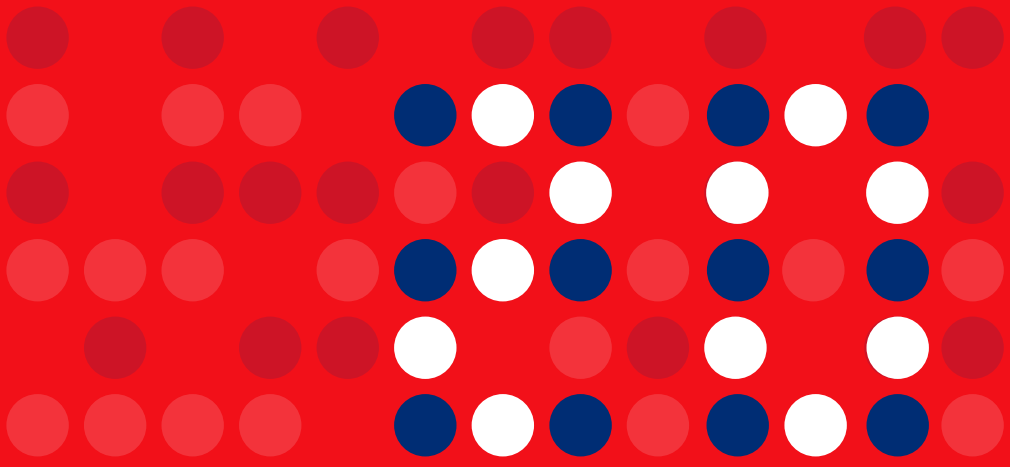
Human Immunodeficiency Virus (HIV)
Infection in the Netherlands

HIV Monitoring

HIV Monitoring Report 2020



8. The Amsterdam Cohort Studies on HIV infection: annual report 2019

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Introduction

The Amsterdam Cohort Studies (ACS) on HIV infection and AIDS started shortly after the first cases of AIDS were diagnosed in the Netherlands. Since October 1984, men who have sex with men (MSM) have been enrolled in a prospective cohort study. A second cohort involving people who use/used injecting drugs [PWID] was initiated in 1985. In 2019, the cohorts reached 35 years of follow up. The initial aim of the ACS was to investigate the prevalence and incidence of HIV-1 infection and AIDS, the associated risk factors, the natural history and pathogenesis of HIV-1 infection, and the effects of interventions. During the past 35 years, these aims have remained primarily the same, although the emphasis of the studies has changed. Early on, the primary focus was to elucidate the epidemiology of HIV-1 infection, whereas, later, more in-depth studies were performed to investigate the pathogenesis of HIV-1 infection. In the past decade, research on the epidemiology of other blood-borne and sexually-transmitted infections (STIs), and their interaction with HIV, has also become an important component of the ACS research programme.

From the outset, research in the ACS has taken a multidisciplinary approach, integrating epidemiology, social science, virology, immunology, and clinical medicine under one study team. This unique collaboration has been highly productive, significantly contributing to the knowledge and understanding of many different aspects of HIV-1 infection and other infections such as viral hepatitis B and C and human papillomavirus (HPV). This expertise, in turn, has contributed directly to advances in prevention, diagnosis, and management of these infection.

Collaborating institutes and funding

Within the ACS, different institutes collaborate to bring together data and biological sample collections, and to conduct research. These include the Public Health Service of Amsterdam (*Gemeentelijke Gezondheidsdienst Amsterdam*; GGD Amsterdam): Department of Infectious Diseases, Research, and Prevention; the Amsterdam University Medical Centres (Academic Medical Centre (AMC) site): Departments of Medical Microbiology, Experimental Immunology, and Internal

Medicine (Division of Infectious Disease); the Emma Kinderziekenhuis (paediatric HIV treatment centre); Stichting HIV Monitoring (SHM); MC Jan van Goyen: Department of Internal Medicine; and the Hiv Focus Centrum (DC Klinieken Lairesse). From the start, Sanquin Blood Supply Foundation has been involved in the ACS and, since 2007, has provided financial support for the biobank of viable peripheral blood mononuclear cells (PBMC) at the AMC's Department of Experimental Immunology. In addition, there are numerous collaborations between the ACS and other research groups, both within and outside the Netherlands. The ACS is financially supported by the Centre for Infectious Disease Control Netherlands of the National Institute for Public Health and the Environment (*Centrum voor Infectieziektenbestrijding-Rijksinstituut voor Volksgezondheid en Milieu*, RIVM-CIb).

