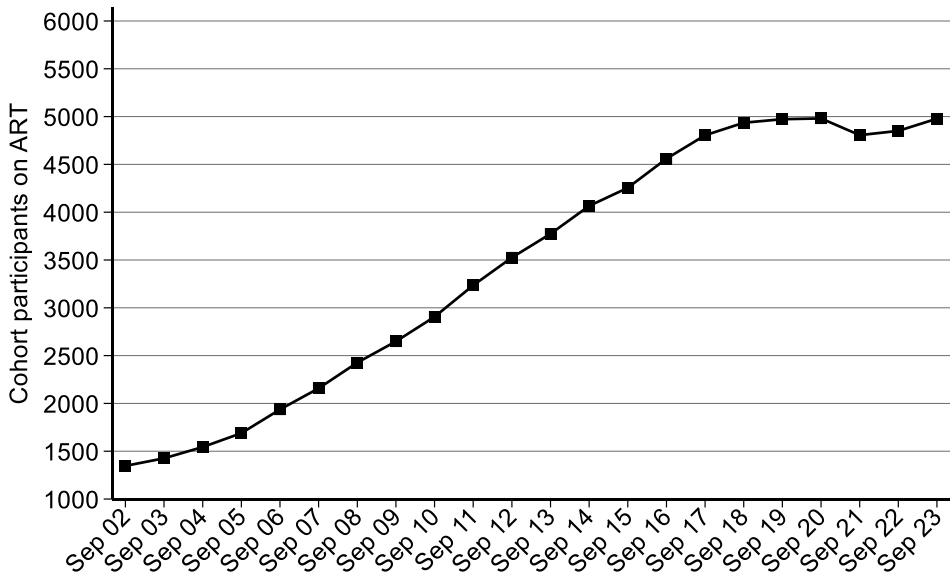
Number of participants currently on antiretroviral therapy

	Penzing Vienna	AKH Vienna	Favoriten Vienna	Linz	Salz-burg	Inns-bruck	Feld-kirch	Graz	Klagen-furt	**Total**
01.09.2023	828	1344	194	691	334	756	123	484	224	**4978**
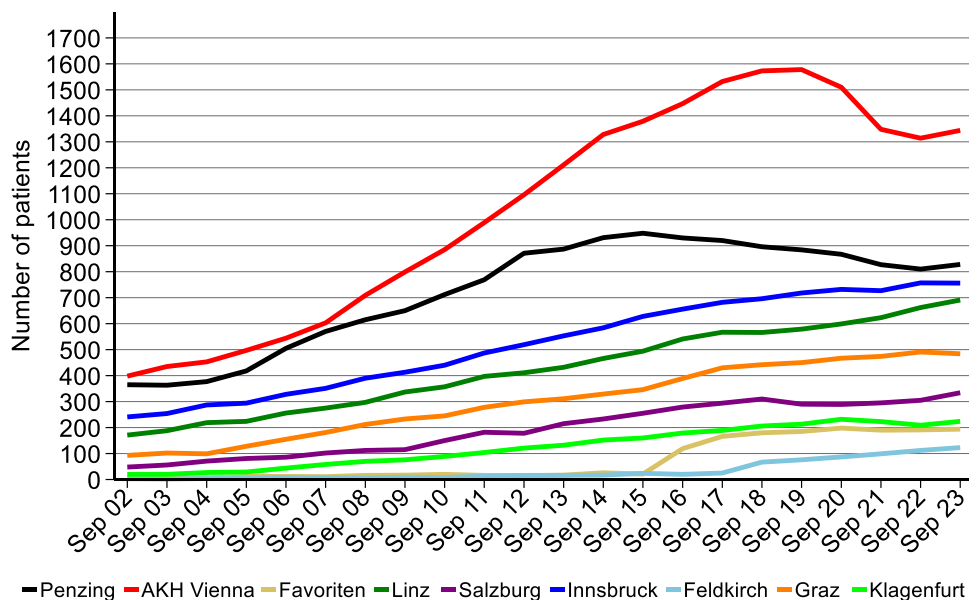
Number of participants currently on antiretroviral therapy by area of residence

	HIV-centre									
	Penzing Vienna	AKH Vienna	Favoriten Vienna	Linz	Salz-burg	Inns-bruck	Feld-kirch	Graz	Klagen-furt	**Total**
Burgenland	21	29	9	0	0	3	0	16	0	**78**
Carinthia	0	0	0	3	6	7	0	16	217	**249**
Lower Austria	186	256	18	48	1	2	0	2	0	**513**
Upper Austria	1	5	1	616	29	5	0	1	0	**658**
Salzburg	0	1	1	6	252	30	1	1	0	**292**
Styria	3	7	1	5	8	4	0	440	2	**470**
Tyrol	0	0	0	1	3	560	0	1	0	**565**
Vorarlberg	1	0	0	1	0	116	121	0	0	**239**
Vienna	612	1039	160	8	1	7	0	5	1	**1833**
Foreign/missing	4	7	4	3	34	22	1	2	4	**81**
Total	**828**	**1344**	**194**	**691**	**334**	**756**	**123**	**484**	**224**	**4978**

4.5.3   How many persons living with HIV (PLHIV) are there in Austria?

The Dachverband der Sozialversicherungsträger recorded 7768 persons in Austria receiving ART in 2022. According to the ECDC modelling tool 8 (chapter 10.4.2) the proportion of PLHIV on ART in 2022 is estimated to be between 86.5% and 92.2%. Thus, the estimate for PLHIV in Austria ranges from 8400 to 9000 for end of 2022.

The number of PLHIV analysed completely by the modelling tool of ECDC reveals 7596 PLHIV within AHIVCOS for the end of 2022 (a delay of one year for the estimate is caused by the ascertainment of deaths). AHIVCOS captures 64% of all PLHIV receiving ART. Assuming that AHIVCOS is representative for Austria, the overall estimate for PLHIV therefore sums up to 11 860, which is an overestimate, since the ascertainment of out-migration, persons who left the country is very incomplete (e.g. migrant workers from other European countries mainly in the tourism industry, rejection of asylum application or voluntary return to home country).

4.6   Use of antiretroviral drugs to prevent HIV infection

PEP

	Non-occupational PEP started in						
	2016	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Sex							
Women	37	40	63	65	44	45	42
Men	107	134	161	263	150	180	190
Age (years)							
<30	64	97	114	164	103	126	119
30-48	72	72	103	150	84	94	107
≥50	8	5	7	14	7	5	6
Area of residence							
Vienna	74	100	127	191	108	120	129
Lower Austria	4	6	10	13	21	13	17
Burgenland	1	0	1	4	4	2	2
Upper Austria	3	15	17	25	11	31	21
Salzburg	0	7	8	10	2	3	8
Tyrol	22	11	23	29	29	30	18
Vorarlberg	2	1	2	3	3	3	9
Styria	10	7	14	17	8	10	18
Carinthia	0	0	1	1	0	0	0
Missing/Foreign	28	27	21	35	8	13	10

PrEP

	PrEP started in							
	2016	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**On PrEP at 01.03.2023**
Sex								
Women	0	1	3	8	4	2	5	21
Men	4	101	200	287	210	300	416	1249
Age (years)								
<30	2	32	53	83	63	110	172	402
30-48	2	64	124	186	130	157	203	733
≥50	0	6	26	26	21	35	46	135
Area of residence								
Vienna	1	81	84	133	62	86	102	457
Lower Austria	0	5	9	11	10	8	14	53
Burgenland	0	0	0	3	1	3	2	10
Upper Austria	0	0	21	28	33	51	71	198
Salzburg	0	1	5	6	2	5	24	42
Tyrol	3	12	60	87	73	118	153	351
Vorarlberg	0	1	19	12	17	21	30	86
Styria	0	1	4	10	14	8	20	57
Carinthia	0	0	0	0	1	1	1	3
Missing/Foreign	0	1	1	5	1	1	4	13

5 HIV/AIDS Surveillance in Austria

5.1 General overview (ECDC data)

HIV diagnoses acquired through heterosexual transmission per 100 000 population, 2022
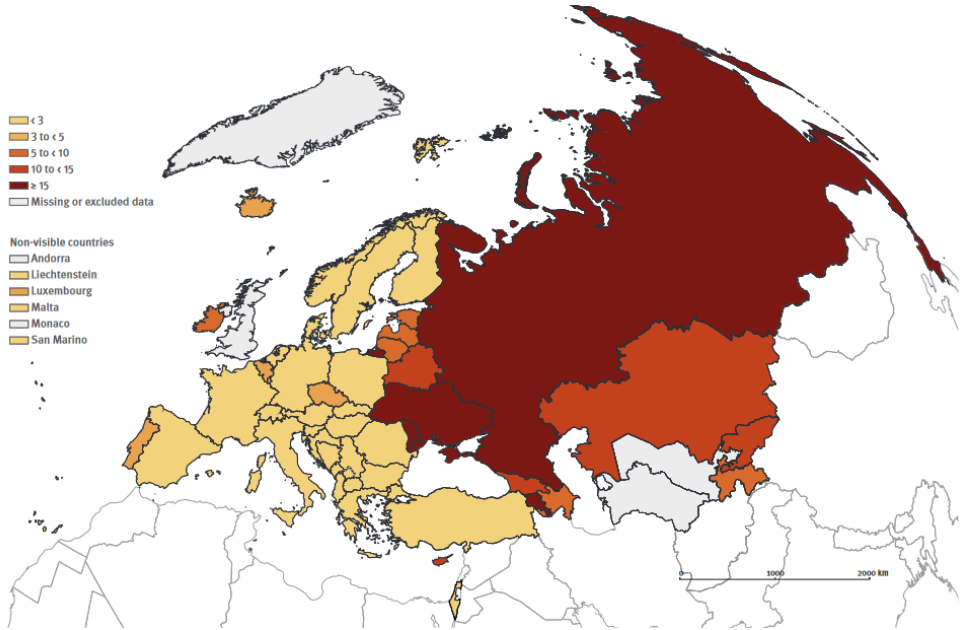
HIV diagnoses in men who have sex with men per 100 000 male population, 2022
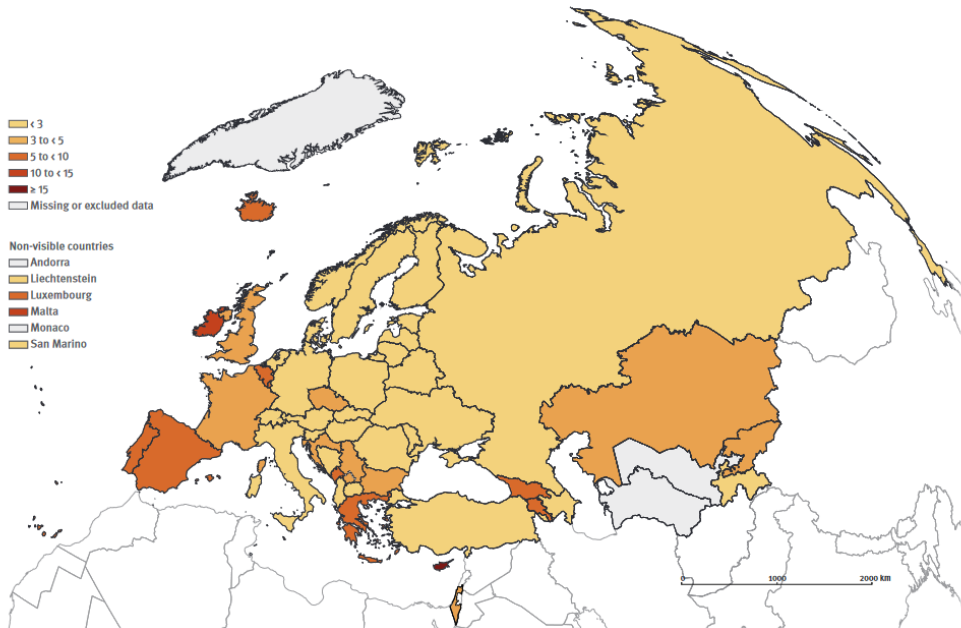
Percentage of new HIV diagnoses, by age group and country, EU/EEA, 2022 (n=22 830)
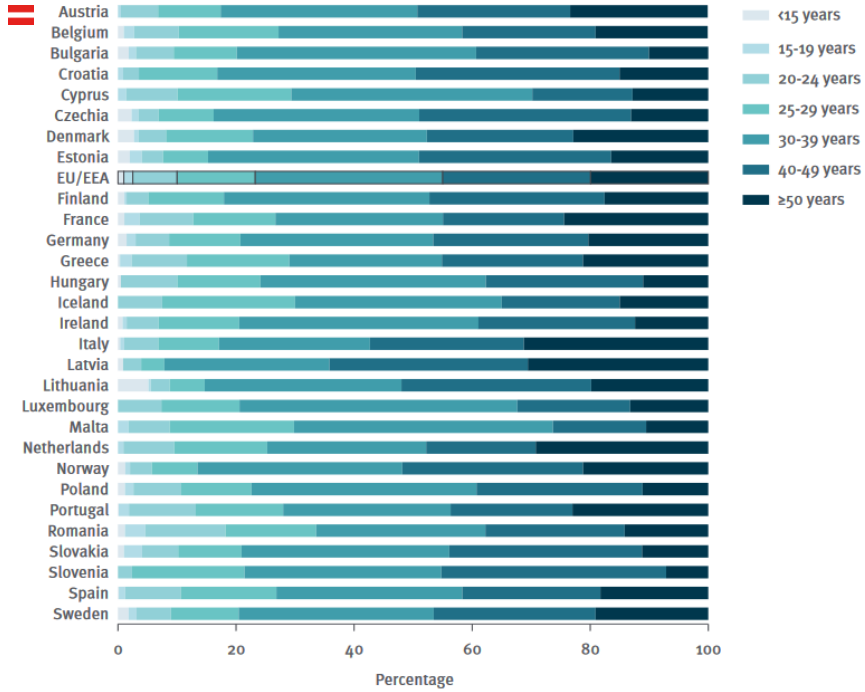
Male-to-female ratio in new HIV diagnoses, by country, EU/EEA, 2022 (n=22 790)
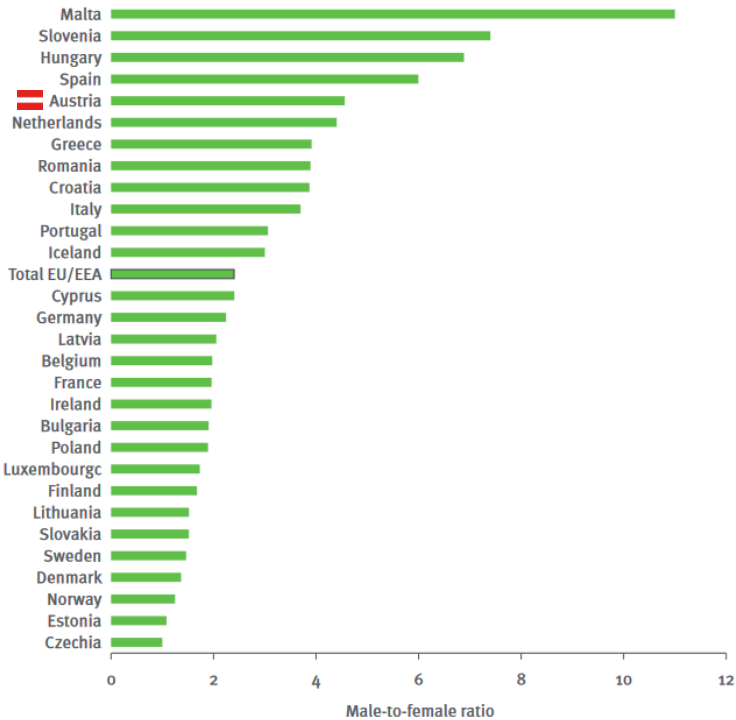
Percentage of new HIV diagnoses with known mode of transmission, by transmission route and country, EU/EEA, 2022 (n=16 718)
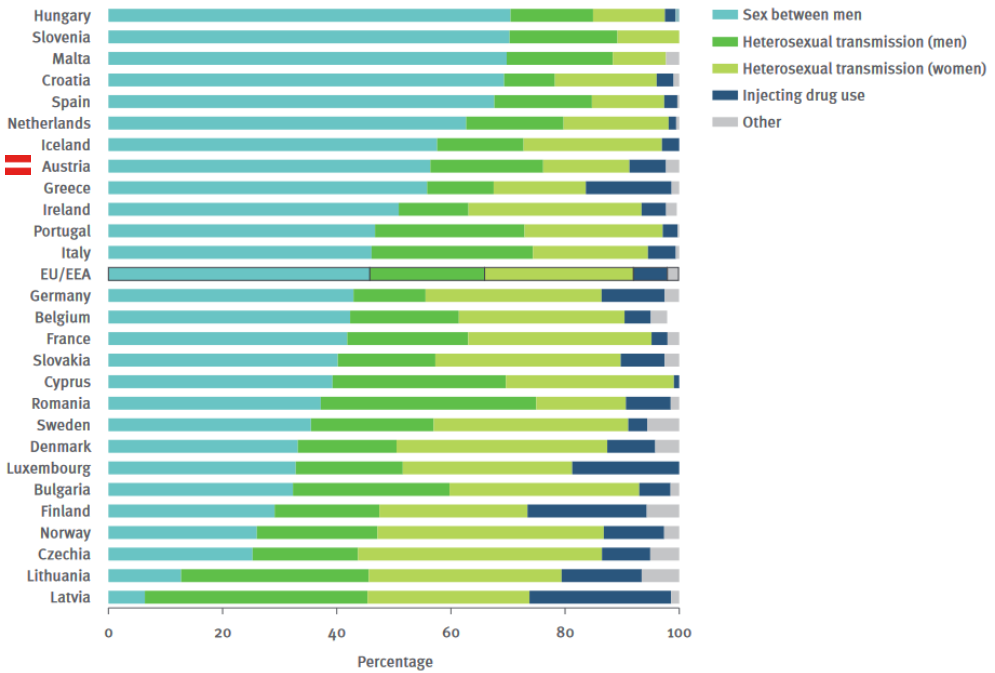
Percentage of new HIV diagnoses among migrants out of all reported cases with known information on region of origin, by country, EU/EEA, 2022 (n=20 016)
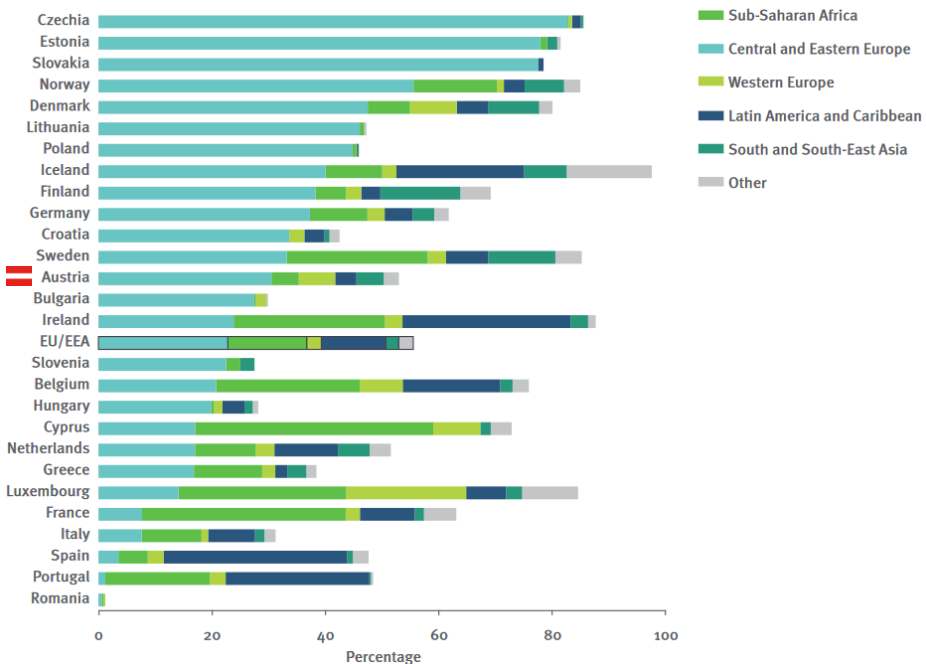
5.2 Mode of transmission

5.2.1 Transgender

There are 16 transgender women in the Austrian HIV Cohort Study.
One of them died and median age at diagnosis is 34.4. Fourteen are Austrian nationality.
Twelve had a visit in the last 12 months. Median age of those with a follow up in the last 12 months is 47.5 (mean 46.9).

If gender and transmission are combined, transgender persons are put in the group Other or *excluded* from the analyses.

5.2.2 All modes of transmission
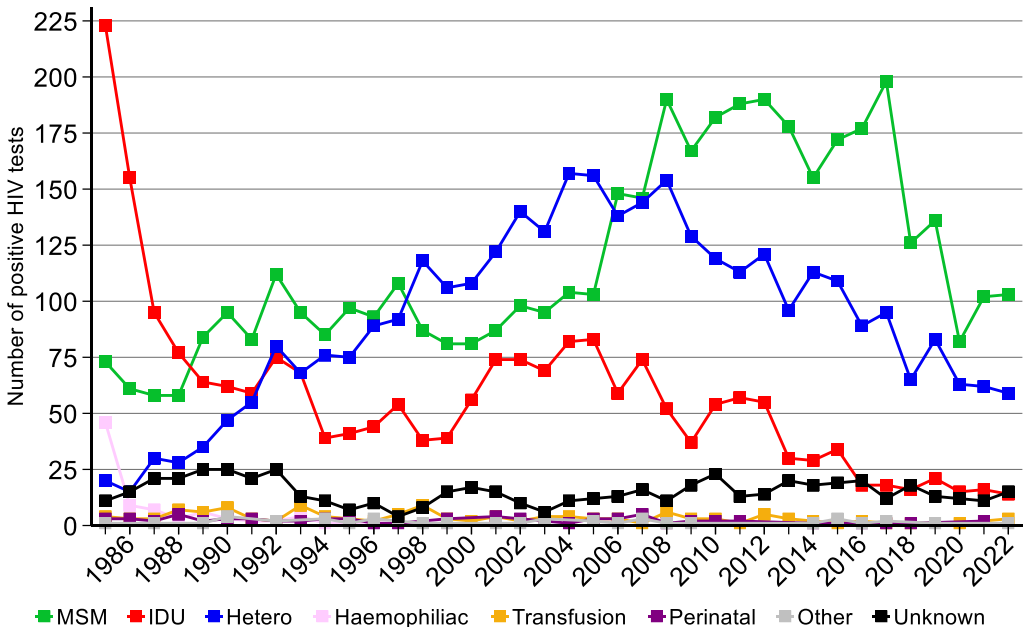
The abbreviation MSM is used for „Men who have sex with men". IDU means „Injecting Drug Use". The category IDU also includes men who are both MSM and IDU. The category "blood products" includes cohort participants who have received coagulation compounds or blood transfusions. Among the patients with a follow-up in the last 12 months, 38.58% have been infected through heterosexual contacts, 43.79% through homosexual contacts and 12.06% through the injection of drugs.

	BMG	AHIVCOS									
		MSM		IDU		Heterosexually infected		Others		Total	Women	
Year	Total	MSM		IDU		infected		Others		Total	Women	
1998	313	87	33.33%	38	14.56%	118	45.21%	18	6.90%	261	60	22.99%
1999	339	81	32.53%	39	15.66%	106	42.57%	23	9.24%	249	69	27.71%
2000	428	81	30.68%	56	21.21%	108	40.91%	19	7.20%	264	77	29.17%
2001	402	87	28.34%	74	24.10%	122	39.74%	24	7.82%	307	74	24.10%
2002	442	98	29.88%	74	22.56%	140	42.68%	16	4.88%	328	92	28.05%
2003	423	95	30.65%	69	22.26%	131	42.26%	15	4.84%	310	94	30.32%
2004	470	104	28.97%	82	22.84%	157	43.73%	16	4.46%	359	107	29.81%
2005	453	103	28.45%	83	22.93%	156	43.09%	20	5.52%	362	100	27.62%
2006	435	148	40.55%	59	16.16%	138	37.81%	20	5.48%	365	88	24.11%
2007	515	146	37.53%	74	19.02%	144	37.02%	25	6.43%	389	88	22.62%
2008	505	190	45.78%	52	12.53%	154	37.11%	19	4.58%	415	98	23.61%
2009	507	167	46.78%	37	10.36%	129	36.13%	24	6.72%	357	79	22.13%
2010	487	182	47.52%	54	14.10%	119	31.07%	28	7.31%	383	74	19.32%
2011	525	188	50.27%	57	15.24%	113	30.21%	16	4.28%	374	78	20.86%
2012	523	190	49.35%	55	14.29%	121	31.43%	19	4.94%	385	81	21.04%
2013	481	178	54.43%	30	9.17%	96	29.36%	23	7.03%	327	52	15.90%
2014	403	155	48.59%	29	9.09%	113	35.42%	22	6.90%	319	72	22.57%
2015	428	172	50.89%	34	10.06%	109	32.25%	23	6.80%	338	45	13.31%
2016	447	177	57.47%	18	5.84%	89	28.90%	24	7.79%	308	52	16.88%
2017	510	198	60.55%	18	5.50%	95	29.05%	16	4.89%	327	54	16.51%
2018	323 / 74*	126	55.51%	16	7.05%	65	28.63%	20	8.81%	227	39	17.18%
2019	336 / 94*	136	53.54%	21	8.27%	83	32.68%	14	5.51%	254	40	15.75%
2020	283 / 49*	82	47.40%	15	8.67%	63	36.42%	13	7.51%	173	31	17.92%
2021	310 / 66*	102	52.85%	16	8.29%	62	32.12%	13	6.74%	193	33	17.10%
2022	395 / 78*	103	52.82%	14	7.18%	59	30.26%	19	9.74%	195	35	17.95%
2023		57	50.00%	10	8.77%	29	25.44%	18	15.79%	114	14	12.28%

*second number tested anonymously since 2018

Transmission category and residence for the individual formal state in patients with follow-up within the last 12 months
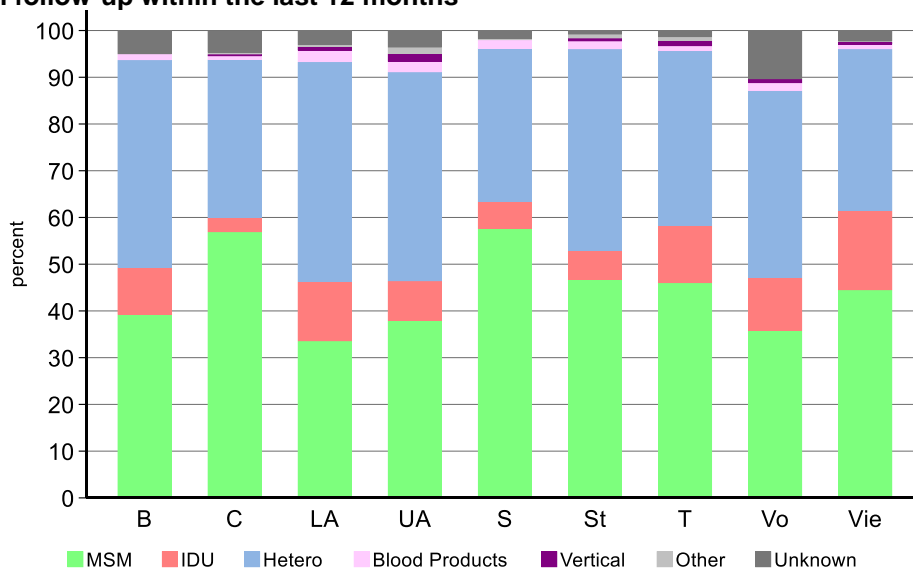
5.2.3   Categories of heterosexually acquired infections

Because of missing data, the HIV treatment centre Penzing Vienna has been excluded from some analyses. Transgender persons are excluded from aswell.

All

- Originating from high prevalence
- Sex with MSM
- Sex with IDU
- Sex with hemophilac
- Sex with persons from high prevalence
- Sex with HIV+ persons not matching above
- Believes to be infected heterosexually
- Heterosexual with no information

Men

Women

Categories of transmission

Men

Women

Sub-categories of transmission

Men

Women

Legend (Women):
- IDU
- Originating from a high prevalen
- Originating from a high prevalence country
- Sex with bisexual male,IDU,haemophiliac
- Sex with person from high prevalence
- Sex with HIV+ persons not matching above
- Believes to be infected heterosexually
- Other risk

Sub-categories of heterosexually acquired infections

Legend:
- Origin high prevalence country
- Sex with MSM
- Sex with IDU
- Sex with hemophilac
- Sex with high prevalence
- Sex with HIV+ other
- Believes hetero
- Hetero with no information

5.2.4 Mother-to-child-transmission

Nowadays, mother-to-child-transmission is the only route of HIV transmission amongst children. All HIV infected children in Austria are followed in paediatric HIV treatment centres, therefore the data presented here are related to patients who have also been in care by the adult HIV treatment centres. Obviously, these data are incomplete.

	Living participants		Deceased participants	Total
	<18 years	>18 years		
Burgenland	0	1	0	**1**
Carinthia	0	1	0	**1**
Lower Austria	1	4	0	**5**
Upper Austria	2	10	1	**13**
Salzburg	1	0	0	**1**
Styria	0	4	0	**4**
Tyrol	3	4	4	**11**
Vorarlberg	2	0	3	**5**
Vienna	3	18	3	**24**
Missing residency	0	1	0	**1**
Foreign	2	2	0	**4**
Total	**14**	**45**	**11**	**70**

In January 2010, routine HIV testing was introduced in Austria. The HIV test is part of the mother-child booklet (*Mutter-Kind-Pass*). In order to be eligible for childcare allowance *(Kinderbetreuungsgeld)* you must have the first ten examinations stipulated in the mother-child booklet done correctly and obtain proof of it. Recently, at least two transmissions of mother-to-child in Austria have been linked to counselling with HIV denialists.

All

Born in Austria
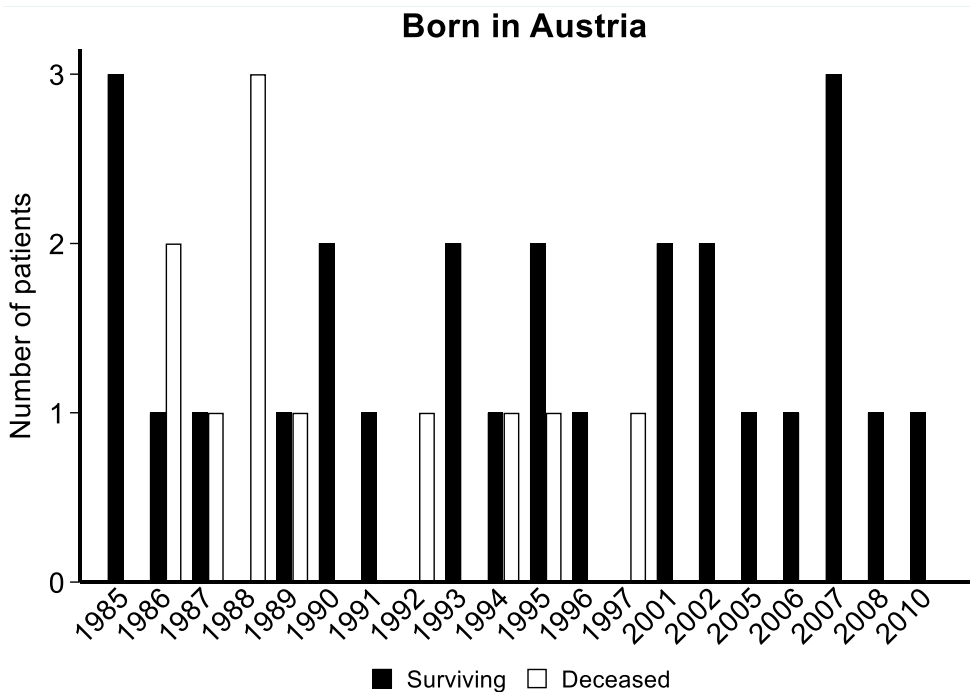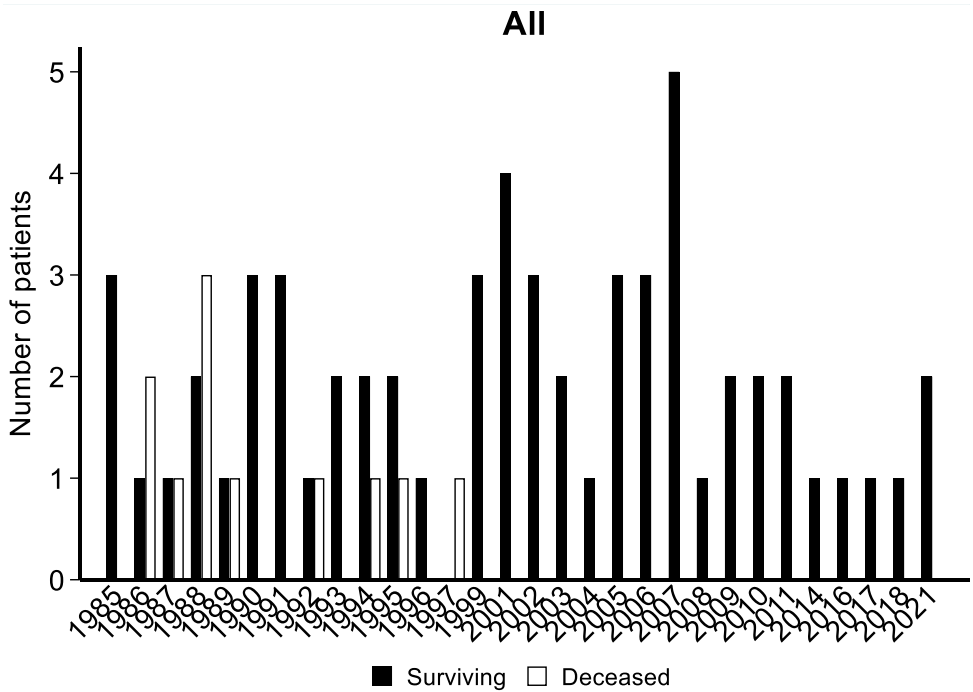
5.3 Sex

25.3% of the patients with a follow-up within the last 12 months are female. The rate is highest in Burgenland (31.7%) and Upper Austria (31.0%).
In the subgroup of heterosexually acquired infections, the rate of the women is 52.0%. It is highest Styria (56.8%), and Upper Austria (55.4%).