Ethics statement

The ACS have been conducted in accordance with the ethical principles set out in the Helsinki declaration. Participation in the ACS is voluntary and written informed consent is obtained from each participant. The most recent version was approved by the AMC medical ethics committee in 2007 for the MSM cohort, and in 2009 for the PWID cohort.

The Amsterdam Cohort Studies in 2019

The cohort of men who have sex with men (MSM)

As of 31 December 2019, 2,899 MSM were included in the ACS. Every three to six months, participants complete a standardized questionnaire designed to obtain information regarding medical history, sexual and drug use behavior, underlying psychosocial determinants, healthcare use, depression, psychological disorders, and demographics. Blood is also collected for diagnostic tests and storage. Of the 2,899 MSM, 607 were HIV-positive at entry into the study, and 263 seroconverted for HIV during follow up. In total, the GGD Amsterdam was visited 61,172 times by MSM.

In 1984-85, men who had had sexual contact with a man in the preceding six months were enrolled, independent of their HIV status. In the period 1985-88, HIV-negative men of all age groups were eligible to participate if they lived in, or around Amsterdam, and had had at least two male sexual partners in the preceding six months. From 1988 to 1998, the cohort was also open for HIV-positive MSM. During the period 1995–2004, only men aged ≤30 years with at least one male sexual partner in the previous six months, could enter the study. Since 2005, HIV-negative men of all age groups have been eligible to participate in the ACS if

they live in, or are closely connected with the city of Amsterdam, and have had at least one male sexual partner in the preceding six months. In line with the advice issued by the international scientific advisory committee in 2013, the cohort now makes additional efforts to recruit young HIV-negative MSM (age ≤30 years).

HIV-seroconverters within the ACS remained in the cohort until 1999, when follow up of a selection of HIV-positive MSM was transferred to the MC Jan van Goyen. In 2003, the *Hiv Onderzoek onder Positieven* (HOP) protocol (*HIV Research in Positive Individuals*) was initiated. Individuals with a recent HIV infection when entering the study at the GGD Amsterdam, and those who seroconverted for HIV during follow up within the cohort, continue to return for study visits at the GGD Amsterdam, or at an HIV treatment centre. Blood samples from these participants are stored. All behavioural data are collected on a six-monthly basis by questionnaires, coordinated by the GGD Amsterdam, and clinical data are provided by SHM.

In 2019, 708 HIV-negative and 53 HIV-positive MSM were in active participation at the GGD Amsterdam; in other words, these men visited the cohort at least once in 2019 or 2018. All 53 HIV-positive MSM filled out behavioural questionnaires. In addition to the HIV-positive MSM visiting the GGD Amsterdam, 256 HIV-positive MSM participated at the MC Jan van Goyen, or the DC Klinieken Lairesse-HIV Focus Centrum in Amsterdam. Behavioural questionnaires were not filled out by these men. In 2019, 18 new HIV-negative MSM were recruited. The median age of this group was 29.6 years (interquartile range [IQR] 26.9-31.7), while that of the total group of MSM in active follow up was 43.6 years at their last visit (IQR 33.2-51.0). The majority (83.3%) of the total group was born in the Netherlands and 87.9% were residents of Amsterdam. In total, 77.0% of the participants had a college degree or higher.

The cohort of people who use/used injecting drugs [PWID]

As of 31 December 2016, 1,680 PWID were included in the ACS and contributed 28,194 visits. In 2014, the cohort was closed to new participants. Regular follow up of PWID continued until February 2016. All PWID who had ever participated in the ACS were then invited for an end-of-study interview and follow up was successfully ended in July 2016. Of the 1,680 PWID, 323 were HIV-positive at entry, and 99 seroconverted during follow up. The last HIV seroconversion was seen in 2012. By 31 December 2016, 576 deaths had been confirmed among PWID. The median age of the PWID who visited the ACS in 2016 was 55 (IQR 49-59), 8.1% had attained a high level of education, and 63.4% were born in the Netherlands.

The Amsterdam Cohort Studies biobank

The ACS visits, together with data collection from several subgroup studies and affiliated studies embedded in the ACS, have resulted in a large collection of stored samples. The ACS biobank includes plasma/serum and PBMC samples collected within the context of the ACS cohorts and the Primo-SHM study (a national randomised study comparing the effects of early temporary antiviral therapy with that of no therapy among patients who presented with primary HIV-1 infection at the AMC HIV outpatient clinic, and ACS seroconverters). These samples are stored at the AUMC, location AMC. At present, biological samples are still being collected prospectively for Primo-SHM participants visiting the AUMC, location AMC clinic until one year after they have recommenced therapy. The ACS biobank also includes plasma and PBMC samples that were collected from HIV-positive and HIV-exposed children at the Emma Kinderziekenhuis in the AUMC, location AMC until 2008. All stored samples are available for ACS research.

Subgroup studies and affiliated studies

AGE$_h$IV cohort study

The AGE$_h$IV cohort study (a collaboration between the Amsterdam UMC, location AMC Departments of Infectious Diseases and Global Health, the Amsterdam Institute of Global Health and Development, the GGD Amsterdam, and SHM) was started in October 2010. The aim of the study is to assess the prevalence and incidence of a broad range of comorbidities, along with known risk factors for these comorbidities, in HIV-positive individuals aged ≥45 years, and to determine the extent to which comorbidities, their risk factors and their relation to quality of life differ between HIV-positive and HIV-negative groups.

Participants undergo a comprehensive assessment for comorbidities and complete a questionnaire at intake, as well as research follow-up questionnaires every subsequent two years. In total, 598 HIV-1-positive participants, and 550 HIV-negative individuals, completed a baseline visit between October 2010 and September 2012. HIV-1-positive participants were included through the AUMC, location AMC HIV outpatient clinic, and HIV-negative participants from similar risk groups through the STI clinic at the GGD Amsterdam (486) or the ACS (64). All participants were aged ≥45 years and were as comparable as possible with respect to age, gender, ethnicity, and risk behaviour. In the fourth round (2016-18), 420 HIV-positive and 457 HIV-negative participants had a fourth visit. In 2019, visits for the fifth round started and this round is expected to be completed in 2021.

H2M cohort studies

From 2010 to 2013, the H2M (HIV and human papillomavirus (HPV) in MSM) cohort study was conducted in a subset of the HIV-negative (n=459) and HIV-positive (n=40) participants of the ACS who were in active participation, and also among patients of the STI clinic of GGD Amsterdam and MC Jan van Goyen. The aim of the Aidsfonds-supported study was to compare the prevalence, incidence, and clearance of HPV infections associated with high-risk (hr) of anal cancer between HIV-negative and HIV-positive MSM.

Since September 2014, collection of anal and genital swabs has been resumed in all consenting ACS participants. The key aim of this second new study (the H2M3 study), which builds on the H2M study, is to examine long-term incidence and clearance of anal and penile hrHPV infections. Between September 2014 and November 2015, 700 men provided samples for HPV testing during ACS cohort visits. Of these, 434 (62%) were already participating in the H2M study (recruited 2010-11), and 266 (38%) were new participants who joined the ACS after the H2M study had ended. Samples at two time points (six months apart) were tested in the laboratory for HPV DNA, and analyses of anal samples were conducted. This study, supported by Crucell (Leiden), found that a quarter of MSM did not clear an anal HPV-16 infection after three years; therefore, persistence of anal HPV is common. Twenty-two percent of men who were not infected with HPV-16 at baseline, acquired an anal HPV-16 infection over a four-year period. Therefore, even in highly pre-exposed men, the incidence rate of hrHPV infections is high. Analysis of penile HPV infections showed that HPV-16 had the highest incidence rate of all high-risk HPV types, and the lowest clearance rate. In 2019, collection of anal and penile swabs from ACS participants continued and these are stored at the laboratory of the Public Health Service of Amsterdam for future studies.

AMPrEP project in H-TEAM

The Amsterdam pre-exposure prophylaxis (AMPrEP) project is a prospective, longitudinal, open-label demonstration study. Its aim is to assess the uptake and acceptability of daily, versus event-driven, pre-exposure prophylaxis (PrEP) among MSM and transgender people (TGP) at increased risk for HIV infection, as part of a comprehensive HIV-reduction package offered at a large STI clinic.

In total, 374 MSM and two TGP were enrolled between August 2015 and May 2016 at the STI outpatient clinic of the GGD Amsterdam, including 35 ACS participants who participated in the AMPrEP project at their own initiative. Participants were asked to return for follow-up visits one month after the PrEP start visit, and then every three months. At every visit, participants fill out questionnaires on risk behaviour, adherence, and general wellbeing, and are screened for STI and HIV.