Sex of the patients with a follow-up in the last 12 months
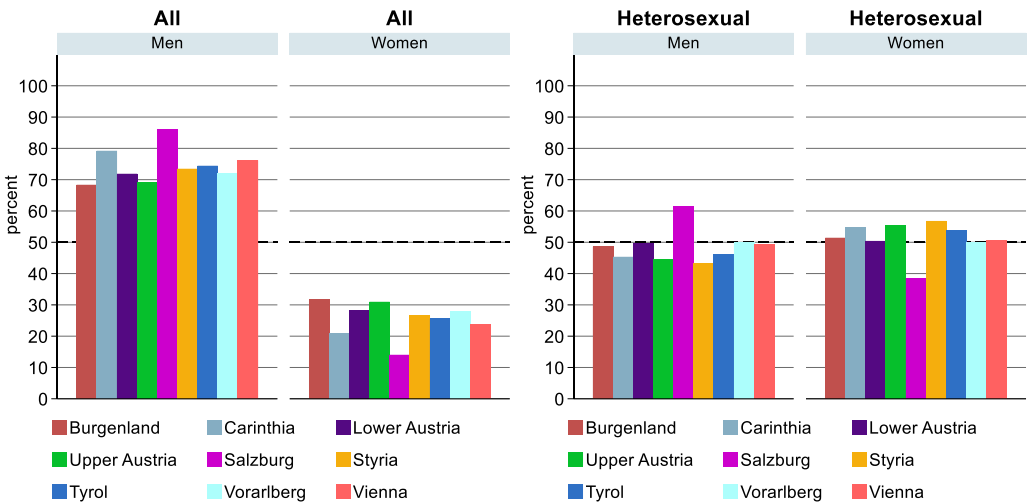
5.4 Age
5.4.1 Age at time of HIV diagnosis

Median age at time of the HIV diagnosis

Age at time of the HIV diagnosis

28

MSM

Male heterosexual

Female heterosexual
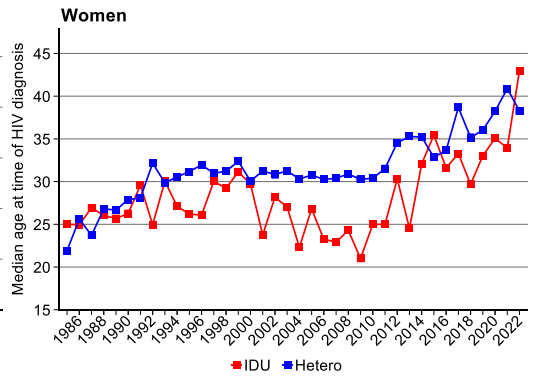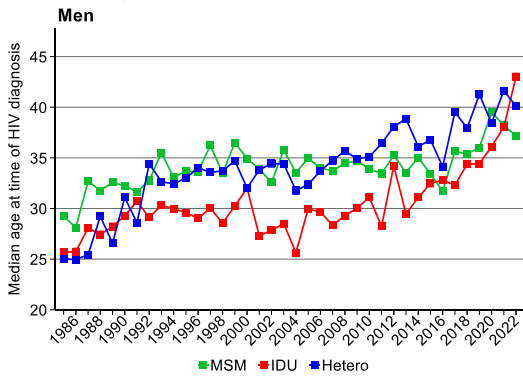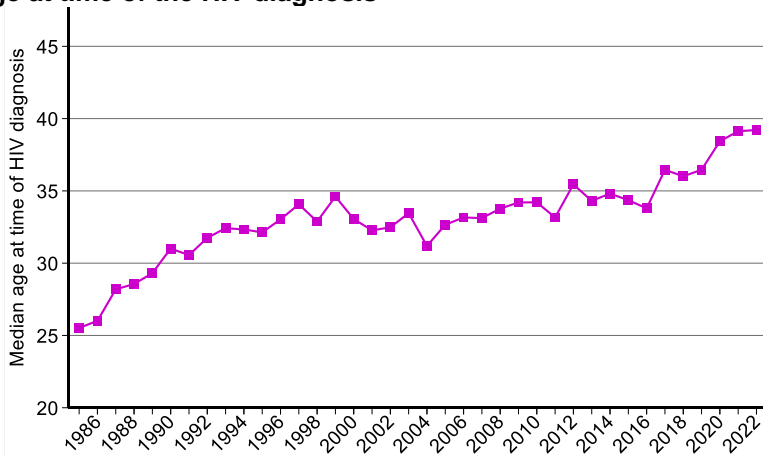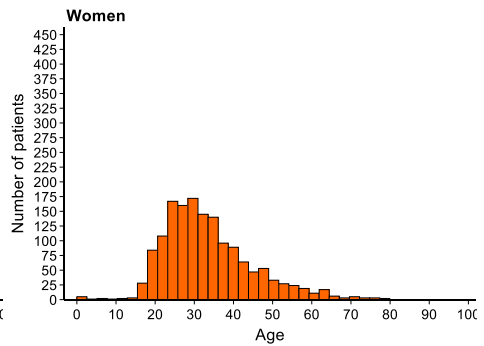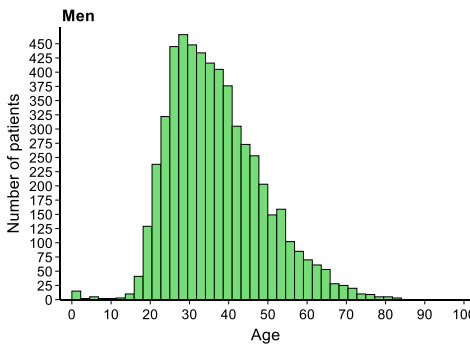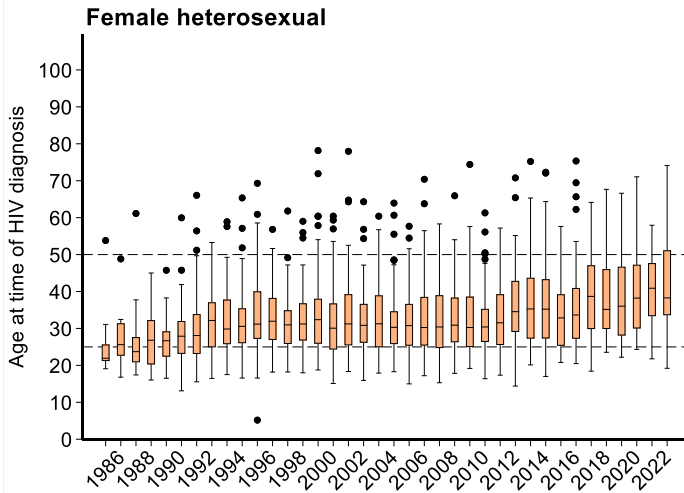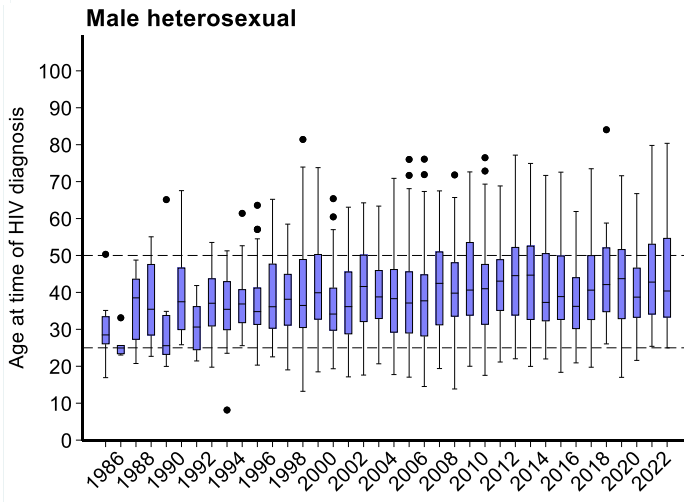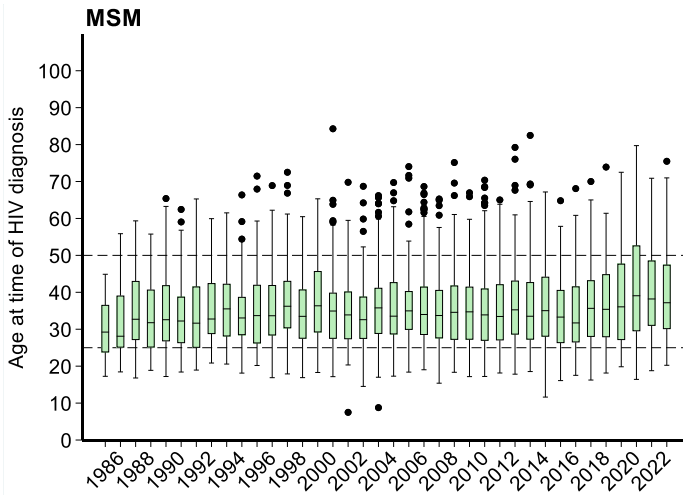
5.4.2   Age of patients currently in care

Overall, median age increased from 39.2 in September 2002 to 50.7 in September 2023. In MSM, median age increased from 41.0 in September 2002 to 49.1 in September 2023, in men (not MSM) from 39.9 to 53.6 and in women from 37.2 to 49.1.
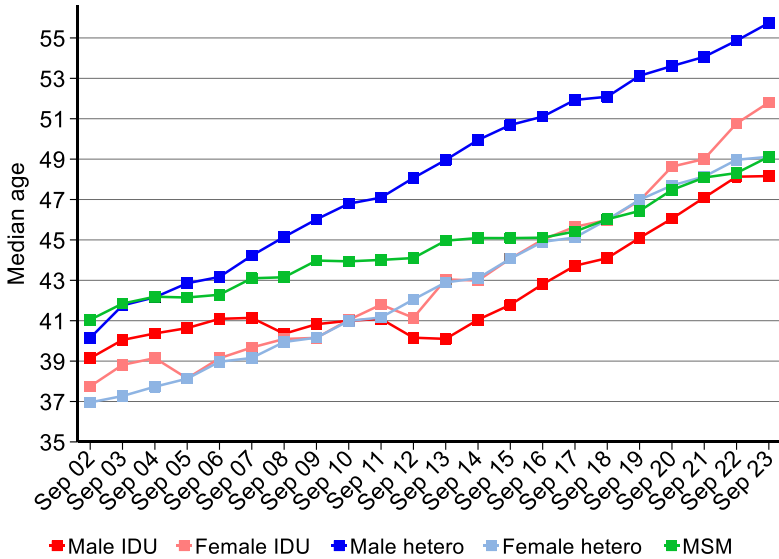
Median and average age are 50.8 and 50.7 years, respectively. 23.2% are older than 60 years, 51.7% are older than 50 years.

30
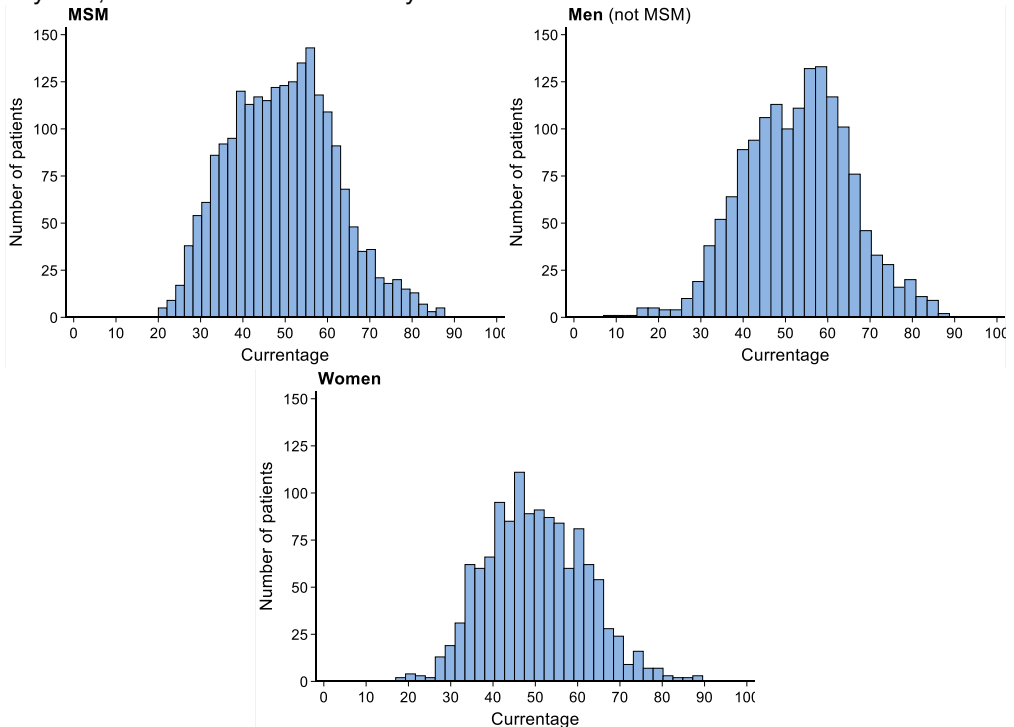
Age across the federal states: follow-up in the last 12 months

Federal state	Median Age years	≥50 years	≥60 years	≥75 years
Burgenland	52.0	58.2	26.6	2.5
Carinthia	51.3	54.9	22.7	2.0
Lower Austria	52.9	56.6	26.4	5.0
Upper Austria	50.3	50.8	26.0	2.9
Salzburg	49.5	48.6	19.9	2.4
Styria	49.6	48.4	19.3	2.3
Tyrol	53.5	58.8	27.9	3.2
Vorarlberg	51.4	53.3	22.5	5.0
Vienna	49.5	48.8	21.3	2.9
Total	**50.8**	**51.7**	**23.2**	**3.1**

Federal states: Follow-up in the last 12 months – Injecting Drug Use
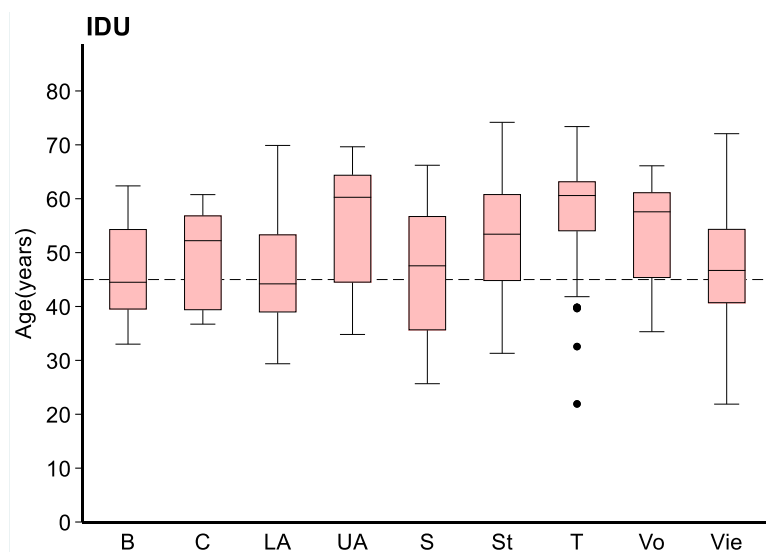
5.5 Nationality and country of birth

Nationality — Number of HIV diagnosis. Legend: Austria, Non-Austria, No information

Country of birth — Number of HIV diagnosis. Legend: Austria, Non-Austria, No information
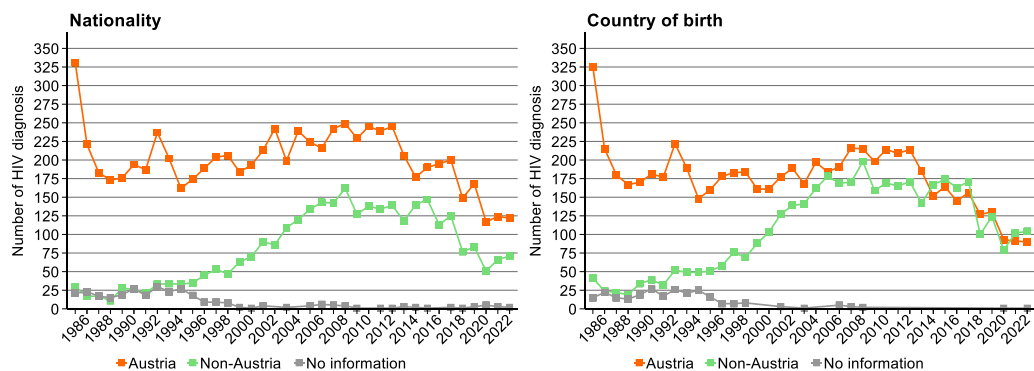
5.5.1 Overview

Year	BMG Total	AHIVCOS Austria		Low prevalence countries		High prevalence countries		Missing value		Total
1998	313	206	78.93%	29	11.11%	18	6.90%	8	3.07%	261
1999	339	184	73.90%	43	17.27%	20	8.03%	2	0.80%	249
2000	428	193	73.11%	38	14.39%	32	12.12%	1	0.38%	264
2001	402	213	69.38%	51	16.61%	39	12.70%	4	1.30%	307
2002	442	242	73.78%	51	15.55%	35	10.67%	0	0.00%	328
2003	423	199	64.19%	58	18.71%	51	16.45%	2	0.65%	310
2004	470	239	66.57%	61	16.99%	59	16.43%	0	0.00%	359
2005	453	224	61.88%	60	16.57%	74	20.44%	4	1.10%	362
2006	435	216	59.18%	81	22.19%	62	16.99%	6	1.64%	365
2007	515	242	62.21%	79	20.31%	63	16.20%	5	1.29%	389
2008	505	249	60.00%	107	25.78%	55	13.25%	4	0.96%	415
2009	507	229	64.15%	80	22.41%	47	13.17%	1	0.28%	357
2010	487	245	63.97%	106	27.68%	32	8.36%	0	0.00%	383
2011	525	239	63.90%	104	27.81%	30	8.02%	1	0.27%	374
2012	523	245	63.64%	102	26.49%	37	9.61%	1	0.26%	385
2013	481	206	63.00%	96	29.36%	22	6.73%	3	0.92%	327
2014	403	177	55.49%	105	32.92%	35	10.97%	2	0.63%	319
2015	428	190	56.21%	110	32.54%	37	10.95%	1	0.30%	338
2016	447	195	63.31%	86	27.92%	27	8.77%	0	0.00%	308
2017	510	200	61.16%	109	33.33%	16	4.89%	2	0.61%	327
2018	323 / 74*	149	65.64%	67	29.52%	10	4.41%	1	0.44%	227
2019	336 / 94*	168	66.14%	69	27.17%	14	5.51%	3	1.18%	254
2020	283 / 49*	117	67.63%	43	24.86%	8	4.62%	5	2.89%	173
2021	310 / 66*	124	64.25%	57	29.53%	9	4.66%	3	1.55%	193
2022	395 / 78*	122	62.56%	65	33.33%	6	3.08%	2	1.03%	195
2023		74	64.91%	33	28.95%	7	6.14%	0	0.00%	114

* second number tested anonymously since 2018

5.5.2   Nationality: HIV diagnoses between 2021 and 2023

■Austria ■Eastern and Southeastern Europe ■CIS-states ■Western Europe ■Africa ■Asia ■Others/missing value

HIV diagnosis 2021 N=193	
Afghanistan	3
Armenia	1
Austria	124
Bosnia and Herzegovina	1
Brazil	1
Bulgaria	1
China	1
Croatia	2
Egypt	1
Germany	4
Ghana	2
Haiti	1
Hungary	3
Italy	3
Kenya	1
Lithuania	1
Nigeria	1
Occupied Palestinian Territory	1
Philippines	1
Poland	1
Portugal	3
Republic of Korea	1
Romania	6
Russian Federation	1
Saint Vincent and the Grenadines	1
Serbia	2
Slovakia	2
Slovenia	1
Somalia	2
Switzerland	1
Syrian Arab Republic	1
Thailand	2
Tunisia	1
Turkey	4
Ukraine	7
Unknown	3
Zimbabwe	1

HIV diagnosis 2022 N=195	
Afghanistan	3
Austria	122
Bosnia and Herzegovina	2
Brazil	4
Cameroon	2
Canada	1
Colombia	1
Croatia	3
Czech Republic	1
Egypt	1
France	1
Georgia	1
Greece	2
Hungary	2
Iran	3
Italy	4
Kenya	1
Occupied Palestinian Territory	1
Poland	3
Portugal	1
Romania	5
Russian Federation	2
Serbia	4
Slovakia	3
Slovenia	1
Somalia	1
South Africa	1
Spain	1
Switzerland	1
Syrian Arab Republic	1
Turkey	2
Ukraine	12
Unknown	2

HIV diagnosis 2023 N=114	
Afghanistan	4
Argentina	1
Austria	74
Bosnia and Herzegovina	3
Bulgaria	2
Cameroon	2
China	2
Colombia	1
Cote d'Ivoire	1
Democratic Republic of the Congo	1
Ethiopia	1
Germany	3
Indonesia	2
Nigeria	1
Republic of Moldova	1
Romania	3
Russian Federation	1
Slovakia	1
Slovenia	1
Switzerland	1
Syrian Arab Republic	1
The former Yugoslav Republic of Macedonia	2
Turkey	2
Ukraine	3

5.5.3 Nationality

All

MSM

IDU

Heterosexually acquired infection

Legend: Austria (orange), High prevalence countries (green), Low prevalence countries (light blue), Missing/Unknown (grey)

Low prevalence countries are countries with an HIV infection rate of adults <1%, high prevalence countries are countries with an HIV infection rate of adults ≥1%.

5.5.4 Refugees from Ukraine (after March 1st 2022)

Center	Men	Women	Children	ART	Total
Penzing	5	9	0	14	14
AKH Vienna	11	12	0	22	23
Favoriten	3	3	0	6	6
Linz	7	17	2	25	26
Salzburg	2	4	0	6	6
Innsbruck	1	7	3	11	11
Feldkirch	2	2	0	4	4
Graz	3	11	0	14	14
Klagenfurt	0	2	0	2	2
Total	**34**	**67**	**5**	**104**	**106**

5.6 Residence

5.6.1 Population size of area of residence

	Living with HIV/AIDS						Deceased					
	< 100 000		≥ 100 000		> 1 million		< 100 000		≥ 100 000		> 1 million	
	N (% women)		N (% women)		N (% women)		N (% women)		N (% women)		N (% women)	
B	111	30.6	**0**		0		23	26.1	**0**		0	
C	242	24.4	**77**	16.9	0		32	18.8	9	11.1	0	
LA	746	26.1	**0**		0		184	19.0	**0**		0	
UA	501	29.9	315	34.6	0		186	29.6	200	31.5	0	
S	218	16.1	203	17.7	0		30	16.7	46	10.9	0	
St	413	28.3	274	21.5	0		67	22.4	46	17.4	0	
T	404	25.5	214	26.2	0		122	20.5	135	25.2	0	
Vo	268	26.1	**0**		**0**		74	25.7	**0**		0	
Vie	**0**		**0**		3349	21.2	**0**		**0**		1560	20.3

Federal state outside capital city

Capital city of federal state

Legend: Male IDU, Female IDU, Male hetero, Female hetero, MSM, Other
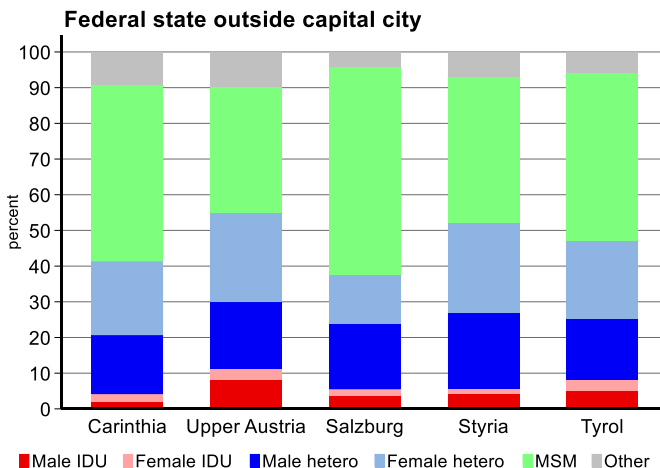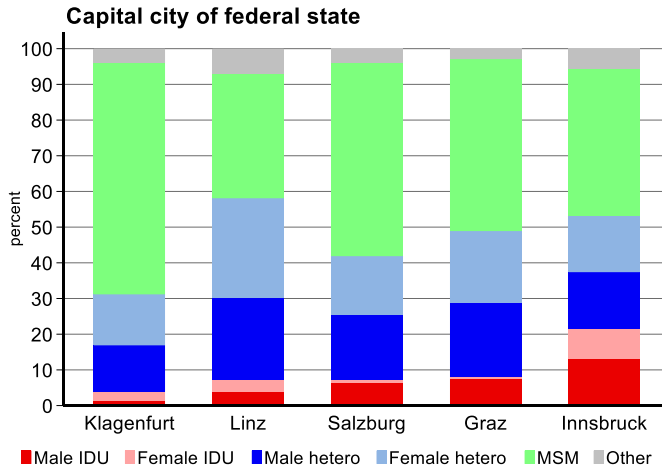
5.6.2 Residence: Federal states

Lower Austria, Upper Austria, Styria, Tyrol, Vienna

Burgenland, Carinthia, Salzburg, Vorarlberg
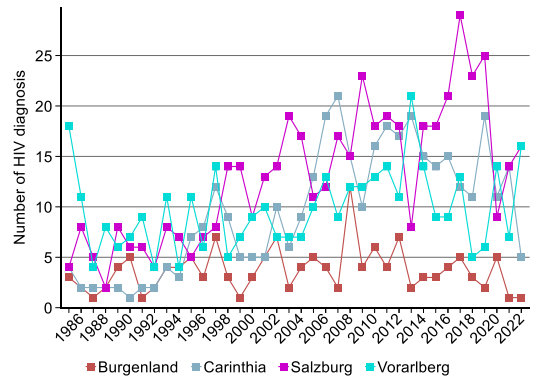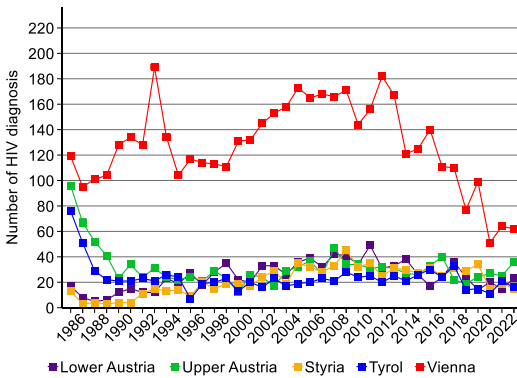
5.7 Health insurance

In the framework of statutory health insurance, all gainfully active persons must become insured. Approximately 99% of the Austrian population are protected by statutory health insurance. Depending on the type of employment there are different kinds of mandatory health insurance: e.g. BVAEB for civil servants, SVS for businessmen and businesswomen, and ÖGK for most employees.

Providers of health insurance according to the federal state (patients with a follow-up within the last 12 months)
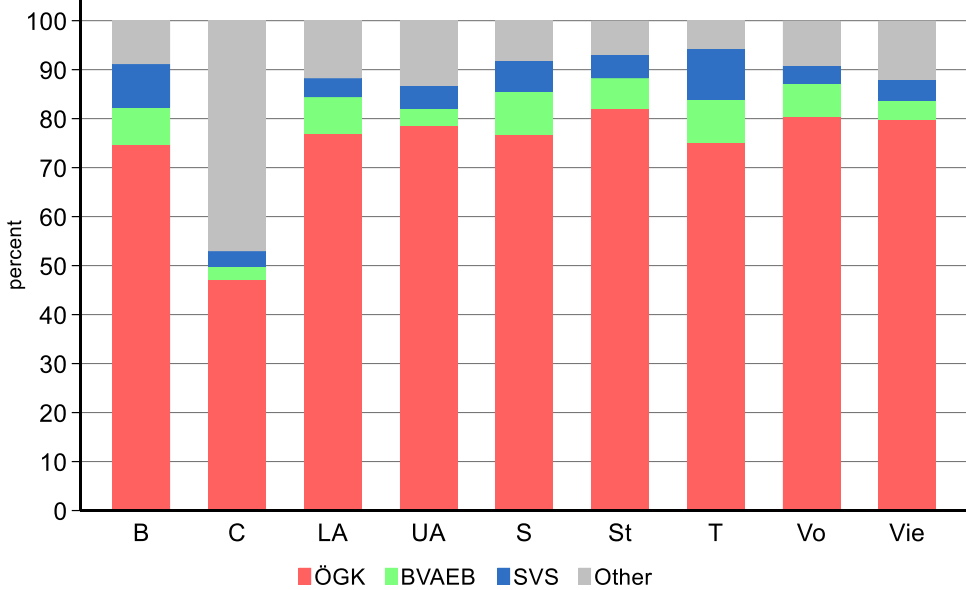
5.8   Providers of health care

Included are only participants from the HIV centers in Linz and Innsbruck with a follow-up in the last 12 months.

	N of patients	General practice		Psychiatry		Internal medicine		Dermatology		Pulmo-nology		Other	
Innsbruck	752	545	72.50%	50	6.60%	44	5.90%	12	1.60%	7	0.90%	59	7.80%
Linz	694	321	46.30%	20	2.90%	46	6.60%	8	1.20%	15	2.20%	138	19.90%
Age < 50	649	311	47.90%	18	2.80%	18	2.80%	8	1.20%	4	0.60%	69	10.60%
Age ≥ 50	797	555	69.60%	52	6.50%	72	9.00%	12	1.50%	18	2.30%	128	16.10%
< 100 000	**948**	587	61.90%	42	4.40%	66	7.00%	9	0.90%	17	1.80%	114	12.00%
≥ 100 000	498	279	56.00%	28	5.60%	24	4.80%	11	2.20%	5	1.00%	83	16.70%
Total	1446	866	59.90%	70	4.80%	90	6.20%	20	1.40%	22	1.50%	197	13.60%

	N of patients	No doctors outside centre		GP, no specialist		Specialist, no GP		GP, + specialist	
Innsbruck	752	168	22.30%	429	57.00%	39	5.20%	116	15.40%
Linz	694	322	46.40%	182	26.20%	51	7.30%	139	20.00%
Patients without ART	11	2	18.20%	7	63.60%	1	9.10%	1	9.10%
Patients with ART	1435	488	34.00%	604	42.10%	89	6.20%	254	17.70%
HIV RNA > 50 (with ART)	63	38	60.30%	18	28.60%	1	1.60%	6	9.50%
HIV RNA ≤ 50 (with ART)	1372	450	32.80%	586	42.70%	88	6.40%	248	18.10%
Chronic hepatitis C	22	13	59.10%	8	36.40%	1	4.50%	13	59.10%
Use of antidepressants	253	52	20.60%	119	47.00%	15	5.90%	67	26.50%
MSM	617	239	38.70%	276	44.70%	27	4.40%	75	12.20%
Male IDU	93	24	25.80%	46	49.50%	5	5.40%	18	19.40%
Female IDU	58	8	13.80%	27	46.60%	5	8.60%	18	31.00%
Male hetero	269	110	40.90%	107	39.80%	9	3.30%	43	16.00%
Female hetero	315	66	21.00%	122	38.70%	37	11.70%	90	28.60%
Age < 50	649	304	46.80%	237	36.50%	34	5.20%	74	11.40%
Age ≥ 50	797	186	23.30%	374	46.90%	56	7.00%	181	22.70%
< 100 000	948	310	32.70%	424	44.70%	51	5.40%	163	17.20%
≥ 100 000	498	180	36.10%	187	37.60%	39	7.80%	92	18.50%
Total	1446	490	33.90%	611	42.30%	90	6.20%	255	17.60%

5.9 HIV-1 subtypes

Subtypes were determined by genotypic resistance testing of Reverse Transcriptase and Protease according to Stanford database. Overall 3909 subtypes were available.

HIV-1 subtypes

MSM

IDU
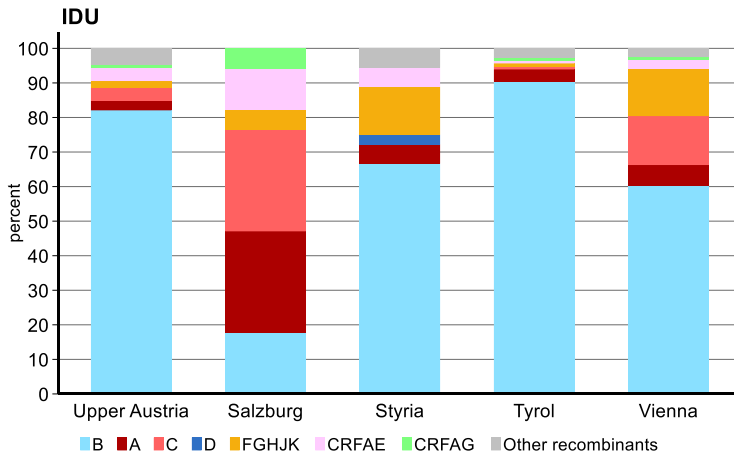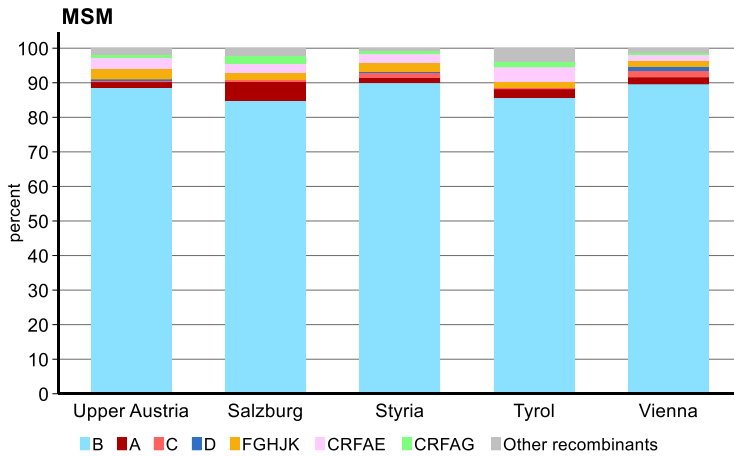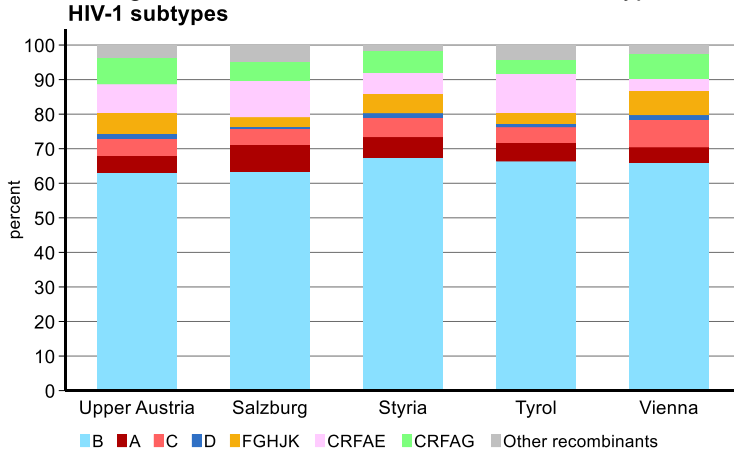
5.10 Stage of HIV disease

5.10.1 Lowest ever measured CD4 cell count

The median of the lowest CD4 cell count ever measured („CD4 nadir") in the patients with follow-up in the last 12 months is 243/µl.

CD4 nadir (patients with follow-up the last 12 months)
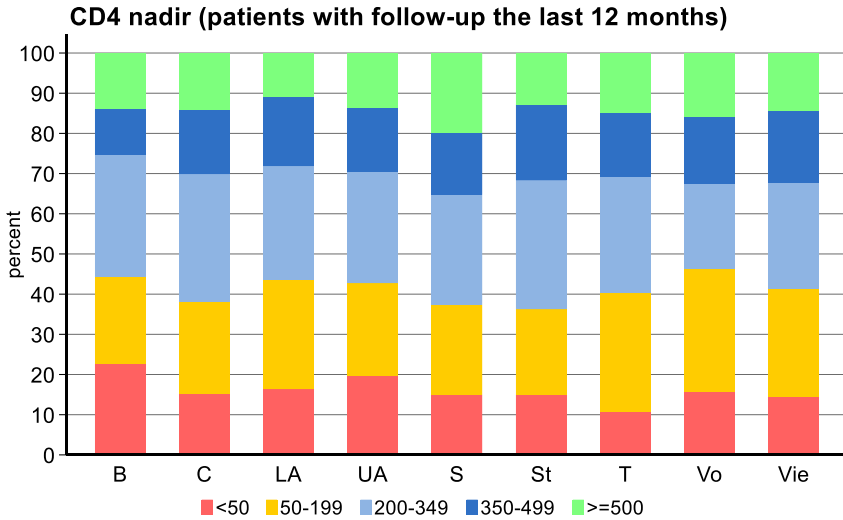
5.10.2 Proportion of Patients with AIDS

The classification of the HIV infection according to CDC puts patients in one of three clinical categories (A, B, C) and one of three CD4 cell count categories (1, 2, 3).

CD4 count		A Asymptomatic	B Non-AIDS defining conditions	C AIDS
1	≥ 500/µl	A1	B1	C1
2	200-499/µl	A2	B2	C2
3	< 200/µl	A3	B3	C3
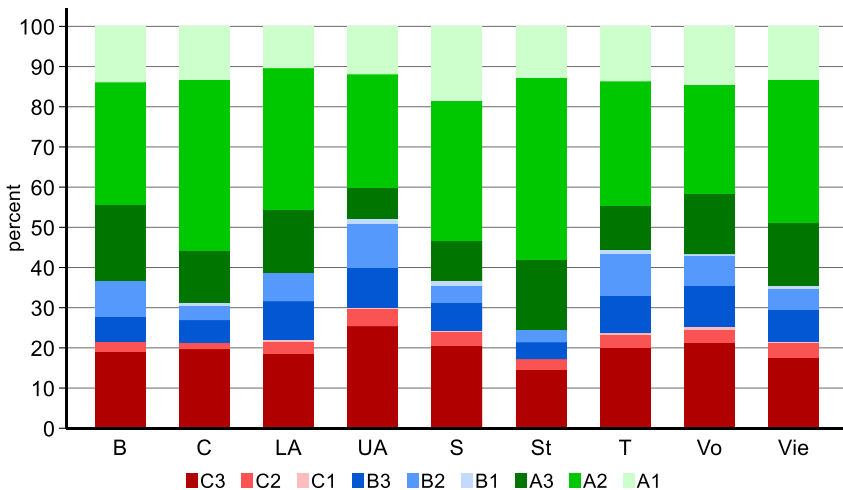
5.11   Elite-controllers" and „viremia-controllers"

Median time from HIV-1 infection to death in untreated patients is estimated to be approximately 10-12 years. However, there is considerable variation in survival time between patients. A small number of patients remain asymptomatic for many years and maintain high CD4 cell counts or low plasma HIV RNA levels, or both, without antiretroviral therapy. Patients able to maintain high CD4 counts have been called "long-term non-progressors", whilst those with low viral loads have been called "HIV controllers" or "elite controllers". Viremic controllers have low but readily measurable virus loads. Elite controllers suppress HIV to extremely low levels, measurable only by sensitive laboratory techniques.

Being ART naive	HIV-infected up to 10 years N=1745		HIV-infected for over 10 years N=3247	
	N	%	N	%
HIV RNA ≤ 50 copies/ml	13	0.74%	5	0.15%
HIV RNA < 400 copies/ml	13	0.74%	7	0.22%
CD4 > 500 cells/µl	4	0.23%	10	0.31%
CD4 > 500 cells/µl and HIV RNA ≤ 50 copies/ml	4	0.23%	3	0.09%
CD4 > 500 cells/µl and HIV RNA < 400 copies/ml	4	0.23%	5	0.15%

6 Diagnosis of HIV and presentation to an HIV centre

6.1 Presentation to an HIV centre

Austria has one of the highest rates of HIV tests in Europe (more than 75 tests per year per 1000 population). Nevertheless, a substantial portion of the patients (>40%) are diagnosed late (CD4 cell count <350/µl).

Year of HIV diagnosis	Time between HIV test and first CD4 cell count measurement in months						First CD4 cell count (all patients, 459 missing)		
	All Patients			IDU					
	N	Median	90 Per	N	Median	90 Per	Median	Quartiles	
1985	342	64.5	181.1	199	50.1	133.4	313.5	119.0	545.0
1990	228	18.6	107.3	59	5.3	62.2	255.0	50.0	529.0
1995	217	2.6	100.3	39	4.2	101.4	239.0	88.0	476.0
2000	257	1.1	135.9	56	2.3	92.0	361.0	156.0	566.0
2005	355	0.7	89.1	83	1.1	48.3	354.0	165.0	538.0
2006	355	0.8	74.0	59	1.1	51.1	371.0	193.0	579.0
2007	378	0.7	81.5	73	1.8	61.3	327.0	154.0	551.0
2008	405	0.8	78.7	52	1.7	88.3	398.0	228.0	570.0
2009	345	0.6	78.2	37	0.9	87.8	343.0	192.0	550.0
2010	372	0.6	69.7	54	0.7	69.5	396.5	200.5	641.0
2011	363	0.6	54.3	55	1.9	38.8	380.0	221.0	570.0
2012	380	0.6	46.8	55	0.9	47.0	362.5	164.5	579.5
2013	316	0.5	40.0	29	1.5	40.9	400.5	207.5	625.0
2014	308	0.7	46.6	29	1.7	55.7	382.0	202.5	587.0
2015	323	0.5	31.8	34	1.2	38.5	378.0	178.0	569.0
2016	297	0.4	13.0	17	0.7	7.7	369.0	164.0	572.0
2017	316	0.4	15.4	18	1.3	15.4	393.0	191.0	584.0
2018	222	0.4	29.0	15	0.6	38.9	377.5	214.0	613.0
2019	251	0.4	13.8	21	1.9	12.0	369.0	164.0	577.0
2020	170	0.4	9.9	15	2.2	35.7	342.0	184.0	552.0
2021	189	0.4	2.0	15	0.4	2.7	282.0	107.0	508.0
2022	193	0.4	3.1	14	0.7	9.9	322.0	122.0	519.0
2023	107	0.3	1.4	9	0.6	4.7	367.0	168.0	561.0

CD4 count at HIV-test
All

Male IDU

Female IDU

Male heterosexual

Legend: <50 | 50-199 | 200-349 | 350-499 | >=500 | No CD4 within 6 months

43
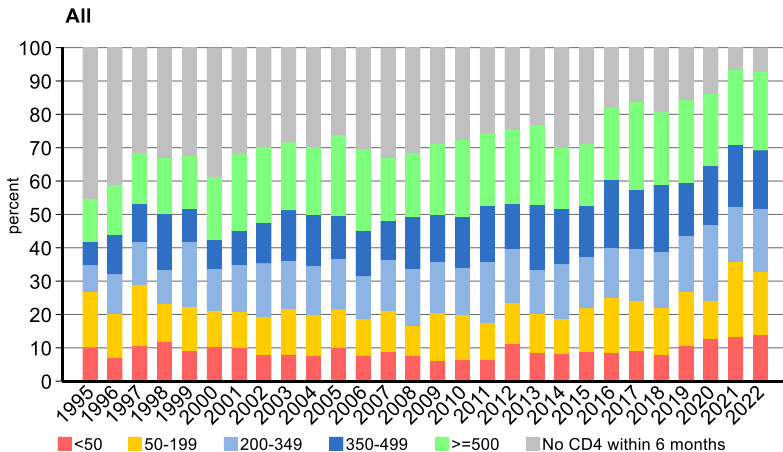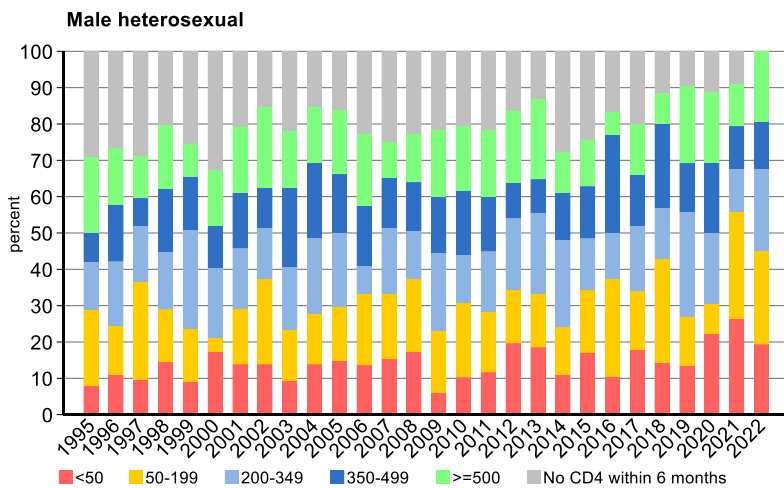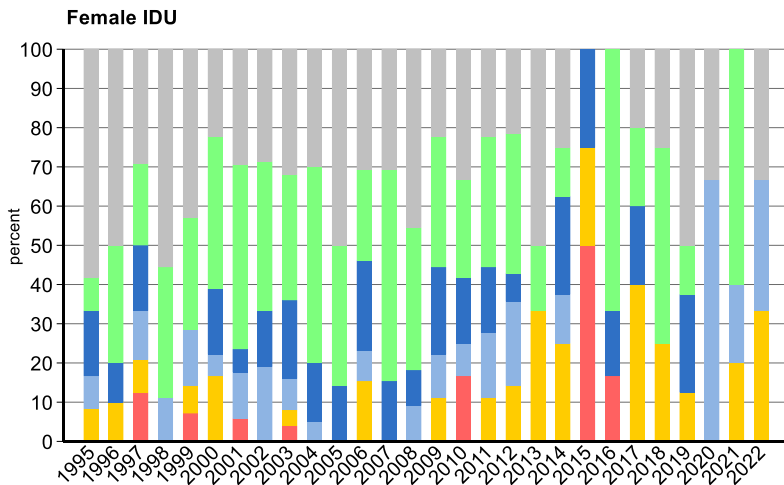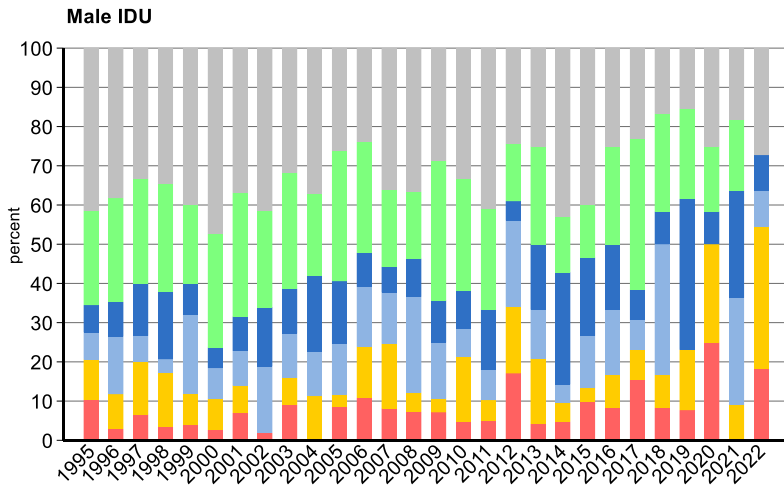
Female heterosexual
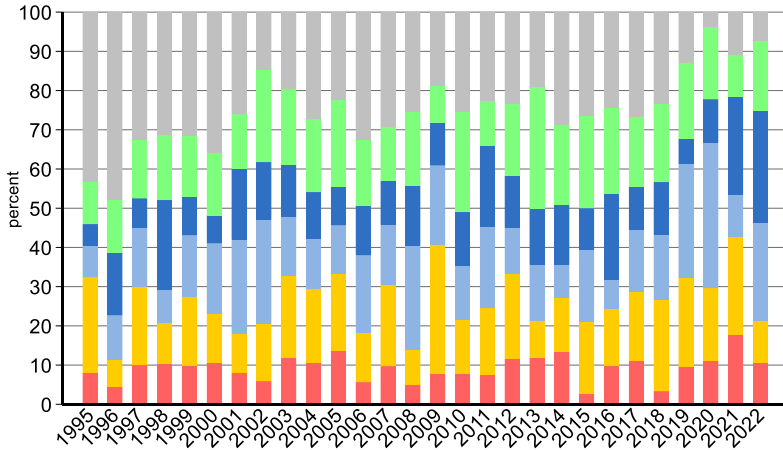
MSM
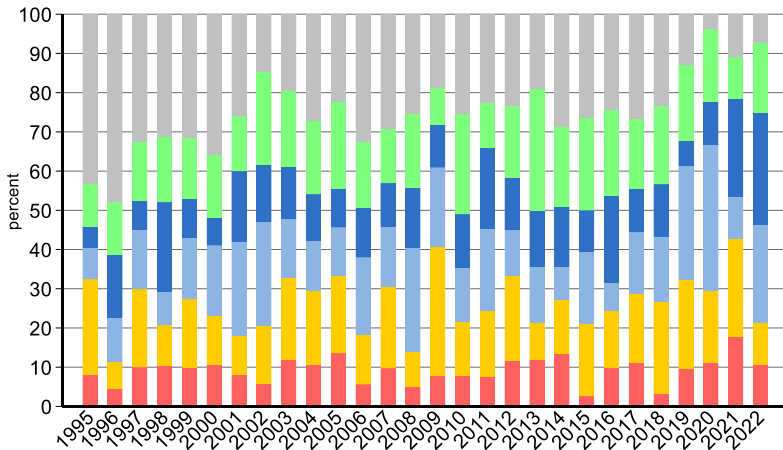
Other

■ <50　■ 50-199　■ 200-349　■ 350-499　■ >=500　■ No CD4 within 6 months

44
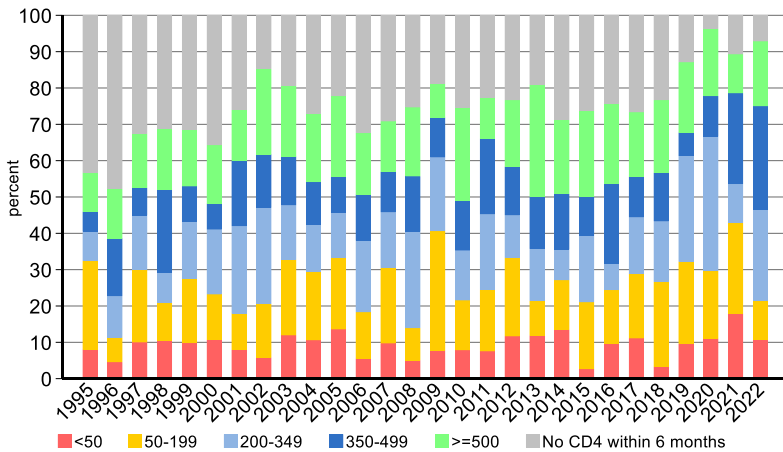
6.2   Patients diagnosed since 2001

6.2.1   Frequency of early and late diagnoses

"Early" diagnosis or **„recent" infection** is defined as: acute HIV infection (westernblot pattern or antigen/HIV RNA combined with clinical presentation) or documented seroconversion with negative HIV test not more than 3 years before the first positive test.

"Late" diagnosis is defined as: CD4 cell count below 350 at time of HIV diagnosis and/or AIDS within 3 months of HIV diagnosis

"Advanced" diagnosis is defined as: CD4 cell count below 200 at time of HIV diagnosis and/or AIDS within 3 months of HIV diagnosis

"Intermediate" diagnosis: CD4 cell count > 200, however not early diagnosed

Percentage of patients with late and advanced diagnosis

Advanced (men) | Advanced (women)
Late (men) | Late (women)

AIDS diagnosis within 3 months of testing HIV positive

Men | Women

46
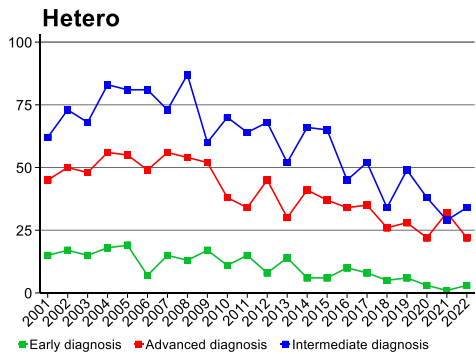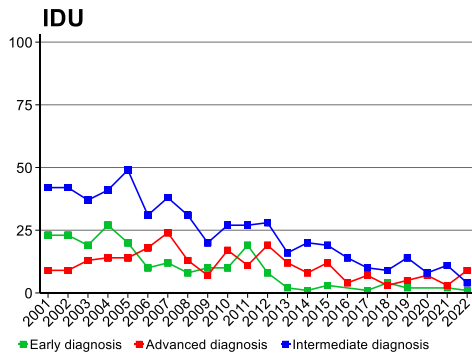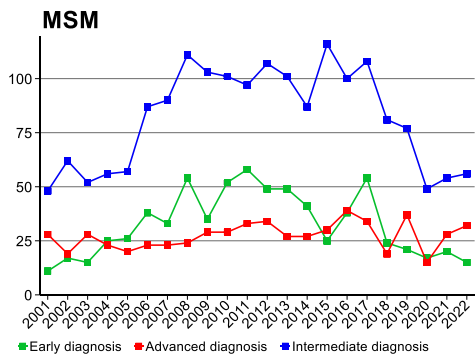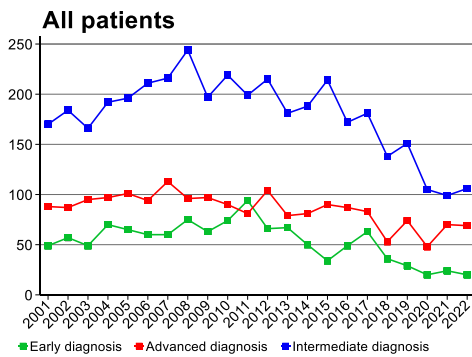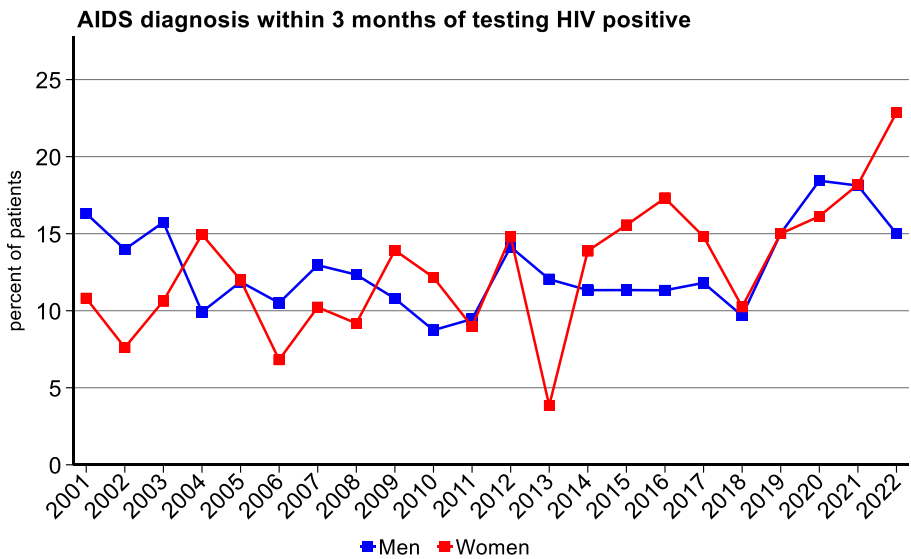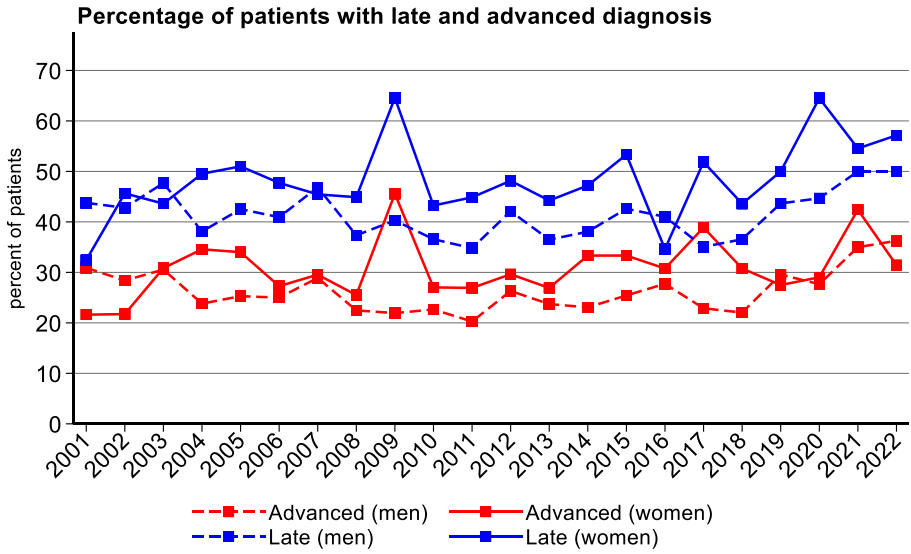
6.2.2 Factors associated with an „early" diagnosis in patients diagnosed since 2001

"Early" diagnosis or „recent" infection is defined as: acute HIV infection (westernblot pattern or antigen/HIV RNA combined with clinical presentation) or documented seroconversion with negative HIV test not more than 3 years before the first positive test.

All centres	1186	7109	16.68%	Univariable logistic Regression			Multivariable logistic Regression		
	Frequencies		%	OR	[95% CI]	p value	OR	[95% CI]	p value
Demographic characteristics									
Age at time of HIV diagnosis									
< 30 years	479	2444	19.60%	1.84	[1.47,2.30]	0.000	1.85	[1.45,2.35]	0.000
30-50 years	599	3741	16.01%	1.44	[1.16,1.79]	0.001	1.38	[1.10,1.74]	0.005
≥ 50	108	924	11.69%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
HIV transmission category									
Male IDU	141	752	18.75%	0.78	[0.64,0.95]	0.015	0.76	[0.62,0.94]	0.011
Female IDU	65	239	27.20%	1.26	[0.94,1.70]	0.127	1.06	[0.77,1.44]	0.731
Male heterosexual	120	1303	9.21%	0.34	[0.28,0.42]	0.000	0.39	[0.32,0.49]	0.000
Female heterosexual	113	1181	9.57%	0.36	[0.29,0.44]	0.000	0.42	[0.33,0.52]	0.000
Other	21	459	4.58%	0.16	[0.10,0.25]	0.000	0.19	[0.12,0.30]	0.000
MSM	726	3175	22.87%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
Federal state									
Carinthia	30	301	9.97%	0.63	[0.43,0.93]	0.020			
Upper Austria	120	663	18.10%	1.26	[1.01,1.57]	0.044			
Salzburg	90	389	23.14%	1.71	[1.32,2.21]	0.000			
Styria	92	634	14.51%	0.97	[0.76,1.23]	0.774			
Tyrol	150	479	31.32%	2.59	[2.08,3.22]	0.000			
Other federal states	189	1012	18.68%	1.31	[1.08,1.58]	0.005			
Missing	0	6	0.00%	1.00	[1.00,1.00]	.			
Foreign countries	73	670	10.90%	0.70	[0.53,0.90]	0.007			
Vienna	442	2955	14.96%	1.00	[1.00,1.00]	.			
Population size of area of residence									
Missing value	6	97	6.19%	0.39	[0.17,0.89]	0.026	0.59	[0.25,1.37]	0.220
< 100 000	533	2869	18.58%	1.34	[1.17,1.54]	0.000	1.66	[1.43,1.92]	0.000
≥ 100 000	185	964	19.19%	1.40	[1.16,1.69]	0.001	1.79	[1.46,2.18]	0.000
> 1 million	462	3179	14.53%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
Nationality									
Missing value	5	50	10.00%	0.43	[0.17,1.08]	0.072	0.45	[0.17,1.15]	0.096
Low prevalence countries	213	1780	11.97%	0.52	[0.45,0.61]	0.000	0.52	[0.44,0.62]	0.000
High prevalence countries	39	775	5.03%	0.20	[0.15,0.28]	0.000	0.29	[0.21,0.41]	0.000
Austria	929	4504	20.63%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
Calendar period of HIV test									
2005-2008	260	1531	16.98%	0.98	[0.81,1.19]	0.848	0.96	[0.78,1.18]	0.713
2009-2012	297	1499	19.81%	1.18	[0.98,1.44]	0.083	1.08	[0.88,1.32]	0.473
2013-2016	200	1292	15.48%	0.88	[0.71,1.08]	0.222	0.78	[0.63,0.98]	0.031
≥ 2017	204	1483	13.76%	0.76	[0.62,0.94]	0.011	0.67	[0.54,0.83]	0.000
2001-2004	225	1304	17.25%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.

6.2.3 Factors associated with a „late" diagnosis in patients diagnosed since 2001

"Late" diagnosis is defined as: CD4 cell count below 350 at time of HIV diagnosis and/or AIDS within 3 months of HIV diagnosis

All centres	3011	7109	42.35%	Univariable logistic Regression			Multivariable logistic Regression		
	Frequencies		%	OR	[95% CI]	p value	OR	[95% CI]	p value
Demographic characteristics									
Age at time of HIV diagnosis									
< 30 years	760	2444	31.10%	0.32	[0.27,0.37]	0.000	0.32	[0.27,0.38]	0.000
30-50 years	1707	3741	45.63%	0.59	[0.51,0.68]	0.000	0.60	[0.52,0.70]	0.000
≥ 50	544	924	58.87%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
HIV transmission category									
Male IDU	311	752	41.36%	1.38	[1.17,1.62]	0.000	1.52	[1.29,1.80]	0.000
Female IDU	65	239	27.20%	0.73	[0.54,0.98]	0.037	0.92	[0.68,1.25]	0.594
Male heterosexual	735	1303	56.41%	2.53	[2.22,2.89]	0.000	2.01	[1.75,2.32]	0.000
Female heterosexual	603	1181	51.06%	2.04	[1.78,2.34]	0.000	1.85	[1.60,2.15]	0.000
Other	223	459	48.58%	1.85	[1.52,2.25]	0.000	1.67	[1.35,2.05]	0.000
MSM	1074	3175	33.83%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
Federal state									
Carinthia	140	301	46.51%	1.24	[0.97,1.57]	0.080			
Upper Austria	305	663	46.00%	1.21	[1.02,1.44]	0.026			
Salzburg	161	389	41.39%	1.00	[0.81,1.24]	0.969			
Styria	283	634	44.64%	1.15	[0.96,1.36]	0.121			
Tyrol	181	479	37.79%	0.86	[0.71,1.05]	0.149			
Other federal states	451	1012	44.57%	1.14	[0.99,1.32]	0.068			
Missing	1	6	16.67%	0.28	[0.03,2.44]	0.251			
Foreign countries	269	670	40.15%	0.95	[0.80,1.13]	0.589			
Vienna	1220	2955	41.29%	1.00	[1.00,1.00]	.			
Population size of area of residence									
Missing value	31	97	31.96%	0.67	[0.44,1.04]	0.072	0.60	[0.38,0.94]	0.027
< 100 000	1278	2869	44.55%	1.15	[1.04,1.27]	0.007	1.01	[0.91,1.13]	0.826
≥ 100 000	395	964	40.98%	0.99	[0.86,1.15]	0.939	0.88	[0.76,1.03]	0.116
> 1 million	1307	3179	41.11%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
Nationality									
Missing/Unknown	12	50	24.00%	0.45	[0.24,0.87]	0.017	0.49	[0.25,0.97]	0.040
Low prevalence countries	708	1780	39.78%	0.95	[0.85,1.06]	0.353	1.04	[0.93,1.17]	0.487
High prevalence countries	442	775	57.03%	1.91	[1.63,2.22]	0.000	1.68	[1.41,2.00]	0.000
Austria	1849	4504	41.05%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
Calendar period of HIV test									
2005-2008	663	1531	43.31%	1.01	[0.87,1.17]	0.912	1.01	[0.87,1.18]	0.867
2009-2012	613	1499	40.89%	0.91	[0.79,1.06]	0.238	0.96	[0.82,1.12]	0.578
2013-2016	523	1292	40.48%	0.90	[0.77,1.05]	0.176	0.93	[0.79,1.10]	0.417
≥ 2017	650	1483	43.83%	1.03	[0.89,1.20]	0.697	1.03	[0.87,1.20]	0.760
2001-2004	562	1304	43.10%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.

6.2.4 Factors associated with mortality in patients diagnosed since 2001

Date of censoring: last contact with the HIV centre (32 missing)

All centres	806	7109	11.34%	Univariable Cox Regression			Multivariable Cox Regression		
	Frequencies		%	HR	[95% CI]	p value	HR	[95% CI]	p value
Demographic characteristics									
Age at time of HIV diagnosis									
< 30 years	206	2444	8.43%	0.26	[0.21,0.31]	0.000	0.19	[0.15,0.24]	0.000
30-50 years	372	3741	9.94%	0.32	[0.27,0.38]	0.000	0.29	[0.24,0.34]	0.000
≥ 50	228	924	24.68%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
HIV transmission category									
Male IDU	226	752	30.05%	3.82	[3.16,4.61]	0.000	4.28	[3.51,5.22]	0.000
Female IDU	68	239	28.45%	3.18	[2.41,4.18]	0.000	3.80	[2.84,5.07]	0.000
Male heterosexual	174	1303	13.35%	1.77	[1.45,2.17]	0.000	1.23	[0.99,1.51]	0.057
Female heterosexual	70	1181	5.93%	0.71	[0.54,0.93]	0.014	0.73	[0.55,0.97]	0.030
Other	59	459	12.85%	2.24	[1.68,2.99]	0.000	1.93	[1.43,2.59]	0.000
MSM	209	3175	6.58%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
Population size of area of residence									
Missing value	6	97	6.19%	0.87	[0.39,1.95]	0.733	1.16	[0.50,2.65]	0.730
< 100 000	254	2869	8.85%	0.60	[0.51,0.70]	0.000	0.64	[0.55,0.75]	0.000
≥ 100 000	87	964	9.02%	0.60	[0.48,0.75]	0.000	0.76	[0.60,0.96]	0.021
> 1 million	459	3179	14.44%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
Nationality									
Missing/Unknown	4	50	8.00%	0.68	[0.26,1.83]	0.449	0.85	[0.31,2.33]	0.750
Low prevalence countries	97	1780	5.45%	0.46	[0.37,0.57]	0.000	0.61	[0.49,0.76]	0.000
High prevalence countries	46	775	5.94%	0.41	[0.31,0.56]	0.000	0.68	[0.50,0.94]	0.019
Austria	659	4504	14.63%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
Stage of disease									
Advanced diagnosis									
Yes	346	1908	18.13%	2.19	[1.90,2.51]	0.000	2.00	[1.73,2.31]	0.000
No	460	5201	8.84%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
Calendar period of HIV test									
2005-2008	223	1531	14.57%	0.77	[0.65,0.93]	0.005	0.87	[0.72,1.04]	0.116
2009-2012	158	1499	10.54%	0.74	[0.60,0.91]	0.004	0.82	[0.67,1.01]	0.065
2013-2016	79	1292	6.11%	0.61	[0.47,0.80]	0.000	0.70	[0.54,0.91]	0.008
≥ 2017	45	1483	3.03%	0.56	[0.41,0.79]	0.001	0.61	[0.44,0.86]	0.004
2001-2004	301	1304	23.08%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.

Survival after the HIV diagnosis

Number at risk						
	0	1	2	3	4	5
Advanced	1907	1603	1461	1355	1248	1169
Early	5184	4647	4322	4041	3780	3500

Number at risk						
Male IDU	749	663	618	582	543	509
Female IDU	239	225	211	203	192	189
Male heterosexual	1303	1132	1046	975	906	844
Female heterosexual	1180	1043	991	941	891	851
MSM	3167	2835	2606	2408	2235	2039
Other	453	352	311	287	261	237

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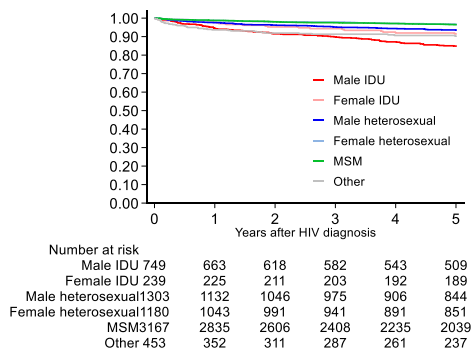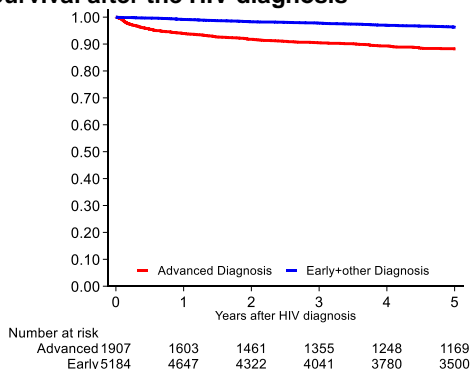
7 Co-infections

7.1 Syphilis

Syphilis can persist for several years when it is not treated, and reinfection with syphilis is possible because there is no protective immunity.