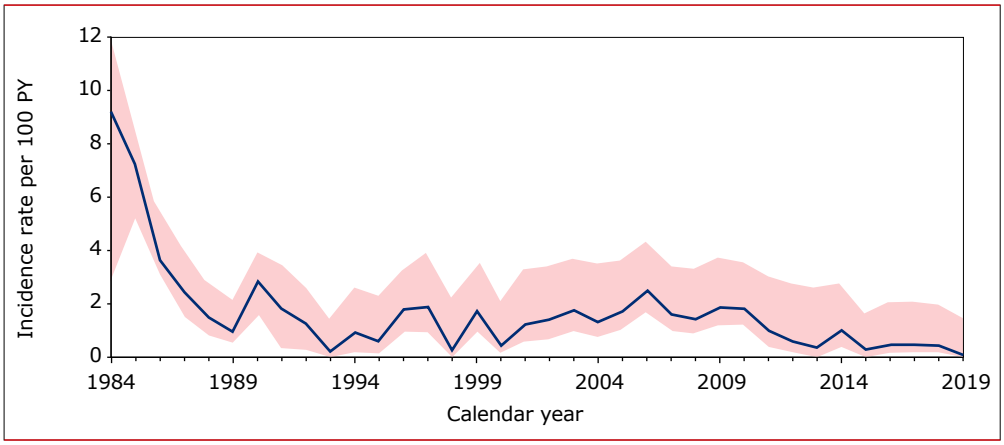
The AMPrEP project is part of the HIV Transmission Elimination Amsterdam (H-TEAM) initiative, a multidisciplinary and integrative approach to stop the epidemic (www.hteam.nl).

The HIV epidemic

HIV incidence

The observed HIV incidence among MSM participating in the ACS has changed over time. Between 1985-1993, the HIV incidence rate declined significantly, which was followed by a stable incidence between 1993 and 1996, and a rising incidence in 1996-2009. From 2009 onwards, the HIV incidence decreased significantly. In 2019, two MSM participating in the ACS seroconverted for HIV. The HIV incidence rate was 0.11 per 100 person years (95%-confidence interval (CI) 0.02-0.81) in 2019. *Figure 8.1* shows the yearly-observed HIV incidence rate for MSM from the start of the ACS through 2019.

Figure 8.1: *HIV incidence per calendar year in the Amsterdam Cohort Studies (ACS) among men who have sex with men (MSM), 1984–2019.*



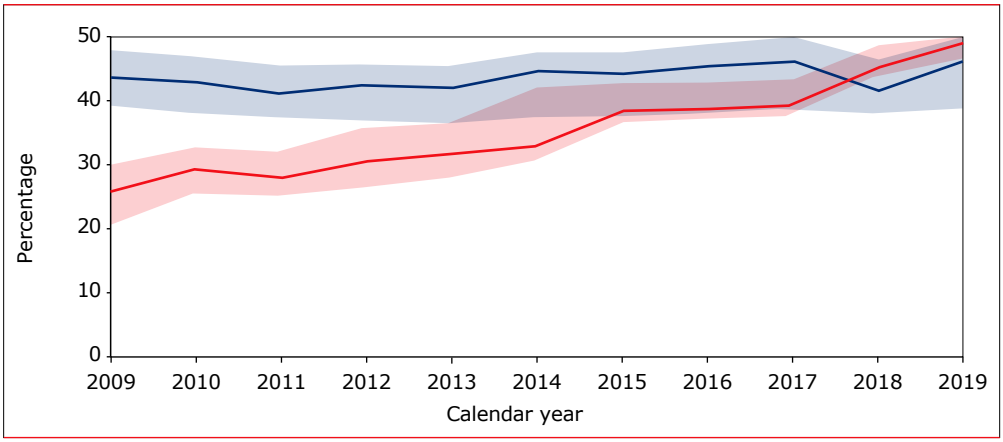
Transmission of therapy-resistant HIV strains

In 2019, no surveillance of transmitted drug-resistant HIV-1 strains was conducted.