7.1.1 Status post syphilis diagnoses

Included are all patients seen since 1.1.2001.
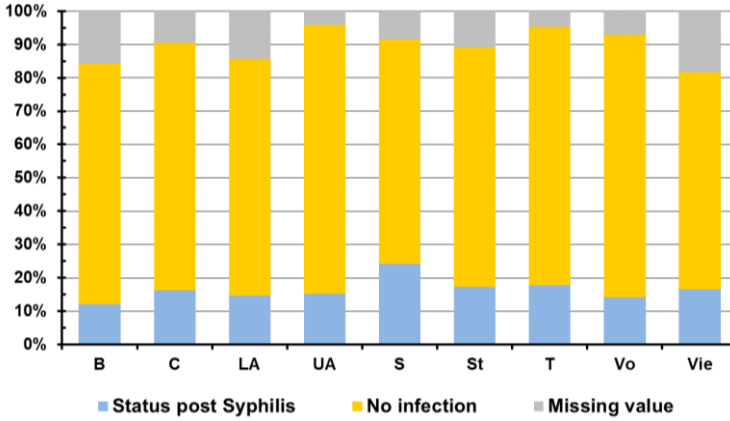
7.1.2 Syphilis at time of HIV diagnosis
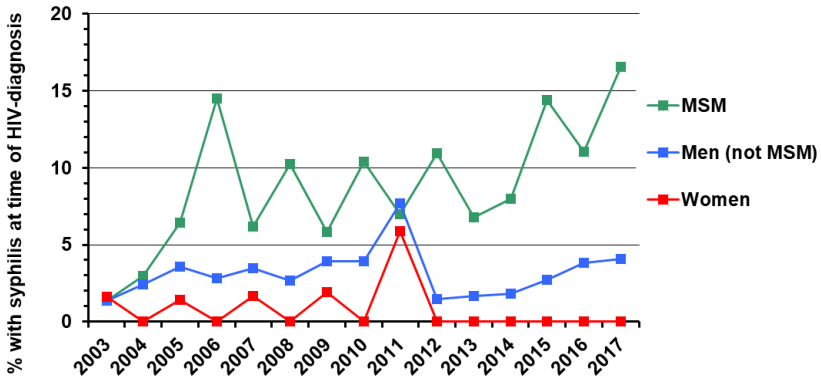
7.1.3   Stages of syphilis among HIV-infected MSM
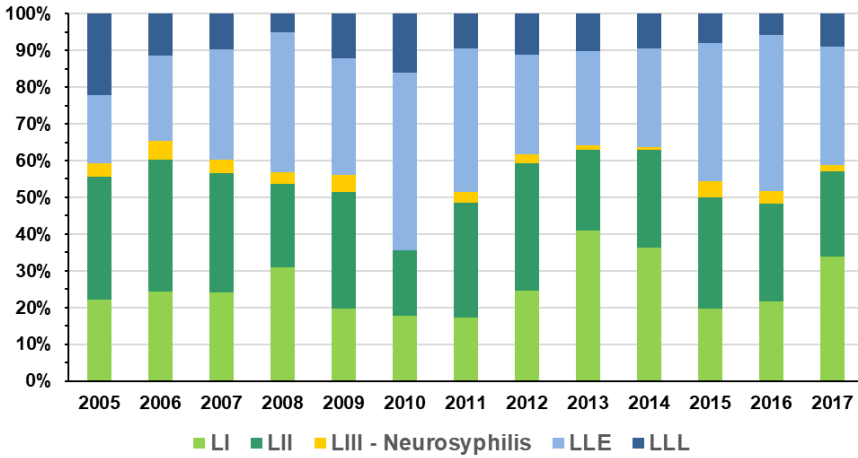
7.1.4   „Recent" syphilis infections: Incidence

This analysis only includes new "recent" syphilis infections defined as follows: patients with a former syphilis result that was either negative or a status post treatment and who now presented with active syphilis (= new „recent" syphilis infections).
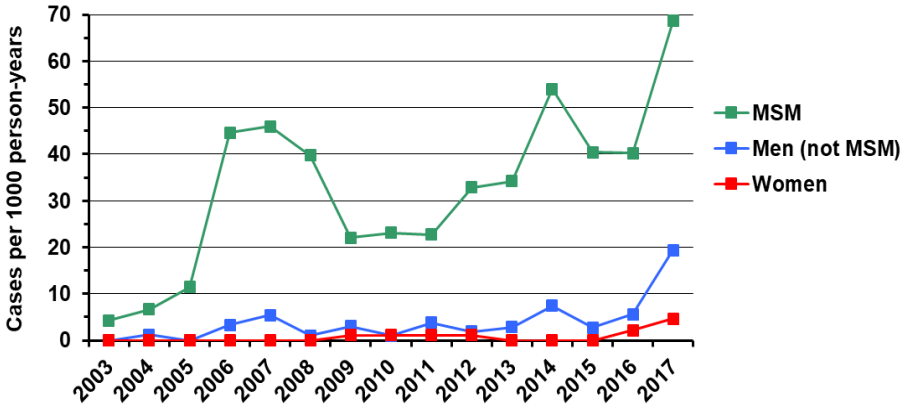
	MSM with incident syphilis		MSM without syphilis		Odds ratio	± 95% C.I.	
N	533	(100.0%)	1825	(100.0%)			
Patients not on ART	105	(19.7%)	313	(17.2%)			
Patients on ART	428	(80.3%)	1512	(82.8%)	0.84	0.66 to	1.08
ART interruptions	95	(22.2%)	274	(18.1%)	1.29	0.99 to	1.68
Mean duration of ART in months (± SD)	34.4	(± 66.5)	61.6	(± 67.9)	p<0.001		
Patients on ART since 2.5 m	339	(63.6%)	1372	(75.2%)	0.43	0.32 to	0.58
HIV RNA <50 copies/ml	299	(88.2%)	1223	(89.1%)	0.77	0.51 to	1.15
Chronic hepatitis B	22	(4.1%)	42	(2.3%)	1.83	1.08 to	3.09
Chronic hepatitis C	20	(3.8%)	25	(1.4%)	2.81	1.55 to	5.09
Resistance							
Any (on ART)	86	(20.1%)	206	(13.6%)	1.51	1.15 to	1.99
Any transmitted	34	(6.4%)	97	(5.3%)	1.21	0.81 to	1.82
Mean CD4 nadir (± SD)	283.2	(± 175.3)	308.9	(± 219.9)	p=0.014		
Mean age (± SD)	40.6	(± 10.0)	44.3	(± 12.6)	p<0.001		

Incident cases of syphilis among HIV-infected MSM
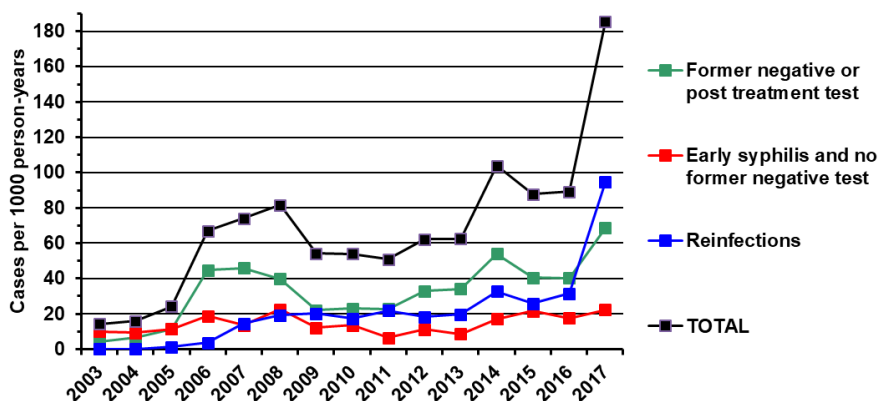
7.2 Tuberculosis in patients seen since 1.1.2010

Tuberculosis is incompletely recorded in the *HIV Patient Management System*.

Tuberculosis
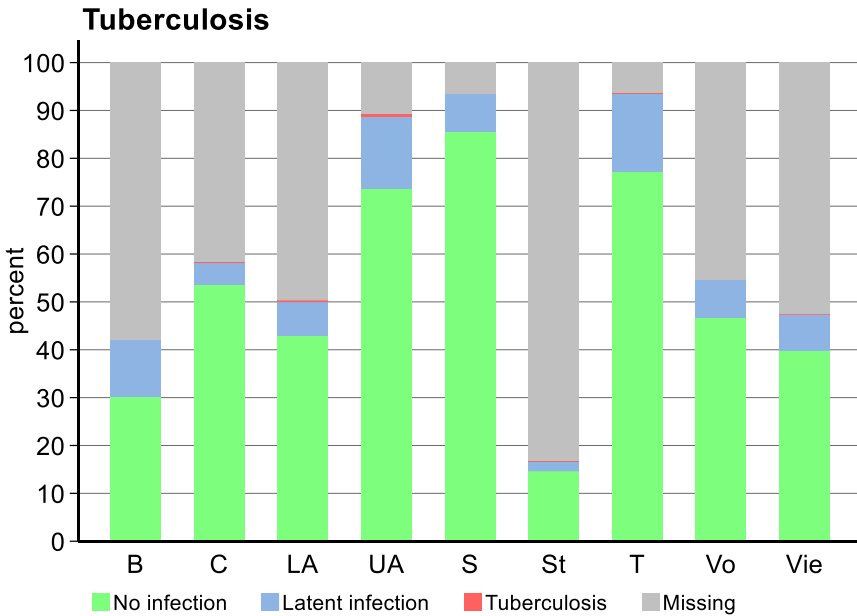
7.3 Hepatitis C

HCV co-infection was defined by a positive result on a qualitative or quantitative RNA test result.

Hepatitis C-All patients since 2014

Hepatitis C-All patients since 2014
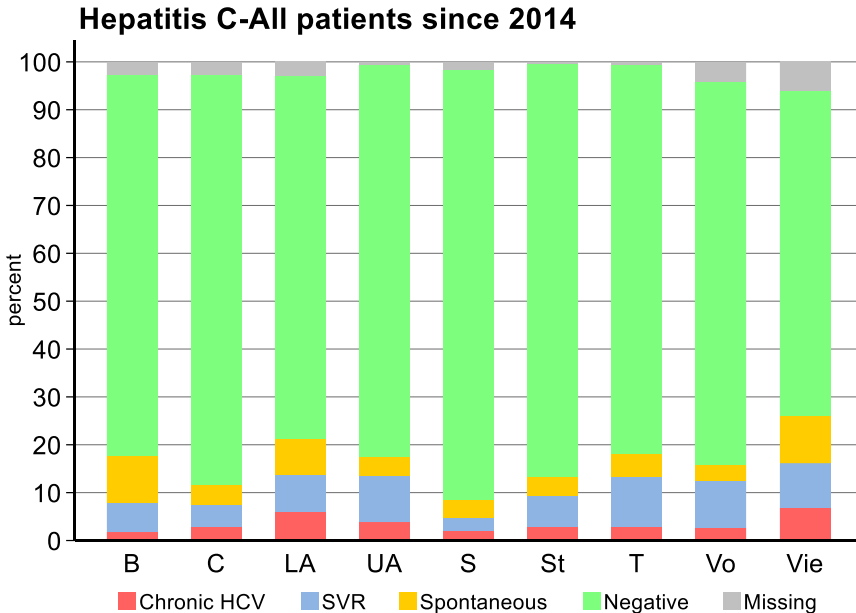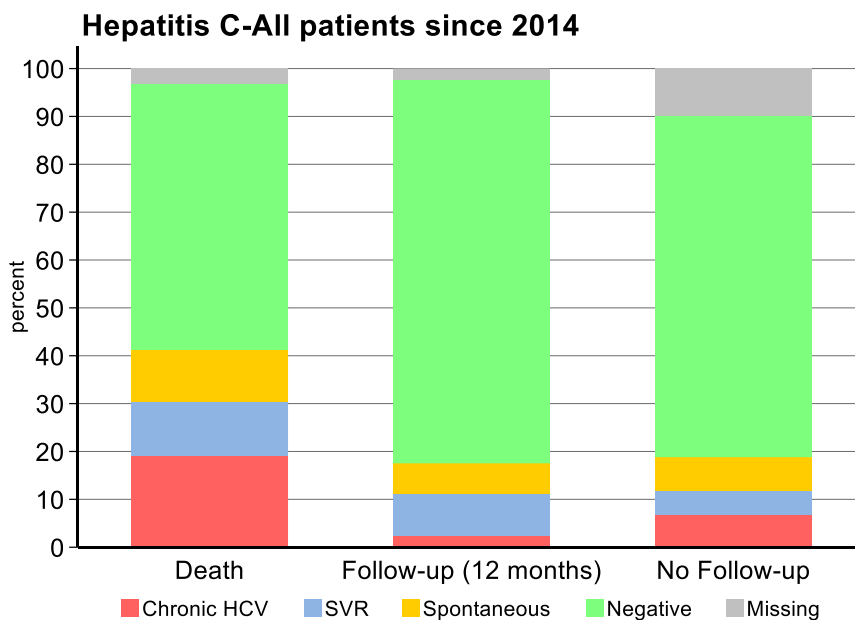
7.3.1 Cascade of Care in patients seen since 01.01.2014 and alive after 01.01.2023

Stage	Definition
Stage1: anti-HCV +ve	Either anti-HCV positive test, HCV-RNA positive test, HCV genotyped or received HCV treatment before index date
Stage 2: HCV-RNA tested	Either HCV-RNA tested, HCV genotyped or received HCV treatment before index date
Stage 3: Ever HCV-RNA +ve	Either HCV-RNA positive test, received HCV treatment or HCV genotyped before index date
Stage 4: Remaining HCV-RNA +ve	HCV-RNA ever positive and no spontaneous clearance
Stage 5: Ever received treatment	Started HCV treatment on or before index date
Stage 6: Cured (SVR) and ongoing therapy	HCV-RNA test after completing treatment (HCV-RNA test data included for duration of FU to allow for assessment of SVR); Ongoing therapy if still on treatment or end of therapy less than 12 weeks before 01.09.2023
Stage 8: Cured (SVR)	HCV-RNA negative test at least 12 or 24 weeks post-treatment (for IFN-free and IFN-based therapy, respectively)

7046 (100%)	6733 (95.6%)	1278 (18.1%)	1278 (100%)	1248 (97.7%)	973 (76.1%)	784 (61.3%)	784 (100%)	624 (79.6%)	573 (73.1%)	567 (72.3%)

■ Centres referring DAAs (1833)   ■ Centres refer to hepatologists for DAAs (5213)
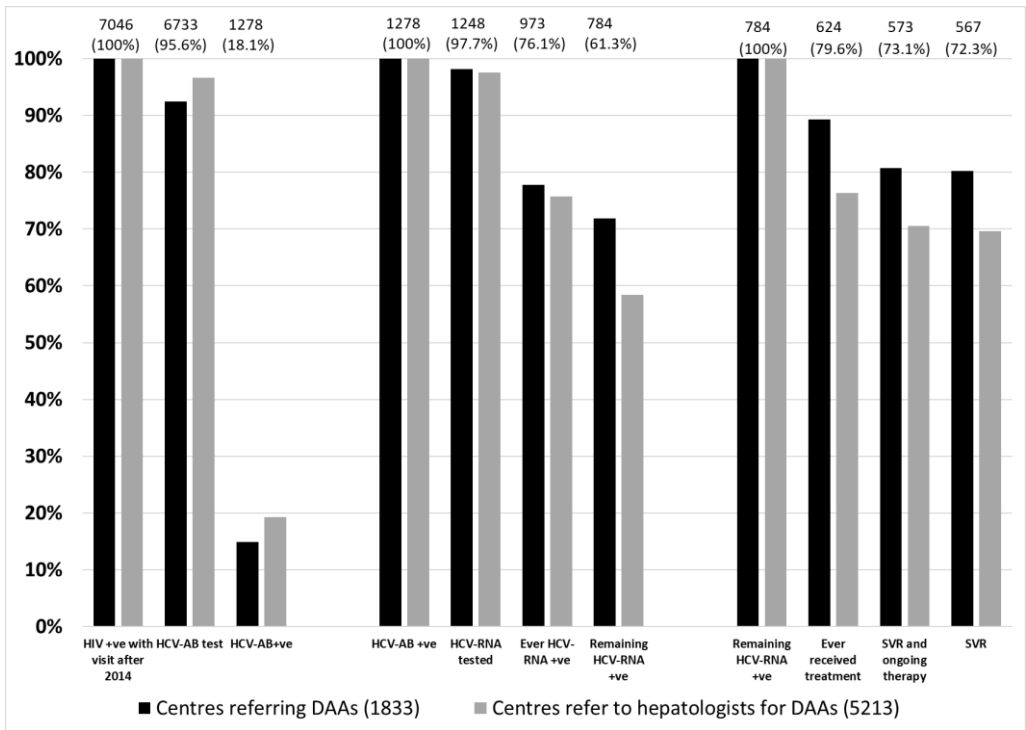
7.4 Hepatitis B in patients seen since 1.1.2010

Chronic HBV was defined by a positive result on a hepatitis B surface antigen (HBsAg) test or by a positive HBV DNA test result.

Hepatitis B-All patients since 2010

Legend:
- Chronic HBV
- Antibody positive (vaccination)
- Antibody positive
- No antibodies despite vaccinatio
- No Infection
- Missing
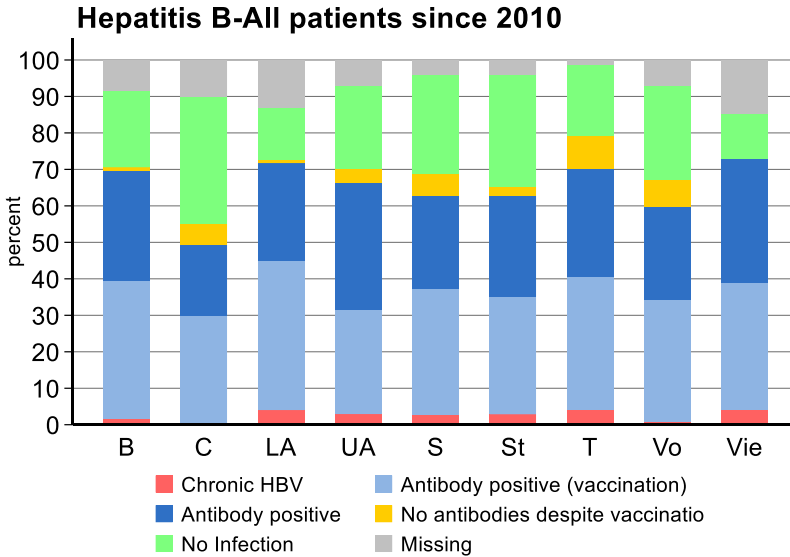
Therapy for hepatitis B (patients currently in care)

Current guidelines recommend the use of tenofovir and emtricitabine or tenofovir and lamivudine as the NRTI-backbones in cART combinations for HBV-HIV co-infected patients. Most of the HBV-HIV co-infected patients in care at one of the Austrian HIV treatment centres received an NRTI-backbone to help control the HBV infection.

Legend:
- Lamivudin
- Lamivudin&Tenofovir
- Tenofovir
- Tenofovir&Emtricitabin
- Emtricitabin
- ART without HBV-therapy
- Neither ART nor HBV-therapy

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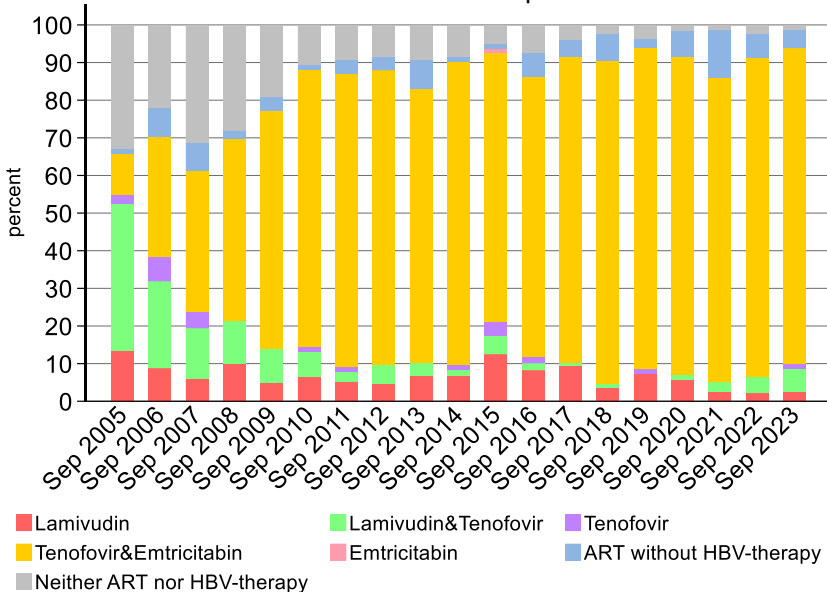
8 Transmission of drug resistant HIV (data: 03/2023)

8.1 Abstract

Prevalence of Transmitted Drug Resistance is Stabilising at a Low Rate in Austria

Objective: To determine the prevalence of transmitted drug resistance (TDR), temporal trends in resistance, and predictors for TDR.
Method: Newly diagnosed patients from 2003 to December 2022 from nine centres were analyzed. Mutations were judged as resistant according to Bennett et al. (WHO 2009 mutation list). For patients with acute or recent infection the year of infection was obtained by the date of primary HIV infection or the median point in time between negative and positive HIV test. For patients with chronic infection the rate of resistance was plotted against the year of the HIV diagnosis.
Results: Overall 3913 of 6307 patients had an amplifiable resistance test. The overall prevalence of TDR was 7.0 (275 of 3913 patients; 95% CI: 6.3%-7.9%). The prevalence of NRTI resistance was 2.9% (2.4%-3.4%), the prevalence of NNRTI resistance was 2.9% (2.4%-3.5%), and the prevalence of PI resistance was 1.7% (1.4%-2.2%). The relative risk of TDR in men who have sex with men compared to heterosexual contacts was 1.5 (95% CI: 1.1-1.9). The prevalence rate of TDR in the 1128 patients with acute/recent infection was 7.5% (64 of 852 patients; 5.9%-9.5%). One patient (0.1%) showed TDR against 3 drug classes (K70R; K103N; L90M). The prevalence rate of TDR in the 5155 patients with chronic infection was 6.9% (211 of 3061 patients; 6.1%-7.9%).
Conclusions: The prevalence of TDR among newly diagnosed patients was found to be stabilizing. No difficult to treat cases of TDR has been observed.

8.2 Introduction

Number of cohort participants:
Only patients with HIV diagnosis between 2003-2022 have been analyzed because extensive documentation of resistance testing started at this time.

HIV test	OWS Vienna	AKH Vienna	KFJ Vienna	Linz	Salz-burg	Inns-bruck	Feld-kirch	Graz	Klagen-furt	Total
until 2003	1575	1192	37	610	124	818	14	236	66	**4672**
2003-2022	1203	2093	234	662	431	685	137	605	257	**6307**

The rate of transmission of drug resistant HIV („percent with resistance") corresponds to the number of patients with resistance mutations in relation to the number of patients with a genotypic resistance test <u>before</u> antiretroviral therapy. For this, the genomes of the reverse transcriptase (RT) and the protease (P) were sequenced. The resistance mutations have been classified according to Bennett DE et al. Drug resistance mutations for surveillance of transmitted HIV-1 drug-resistance: 2009 update. PLoS One 2009;4(3):e4724.
Patients were either analysed according to the time of the infection („recent infection"), or, if this was not known, patients were analysed according to the year of the HIV diagnosis.

The following codons and amino acids were classified as resistance:

Reverse Transkriptase				Protease	
NRTI		**NNRTI**			
M41	L	L100	I	L23	I
K65	R	K101	E, P	L24	I
D67	N, G, E	K103	N, S	D30	N
T69	D, ins	V106	M, A	V32	I
K70	R, E	V179	F	M46	I, L
L74	V, I	Y181	C, I, V	I47	V, A
V75	T, M, A, S	Y188	L, H, C	G48	V, M
F77	L	G190	A, S, E	I50	V, L
Y115	F	P225	H	F53	L, Y
F116	Y	M230	L	I54	V, L, M, A, T, S
Q151	M			G73	S, T, C, A
M184	V, I			L76	V
L210	W			V82	A, T, F, S, C, M, L
T215	Y, F, I, S, C, D, V, E			N83	D
K219	Q, E, N, R			I84	V, A, C
				I85	V
				N88	D, S
				L90	M

8.3 Number of patients with "recent" or chronic HIV infection

	Number of HIV diagnoses	"Recent" infections	Unknown time of infection
Year	**Year of HIV diagnosis**	**Year of HIV infection**	**Year of HIV diagnosis**
2001	-	2	-
2002	-	22	-
2003	308	61	256
2004	359	64	287
2005	361	77	292
2006	365	57	303
2007	388	83	315
2008	413	66	335
2009	353	68	287
2010	374	96	289
2011	372	99	269
2012	385	63	313
2013	325	66	251
2014	316	46	263
2015	336	48	299
2016	306	53	255
2017	323	50	257
2018	222	43	186
2019	251	30	217
2020	173	27	152
2021	188	16	163
2022	189	15	166
Total	**6307**	**1152**	**5155**

8.4 „Recent" infection (time of infection known or estimated)

„Recent" infection means:
- Acute HIV infection (westernblot pattern or antigen/HIV RNA with clinical symptoms)
- Documented seroconversion with a negative HIV test not more than 3 years before the first positive test

Calculation of the time of infection (year of the HIV infection):
- Time point of the acute HIV infection or
- Midpoint between last negative and first positive HIV test

	Number of "recent" HIV infections	Available resistance tests before ART	Any resistance
Year of "recent" HIV infection			
2003	61	50	5
2004	64	52	3
2005	77	57	3
2006	57	44	3
2007	83	64	8
2008	66	52	6
2009	68	54	7
2010	96	72	7
2011	99	81	5
2012	63	45	3
2013	66	51	4
2014	46	34	2
2015	48	35	2
2016	53	41	1
2017	50	36	1
2018	43	32	2
2019	30	16	-
2020	27	18	2
2021	16	10	-
2022	15	8	-
Sex/ mode of transmission			
MSM	731	557	50
Male IDU	114	82	3
Female IDU	45	30	3
Male heterosexual	113	89	6
Female heterosexual	102	83	2
Other	23	11	-
Total	**1128**	**852**	**64**

Overall rate of transmitted drug resistance in recent infection was 7.5% (64 of 852).
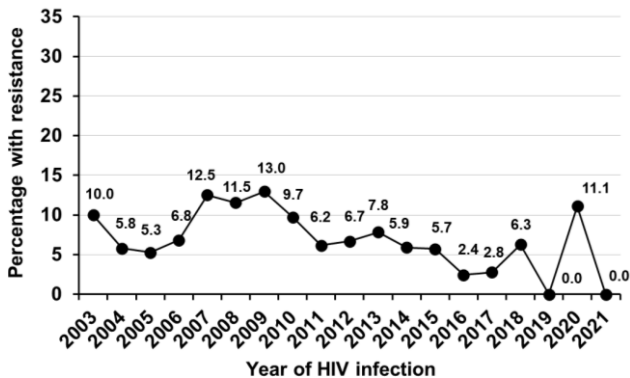
The year 2022 is not shown in the graph, as because of the definition of recent infection only a limited number of patients can be defined.

Transmission of drug resistant HIV according to the time of the "recent" HIV infection, residence, mode of transmission, sex, age
"Recent" infections

	Number of HIV infections	Available resistance tests	Wild type	Any resistance	Resistance to						
					NRTI	NNRTI	PI	NRTI and PI	NRTI and NNRTI	NNRTI and PI	3-class-resistance
Year of HIV infection											
2003	61	50	45	5	4	1	-	-	-	-	-
2004	64	52	49	3	-	3	-	-	-	-	-
2005	77	57	54	3	1	2	-	-	-	-	-
2006	57	44	41	3	1	2	-	-	-	-	-
2007	83	64	56	8	4	4	3	1	2	1	1
2008	66	52	46	6	3	1	3	1	-	-	-
2009	68	54	47	7	2	3	4	1	-	1	-
2010	96	72	65	7	1	5	1	1	-	-	-
2011	99	81	76	5	1	4	1	1	-	1	-
2012	63	45	42	3	3	-	-	-	-	-	-
2013	66	51	47	4	1	2	1	-	-	-	-
2014	46	34	32	2	2	-	-	-	-	-	-
2015	48	35	33	2	1	1	-	-	-	-	-
2016	53	41	40	1	-	1	-	-	-	-	-
2017	50	36	35	1	-	-	1	-	-	-	-
2018	43	32	30	2	-	1	1	-	-	-	-
2019	30	16	16	-	-	-	-	-	-	-	-
2020	27	18	16	2	-	2	-	-	-	-	-
2021	16	10	10	-	-	-	-	-	-	-	-
2022	15	8	8	-	-	-	-	-	-	-	-
Population size of area of residence											
Rural areas	501	391	363	28	10	16	6	1	1	3	1
Capital cities	180	143	130	13	3	5	6	1	-	-	-
Vienna	442	317	294	23	11	11	3	1	1	-	-
Missing value	5	1	1	-	-	-	-	-	-	-	-
Sex/ mode of transmission											
MSM	731	557	507	50	18	25	14	3	2	3	1
Male IDU	114	82	79	3	2	1	-	-	-	-	-
Female IDU	45	30	27	3	-	3	-	-	-	-	-
Male heterosexual	113	89	83	6	2	3	1	-	-	-	-
Female heterosexual	102	83	81	2	2	-	-	-	-	-	-
Others	23	11	11	-	-	-	-	-	-	-	-
Age at time of HIV-test											
< 35 years	649	478	432	46	16	25	8	1	1	1	-
≥ 35 years	479	374	356	18	8	7	7	2	1	2	1
Total	**1128**	**852**	**788**	**64**	**24**	**32**	**15**	**3**	**2**	**3**	**1**

Younger patients (<35 years) had a higher risk for transmitted resistance (OR=2.3, 95% CI: 1.3-4.1).

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8.5   Unknown time of infection (not "recent")

Men who had been infected through intravenous drug use (OR=0.4, 95% CI: 0.2-0.7) or heterosexually (OR=0.6, 95% CI: 0.4-0.9) had a lower risk of transmitted resistance, younger patients (<35 years) had a higher risk (OR=1.5, 95 %-CI: 1.1–1.9).

	Number of HIV diagnoses	Available resistance tests before ART	Any resistance
Year of HIV diagnosis			
2003	256	145	8
2004	287	182	11
2005	292	189	9
2006	303	185	13
2007	315	193	12
2008	335	194	9
2009	287	188	19
2010	289	189	15
2011	269	173	13
2012	313	190	9
2013	251	156	12
2014	263	147	13
2015	299	171	14
2016	255	162	14
2017	257	151	10
2018	186	107	6
2019	217	107	8
2020	152	65	5
2021	163	88	5
2022	166	79	6
Mode of transmission			
MSM	2175	1350	111
Male IDU	504	307	10
Female IDU	146	82	7
Male heterosexual	1022	625	30
Female heterosexual	934	563	41
Other	374	134	12
Total	**5155**	**3061**	**211**

Transmission of drug resistant HIV according to the time of the HIV diagnosis, residence, mode of transmission, gender and age
Not-"recent" infections

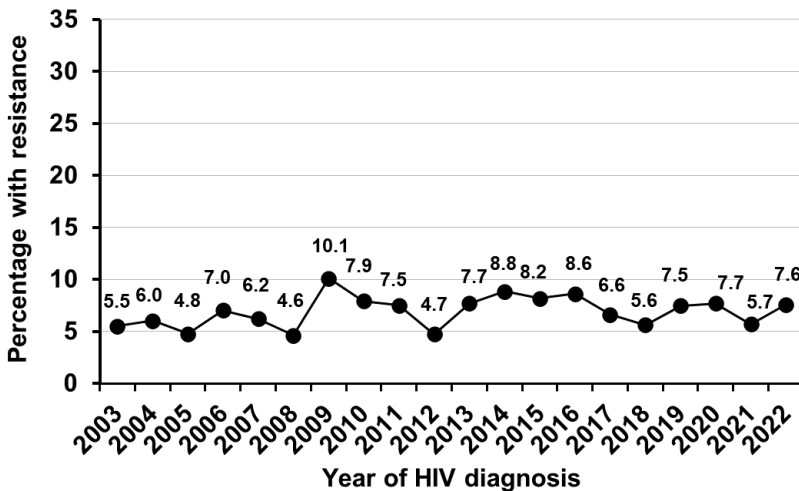|	Number of HIV diagnoses	Available resistance tests	Wild type	Resistance to							
				Any resistance	NRTI	NNRTI	PI	NRTI and PI	NRTI and NNRTI	NNRTI and PI	3-class-resistance
Year of HIV diagnosis											
2003	256	145	137	8	4	3	1	-	-	-	-
2004	287	182	171	11	6	2	4	1	-	-	-
2005	292	189	180	9	7	1	4	3	-	-	-
2006	303	185	172	13	6	2	5	-	-	-	-
2007	315	193	181	12	7	2	3	-	-	-	-
2008	335	194	185	9	4	2	3	-	-	-	-
2009	287	188	169	19	7	4	9	-	1	-	-
2010	289	189	174	15	4	8	4	1	-	-	-
2011	269	173	160	13	3	6	4	-	1	-	-
2012	313	190	181	9	7	2	1	-	-	-	-
2013	251	156	144	12	7	5	-	-	-	-	-
2014	263	147	134	13	3	6	4	-	-	-	-
2015	299	171	157	14	5	6	4	-	-	1	-
2016	255	162	148	14	3	10	1	-	-	-	-
2017	257	151	141	10	4	6	-	-	-	-	-
2018	186	107	101	6	4	1	2	1	-	-	-
2019	217	107	99	8	2	5	1	-	1	-	-
2020	152	65	60	5	2	4	-	-	-	-	-
2021	163	88	83	5	2	3	-	-	-	-	-
2022	166	79	73	6	1	3	2	-	-	-	-
Population size of area of residence											
Rural areas	2051	1260	1167	93	40	33	21	-	1	-	-
Capital cities	689	480	446	34	9	18	9	-	2	-	-
Vienna	2345	1302	1221	81	38	29	21	6	-	1	-
Missing value	70	19	16	3	1	1	1	-	-	-	-
Sex/ mode of transmission											
MSM	2175	1350	1239	111	42	44	28	2	-	1	-
Male IDU	504	307	297	10	3	7	-	-	-	-	-
Female IDU	146	82	75	7	2	4	1	-	-	-	-
Male heterosexual	1022	625	595	30	14	7	11	1	1	-	-
Female heterosexual	934	563	522	41	23	13	10	3	2	-	-
Others	374	134	122	12	4	6	2	-	-	-	-
Age at time of HIV-test											
< 35 years	2586	1443	1330	113	48	48	25	6	2	-	-
≥ 35 years	2569	1618	1520	98	40	33	27	-	1	1	-
Total	**5155**	**3061**	**2850**	**211**	**88**	**81**	**52**	**6**	**3**	**1**	**0**

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9 Antiretroviral therapy (ART)

9.1 Patients currently in care regarding treatment status

Overall, 4710 persons were currently in care at a hospital-based HIV treatment centre (currently in care, those who had a visit within the last 6 months). On September 1st, 2023 4655 (98.8%) patients were on antiretroviral therapy in the 9 HIV treatment centres. Of the 55 patients not on treatment on September 1st, 2023, 22 had received antiretroviral treatment at an earlier point in time.
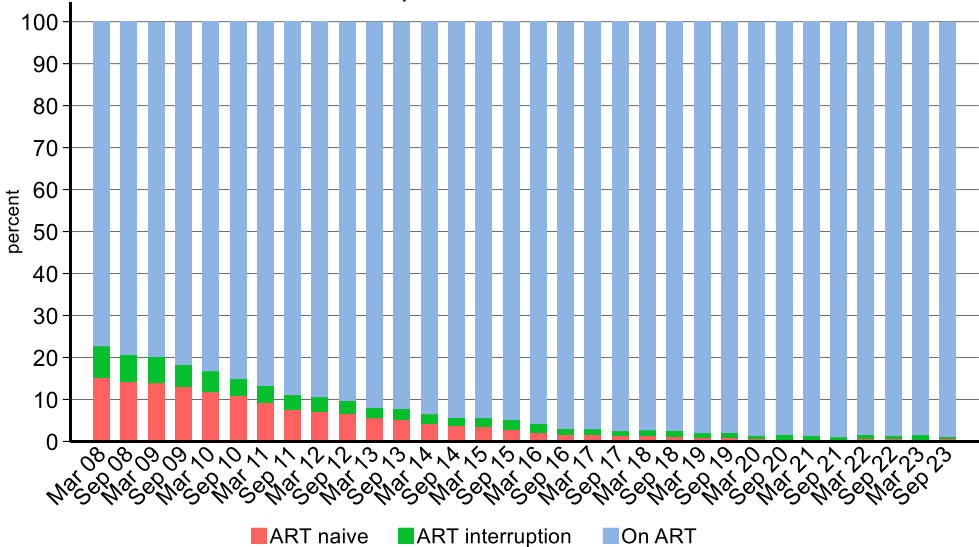
9.2 Regimens of antiretroviral therapy

Use of therapy regimens over time
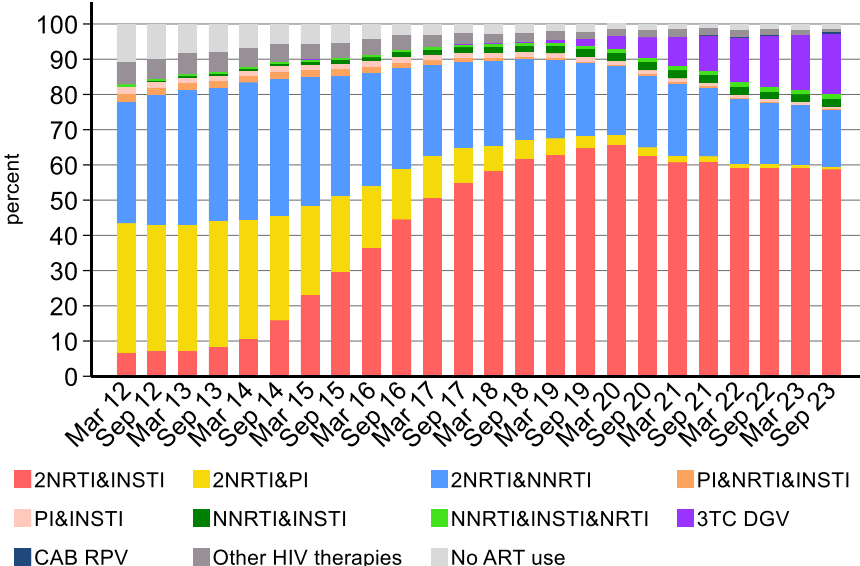
Proportion of therapy regimens on September 1st 2023

(absolut numbers given in parantheses)

Categories (x-axis):
2NRTI&INSTI (n=2767), 2NRTI&PI (n=38), 2NRTI&NNRTI (n=762), PI&NRTI&INSTI (n=11), PI&INSTI (n=30), NNRTI&INSTI (n=103), NNRTI&INSTI&NRTI (n=66), 3TC DGV (n=805), CAB RPV (n=23), Other HIV therapies (n=50), No ART use (n=55)
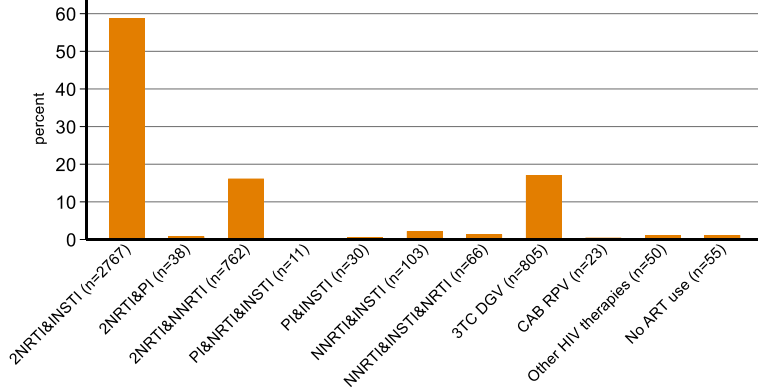
Therapy regimens in the patients currently in care

x-axis categories: B, C, LA, UA, S, St, T, Vo, Vie

x-axis categories: Male IDU, Female IDU, Male hetero, Female hetero, MSM, Other

Legend:
- 2NRTI&INSTI
- 2NRTI&PI
- 2NRTI&NNRTI
- PI&NRTI&INSTI
- PI&INSTI
- NNRTI&INSTI
- NNRTI&INSTI&NRTI
- 3TC DGV
- CAB RPV
- Other HIV therapies
- No ART use

64
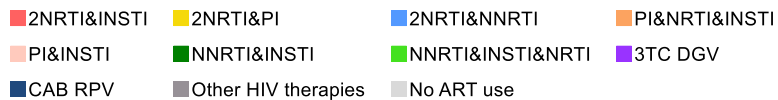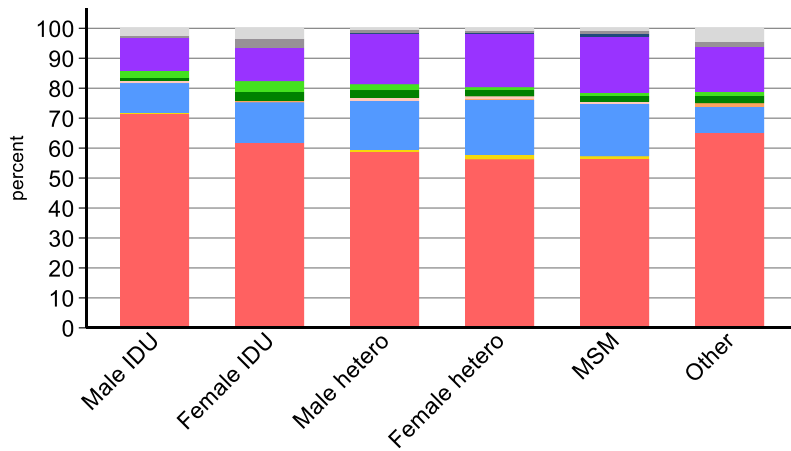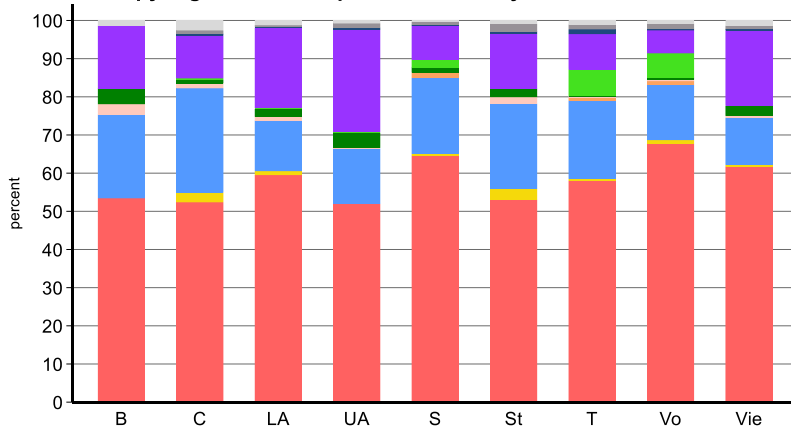
9.3   CD4 cell counts at initiation of ART

9.3.1   CD4 cell counts at initiation of ART

Median CD4 cell count-last measurement before ART start
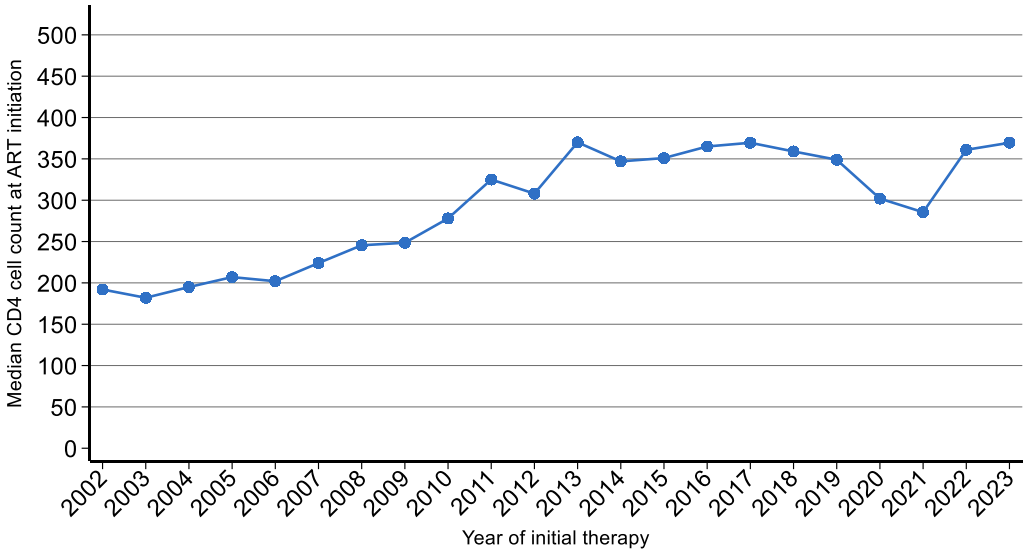
9.3.2   Median CD4 count at ART initiation

Transmission category
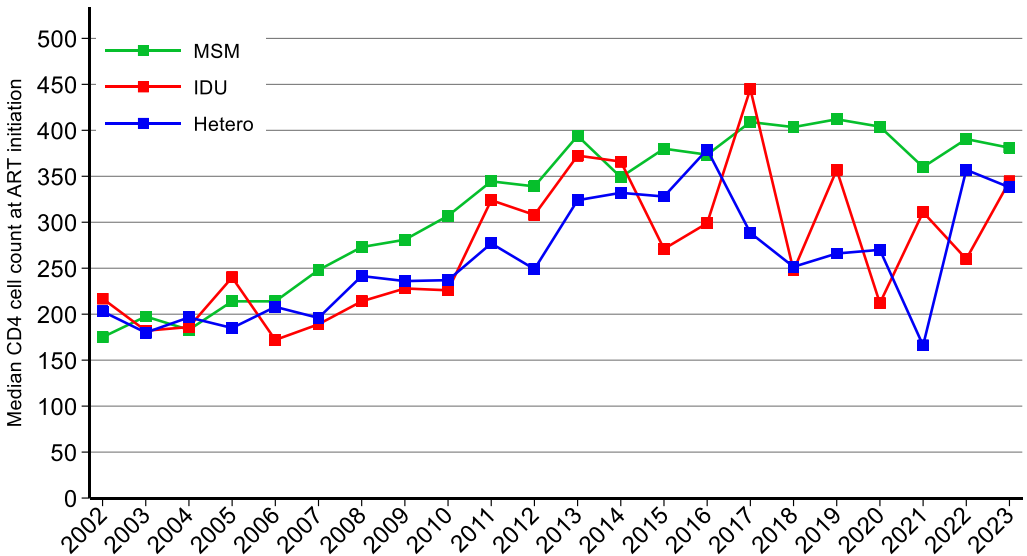
Level of education
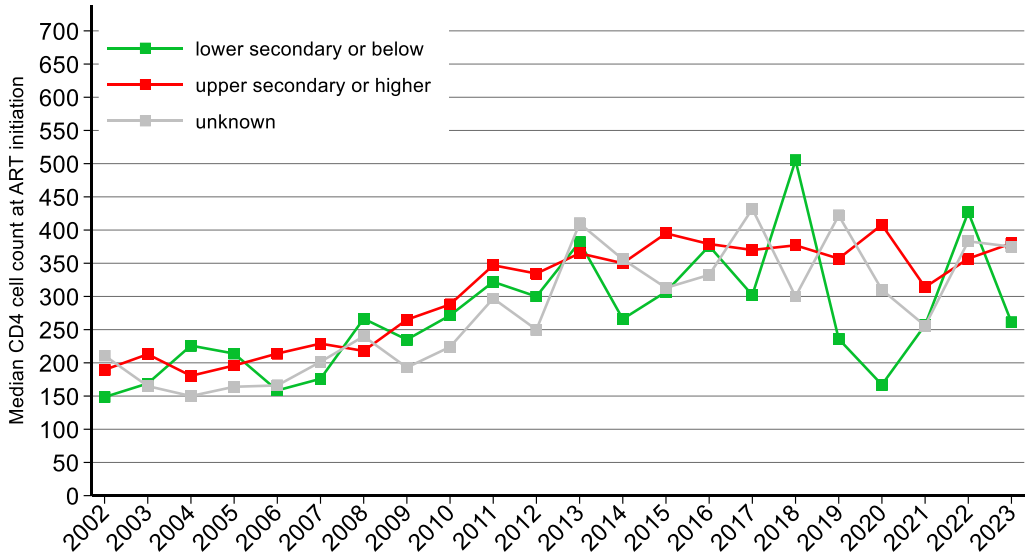
Status of employment

66
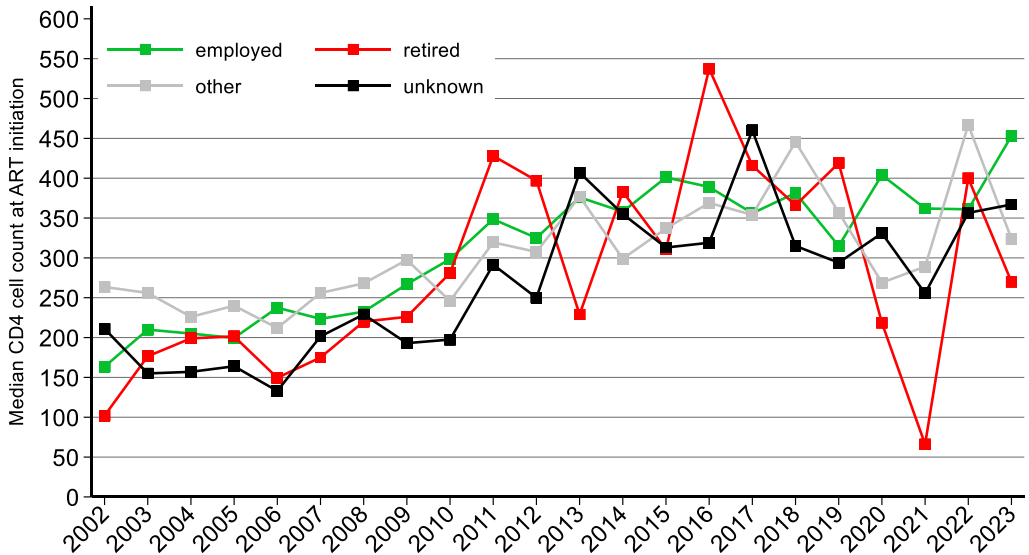
9.4 Initial therapy

9.4.1 Number of persons who started ART in the respective year
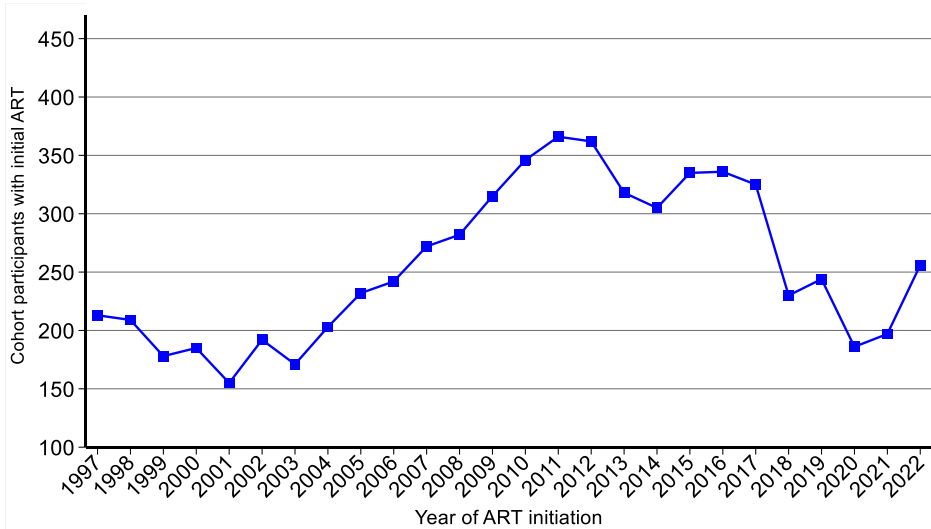
9.4.2 Regimens of the initial therapy

After March 1st, 2023, 116 patients started antiretroviral therapy. 104 of them also had their first measurement of CD4 cell count within this period.

Initial therapy by transmission category and sex

Chart: vertical stacked bar chart with y-axis labeled "percent" ranging from 0 to 100 in increments of 10. X-axis categories: Male IDU, Male hetero, Female hetero, MSM, Other.

Legend:
- 2NRTI&INSTI
- 2NRTI&PI
- 2NRTI&NNRTI
- 3TC DGV
- Other HIV therapies
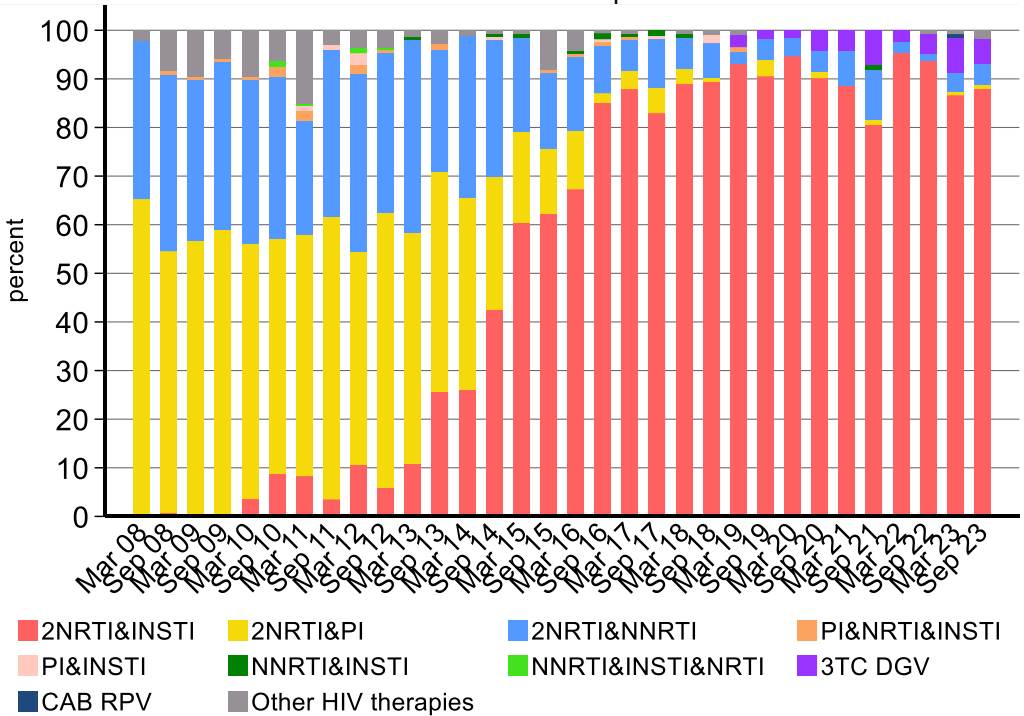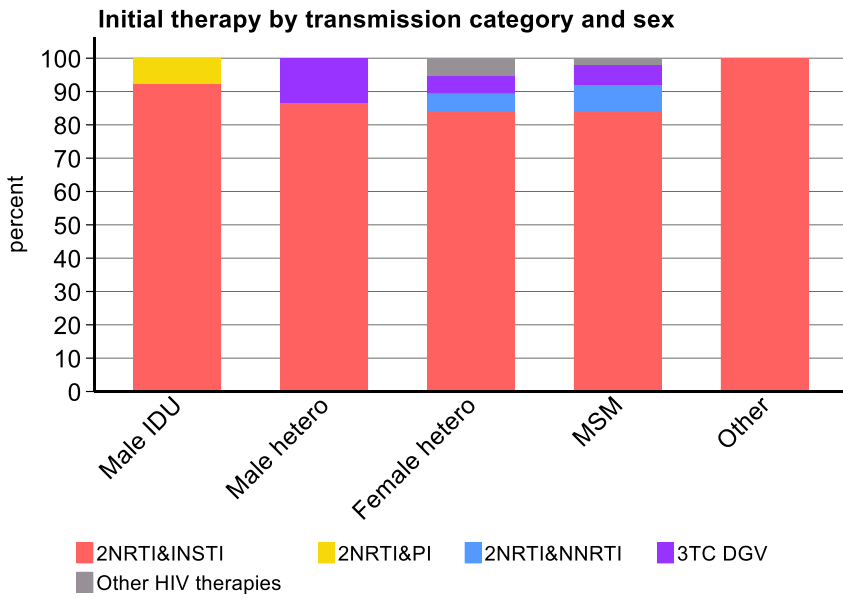
9.5 ART switches and interruptions

9.5.1 Switches and interruptions of ART during the first year of treatment

9.5.1.1 All switches, excluding switches from TDF to TAF containing regimens

Percentage of patients with ART switches and interruptions during the first year of treatment

Year of ART initiation	% of patients with ART switches	% of patients with ART interruptions
2004	36.4	23.9
2005	35.7	18.9
2006	23.0	13.5
2007	28.9	13.9
2008	25.9	14.0
2009	30.4	9.3
2010	21.6	7.3
2011	24.0	7.5
2012	26.6	6.0
2013	21.3	6.1
2014	24.4	6.8
2015	22.9	5.4
2016	23.1	3.8
2017	13.9	3.0
2018	24.4	2.9
2019	22.8	0.4
2020	17.3	3.1
2021	18.8	2.9
2022	11.5	2.3
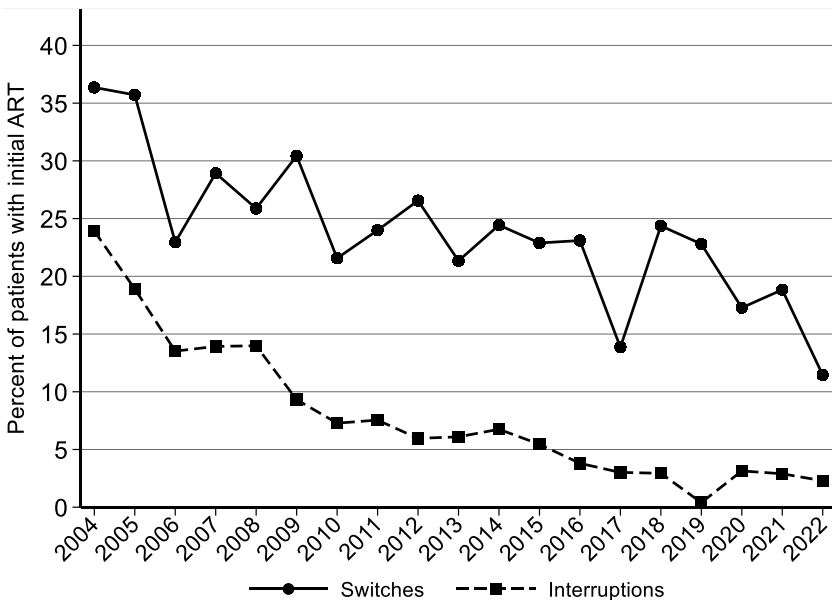
9.5.2 ART switches and interruptions per calendar year

9.5.2.1 All switches, excluding switches from TDF to TAF containing regimens

Percentage of patients with ART switches and interruptions in the respective year

Year of ART initiation	% of patients with ART switches	% of patients with ART interruptions
2004	28.3	8.7
2005	27.6	10.8
2006	24.5	7.3
2007	21.9	6.0
2008	22.7	5.3
2009	19.4	5.2
2010	19.9	4.1
2011	16.8	4.0
2012	18.1	3.9
2013	15.6	3.0
2014	21.6	3.1
2015	22.1	2.9
2016	23.4	2.4
2017	18.0	2.2
2018	13.6	1.7
2019	19.9	1.4
2020	17.7	1.4
2021	15.2	0.8
2022	17.5	0.7
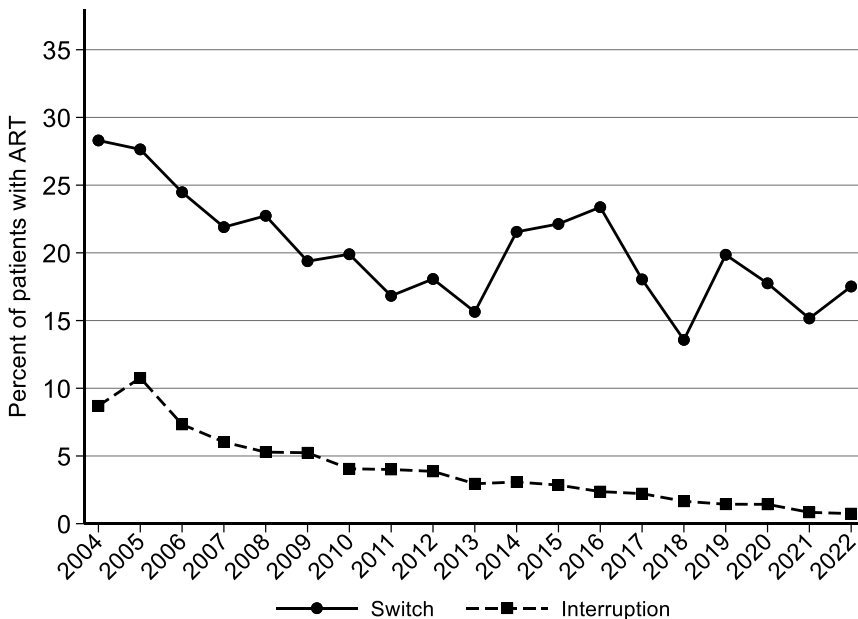
9.5.3 Risk factors for treatment switches during the first year of treatment, excluding switches from TDF to TAF containing regimens

10 Transgender persons were excluded from these analyses

	Switch	All		Univariable logistic regression			Multivariable logistic regression		
	1303	5494	23.72%	OR	[95% CI]	p value	OR	[95% CI]	p value
HIV transmission category									
Male IDU	128	585	21.88%	1.04	[0.83,1.29]	0.752	0.92	[0.73,1.15]	0.458
Female IDU	42	212	19.81%	0.91	[0.64,1.30]	0.614	0.84	[0.59,1.21]	0.351
Male heterosexual	234	1017	23.01%	1.11	[0.93,1.32]	0.262	0.93	[0.77,1.11]	0.415
Female heterosexual	294	921	31.92%	1.73	[1.47,2.05]	0.000	1.56	[1.31,1.86]	0.000
Other	75	269	27.88%	1.43	[1.08,1.90]	0.013	1.31	[0.98,1.76]	0.069
MSM	530	2490	21.29%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
Age at baseline									
< 30 years	303	1353	22.39%	0.81	[0.67,0.98]	0.035	0.83	[0.68,1.02]	0.080
30-50 years	762	3235	23.55%	0.86	[0.73,1.02]	0.092	0.85	[0.71,1.01]	0.072
≥ 50	238	906	26.27%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
AIDS at baseline									
Yes	288	825	34.91%	1.93	[1.65,2.26]	0.000			
No	1015	4669	21.74%	1.00	[1.00,1.00]	.			
CD4 count at baseline									
< 50	207	623	33.23%	2.13	[1.74,2.60]	0.000	1.98	[1.61,2.45]	0.000
50-199	300	1066	28.14%	1.67	[1.41,2.00]	0.000	1.52	[1.26,1.83]	0.000
200-349	306	1408	21.73%	1.19	[1.00,1.41]	0.048	1.07	[0.90,1.28]	0.432
Missing	124	466	26.61%	1.55	[1.23,1.96]	0.000	1.63	[1.28,2.06]	0.000
≥ 350	366	1931	18.95%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
HIV-RNA at baseline									
10.000-99.999	377	1903	19.81%	0.89	[0.74,1.08]	0.244			
≥ 100.000	529	1947	27.17%	1.35	[1.12,1.62]	0.001			
Missing	190	689	27.58%	1.38	[1.10,1.73]	0.006			
≤ 9.999	207	955	21.68%	1.00	[1.00,1.00]	.			
Nationality									
High prevalence countries	201	700	28.71%	1.35	[1.13,1.61]	0.001			
Low prevalence countries	1102	4794	22.99%	1.00	[1.00,1.00]	.			
Population size of area of residence									
Rural areas	532	2222	23.94%	1.12	[0.97,1.28]	0.114	1.13	[0.98,1.30]	0.085
Capital cities	217	755	28.74%	1.43	[1.19,1.72]	0.000	1.50	[1.24,1.82]	0.000
Vienna	554	2517	22.01%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
Year of ART Initiation									
2004-2007	298	970	30.72%	2.42	[1.88,3.11]	0.000	2.42	[1.86,3.14]	0.000
2008-2011	338	1334	25.34%	1.85	[1.45,2.37]	0.000	2.03	[1.58,2.61]	0.000
2012-2015	327	1374	23.80%	1.71	[1.34,2.18]	0.000	1.89	[1.47,2.42]	0.000
2016-2019	238	1157	20.57%	1.41	[1.10,1.82]	0.008	1.54	[1.19,1.99]	0.001
2020-2022	102	659	15.48%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.

9.5.4 Risk factors for treatment interruptions (TI) during the first year of treatment

10 Transgender persons were excluded from these analyses

	TI	All		Univariable logistic regression			Multivariable logistic regression		
	422	5494	7.68%	OR	[95% CI]	p value	OR	[95% CI]	p value
HIV transmission category									
Male IDU	89	585	15.21%	4.84	[3.55,6.60]	0.000	3.46	[2.51,4.78]	0.000
Female IDU	52	212	24.53%	8.77	[6.01,12.79]	0.000	6.24	[4.19,9.30]	0.000
Male heterosexual	73	1017	7.18%	2.09	[1.52,2.87]	0.000	1.71	[1.21,2.41]	0.002
Female heterosexual	106	921	11.51%	3.51	[2.62,4.70]	0.000	2.41	[1.73,3.35]	0.000
Other	13	269	4.83%	1.37	[0.75,2.49]	0.301	1.34	[0.73,2.47]	0.350
MSM	89	2490	3.57%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
Age at baseline									
< 30 years	167	1353	12.34%	2.57	[1.84,3.60]	0.000	1.77	[1.23,2.55]	0.002
30-50 years	208	3235	6.43%	1.26	[0.91,1.74]	0.170	0.95	[0.68,1.35]	0.790
≥ 50	47	906	5.19%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
AIDS at baseline									
Yes	68	825	8.24%	1.09	[0.84,1.44]	0.511			
No	354	4669	7.58%	1.00	[1.00,1.00]	.			
CD4 count at baseline									
< 50	49	623	7.87%	1.10	[0.78,1.54]	0.580			
50-199	82	1066	7.69%	1.07	[0.81,1.43]	0.620			
200-349	117	1408	8.31%	1.17	[0.90,1.51]	0.234			
Missing	35	466	7.51%	1.05	[0.71,1.54]	0.816			
≥ 350	139	1931	7.20%	1.00	[1.00,1.00]	.			
HIV-RNA at baseline									
10.000-99.999	143	1903	7.51%	0.85	[0.64,1.13]	0.272			
≥ 100.000	138	1947	7.09%	0.80	[0.60,1.06]	0.127			
Missing	58	689	8.42%	0.97	[0.68,1.37]	0.845			
≤ 9.999	83	955	8.69%	1.00	[1.00,1.00]	.			
Nationality									
High prevalence countries	88	700	12.57%	1.92	[1.50,2.46]	0.000	1.35	[1.00,1.82]	0.053
Low prevalence countries	334	4794	6.97%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
Population size of area of residence									
Rural areas	131	2222	5.90%	0.66	[0.53,0.83]	0.000	0.88	[0.70,1.12]	0.312
Capital cities	73	755	9.67%	1.13	[0.85,1.49]	0.394	1.48	[1.09,1.99]	0.011
Vienna	218	2517	8.66%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
Year of ART Initiation									
2004-2007	167	970	17.22%	7.41	[4.50,12.18]	0.000	5.25	[3.16,8.70]	0.000
2008-2011	124	1334	9.30%	3.65	[2.21,6.04]	0.000	2.81	[1.68,4.69]	0.000
2012-2015	82	1374	5.97%	2.26	[1.35,3.80]	0.002	1.97	[1.16,3.32]	0.012
2016-2019	31	1157	2.68%	0.98	[0.54,1.77]	0.948	0.95	[0.53,1.72]	0.870
2020-2022	18	659	2.73%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.

9.6 Frequency of drug dosing

9.6.1 Overview

23 of 4710 (0.5%) patients do not take any drugs at all and 32 (0.7%) patients have no ART but take other drugs. 708 (15.0%) patients are receiving ART only.

Dosing frequency	Number of patients					
	0	**1**	**2**	**3**	**4**	**Total**
Antiretrovirals (ARVs)	55	4528	127	0	0	4710
Drugs other than ARVs	731	1610	1284	764	321	4710
Overall dosing frequency	23	1578	1791	944	374	4710
Overall dosing frequency in patients with once daily ARVs	0	1567	1713	897	351	4528
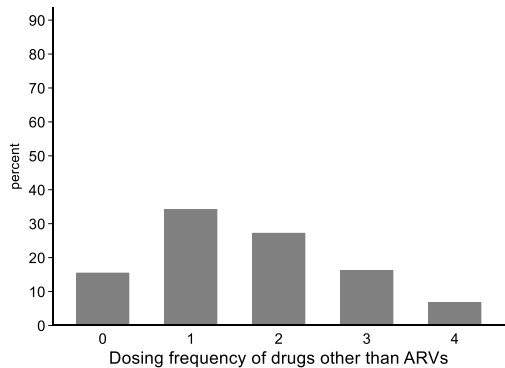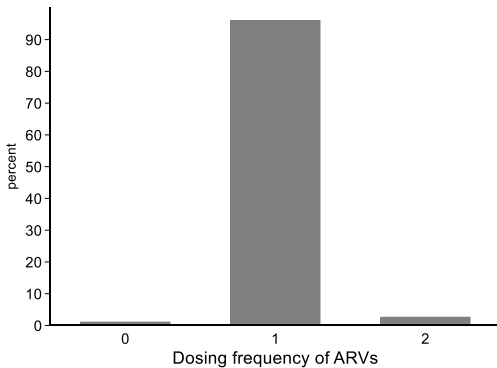
9.6.2 Most frequent used regimen on September 1st 2023

Regime	Häufigkeit	Percent
BGV FTC TAF	1,968	42.28
DGV 3TC	805	17.29
DGV 3TC ABC	356	7.65
RPV FTC TAF	326	7.00
DOR 3TC TDF	240	5.16
DGV FTC TDF	112	2.41
EVG FTC TAF	108	2.32
RAL 3TC ABC	76	1.63
DGV FTC TAF	65	1.40
DGV RPV	57	1.22
NVP 3TC ABC	51	1.10
RAL FTC TDF	50	1.07
RPV FTC TDF	38	0.82
DGV DOR	34	0.73
EFV FTC TDF	33	0.71
DGV 3TC DOR	29	0.62
RAL FTC TAF	26	0.56
CAB RPV	23	0.49
NVP FTC TDF	21	0.45
NVP FTC TAF	20	0.43
Other	217	4.53
Total	**4,655**	**100.00**

10 Disease progression and Response to ART

10.1 Mortality of patients with AIDS since 1985

The documentation of death is partially incomplete in the HIV Patient Management System (e.g. considerable proportion of patients without follow-up since 2001 are not documented dead but presumed dead, see chapter 4).