Risk behaviour of MSM in ACS

Condomless anal sex (CAS) with a steady partner was reported by 295/639 (46.2%) HIV-negative MSM at their last cohort visit, compared with 314/639 (49.1%) who reported CAS with a casual partner. Trends in CAS among HIV-negative MSM participating in the ACS, especially CAS with casual partners, continued to show a gradual increase from 2009 onwards (*Figure 8.2*). The use of PrEP has also increased over time since 2015. In 2019, 185/662 (27.9%) HIV-negative MSM in active participation reported PrEP use in the preceding six months. CAS with a steady partner was reported by 77/173 (44.5%) MSM who used PrEP, and 180/441 (40.8%) MSM who did not use PrEP. CAS with a casual partner was reported by 140/173 (80.9%) MSM who used PrEP, and 96/441 (21.7%) MSM who did not use PrEP.

Figure 8.2: Trend in the proportion of condomless anal sex (CAS) with (A) casual partners, and (B) steady partners, among HIV-negative men who have sex with men (MSM) in the Amsterdam Cohort Studies (ACS), 2009-19.

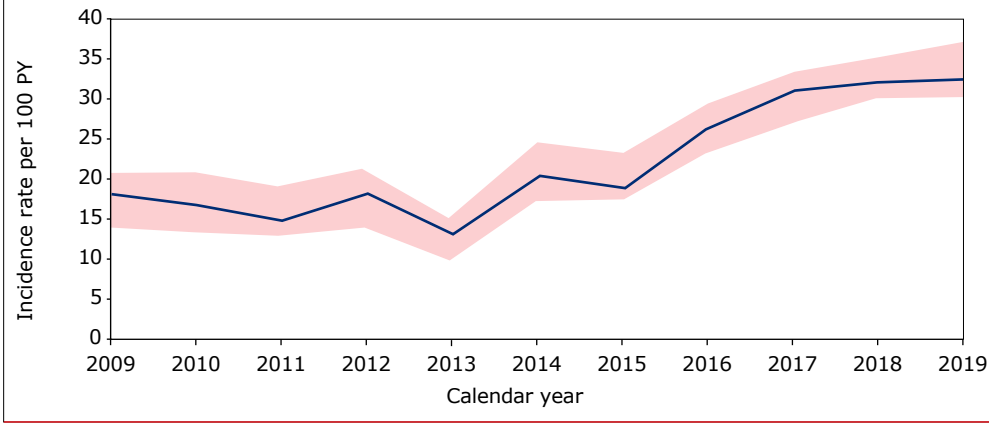


STI screening among MSM in ACS

Since October 2008, all MSM in the ACS have been routinely screened for chlamydia and gonorrhoea by polymerase chain reaction (PCR) techniques using urine samples and pharyngeal and rectal swabs. Cases of syphilis are detected by *Treponema pallidum* haemagglutination assay (TPHA). In 2019, 731 MSM from the ACS were screened for STIs. The incidence rate of any STI (i.e., chlamydia, gonorrhoea, or syphilis) was 30.2/100 person-years in 2019 (95%-CI 25.6-35.6) among HIV-negative MSM. The incidence rate of any STI significantly increased

between 2009-19 (*Figure 8.3*). The incidence rate of any STI was 37.6/100 PY (95%-CI 27.5-51.5) among HIV-negative MSM who used PrEP, and 24.8/100 PY (95%-CI 20.4-30.0) among HIV-negative MSM who did not report use of PrEP.

Figure 8.3: *The incidence of any STI (i.e., chlamydia, gonorrhoea, or syphilis) among HIV-negative MSM in the Amsterdam Cohort Studies (ACS), 2009-19.*



The Amsterdam Cohort Studies research highlights

Cross-genotype AR3-specific neutralizing antibodies confer long-term protection in injecting drug users after HCV clearance

Although effective treatments against HCV are available, each year, 500,000 people die from liver disease caused by HCV, and approximately 1.75 million people are newly infected. These infections could be prevented if there was a vaccine available against HCV. To design such a vaccine, more insight into the role of antibodies in protection against HCV infection is needed. In the ACS cohort of PWID, antibodies interfering with HCV cell entry were found. A strong B cell response, producing cross-genotype and neutralizing antibodies, especially targeting antigenic region 3 of HCV, contributed to clearance and long-term immune protection against HCV. In addition, three individuals developed antibodies recognizing antigenic region 4, of which one monoclonal antibody showed cross-neutralizing capacity. These observations permit cautious optimism that development of an effective preventive vaccine is feasible. Published by: Merat SJ, Bru C, van de Berg D, et al. *J Hepatol. 2019;71(1):14-24. doi:10.1016/j.jhep.2019.02.013*