A Survival after the diagnosis AIDS

C Death rate (all-cause mortality) of patients with AIDS
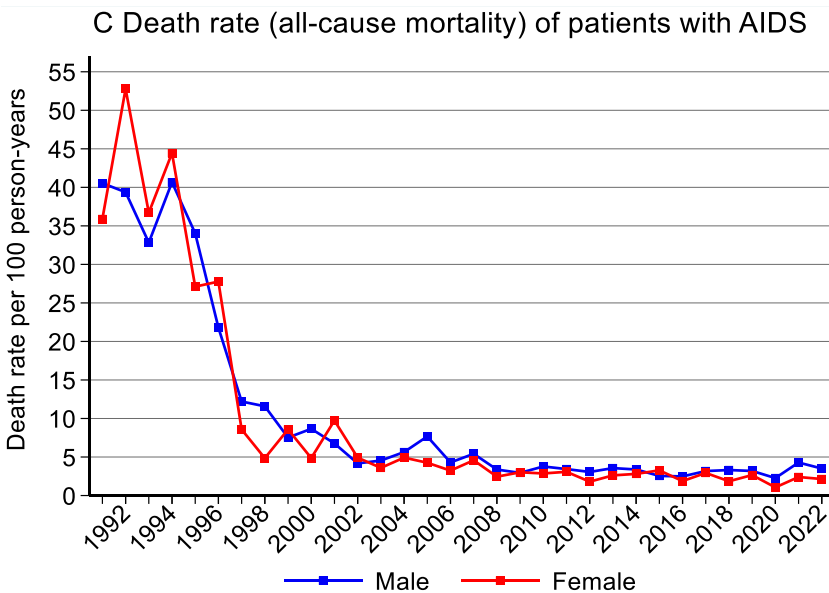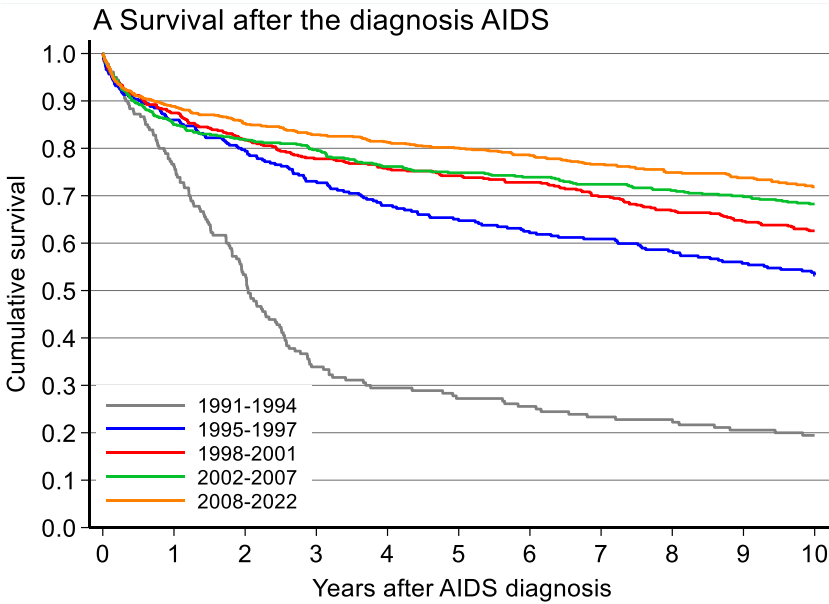
Transgender persons excluded
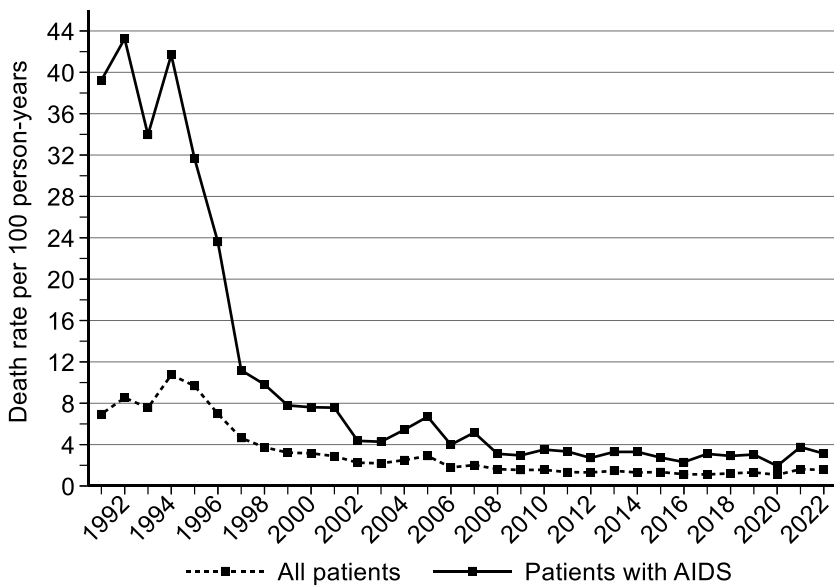
10.2 Mortality in combination ART era (years 1997-2017)

Death rates in different age groups
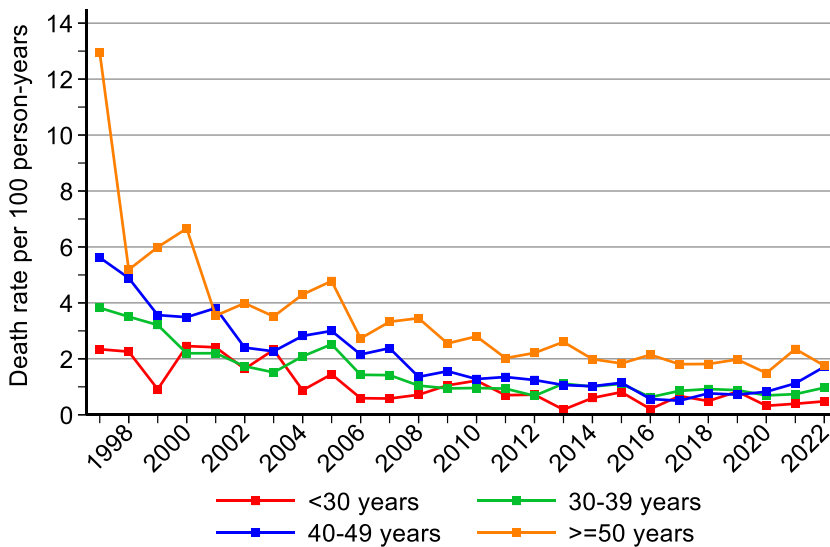
Death rates according to causes of death

Legend: AIDS-related, Non-AIDS-defining malignancies, Liver-related, Cardiovascular, Other/Unknown
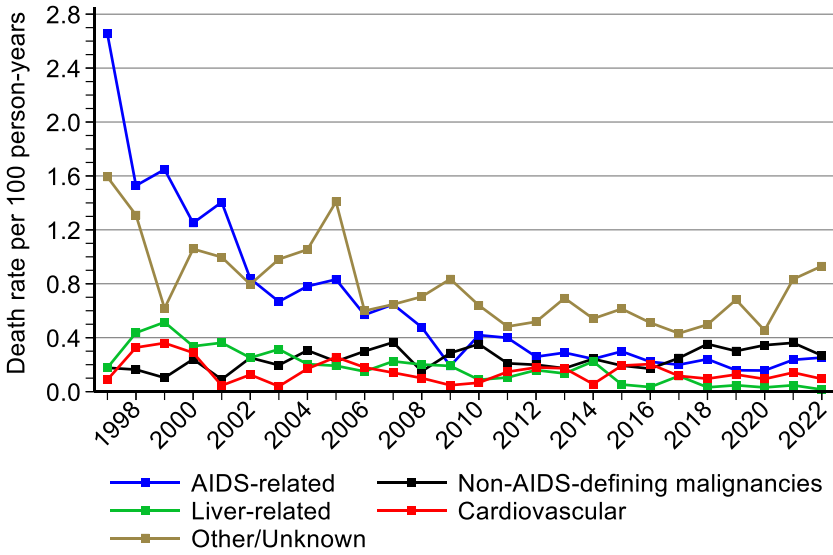
Death rates according to transmission category

Legend: IDU, Hetero, MSM
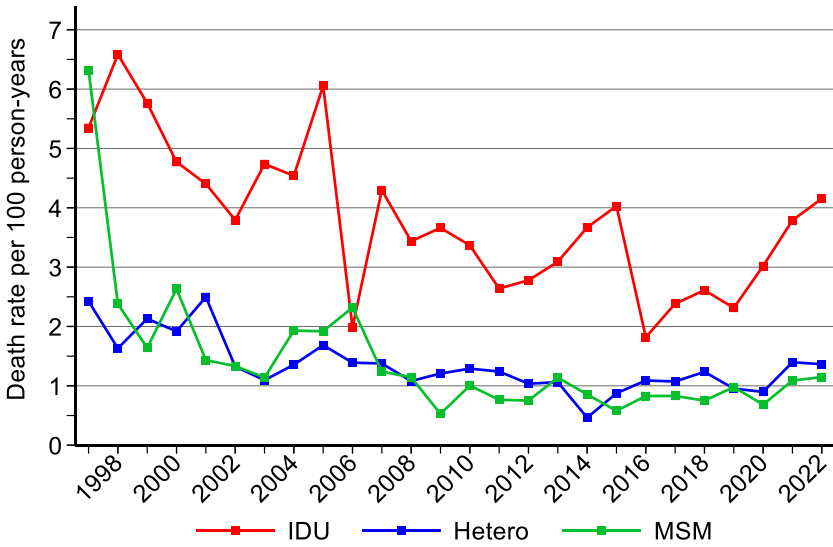
10.3 CD4 cell counts

10.3.1 CD4 cell counts: nadir and most recent

CD4 Nadir

Recent CD4 cell count

Most recent CD4 cell count
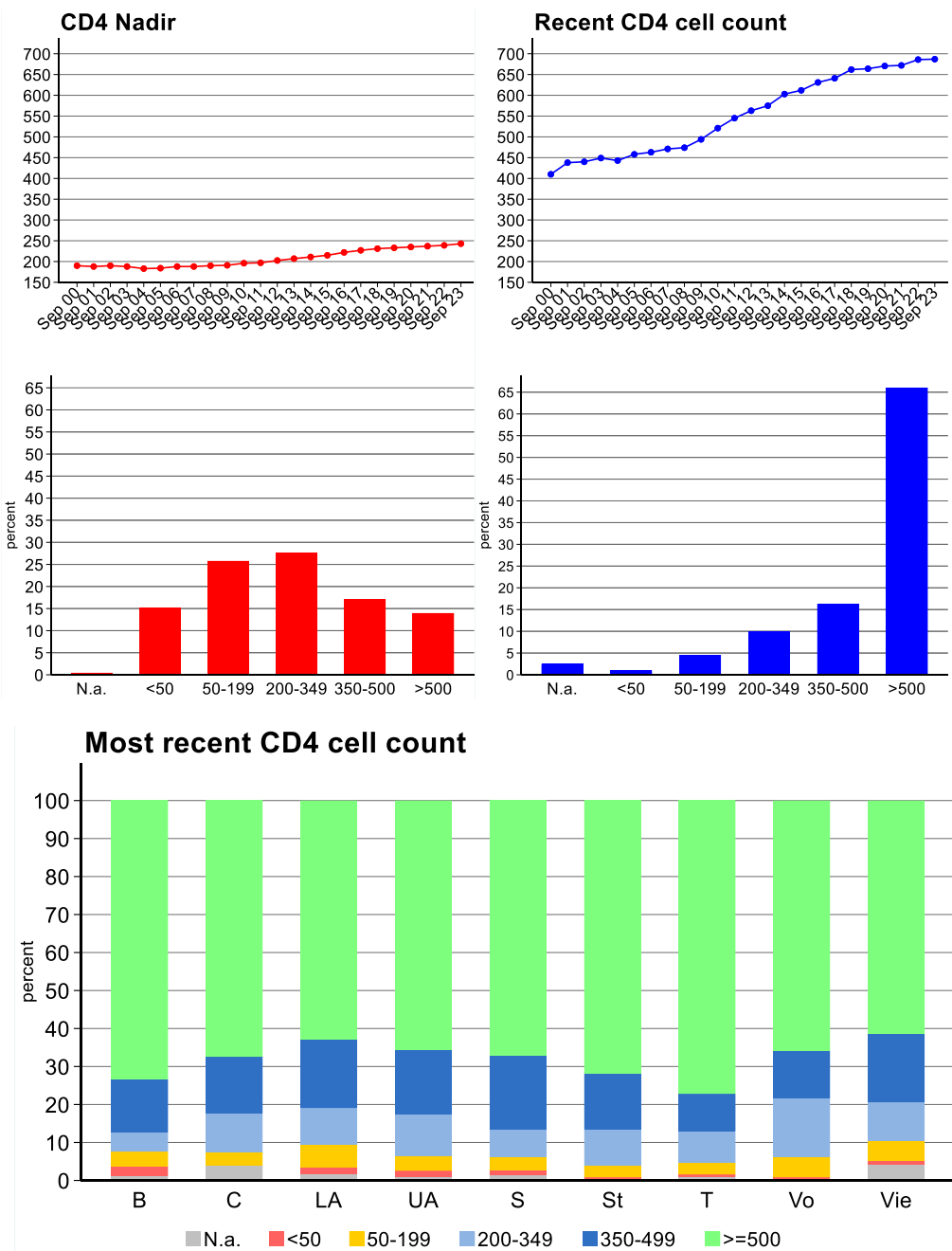
10.3.2 Median CD4 cell counts after initiating ART

The analyses include only patients who initiated ART after January 1, 1997.

a) Interruptions of ART
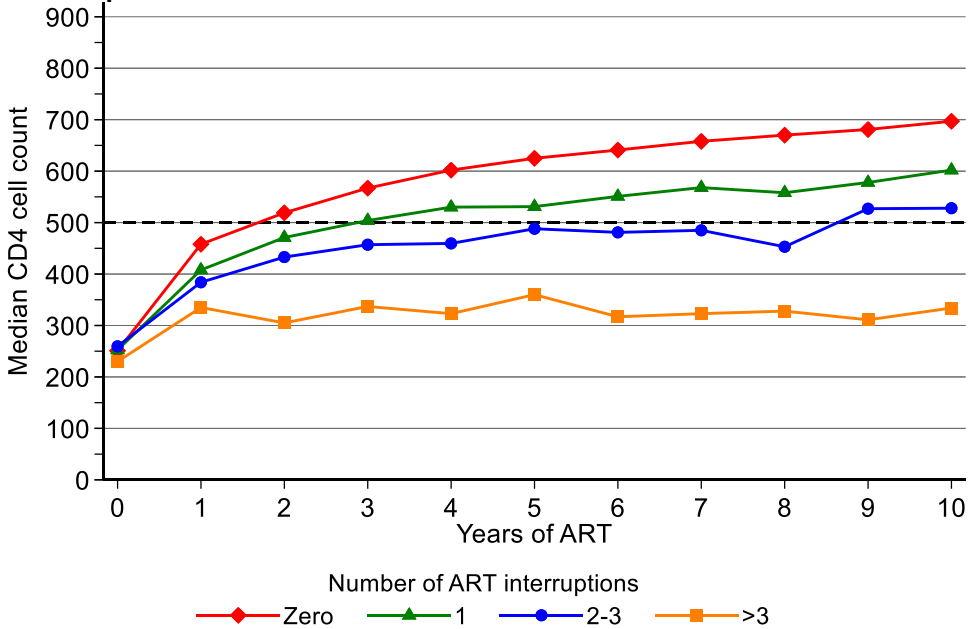
b) Baseline CD4 count

Patients were included until treatment interruption.
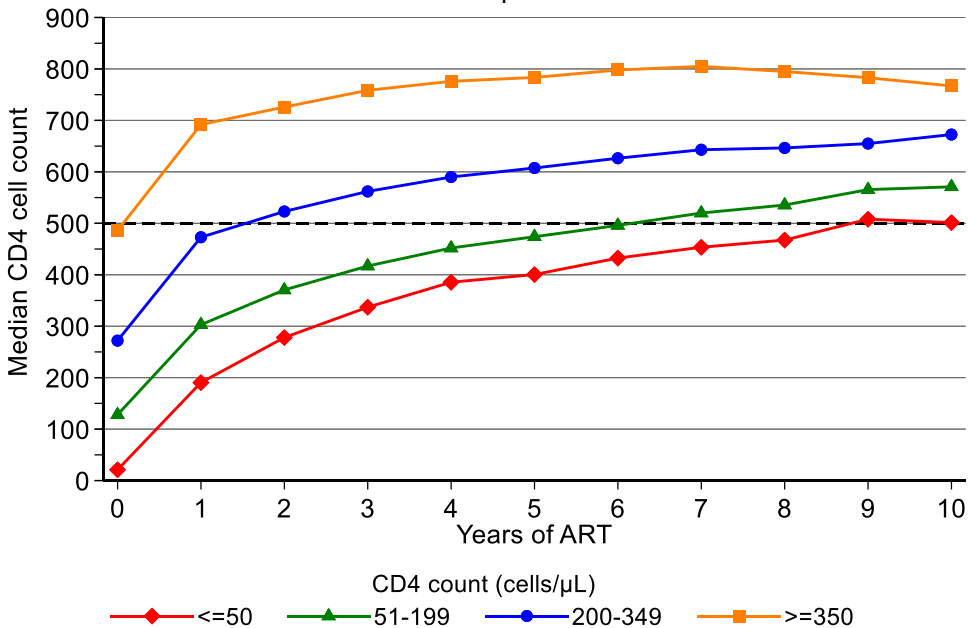
10.4   HIV RNA (viral load)

10.4.1   Last HIV RNA currently in care regardless of ART

95.8% of the patients currently in care (4780 of 4992) have a current HIV RNA below 400 copies/ml.

Last HIV RNA Measurement

Legend: <=50 | 51-199 | 200-999 | >=1000 | No information

Proportion of patients with HIV RNA =50 <200 and <1000 in different periods

Legend: <=50 copies/ml | <200 copies/ml | <1000 copies/ml
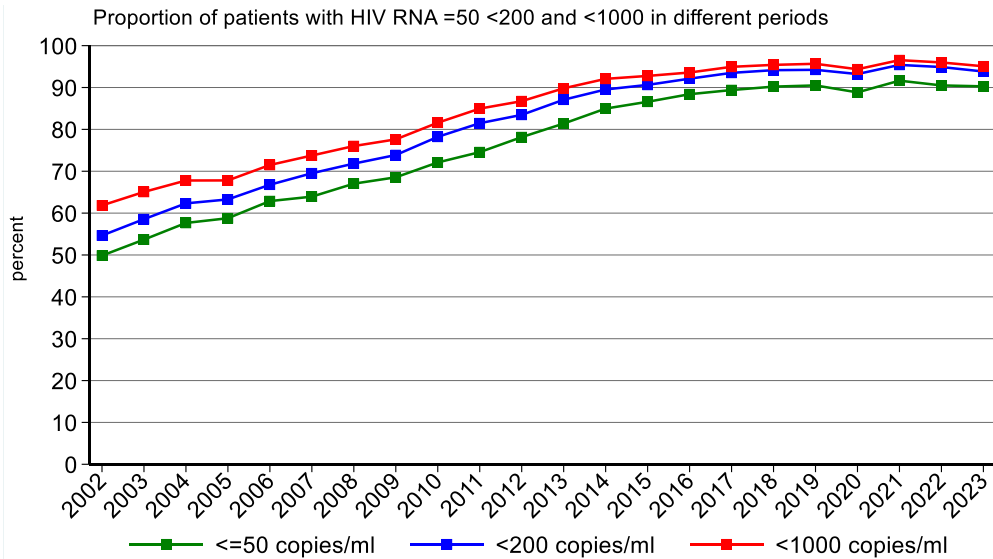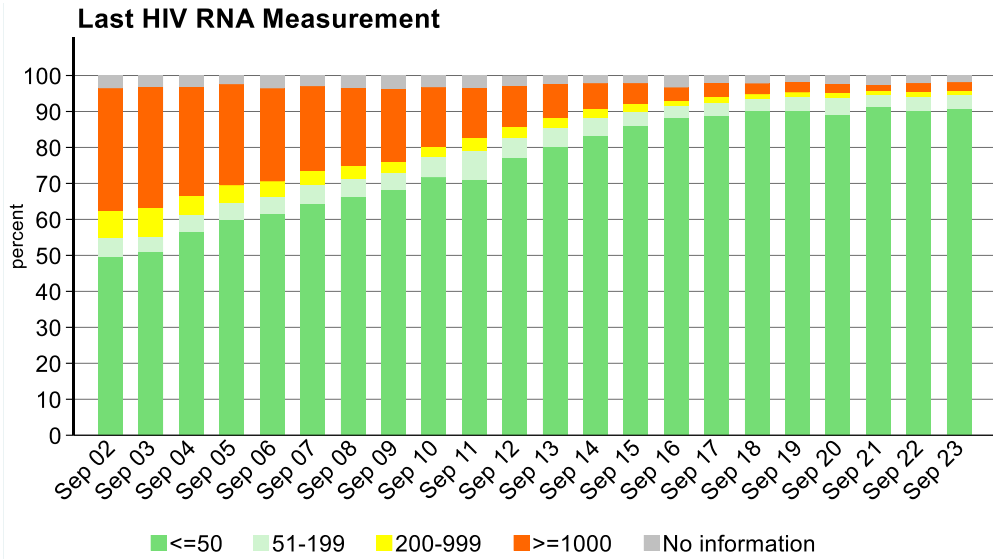
RNA-measurement and visit in the last 12 months

Legend: ■ <=50 ■ 51-199 ■ 200-999 ■ >=1000 ■ No Information

Legend: ■ <=50 ■ 51-199 ■ 200-999 ■ >=1000 ■ No Information
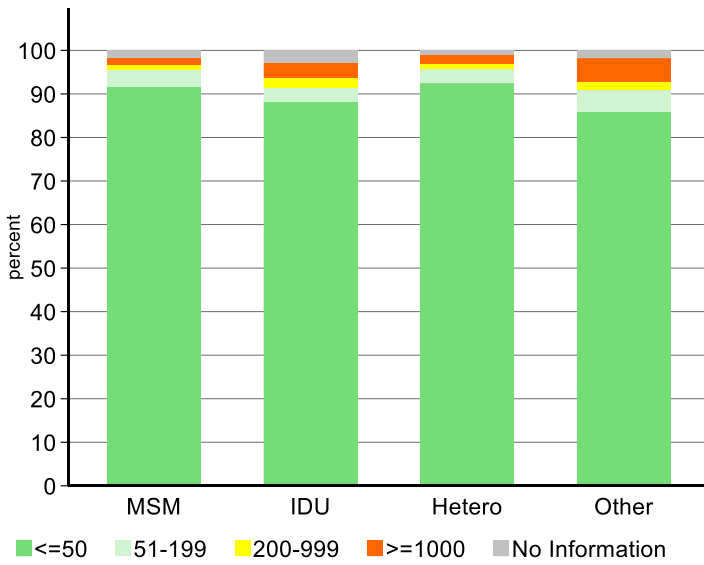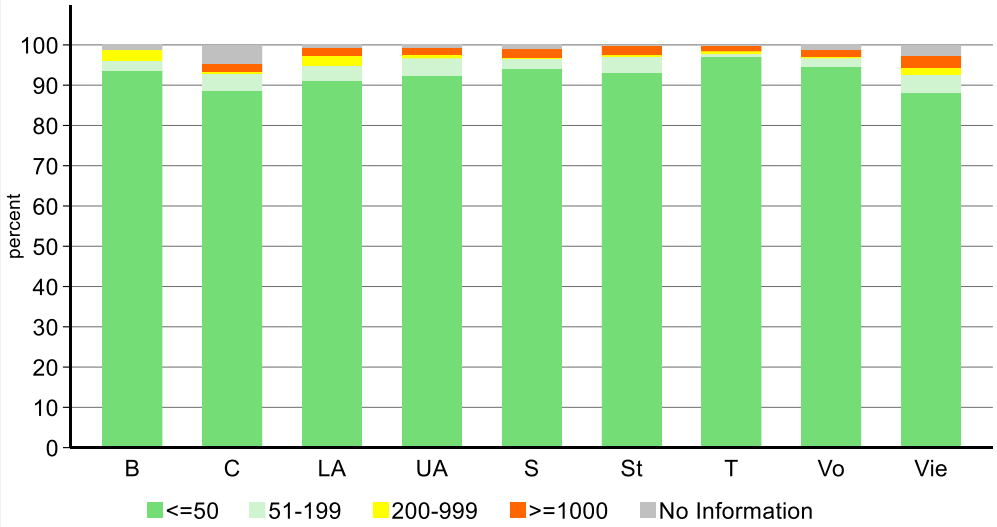
10.4.2   The continuum of care in Austria

Data from AHIVCOS were used to derive the four-stage continuum of HIV care and assessed for all patients and for men who have sex with men (MSM) for the years 2010 to 2016.

- a. People living with HIV (PLHIV) estimates were obtained using back-calculation models (ECDC tool 1.3.0) to estimate HIV incidence and the undiagnosed fraction.
- b. Proportion ever diagnosed.
- c. Proportion ever diagnosed who ever initiated ART
- d. Proportion of them who were virally suppressed (≤200 c/mL)
- e. Proportion suppressed of all PLHIV (e) for all patients in Austria

For high estimates patients lost to follow-up (LTFU, no contact 1.5 years before the end of the respective year) were excluded and for low estimates they were included. The preferred estimate was the mid-point between the high and low estimate.
Missing HIV-RNA was considered as unsuppressed.

Year	(a) PLHIV	(b) Diagnosed [estimated range]	(c) On ART Mean [low, high estimate]	(d) Suppressed Mean [low, high estimate]	(e) Suppressed of all PLHIV
2010	6254	**84%** [80%,86%]	**83%** [76%,89%]	**79%** [71%,86%]	**55%**
2011	6432	**86%** [82%,88%]	**85%** [79%,91%]	**80%** [72%,88%]	**59%**
2012	6594	**88%** [84%,90%]	**87%** [81%,93%]	**81%** [73%,89%]	**62%**
2013	6734	**89%** [85%,91%]	**89%** [83%,94%]	**83%** [74%,91%]	**66%**
2014	6864	**90%** [86%,92%]	**91%** [85%,96%]	**84%** [75%,92%]	**69%**
2015	6975	**91%** [88%,94%]	**92%** [87%,97%]	**84%** [75%,93%]	**70%**
2016	7079	**92%** [89%,94%]	**94%** [89%,98%]	**85%** [77%,93%]	**74%**
2018	7480	**94%** [91%,96%]	**95%** {91%,99%]	**85%** [76%,94%]	**76%**
2019	7655	**94% [**91%,97%]	**95%** {91%,99%]	**85% [**74%,95%]	**76%**
2020	7652	**96%** [93%,99%]	**96%** [92%,99%]	**89%** [72%,95%]	**82%**
2021	7732	**97%** [94%,100%]	**96%** [92%,99%]	**89%** [69%,96%]	**82%**
2022	7596	**96%** [93%, 99%]	**96%** [93%, 99%]	**89%** [70%, 95%]	**82%**

We conclude that Austria has finally reached the 90-90-90 target of UNAIDS for 2020. The somewhat smaller estimate of viral suppression maybe explained substantially by transfer of care in Vienna and out-migration. This and the decrease in HIV incidence support the hypothesis that the high estimate of being on ART and virally-suppressed is the more likely scenario. For more reliable nationwide estimates data from private physicians might be included.

10.4.3 Last HIV RNA on ART

Patients were included if there were at least 75 days between ART initiation and HIV RNA measurement.
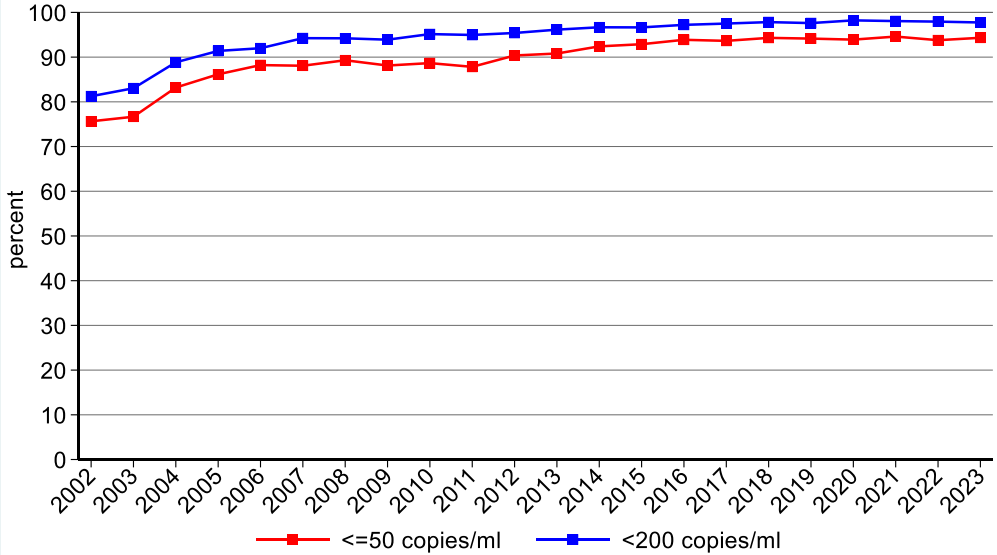
10.4.3.1 Last HIV RNA on ART at different points in time

Patients currently in care (12 months), currently on ART and measurement of viral load at least 2.5 months after ART initiation
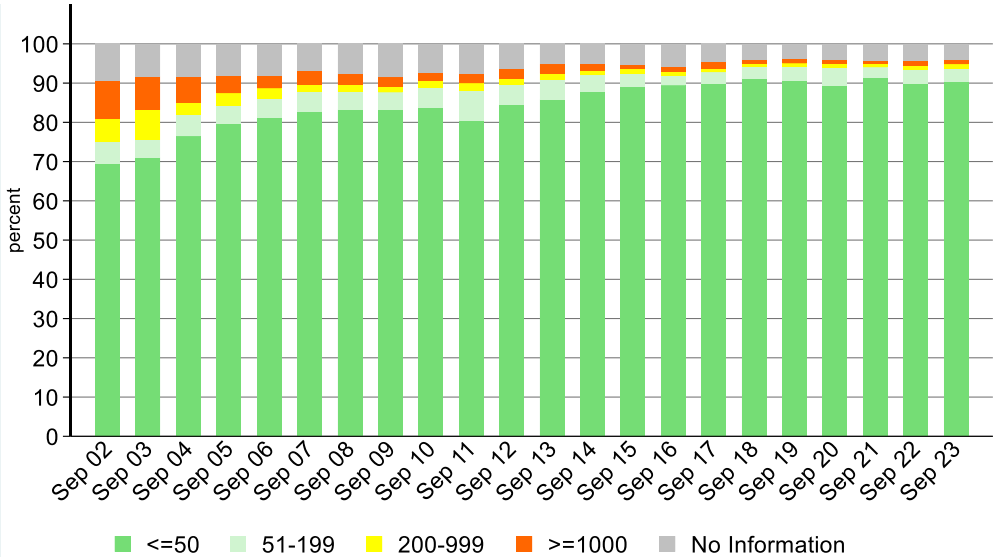
10.4.3.2 Last HIV RNA on ART according to federal state

Patients in care and on ART within the last 12 months and measurement of viral load at least 2.5 months after ART initiation
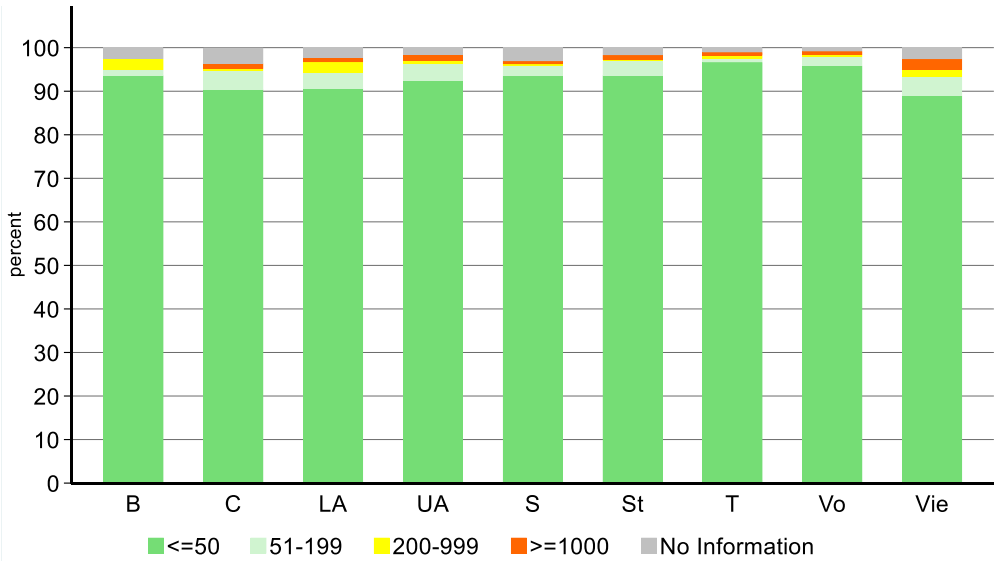
10.4.3.3 Last HIV RNA on ART according to transmission category
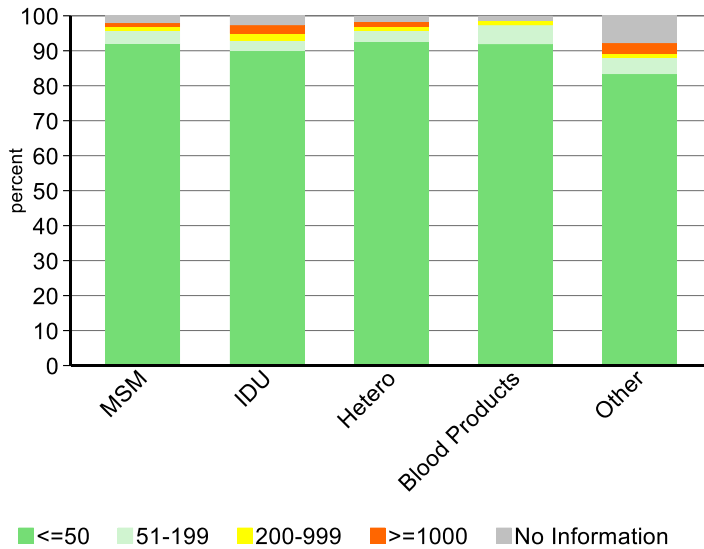
10.4.4 Risk factors for viral replication

Risk factors for HIV RNA ≥200 copies/ml on ART

The analyses in this chapter include all patients with a visit in the last 12 months who have been on ART for at least 75 days before the measurement of the viral load.

	130	4839	2.69%	Univariable logistic regression			Multivariable logistic regression		
				OR	[95% CI]	p value	OR	[95% CI]	p value
Age									
< 30 years	9	163	5.52%	2.72	[1.32,5.62]	0.007	3.83	[1.72,8.52]	0.001
30-50 years	67	2106	3.18%	1.53	[1.06,2.20]	0.022	1.67	[1.12,2.48]	0.012
≥ 50	54	2570	2.10%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
HIV transmission category									
Male IDU	17	395	4.30%	2.12	[1.20,3.75]	0.010	1.29	[0.71,2.36]	0.400
Female IDU	9	183	4.92%	2.44	[1.17,5.07]	0.017	1.38	[0.64,2.99]	0.417
Male heterosexual	25	908	2.75%	1.33	[0.81,2.19]	0.256	1.22	[0.72,2.06]	0.467
Female heterosexual	26	974	2.67%	1.29	[0.79,2.11]	0.306	0.87	[0.50,1.51]	0.623
Other	9	262	3.44%	1.68	[0.81,3.47]	0.165	1.16	[0.53,2.57]	0.709
MSM	44	2117	2.08%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
Nationality									
Missing/unknown	0	26	0.00%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
High prevalence	20	399	5.01%	2.01	[1.22,3.30]	0.006	1.60	[0.89,2.86]	0.113
Low prevalence	21	941	2.23%	0.87	[0.54,1.40]	0.564	0.85	[0.51,1.41]	0.526
Austria	89	3473	2.56%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
Population size of area of residence									
Rural areas	46	2231	2.06%	0.49	[0.34,0.71]	0.000			
Capital cities	10	820	1.22%	0.29	[0.15,0.56]	0.000			
Vienna	74	1788	4.14%	1.00	[1.00,1.00]	.			
AIDS									
Yes	16	749	2.14%	0.76	[0.45,1.29]	0.312			
No	114	4090	2.79%	1.00	[1.00,1.00]	.			
CD4 Nadir									
<50	29	755	3.84%	1.97	[1.25,3.11]	0.003	1.83	[1.13,2.94]	0.013
50-199	44	1259	3.49%	1.79	[1.20,2.67]	0.004	1.67	[1.09,2.56]	0.018
≥200	56	2823	1.98%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
ART initiation									
Before 1.1.1997	8	370	2.16%	0.79	[0.38,1.62]	0.517	0.46	[0.21,1.01]	0.053
After 1.1.1997	122	4469	2.73%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
Ever ART interruptions									
None	67	3680	1.82%	0.28	[0.18,0.44]	0.000	0.24	[0.14,0.39]	0.000
1	32	652	4.91%	0.79	[0.48,1.32]	0.370	0.80	[0.47,1.35]	0.396
≥2	31	507	6.11%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.
Art duration									
< 9 months	7	70	10.00%	4.24	[1.90,9.45]	0.000	4.93	[2.00,12.16]	0.001
9-18 months	6	192	3.13%	1.23	[0.53,2.83]	0.627	1.68	[0.70,4.02]	0.242
> 18 months	117	4577	2.56%	1.00	[1.00,1.00]	.	1.00	[1.00,1.00]	.

11 Development of resistance to ART (data: 03/2022)

11.1 Abstract

Prevalence of Development of Drug Resistance in HIV infected patients in Austria

Objective: To determine the prevalence of development of drug resistance, predictors and temporal trends in resistance.

Method: Patients currently in care in one of nine centres who have ever been on antiretroviral therapy (ART) were analyzed. Mutations were judged as resistant according to "2022 Update of the Drug Resistance Mutations in HIV-1" from the International Antiviral-Society-USA (https://www.iasusa.wpenginepowered.com/wp-content/uploads/2022/10/30-4-559.pdf).

Results: Overall 4580 patients have ever received ART, 1215 had a resistance test after ART (26.5%). The overall prevalence of development of drug resistance was 64.0% (778 of 1215 patients), the prevalence of NRTI resistance was 31.8%, the prevalence of NNRTI resistance was 26.5%, and the prevalence of PI resistance was 53.2%. The prevalence of 3-class-resistance was 14.5% (176 of 1215 patients). The risk factors for developing a 3-class-resistance were a CD4 nadir <50 (OR=3.6; 95% CI: 2.3-5.6), a CD4 nadir between 50 and 200 (OR=1.9; 95% CI: 1.3-2.9) and initial therapy before 1997 (OR=28.2; 95% CI: 18.2-43.7) as well as from 1997 to 2003 (OR=7.4; 95% CI: 4.6-11.7) and an age at ART-start <30 (OR=2.6; 95% CI: 1.2-5.7). The risk to develop a 3-class-resistance was lower in patients with a low viral load (for <50 copies/ml OR=0.2; 95% CI: 0.1-0.5).

Conclusions: The overall prevalence of development of drug resistance is at a rather high level, while the prevalence of 3-class-resistance was found to be stabilizing at a low level. The risk for developing resistance is small in those who initiated therapy in recent years.

11.2 Definition of resistance under ART

The rate of resistance development during antiretroviral therapy („percent with resistance") corresponds to the number of patients with resistance mutations in relation to the number of patients on ART (see also chapter 5).

"Cumulative resistance" includes any mutation ever found in a particular patient.

The resistance mutations have been classified according to the "2022 Update of the Drug Resistance Mutations in HIV-1" from the International AIDS-Society-USA (https://www.iasusa.wpenginepowered.com/wp-content/uploads/2022/10/30-4-559.pdf).

The following codons and amino acids have been classified as resistance (IAS):

Reverse transcriptase				Protease	
NRTI		**NNRTI**			
M41	L	V90	I	L10	F, R, I, V
A62	V	A98	G	V11	I
K65	R, E, N	L100	I	K20	R, M, T
D67	N	K101	H, E, P	L24	I
T69	ins	K103	N, S	D30	N
K70	R, E	V106	A, M, I, T	V32	I
L74	V	V108	I	L33	F
V75	I	E138	A, G, K, Q, R	M36	I, L, V
F77	L	V179	D, F, T, L	K43	T
Y115	F	Y181	C, I, V	M46	I, L
F116	Y	Y188	L, H, C	I47	V, A
Q151	M	G190	A, S, E	G48	V
M184	V, I	H221	Y	I50	V, L
L210	W	P225	H	F53	L, Y
T215	Y, F	F227	C, L, R, I, V	I54	V, M, L, T, S, A
K219	Q, E	M230	I, L	Q58	E
		L234	I	I62	V
		Y318	F	H69	K, R
				A71	V, T
				G73	S, T, C, A
				T74	P
				L76	V
				V77	I
				V82	A, T, F, S, I, L, M
				N83	D
				I84	V
				I85	V
				N88	D, S
				L89	V, I, M
				L90	M

11.3 Frequency of resistance

11.3.1 Frequency of NRTI-associated resistance mutations

11.3.1.1 Overview

The table shows the numbers of patients with NRTI-associated resistance mutations among all patients who have ever been treated with Nucleoside Reverse Transcriptase Inhibitors („NRTI").

All centers	Deceased since 1997, NRTI use		Patients currently in care and NRTI use ever	
	N = 1462		N = 4574	
Resistance to NRTI	240	(16.4%)	386	(8.4%)
Codon 41	88	(6.0%)	146	(3.2%)
Codon 62	10	(0.7%)	18	(0.4%)
Codon 65	11	(0.8%)	23	(0.5%)
Codon 67	78	(5.3%)	121	(2.6%)
Codon 69	3	(0.2%)	3	(0.1%)
Codon 70	56	(3.8%)	105	(2.3%)
Codon 74	34	(2.3%)	35	(0.8%)
Codon 75	5	(0.3%)	6	(0.1%)
Codon 77	3	(0.2%)	6	(0.1%)
Codon 115	7	(0.5%)	13	(0.3%)
Codon 116	2	(0.1%)	4	(0.1%)
Codon 151	2	(0.1%)	6	(0.1%)
Codon 184	188	(12.9%)	270	(5.9%)
Codon 210	59	(4.0%)	73	(1.6%)
Codon 215	100	(6.8%)	154	(3.4%)
Codon 219	49	(3.4%)	65	(1.4%)

11.3.1.2 Risk factors for the resistance mutation K65R of the RT

Recruitment for this analysis has been in agreement to entry criteria of COHERE. Additionally, patients who died before 1.1.2000 have been excluded.

All centres						Model 1 (N = 8796)		
	Frequencies N=			Univariable regression		Multivariable regression*		
Variable	47 /	8796	(0.5%)	OR (95% CI)	p-value	OR (95% CI)		p-value
Demographic characteristics								
Age at ART start								
<30 years	11 /	2345	(0.5%)	1.9	0.5 – 7.0	0.310		
30-50 years	33 /	5213	(0.6%)	2.6	0.8 – 8.6	0.110		
>50 years	3 /	1238	(0.2%)	1				
Sex/ mode of transmission								
Male IDU	7 /	1023	(0.7%)	2.6	1.0 – 6.8	0.056	**1.5**	**0.6 – 4.1**	**0.393**
Female IDU	6 /	437	(1.4%)	5.2	1.9 – 14.4	0.001	**3.0**	**1.1 – 8.5**	**0.038**
Male heterosexual	10 /	1555	(0.6%)	2.4	1.0 – 5.8	0.049	**2.0**	**0.8 – 4.8**	**0.143**
Female heterosexual	14 /	1509	(0.9%)	3.5	1.5 – 7.9	0.003	**3.0**	**1.3 – 6.9**	**0.009**
Other	0 /	528	(0.0%)	-	-	-	**-**	**-**	**-**
MSM	10 /	3744	(0.3%)	1			**1**		
Population size of area of residence								
Missing value	0 /	80	(0.0%)	-	-	-		
Rural areas	15 /	3456	(0.4%)	0.7	0.4 – 1.3	0.217		
Capital cities	6 /	1240	(0.5%)	0.7	0.3 – 1.8	0.520		
Vienna	26 /	4020	(0.6%)	1				
Stage of disease								
AIDS								
Yes	26 /	2452	(1.1%)	3.2	1.8 – 5.7	<0.001		
No	21 /	6344	(0.3%)	1				
CD4 nadir								
Missing value	0 /	86	(0.0%)	-	-	-	**-**	**-**	**-**
<50 cells/µl	23 /	1563	(1.5%)	8.7	3.9 – 19.5	<0.001	**6.9**	**3.0 – 15.7**	**<0.001**
50-199 cells/µl	16 /	2465	(0.6%)	3.8	1.6 – 8.9	0.002	**3.0**	**1.2 – 7.1**	**0.014**
≥200 cells/µl	8 /	4682	(0.2%)	1			**1**		
ART								
Abacavir use ever								
Yes	20 /	3341	(0.6%)	1.2	0.7 – 2.2	0.518		
No	27 /	5455	(0.5%)	1				
Tenofovir use ever								
Yes	44 /	5949	(0.7%)	7.1	2.2 – 22.8	0.001	**5.9**	**1.8 – 18.9**	**0.003**
No	3 /	2847	(0.1%)	1			**1**		
ART initiation								
Before 1.1.1997	9 /	819	(1.1%)	2.3	1.1 – 4.8	0.024		
After 1.1.1997	38 /	7977	(0.5%)	1				

* adjusted for the variables: age, population size of area of residence, Abacavir use ever, ART initiation

11.3.2 Frequency of NNRTI-associated resistance mutations

The table shows the numbers of NNRTI-associated resistance mutations among patients who have ever been treated with Non-Nucleoside Reverse Transcriptase Inhibitors („NNRTI").

All centers	Deceased since 1997, NNRTI use	Patients currently in care and NNRTI use ever
	N = 862	N = 2399
Resistance to NNRTI	182 (21.1%)	274 (11.4%)
Codon 90	8 (0.9%)	24 (1.0%)
Codon 98	16 (1.9%)	17 (0.7%)
Codon 100	4 (0.5%)	8 (0.3%)
Codon 101	28 (3.2%)	32 (1.3%)
Codon 103	94 (10.9%)	140 (5.8%)
Codon 106	18 (2.1%)	24 (1.0%)
Codon 108	27 (3.1%)	29 (1.2%)
Codon 138	8 (0.9%)	34 (1.4%)
Codon 179	7 (0.8%)	16 (0.7%)
Codon 181	72 (8.4%)	79 (3.3%)
Codon 188	10 (1.2%)	13 (0.5%)
Codon 190	45 (5.2%)	44 (1.8%)
Codon 221	14 (1.6%)	15 (0.6%)
Codon 225	6 (0.7%)	9 (0.4%)
Codon 227	6 (0.7%)	4 (0.2%)
Codon 230	4 (0.5%)	4 (0.2%)
Codon 234	0 (0.0%)	0 (0.0%)
Codon 318	4 (0.5%)	1 (0.0%)

11.3.3   Frequency of PI-associated resistance mutations

The table shows the numbers of the PI-associated resistance mutations among patients who have ever been treated with Protease Inhibitors („PI").

Minor mutations:

All centers	Deceased since 1997, PI use	Patients currently in care and PI use ever
	N = 1141	N = 2181
Any minor resistance to PI	354 (31.0%)	563 (25.8%)
Codon 10	114 (10.0%)	183 (8.4%)
Codon 11	6 (0.5%)	5 (0.2%)
Codon 20	66 (5.8%)	78 (3.6%)
Codon 24	7 (0.6%)	13 (0.6%)
Codon 33	19 (1.7%)	33 (1.5%)
Codon 36	174 (15.2%)	284 (13.0%)
Codon 43	3 (0.3%)	6 (0.3%)
Codon 53	10 (0.9%)	12 (0.6%)
Codon 62	43 (3.8%)	75 (3.4%)
Codon 69	30 (2.6%)	97 (4.4%)
Codon 71	143 (12.5%)	152 (7.0%)
Codon 73	21 (1.8%)	15 (0.7%)
Codon 77	128 (11.2%)	195 (8.9%)
Codon 85	1 (0.1%)	2 (0.1%)
Codon 89	30 (2.6%)	98 (4.5%)

Major mutations: All centers	Deceased since 1997, PI use N = 1141	Patients currently in care and PI use ever N = 2181
Any major resistance to PI	122 (10.7%)	161 (7.4%)
Codon 30	12 (1.1%)	28 (1.3%)
Codon 32	12 (1.1%)	5 (0.2%)
Codon 46	60 (5.3%)	69 (3.2%)
Codon 47	8 (0.7%)	7 (0.3%)
Codon 48	4 (0.4%)	7 (0.3%)
Codon 50	1 (0.1%)	5 (0.2%)
Codon 54	37 (3.2%)	46 (2.1%)
Codon 58	7 (0.6%)	9 (0.4%)
Codon 74	0 (0.0%)	1 (0.0%)
Codon 76	1 (0.1%)	0 (0.0%)
Codon 82	46 (4.0%)	65 (3.0%)
Codon 83	1 (0.1%)	1 (0.0%)
Codon 84	20 (1.8%)	18 (0.8%)
Codon 88	15 (1.3%)	23 (1.1%)
Codon 90	61 (5.3%)	63 (2.9%)

11.3.4 Resistance to single or multiple drug classes

All centres	Deceased since 1997, ever ART N = 1471	Patients currently in care and ever ART N = 4580
Resistance test available	634 (43.1%)	1215 (26.5%)
Wild type	179 (12.2%)	437 (9.5%)
"Any" resistance	455 (30.9%)	778 (17.0%)
NRTI	241 (16.4%)	386 (8.4%)
NNRTI	207 (14.1%)	322 (7.0%)
PI	386 (26.2%)	646 (14.1%)
NRTI and PI	189 (12.8%)	289 (6.3%)
NRTI and NNRTI	146 (9.9%)	220 (4.8%)
NNRTI and PI	169 (11.5%)	243 (5.3%)
3-class-resistance	125 (8.5%)	176 (3.8%)

11.3.5 Resistance according to demographic characteristics

All patients	Number of patients	Resistance test available	Wild type	Any resistance	NRTI	NNRTI	PI	NRTI and PI	NRTI and NNRTI	NNRTI and PI	3-class-resistance
							Resistance to				
Year of ART initiation											
Up to 1995	224	179	9	170	145	85	132	107	79	76	70
1996	135	94	21	73	58	34	57	43	32	23	22
1997	102	67	16	51	29	22	45	24	18	18	15
1998	103	52	7	45	17	13	37	10	8	8	4
1999	82	47	14	33	15	17	25	9	8	13	6
2000	101	55	12	43	19	15	40	17	10	14	10
2001	79	34	10	24	9	5	21	6	5	3	3
2002	96	45	16	29	15	12	25	13	9	9	8
2003	92	43	19	24	2	8	22	2	2	6	2
2004	118	37	16	21	7	8	20	7	3	7	3
2005	125	44	13	31	9	7	29	9	4	5	4
2006	138	38	19	19	6	8	17	5	6	6	5
2007	150	45	17	28	9	9	27	8	5	8	4
2008	153	40	24	16	7	6	12	4	3	4	2
2009	210	45	30	15	5	9	12	4	5	6	4
2010	217	46	23	23	5	9	17	3	3	4	2
2011	226	43	22	21	5	8	17	3	4	4	2
2012	230	46	23	23	9	13	20	6	8	10	5
2013	229	40	25	15	2	3	12	-	1	1	-
2014	221	31	14	17	3	7	14	2	1	5	1
2015	221	30	15	15	5	7	11	4	3	3	2
2016	218	27	15	12	3	5	10	2	1	4	1
2017	227	21	12	9	1	6	7	1	1	4	1
2018	157	11	9	2	-	2	1	-	-	1	-
2019	170	16	11	5	-	1	4	-	-	-	-
2020	144	18	11	7	1	3	5	-	1	-	-
2021	169	11	7	4	-	-	4	-	-	-	-
2022	243	10	8	2	-	-	2	-	-	-	-
Missing value	-	-	-	-	-	-	-	-	-	-	-
Federal state											
Burgenland	71	16	7	9	5	3	8	4	3	3	3
Carinthia	224	30	11	19	8	7	14	4	4	4	2
Lower Austria	458	114	32	82	44	36	67	32	26	30	23
Upper Austria	640	195	75	120	80	54	97	62	48	36	35
Salzburg	277	71	18	53	22	26	43	16	13	19	10
Styria	450	106	48	58	19	22	51	16	14	16	12
Tyrol	558	183	50	133	74	49	106	51	30	39	24
Vorarlberg	234	55	14	41	17	12	35	11	8	10	6
Vienna	1608	432	178	254	113	109	220	92	71	85	60
Foreign countries	60	13	5	8	4	4	4	1	3	1	1
Missing value	-	-	-	-	-	-	-	-	-	-	-
Total	**4580**	**1215**	**438**	**777**	**386**	**322**	**645**	**289**	**220**	**243**	**176**

ART initiation after 2000

Patients who initiated ART after 2000	Number of patients	Resistance test	Wild type	Any resistance	Resistance to						
					NRTI	NNRTI	PI	NRTI and PI	NRTI and NNRTI	NNRTI and PI	3-class-resistance
Year of ART initiation											
2001	79	34	10	24	9	5	21	6	5	3	3
2002	96	45	16	29	15	12	25	13	9	9	8
2003	92	43	19	24	2	8	22	2	2	6	2
2004	118	37	16	21	7	8	20	7	3	7	3
2005	125	44	13	31	9	7	29	9	4	5	4
2006	138	38	19	19	6	8	17	5	6	6	5
2007	150	45	17	28	9	9	27	8	5	8	4
2008	153	40	24	16	7	6	12	4	3	4	2
2009	210	45	30	15	5	9	12	4	5	6	4
2010	217	46	23	23	5	9	17	3	3	4	2
2011	226	43	22	21	5	8	17	3	4	4	2
2012	230	46	23	23	9	13	20	6	8	10	5
2013	229	40	25	15	2	3	12	-	1	1	-
2014	221	31	14	17	3	7	14	2	1	5	1
2015	221	30	15	15	5	7	11	4	3	3	2
2016	218	27	15	12	3	5	10	2	1	4	1
2017	227	21	12	9	1	6	7	1	1	4	1
2018	157	11	9	2	-	2	1	-	-	1	-
2019	170	16	11	5	-	1	4	-	-	-	-
2020	144	18	11	7	1	3	5	-	1	1	-
2021	169	11	7	4	-	-	4	-	-	-	-
2022	243	10	8	2	-	-	2	-	-	-	-
Population size of area of residence											
Missing value	-	-	-	-	-	-	-	-	-	-	-
Rural areas	1819	315	158	157	50	64	136	39	32	48	26
Capital cities	653	131	51	80	23	28	64	16	12	13	6
Vienna	1361	275	150	125	30	44	109	24	21	30	17
Sex/ mode of transmission											
MSM	1757	237	127	110	25	46	91	18	16	30	12
Male IDU	282	95	48	47	15	17	41	12	9	12	7
Female IDU	99	39	17	22	3	4	21	3	1	3	1
Male heterosexual	741	138	68	70	27	26	59	21	18	16	13
Female heterosexual	757	188	90	98	29	38	84	23	18	26	14
Others	197	24	9	15	4	5	13	2	3	4	2
Age at time of HIV-test											
< 35 years	1924	469	224	245	68	92	212	52	44	65	34
≥ 35 years	1909	252	135	117	35	44	97	27	21	26	15
Total	**3833**	**721**	**359**	**362**	**103**	**136**	**309**	**79**	**65**	**91**	**49**

11.3.6 Cumulative resistance related to different time periods of ART initiation

	Initial therapy before 1.1.1997		Initial therapy between 1.1.1997 and 31.12.2002		Initial therapy after 1.1.2003	
	N	%	N	%	N	%
Ever HIV RNA ≥ 200 copies/ml	344	95.8%	414	73.5%	1047	28.7%
At least 5 HIV RNA ≥ 200 copies/ml	288	80.2%	232	41.2%	277	7.6%
No resistance test after ART	86	24.0%	263	46.7%	3009	82.6%
Resistance test after ART	273	76.0%	300	53.3%	635	17.4%
Total	**359**	**100%**	**563**	**100%**	**3644**	**100%**
Number of NRTI-associated resistance mutations						
0 mutations	70	19.5%	196	34.8%	556	15.3%
1 mutation	36	10.0%	53	9.4%	55	1.5%
2 mutations	29	8.1%	21	3.7%	14	0.4%
3 mutations	33	9.2%	12	2.1%	5	0.1%
4 mutations	45	12.5%	9	1.6%	3	0.1%
5 mutations	30	8.4%	9	1.6%	1	0.0%
6 mutations	20	5.6%			1	0.0%
7 mutations	8	2.2%				
8 mutations	2	0.6%				
9 mutations	0	0.0%				
Number of NNRTI-associated resistance mutations						
0 mutations	154	42.9%	216	38.4%	517	14.2%
1 mutation	54	15.0%	40	7.1%	71	1.9%
2 mutations	40	11.1%	36	6.4%	31	0.9%
3 mutations	13	3.6%	7	1.2%	10	0.3%
4 mutations	6	1.7%	1	0.2%	4	0.1%
5 mutations	3	0.8%			2	0.1%
6 mutations	2	0.6%				
7 mutations	1	0.3%				
Number of PI-associated resistance mutations						
0 mutations	84	23.4%	107	19.0%	373	10.2%
1 mutation	60	16.7%	81	14.4%	89	2.4%
2 mutations	42	11.7%	45	8.0%	60	1.6%
3 mutations	16	4.5%	36	6.4%	57	1.6%
4 mutations	16	4.5%	13	2.3%	38	1.0%
5 mutations	15	4.2%	9	1.6%	13	0.4%
6 mutations	13	3.6%	3	0.5%	1	0.0%
7 mutations	5	1.4%	3	0.5%	2	0.1%
8 mutations	4	1.1%	3	0.5%	0	0.0%
9 mutations	4	1.1%			2	0.1%
10 mutations	2	0.6%				
11 mutations	4	1.1%				
12 mutations	3	0.8%				
13 mutations	5	1.4%				

11.3.7 Probability of development of resistance

11.3.7.1 Any ART regimen

„Any" resistance
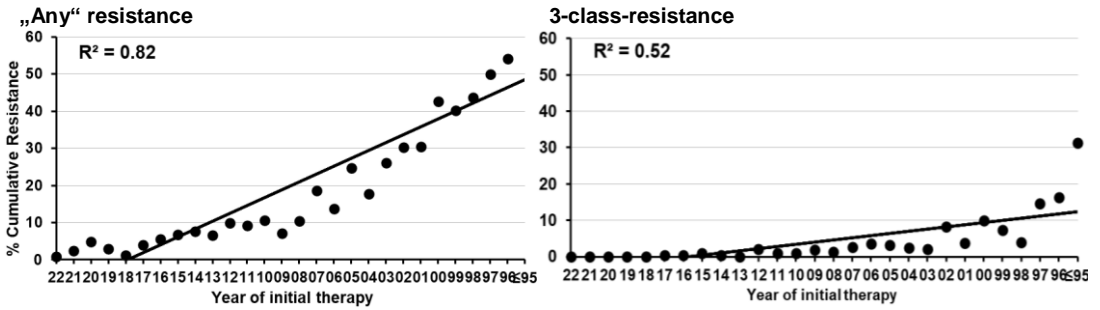
3-class-resistance

11.3.7.2 Any ART regimen and initial ART after January 1, 1997

„Any" resistance
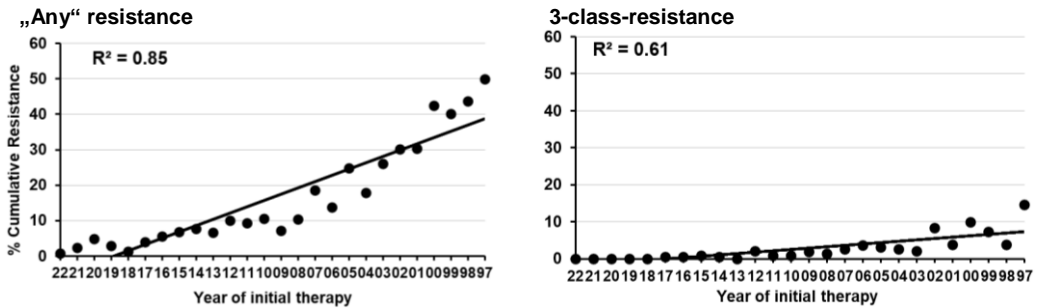
3-class-resistance

11.3.7.3 Initial ART with 2 NRTI + 1 NNRTI

Resistance to NNRTI
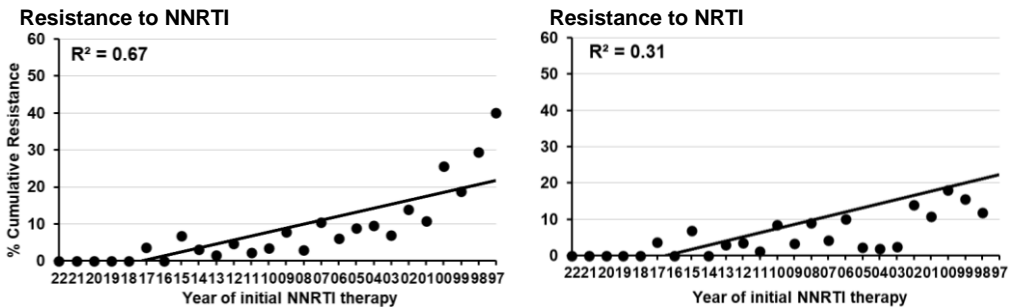
Resistance to NRTI

11.3.7.4 Initial ART with 2 NRTI + 1 PI

Resistance to PI

Resistance to NRTI
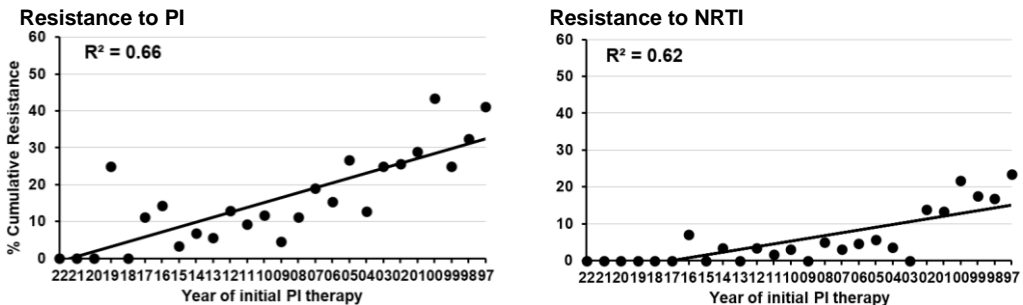
11.3.8 Risk factors for the development of resistance

11.3.8.1 Patients with 3-class-resistance

All centres	All deaths after 1996		AIDS related deaths after 1996		AIDS related deaths after 1996 and ART > 6 months		Patients currently in care and ART use ever	
	N = 1837		N = 499		N = 428		N = 4580	
3-class-resistance	125	(6.8%)	34	(6.8%)	34	(7.9%)	176	(3.8%)

3-class-resistance	Patients currently in care and ART use ever		
	N	=	176
Age (years; mean ± S. D.)	56.6	±	11.1
Federal states			
Carinthia	2		(1.1%)
Upper Austria	35		(19.9%)
Salzburg	10		(5.7%)
Styria	12		(6.8%)
Tyrol	24		(13.6%)
Vienna	60		(34.1%)
Other federal states	32		(18.2%)
Foreign countries	1		(0.6%)
Sex/ Mode of transmission			
MSM	62		(35.2%)
Male IDU	12		(6.8%)
Female IDU	11		(6.3%)
Male heterosexual	37		(21.0%)
Female heterosexual	40		(22.7%)
Others	14		(8.0%)
AIDS	88		(50.0%)
CD4 nadir (cells/µl; mean ± S. D.)	128.2	±	129.5
Current CD4 cell counts (cells/µl; mean ± S. D.)	695.9	±	360.1
Last HIV-RNA			
≤50 copies/ml	156	±	(88.6%)
51-199 copies/ml	13		(6.8%)
≥200 copies/ml	20		(4.5%)
Duration of ART (months; mean ± S. D.)	292.0	±	76.2

Risk factors for the development of 3-class-resistance

All centres

Variable	Frequencies N=			Univariable regression OR (95% CI)	p-value	Model 1 (N = 4580) Multivariable regression* OR (95% CI)	p-value
	176 /	4580	(3.8%)				
Demographic characteristics							
Age at ART start							
<30 years	68 /	1156	(5.9%)	5.0	2.4 - 10.5	<0.001	2.6	1.2 - 5.7	0.018
30-50 years	100 /	2777	(3.6%)	3.0	1.4 - 6.2	0.003	1.7	0.8 - 3.7	0.153
>50 years	8 /	647	(1.2%)	1			1		
Sex/mode of transmission							
Male IDU	12 /	367	(3.3%)	1.1	0.6 - 2.0	0.851			
Female IDU	11 /	159	(6.9%)	2.3	1.2 - 4.5	0.012			
Male heterosexual	37 /	864	(4.3%)	1.4	0.9 - 2.1	0.108			
Female heterosexual	40 /	928	(4.3%)	1.4	0.9 - 2.1	0.093			
Other	14 /	252	(5.6%)	1.8	1.0 - 3.4	0.043			
MSM	62 /	2010	(3.1%)	1					
Population size of area of residence							
Missing value	0 /	0	(0.0%)	-	-	-			
Rural areas	77 /	2162	(3.6%)	1.0	0.7 - 1.3	0.797			
Capital cities	39 /	805	(4.8%)	1.3	0.9 - 2.0	0.190			
Vienna	60 /	1613	(3.7%)	1					
Stage of disease							
AIDS							
Yes	88 /	1069	(8.2%)	3.5	2.6 - 4.7	<0.001			
No	88 /	3511	(2.5%)	1					
CD4 nadir							
Missing value	0 /	8	(0.0%)	-	-	-	-	-	-
<50 cells/µl	64 /	691	(9.3%)	6.4	4.3 - 9.5	<0.001	3.6	2.3 - 5.6	<0.001
50-199 cells/µl	70 /	1208	(5.8%)	3.9	2.6 - 5.7	<0.001	1.9	1.3 - 2.9	0.002
≥200 cells/µl	42 /	2673	(1.6%)	1			1		
Current HIV RNA							
Missing value	0 /	6	(0.0%)	-	-	-	-	-	-
≤50 copies/ml	156 /	4250	(3.7%)	0.5	0.2 - 1.0	0.049	0.2	0.1 - 0.5	<0.001
51-199 copies/ml	12 /	216	(5.6%)	0.7	0.3 - 1.9	0.515	0.5	0.2 - 1.5	0.230
≥200 copies/ml	8 /	108	(7.4%)	1			1		
ART							
ART initiation							
Before 1.1.1997	92 /	359	(25.6%)	32.8	22.1 - 48.9	<0.001	28.2	18.2 - 43.7	<0.001
1.1.1997 to 31.12.2002	46 /	563	(8.2%)	8.5	5.5 - 13.2	<0.001	7.4	4.6 - 11.7	<0.001
Since 1.1.2003	38 /	3658	(1.0%)	1			1		

*adjusted for the variables: sex/ mode of transmission, population size of area of residence

11.3.8.2 Patients with any resistance (ART start since 1.1.1997)

All centres	All deaths after 1996		AIDS related deaths after 1996		AIDS related deaths after 1996 and ART > 6 months		Patients currently in care and ART use ever after 1996	
	N = 1494		N = 409		N = 339		N = 4221	
Any resistance	283	(18.9%)	75	(18.3%)	75	(22.1%)	535	(12.7%)

Any resistance	Patients currently in care and ART use ever after 1996		
	N	=	535
Age (years; mean ± S. D.)	34.3	±	9.6
Federal states			
Carinthia	16		(3.0%)
Upper Austria	80		(15.0%)
Salzburg	46		(8.6%)
Styria	47		(8.8%)
Tyrol	75		(14.0%)
Vienna	183		(34.2%)
Other federal states	83		(15.5%)
Foreign countries/ missing	5		(0.9%)
Sex/ Mode of transmission			
MSM	164		(30.7%)
Male IDU	69		(12.9%)
Female IDU			
Male heterosexual	106		(19.8%)
Female heterosexual	143		(26.7%)
Others	22		(4.1%)
AIDS	200		(37.4%)
CD4 nadir (cells/µl; mean ± S. D.)	115.8	±	148.4
Current CD4 cell counts (cells/µl; mean ± S. D.)	681.6	±	328.4
Last HIV-RNA			
≤50 copies/ml	477		(89.2%)
51-199 copies/ml	34		(6.4%)
≥200 copies/ml	24		(4.5%)
Duration of ART (months; mean ± S. D.)	208.7	±	78.3

Risk factors for the development of any resistance

All centres	Frequencies N=		Univariable regression			Model 1 (N = 4221) Multivariable regression		
Variable	535 / 4221	(12.7%)	OR (95% CI)		p-value	OR (95% CI)		p-value
Demographic characteristics								
Age at ART start								
<30 years	181 / 1023	(17.7%)	3.6	2.5 – 5.2	<0.001	3.1	2.1 – 4.6	<0.001
30-50 years	318 / 2566	(12.4%)	2.3	1.6 – 3.3	<0.001	1.9	1.3 – 2.7	<0.001
>50 years	36 / 632	(5.7%)	1			1		
Sex/ mode of transmission								
Male IDU	69 / 322	(21.4%)	2.9	2.1 – 3.9	<0.001	2.4	1.7 – 3.3	<0.001
Female IDU	31 / 124	(25.0%)	3.5	2.3 – 5.4	<0.001	2.2	1.4 – 3.6	<0.001
Male heterosexual	106 / 818	(13.0%)	1.6	1.2 – 2.0	0.001	1.4	1.0 – 1.8	0.029
Female heterosexual	143 / 857	(16.7%)	2.1	1.6 – 2.7	<0.001	1.7	1.3 – 2.1	<0.001
Other	22 / 220	(10.0%)	1.2	0.7 – 1.9	0.529	0.8	0.5 – 1.4	0.516
MSM	164 / 1880	(8.7%)	1			1		
Population size of area of residence								
Missing value	0 / 0	(0.0%)	-	-	-	-	-	-
Rural areas	236 / 1998	(11.8%)	1.0	0.8 – 1.2	0.694	1.0	0.8 – 1.3	0.772
Capital cities	116 / 729	(15.9%)	1.4	1.1 – 1.7	0.018	1.5	1.1 – 2.0	0.003
Vienna	183 / 1494	(12.2%)	1			1		
Stage of disease								
AIDS								
Yes	200 / 911	(22.0%)	2.5	2.1 – 3.0	<0.001			
No	335 / 3310	(10.1%)	1					
CD4 nadir								
Missing value	0 / 8	(0.0%)	-	-	-	-	-	-
<50 cells/µl	127 / 603	(21.1%)	2.8	2.2 – 3.5	<0.001	2.4	1.8 – 3.1	<0.001
50-199 cells/µl	182 / 1042	(17.5%)	2.2	1.8 – 2.7	<0.001	1.6	1.3 – 2.0	<0.001
≥200 cells/µl	226 / 2568	(8.8%)	1			1		
Current HIV RNA								
Missing value	0 / 6	(0.0%)	-	-	-	-	-	-
≤50 copies/ml	477 / 3905	(12.2%)	0.5	0.3 – 0.8	0.002	0.4	0.2 – 0.6	<0.001
51-199 copies/ml	34 / 204	(16.7%)	0.7	0.4 – 1.2	0.202	0.7	0.4 – 1.3	0.261
≥200 copies/ml	24 / 106	(22.6%)	1			1		
ART								
ART initiation								
1.1.1997 to 31.12.2002	225 / 563	(40.0%)	7.2	5.9 – 8.8	<0.001	6.3	5.0 – 7.8	<0.001
Since 1.1.2003	310 / 3658	(8.5%)	1			1		

12 Co-morbidities and Co-medication
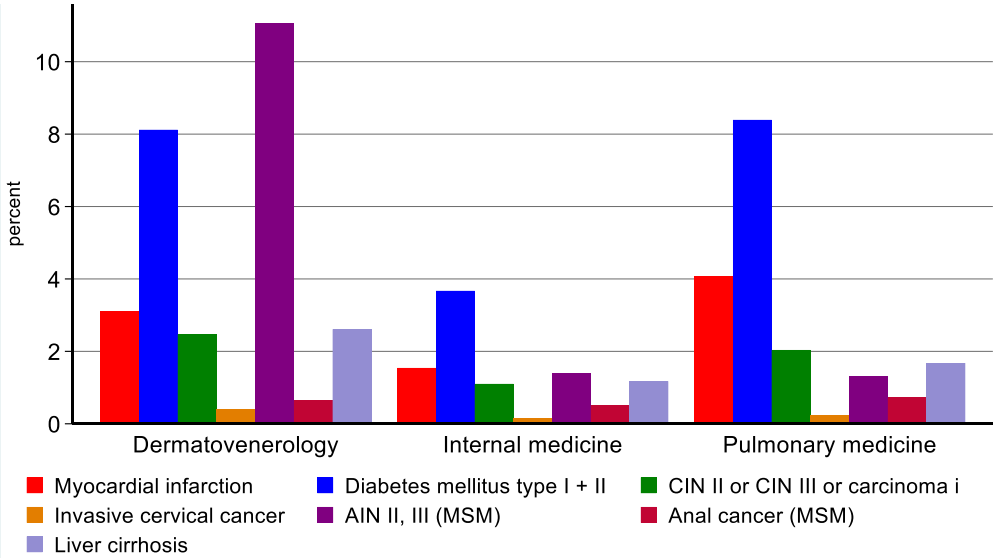
12.1 Co-morbidities

One aim of the Austrian HIV Cohort Study is to document co-morbidities and adverse drug reactions, as well as to investigate possible associations with ART. As a first step, important co-morbidities are illustrated.