Infection Pressure in Men Who Have Sex With Men and Their Suitability to Donate Blood

Deferral of men who have sex with men (MSM) from blood donation is highly debated. To assist in defining MSM donor deferral policies, we have investigated their suitability to donate blood by comparing the antibody prevalence of 10 sexually-transmissible and transfusion-transmissible infections (TTI) among 583 MSM from the Amsterdam Cohort Studies, and 583 age-matched repeat male blood donors. MSM were classified as low-risk (lr) or medium-to-high-risk (hr) based on self-reported sexual behaviour, and as qualified or unqualified using Dutch donor deferral criteria other than male-to-male sex. Infection pressure was defined as the number of antibody-reactive infections, with class A infections (HIV-1/2, HBV, HCV, HTLV-1/2, syphilis), given double weight compared to class B infections (CMV, HSV-1/2, HHV-8, HEV, Parvovirus B19). We found that donors had a lower infection pressure than qualified lr-MSM and qualified hr-MSM. A low infection pressure was found in 76% of donors, 39% of qualified lr-MSM, and 27% of qualified hr-MSM. The prevalence of class A infections did not differ between donors and qualified lr-MSM, but was significantly higher in qualified hr-MSM and unqualified MSM. Recently-acquired class A infections were detected in hr-MSM only. Compared to blood donors, human herpes viruses were more prevalent in all MSM groups, and prevalence increased with self-reported risk behaviour. In conclusion, infection pressure correlated with self-reported risk behaviour among MSM. Although lr-MSM might form a low threat for blood safety with regards to class A infections, the high seroprevalence of human herpes viruses in lr-MSM warrants further investigation. Published by: van Bilsen WPH, Zaaijer HL, Matser A, et al. *Clin Infect Dis. 2019;68(6):1001-1008. doi:10.1093/cid/ciy596*

Steering committee

In 2019, the steering committee met five times. Eight proposals for use of data and/or samples (serum/PBMC) were submitted to the committee: one from the AUMC, location AMC Experimental Immunology, four from the Amsterdam UMC, location AMC laboratory of Experimental Virology, and three from the GGD Amsterdam. Three of the proposals were collaborations with groups outside the ACS: two proposals from the the RIVM, and one proposal from Erasmus MC, all three in collaboration with GGD Amsterdam. All eight requests were approved, of which three were approved following revisions recommended by the ACS steering committee.

Publications in 2019 that include ACS data

Genomic characterization of hepatitis C virus transmitted founder variants with deep sequencing
Abayasingam A, Leung P, Eltahla A, Bull RA, Luciani F, Grebely J, Dore GJ, Applegate T, Page K, Bruneau J, Cox AL, Kim AY, Schinkel J, Shoukry NH, Lauer GM, Maher L, Hellard M, Prins M, Lloyd A, Rodrigo C; InC3 Study Group.
Infect Genet Evol. 2019 Jul;71:36-41.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6487228/

Identification and characterization of latent classes based on drug use among men who have sex with men at risk of sexually transmitted infections in Amsterdam, the Netherlands
Achterbergh RCA, de Vries HJC, Boyd A, et al.
Addiction. 2020;115(1):121-133. doi:10.1111/add.14774
https://pubmed.ncbi.nlm.nih.gov/31400174/

Potential effectiveness of prophylactic HPV immunization for men who have sex with men in the Netherlands: A multi-model approach
Bogaards JA, Mooij SH, Xiridou M, Schim van der Loeff MF.
PLoS Med. 2019 Mar 4;16(3):e1002756. doi: 10.1371/journal.pmed.1002756. PMID: 30830901; PMCID: PMC6398832.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6398832/

Lower Broadly Neutralizing Antibody Responses in Female Versus Male HIV-1 Infected Injecting Drug Users
Euler Z, van den Kerkhof TL, Kouyos RD, Tully DC, Allen TM, Trkola A, Sanders RW, Schuitemaker H, van Gils MJ.
Viruses. 2019 Apr 25;11(4):384. doi: 10.3390/v11040384.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6521154/