Cumulative incidence in patients with a follow-up in the last 12 months (co-morbidities ever documented)

< 50 years	Male IDU	%	Female IDU	%	Male hetero	%	Female hetero	%	MSM	%
Number of patients	223		88		300		512		1122	
Hypertension	19	8.5	3	3.4	41	13.7	58	11.3	92	8.2
Coronary heart disease	2	0.9	1	1.1					6	0.5
Myocardial infarction			1	1.1	2	0.7			13	1.2
Stroke	3	1.3			2	0.7	4	0.8	4	0.4
Diabetes mellitus type I + II	9	4.0	2	2.3	21	7.0	17	3.3	22	2.0
CIN II or CIN III or carcinoma in situ			5	5.7			33	6.4		
Invasive cervical cancer							4	0.8		
St. p. hysterectomy			1	1.1			7	1.4		
Anal intraepithelial neoplasia II, III	6	2.7	1	1.1	8	2.7	3	0.6	184	16.4
Anal cancer					1	0.3			3	0.3
Osteoporosis	3	1.3			5	1.7	8	1.6	16	1.4
Liver cirrhosis	8	3.6	1	1.1	1	0.3	3	0.6	2	0.2
Attempted suicide or suicide	8	3.6	2	2.3	1	0.3	2	0.4	11	1.0
Drug overdose (mainly opiates)	6	2.7	4	4.5			1	0.2	4	0.4
Renal failure stage 3, 4, 5	2	0.9	3	3.4	8	2.7	10	2.0	11	1.0

≥ 50 years	Male IDU	%	Female IDU	%	Male hetero	%	Female hetero	%	MSM	%
Number of patients	187		103		622		490		1055	
Hypertension	57	30.5	17	16.5	214	34.4	138	28.2	326	30.9
Coronary heart disease	26	13.9	13	12.6	77	12.4	29	5.9	123	11.7
Myocardial infarction	12	6.4	6	5.8	26	4.2	11	2.2	62	5.9
Stroke	14	7.5	5	4.9	19	3.1	13	2.7	23	2.2
Diabetes mellitus type I + II	15	8.0	6	5.8	94	15.1	45	9.2	97	9.2
CIN II or CIN III or carcinoma in situ			15	14.6			46	9.4		
Invasive cervical cancer			4	3.9			6	1.2		
St. p. hysterectomy			12	11.7			30	6.1		
Anal intraepithelial neoplasia II, III	3	1.6	3	2.9	15	2.4	9	1.8	155	14.7
Anal cancer			3	2.9	4	0.6	4	0.8	28	2.7
Osteoporosis	33	17.6	28	27.2	59	9.5	86	17.6	97	9.2
Liver cirrhosis	27	14.4	14	13.6	11	1.8	7	1.4	24	2.3
Attempted suicide or suicide	7	3.7	3	2.9	6	1.0	2	0.4	12	1.1
Drug overdose (mainly opiates)	10	5.3	7	6.8	3	0.5	1	0.2	6	0.6
Renal failure stage 3, 4, 5	9	4.8	21	20.4	45	7.2	66	13.5	59	5.6

Comparison of "co-morbidities" diagnosed by the different medical subspecialities

Legend:
- Myocardial infarction
- Diabetes mellitus type I + II
- CIN II or CIN III or carcinoma i
- Invasive cervical cancer
- AIN II, III (MSM)
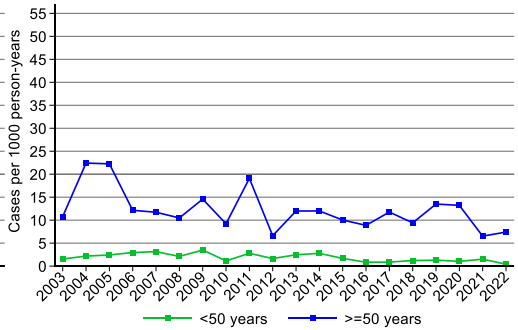- Anal cancer (MSM)
- Liver cirrhosis
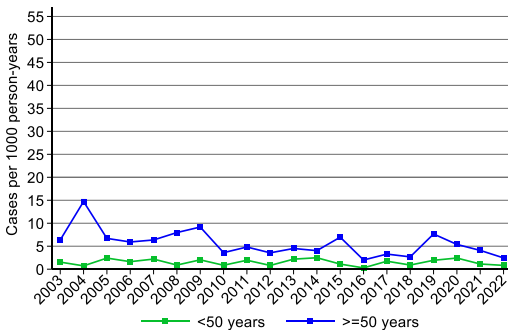
12.2 Incidence of Co-morbidities related to age
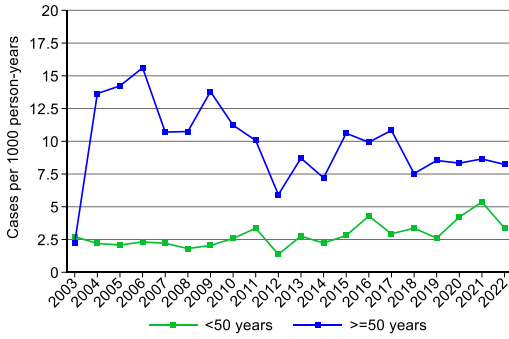
Hypertension
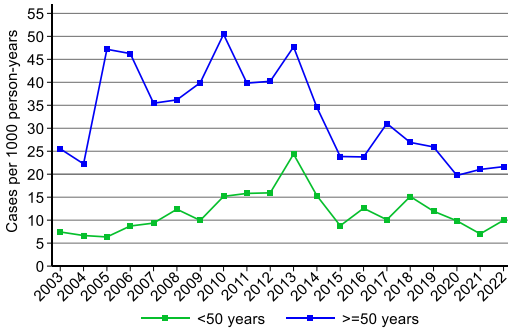
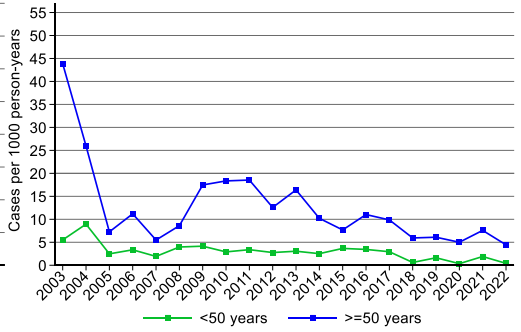**Coronary heart disease**

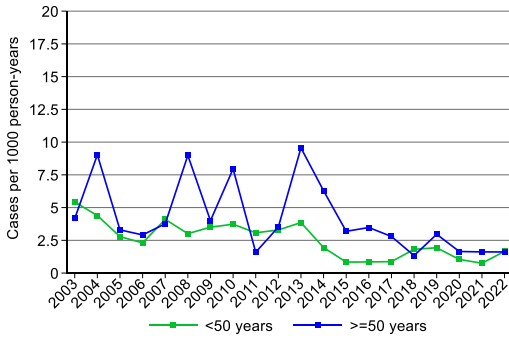**Myocardial infarction**

Stroke
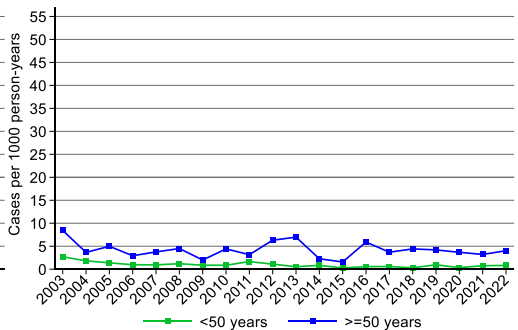
Diabetes mellitus type I+II

Osteoporosis

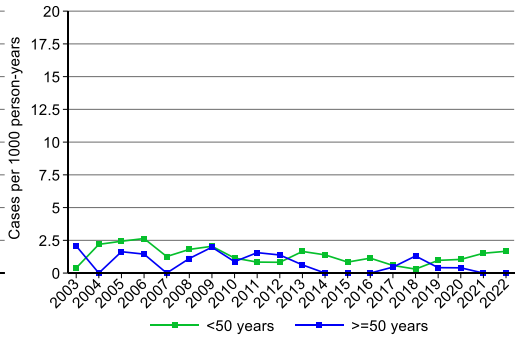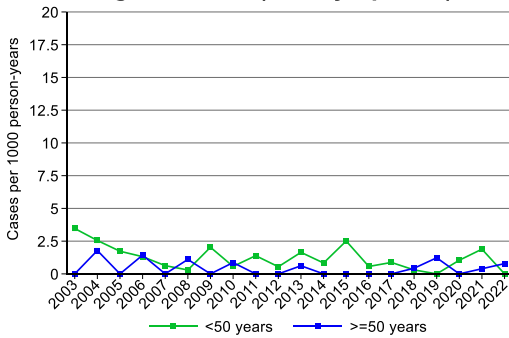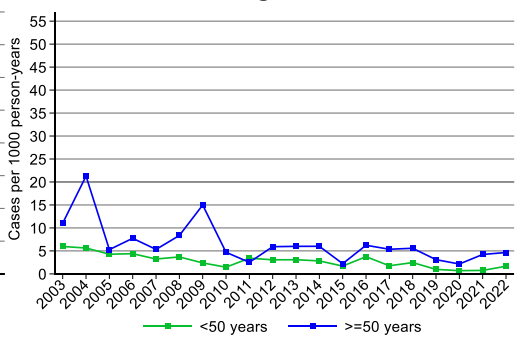## Liver cirrhosis

Attempted suicide or suicide

Drug overdose (mainly opiates)

Renal failure stage 3 or 4 or 5

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12.3 Co-medication related to age

	< 50 years									
	Male IDU		Female IDU		Male hetero		Female hetero		MSM	
Current therapies	223	%	88	%	300	%	512	%	1122	%
Acetylsalicylic acid	5	2.2	4	4.5	10	3.3	4	0.8	20	1.8
ACE inhibitors/angiotensin antagonists	14	6.3	3	3.4	35	11.7	46	9.0	83	7.4
Beta blocker	12	5.4	2	2.3	11	3.7	16	3.1	45	4.0
Statin	11	4.9	1	1.1	27	9.0	29	5.7	88	7.8
Fibrate	2	0.9	1	1.1	1	0.3			6	0.5
Insulin	3	1.3			8	2.7	3	0.6	5	0.4
Oral antidiabetic drugs	6	2.7	2	2.3	21	7.0	16	3.1	19	1.7
Proton pump inhibitors	47	21.1	11	12.5	24	8.0	46	9.0	60	5.3
Bisphosphonates	1	0.4			1	0.3	1	0.2	6	0.5
Thyroid hormones	3	1.3	5	5.7	9	3.0	34	6.6	20	1.8
Opiate substitution	132	59.2	58	65.9	18	6.0	8	1.6	12	1.1
Psychotropic drugs	164	73.5	68	77.3	50	16.7	90	17.6	203	18.1
Anxiolytics, hypnotics, sedatives	59	26.5	27	30.7	10	3.3	13	2.5	38	3.4
Antidepressants	44	19.7	20	22.7	20	6.7	55	10.7	120	10.7
Antipsychotics	44	19.7	17	19.3	13	4.3	30	5.9	58	5.2

|	≥ 50 years									
	Male IDU		Female IDU		Male hetero		Female hetero		MSM	
Current therapies	187	%	103	%	622	%	490	%	1055	%
Acetylsalicylic acid	44	23.5	19	18.4	114	18.3	54	11.0	174	16.5
ACE inhibitors/angiotensin antagonists	62	33.2	21	20.4	255	41.0	133	27.1	348	33
Beta blocker	35	18.7	14	13.6	110	17.7	67	13.7	189	17.9
Statin	59	31.6	33	32.0	239	38.4	166	33.9	362	34.3
Fibrate	1	0.5	1	1.0	23	3.7	8	1.6	22	2.1
Insulin	6	3.2	1	1.0	23	3.7	9	1.8	19	1.8
Oral antidiabetic drugs	10	5.3	5	4.9	87	14.0	40	8.2	102	9.7
Proton pump inhibitors	43	23.0	29	28.2	115	18.5	70	14.3	186	17.6
Bisphosphonates	2	1.1	6	5.8	14	2.3	25	5.1	30	2.8
Thyroid hormones	22	11.8	22	21.4	33	5.3	69	14.1	71	6.7
Opiate substitution	103	55.1	58	56.3	22	3.5	12	2.4	41	3.9
Psychotropic drugs	126	67.4	72	69.9	130	20.9	140	28.6	317	30.0
Anxiolytics, hypnotics, sedatives	54	28.9	32	31.1	28	4.5	34	6.9	53	5.0
Antidepressants	47	25.1	27	26.2	64	10.3	81	16.5	186	17.6
Antipsychotics	25	13.4	15	14.6	29	4.7	31	6.3	62	5.9

Co-medication

Comparison of "co-medications" used by the different medical subspecialities
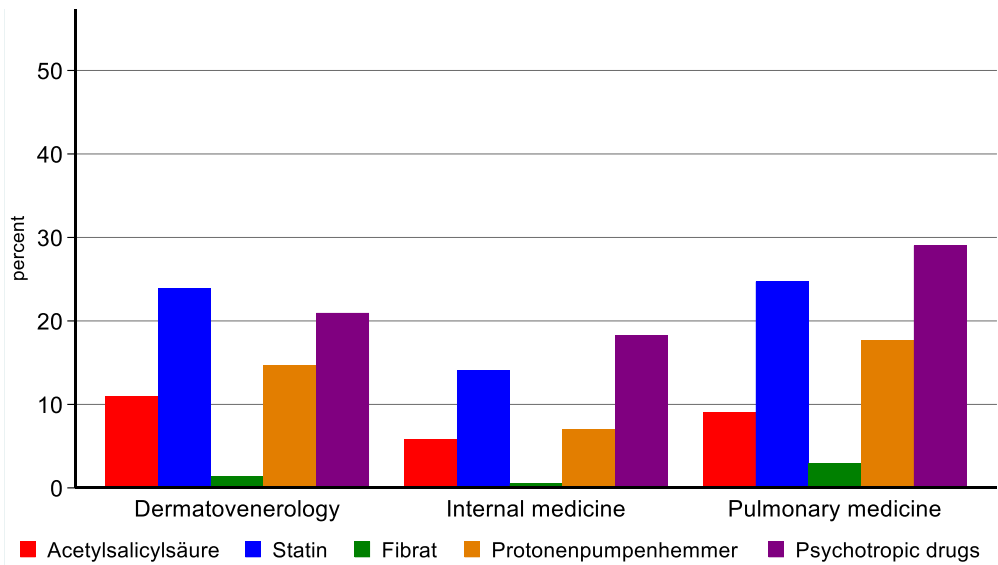
12.4 Examples of quality assurance

"Quality assurance"	Fulfilled	Total	%
LDL cholesterol not documented within the last 12 months (1)	378	4992	7.6%
LDL cholesterol documented	4614	4992	92.4%
LDL > 160 mg/dl	361	4614	7.8%
Smoking never documented (2)	359	4992	7.2%
Smoking documented	4631	4992	92.8%
Smoking	2176	4631	47.0%
LDL > 160 mg/dl and smoking (> 50 years)	70	1011	6.9%
LDL > 160 mg/dl and smoking and no statin (> 50 years)	39	70	55.7%
Blood pressure not documented within the last 12 months (3)	190	4992	3.8%
Blood pressure documented	4802	4992	96.2%
Arterial hypertension	1069	4802	22.3%
Arterial hypertension and smoking	364	1069	34.1%
Blood pressure documented (> 50 years)	2521	2580	97.7%
Arterial hypertension (> 50 years)	833	2521	33.0%
Arterial hypertension and smoking (> 50 years)	267	833	32.1%
Arterial hypertension and smoking and no statin (> 50 years)	143	267	53.6%
Coronary heart disease (CHD)	292	4992	5.8%
CHD and no statin	98	292	33.6%
CHD and LDL cholesterol documented	286	292	97.9%
CHD and LDL > 130 mg/dl	33	286	11.5%
Diabetes	347	4992	7.0%
Diabetes and HbA1c > 8	56	347	16.1%
Diabetes and no HbA1c within the last 12 months (4)	15	347	4.3%
Hepatitis C and visit within the last 12 months	117	4992	2.3%
Hepatitis C and elastography never documented (5)	103	117	88.0%
No syphilis screening in the last 6 months within MSM (6)	274	2177	12.6%
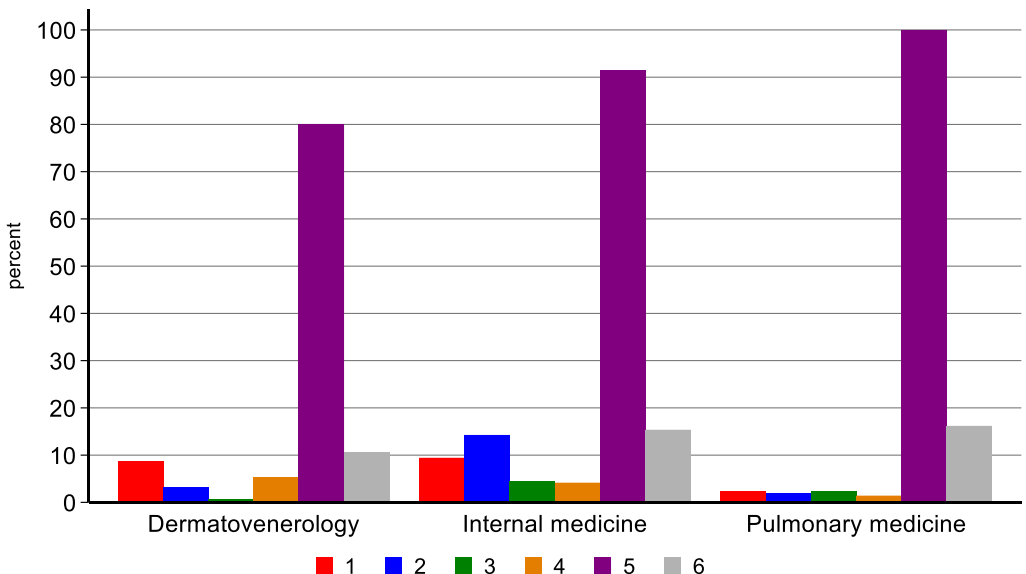
13   Summary

HIV Patient Management System

The Austrian HIV Cohort Study uses its own electronic health record, the *HIV Patient Management System,* which is the common tool for the HIV Cohort. The data input is done decentralized in the HIV centres. The input of laboratory results is done mostly electronically, and in every centre various professional groups are involved in data entry. Before data sets are merged, the cohort participants have been made anonymous. Therefore, it is very laborious to identify cohort participants who are/ were treated in more than just one treatment centre. This cannot be done by using personal data such as initials, date of birth or postal code, but with HIV specific data (date of the HIV test, CD4 cell counts etc.).

On the one hand, the *HIV Patient Management System* fulfills complex tasks for the clinical management of HIV infected patients, and on the other hand it allows queries and analyses to be performed by the users without restrictions. However, to allow both individual patient management and scientific queries is an enormous challenge which scientific HIV cohorts in other countries have not had to deal with. While for the clinical patient management the focus is on readability of diagnoses and therapies, creation of medical reports, prescriptions (trade names!), print-out of results etc., scientific queries need precise coding and categorization. Furthermore, the optimization of individual patient management requires an ongoing adjustment to the progress of information technology, whereas purely scientific data bases do not have such technological renewal pressure. However, in Austria, there was no acceptance for a purely scientific data base.

Patients with a follow-up in the last 12 months

The highest number of cohort participants are seen at the AKH Vienna (27.0%), followed. by the OWS Vienna (16.7%), Innsbruck (15.1%), Linz (13.9%), Graz (9.8%), Salzburg (6.6%), Klagenfurt (4.6%), Favoriten Vienna (3.9%) and Feldkirch (2.4%). However, a considerable proportion (33.7%) of patients did not have a follow-up within the last 12 months. The main reasons for this „loss of follow-up" is the transfer of care to health-care providers outside the hospital based HIV-centres of AHIVCOS and the substantial number of individuals who have left the country.

Who and how many are infected with HIV in Austria?

The median age at diagnosis has been between 30 and 40 years since 1990. 25.3% of the patients with a follow-up in the last 12 months are female. The rate is highest in Burgenland (31.7%), Upper Austria (31.0%), Lower Austria (28.1%), Vorarlberg (27.9%) and Styria (26.4%).

In the subgroup of heterosexually acquired infections, the rate of the women is 52.0%. It is highest in Styria (56.8%), Upper Austria (55.4%), Carinthia (54.7%), Tyrol (53.5%) and Burgenland (51.4%). Among patients newly diagnosed in 2023, 25.4% have been infected through heterosexual contacts. Since 2000, 35.2% of all newly diagnosed HIV infections were transmitted through heterosexual contacts.

Most of the cohort participants are Austrian nationals (69.2%). 8.2% come from high prevalence countries and 19.7% from low prevalence countries outside Austria. Information on the nationality of the remaining patients is missing.

According to Dachverband der Sozialversicherungsträger, 7768 persons received ART in 2022. According to the ECDC modelling tool the proportion of PLHIV on ART in 2022 is estimated to be between 86,5% and 92,2%. Thus, the estimate for PLHIV in Austria ranges from 8400 to 9000 for end of 2022.

As of January 1st 2022, the modelling tool of ECDC reveals 7596 PLHIV. Assuming that AHIVCOS is representative for Austria, the overall estimate for PLHIV sums up to 11 860. This is an overestimation, since the ascertainment of persons who left the country is very incomplete (e.g. migrant workers from Europe mainly in the tourism industry and rejection of asylum application).

Is the HIV test used efficiently?

Austria has one of the highest rates of HIV tests per capita in Europe. Nevertheless, a substantial number of patients (~25%) is already immune deficient (CD4 cell count <200/µl) at the time of the first contact with an HIV centre.

Therefore, risk factors for an "early" and a "late" diagnosis have been evaluated. Patients who have been diagnosed with HIV between 2001 and 2023 were analysed. During this period, 7109 HIV infections were newly diagnosed. The infections occurred in 35.0% through heterosexual transmission, in 44.8% through MSM and in 13.9% through IDU.

An "early" diagnosis is defined by: a seroconversion illness (westernblot pattern or antigen/HIV RNA with corresponding clinical symptoms) or documented seroconversion with negative test not more than 3 years before the first positive HIV test.

A "late" diagnosis is defined by: CD4<350 at time of HIV diagnosis and/or AIDS within 3 months of HIV diagnosis.

16.7% of the examined patients had an "early" diagnosis and 42.4% a "late" diagnosis.

A higher risk to be diagnosed "late" was found in older patients (>50), in those who have been infected heterosexually and male IDU compared to MSM and in persons originating not from Austria.

An „early" diagnosis was found more frequently in younger patients (<50), MSM, in patients originating from Austria and in persons residing in places with less than 1 million inhabitants.

Transmission of drug resistant HIV

In all centres, 275 (7.0%) of 3913 patients were identified who had at least one resistance mutation before their first antiretroviral therapy. One patient had a 3-class resistance to NRTI, NNRTI and PI before starting ART. Nine patients had a resistance to NRTI and PI, five patients had a resistance to NRTI and NNRTI, and four patients had a resistance to NNRTI and PI. The transmission of drug resistant HI viruses has decreased in the last years. However, not all centres did resistance tests before ART initiation or at diagnosis, but most have implemented the routine testing in 2003.

Stage of HIV disease

The cohort participants represent all stages of HIV infection. Half of the patients have a CD4 nadir <200/µl. The median of the CD4 nadir of the patients with a visit in the last 12 months is 243/µl. The current CD4 cell count is 689/µl (median at the last measurement). As of September 1st, 2023, about 3.4% of the patients with a visit in the last 12 months had a current CD4 cell count below 200/µl and 13 (0.3%) of them had a CD4 cell count <50/µl. The mean CD4 cell count is currently 723/µl. Therefore, the number of patients with an opportunistic infection will remain low in the following years.

Mortality

The reduction of mortality after the implementation of antiretroviral combination therapies is impressive (see items 10.1 and 10.2). In 1994, the death rate of patients with AIDS was 40.6 per 100 person-years for men and 44.4 for women. Over the last years the rate decreased to below 5 for men and for women. From 2005 to 2022 (except for the year 2006), injecting drug users had a higher death rate than homosexual men. Only in 2006 the death rate of homosexual men was higher than for IDU.

Viral suppression under antiretroviral therapy

The rate of viral suppression under antiretroviral therapy in Austria is similar to figures from other countries. However, it has to be considered that the rate of viral suppression has been measured with the patients currently in care and that patients with "loss of follow-up" are not included.

Increase of CD4 cell counts during antiretroviral therapy

The CD4 cells during antiretroviral therapy have continuously increased, and the increase continues after 5 and 7.5 years of ART initiation. The increase is faster in patients on continuous ART compared to patients with treatment interruptions (see item 10.3.2).

Development of resistances during antiretroviral therapy

The probability of developing resistance to antiretroviral drugs seems to be decreasing (chapter 12.3.7). So, the risk of „any" resistance after more than 20 years of ART is about 45%, for NRTI-associated resistance about 25% and for 3-class resistance 10%. The probability of NNRTI-associated resistance after more than 20 years is about 20% in patients who started ART with NNRTIs. The probability of PI-associated resistance after 20 years is 30% in patients who had a PI-based antiretroviral combination therapy as their initial therapy. The results are about the same if transmitted resistances are excluded.

The strongest risk factor for the development of 3-class-resistance during antiretroviral therapy is initiation of ART before 1997 as well as from 1997 to 2003, followed by low CD4 nadir and younger age at initiation of ART. Persons with a current HIV RNA below 50 copies/ml seem to have a lower risk of developing 3-class-resistance during ART.

In our cohort, 47 patients of 8796 (0.5%) have a mutation of the codon 65 of the RT (K65R). The occurrence of the mutation K65R was more frequent in regimens including Tenofovir compared with Abacavir and could be found more often in patients with advanced immune deficiency (low CD4 nadir/ AIDS; chapter 12.3.1.2) as well as in women infected heterosexually or through IDU.

Co-infections

Co-infections with syphilis, hepatitis B, and hepatitis C are common. Like in other European countries, an enormous increase of new syphilis infections, especially among

MSM, is apparent. This indicates a lack of prevention and "Safer Sex" practices. However, it is necessary to note that an increased "*sero-sorting*" behaviour (sexual contacts with partners with the same HIV status) could have substantially contributed to this increase.

In Austria, infection with hepatitis C is still uncommon in MSM. Not all patients are offered vaccination against hepatitis B, although it is recommended for all HIV infected persons.

Co-morbidities

Improved survival has shifted the health care towards more individuals older than 50 years. The medical needs of older HIV-infected patients may differ from those of younger patients. Older individuals, with new or longstanding HIV infection, are at greater risk for non-HIV-related morbidities. Of special concern are cardiovascular diseases, osteoporosis, liver and neuropsychiatric disorders. Thus, aging of the HIV-infected population under care will lead to more complex medical management and increased costs of care. Health care agencies need to be aware of the impact of this important change in near future.

Outlook

The report of the Austrian HIV Cohort Study is still representative of the epidemiology of HIV/AIDS in Austria and therefore serves as source of data for the ECDC in Stockholm. It can be well compared with other reports from Austria, such as the report of renal replacement therapy of the Austrian Society for Nephrology and Austrotransplant. Moreover, the establishment of the *HIV Patient Management System* has played an important role to improve clinical care for persons with HIV/AIDS *("Good Clinical Chronic Disease Practice").*

Some remaining problems are mainly due to inconsistent use of the *HIV Patient Management System* with the corollary of inconsistent data entry into this software. Regular updates and improvements of the *HIV Patient Management System* should help to face these challenges.
The development of the HIV Patient Management System incorporated the international standard format, the HIV Cohorts Data Exchange Protocol (HICDEP). Therefore, data merging with international networks of cohorts like RESPOND and ART-CC has been and will be greatly facilitated.

14   Glossary

A   Austria
Ab   Antibody
ACE   Angiotensin-converting enzyme
AGES   Austrian Agency for Health and Food Safety
AHIVCOS   Austrian HIV Cohort Study
ART   Antiretroviral therapy (HIV-therapy)
ARVs   Antiretrovirals
ATC-Code   Anatomical therapeutic-chemical code
B   Burgenland
betw.   between
BMG   Federal Ministry of Health
C   Carinthia
cART   Combination antiretroviral therapy
CDC   Centers for Disease Control
CHD   Coronary heart disease
CIN   Cervical intraepithelial neoplasia
CIS   Commonwealth of Independent States
ECDC   European Centre for Disease Prevention and Control
EuroHIV   European Centre for the Epidemiological Monitoring of AIDS
GP   General practitioner
HBA1c   Hemoglobin A1c
HBV   Hepatitis B virus
HCV   Hepatitis C virus
HDL   High density lipoprotein
Hetero   Heterosexually acquired infection
HIP   HIV-Patient-Management-System
IAS   International AIDS-Society
ICD   International Classification of Diseases (WHO)
IDU   Injecting drug users
INSTI   Integrase strand transfer inhibitor
Interm.   Intermediate
KFJ   Kaiser-Franz-Josef-Spital Wien/Kaiser-Franz-Josef-Hospital Vienna
LA   Lower Austria
LDL   Low density lipoprotein
m.   month(s)
MI   Myocardial infarction
MSM   Men who have sex with men
N.a.   Not available/ not applicable
n.s.   not significant
neg.   negative
NNRTI   Non Nucleoside Reverse Transcriptase Inhibitor
NRTI   Nucleoside Reverse Transcriptase Inhibitor
OWS   Otto-Wagner-Spital Wien/Otto-Wagner Hospital Vienna
P   Protease
PI   Protease inhibitor
RNA   Ribonucleic acid
RT   Reverse transcriptase
S   Salzburg
SD/ s.d.   Standard deviation
St   Styria
St. p.   Status post
T   Tyrol
UA   Upper Austria
UK   United Kingdom
Vertical   Vertical transmission
Vie   Vienna
Vo   Vorarlberg
WHO   World Health Organization
ys.   years

15   Austrian HIV Cohort Study Group

As of November 2023

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