Estimating incidence rates of grouped HPV types: A systematic review and comparison of the impact of different epidemiological assumptions
Jongen VW, van Santen DK, Alberts CJ, Schim van der Loeff MF.
Papillomavirus Res. 2019 Dec;8:100187. doi: 10.1016/j.pvr.2019.100187. Epub 2019 Oct 7. PMID: 31600572; PMCID: PMC6804437.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6804437/

Incidence and Clearance of Anal High-risk Human Papillomavirus Infections and Their Determinants Over 5 Years Among Human Immunodeficiency Virus–negative Men Who Have Sex With Men
Marra E, Kovaleva A, Bruisten SM, Vermeulen W, Boyd A, Schim van der Loeff MF.
Clin Infect Dis. 2019;68(9):1556-1565. doi:10.1093/cid/ciy738
https://pubmed.ncbi.nlm.nih.gov/30169621/

Virological and Serological Predictors of Anal High-grade Squamous Intraepithelial Lesions Among Human Immunodeficiency Virus-positive Men Who Have Sex With Men
Marra E, Siegenbeek van Heukelom ML, Leeman A, et al.
Clin Infect Dis. 2019;68(8):1377-1387. doi:10.1093/cid/ciy719
https://pubmed.ncbi.nlm.nih.gov/30165551/

Cross-genotype AR3-specific neutralizing antibodies confer long-term protection in injecting drug users after HCV clearance
Merat SJ, Bru C, van de Berg D, Molenkamp R, Tarr AW, Koekkoek S, Kootstra NA, Prins M, Ball JK, Bakker AQ, de Jong MD, Spits H, Beaumont T, Schinkel J. J Hepatol.
2019 Jul;71(1):14-24. doi: 10.1016/j.jhep.2019.02.013.
https://pubmed.ncbi.nlm.nih.gov/30797052/

Cross-genotype AR3-specific neutralizing antibodies confer long-term protection in injecting drug users after HCV clearance
Merat SJ, Bru C, van de Berg D, Molenkamp R, Tarr AW, Koekkoek S, Kootstra NA, Prins M, Ball JK, Bakker AQ, de Jong MD, Spits H, Beaumont T, Schinkel J. J Hepatol.
2019 Jul;71(1):14-24. doi: 10.1016/j.jhep.2019.02.013. Epub 2019 Feb 21. Erratum in: J Hepatol. 2020 Aug 1;: PMID: 30797052.
https://pubmed.ncbi.nlm.nih.gov/32753312/

HIV-1 molecular transmission clusters in nine European countries and Canada: association with demographic and clinical factors
Paraskevis D, Beloukas A, Stasinos K, Pantazis N, de Mendoza C, Bannert N, Meyer L, Zangerle R, Gill J, Prins M, d'Arminio Montforte A, Kran AB, Porter K, Touloumi G; CASCADE collaboration of EuroCoord.
BMC Med. 2019 Jan 8;17(1):4. doi: 10.1186/s12916-018-1241-1.PubMed PMID: 30616632
https://pubmed.ncbi.nlm.nih.gov/30616632/

Cost-effectiveness of increased HIV testing among MSM in The Netherlands
Reitsema M, Steffers L, Visser M, Heijne J, van Hoek AJ, Schim van der Loeff M, van Sighem A, van Benthem B, Wallinga J, Xiridou M, Mangen MJ.
AIDS. 2019 Oct 1;33(12):1807-1817. doi: 10.1097/QAD.0000000000002199. PMID: 30889012.
https://pubmed.ncbi.nlm.nih.gov/30889012/

Genomic variability of within-host hepatitis C variants in acute infection
Rodrigo C, Leung P, Lloyd AR, Bull RA, Luciani F, Grebely J, Dore GJ, Applegate T, Page K, Bruneau J, Cox AL, Osburn W, Kim AY, Shoukry NH, Lauer GM, Maher L, Schinkel J, Prins M, Hellard M, Eltahla AA; InC3 Collaborative.
J Viral Hepat. 2019 Apr;26(4):476-484. doi: 10.1111/jvh.13051. Epub 2019 Jan 22. PMID: 30578702; PMCID: PMC6417964.
https://pubmed.ncbi.nlm.nih.gov/30578702/

SNP rs688 within the low-density lipoprotein receptor (LDL-R) gene associates with HCV susceptibility
Steba GS, Koekkoek SM, Tanck MWT, Vanhommerig JW, van der Meer JTM, Kwa D, Brinkman K, Prins M, Berkhout B, Pollakis G, Molenkamp R, Schinkel J, Paxton WA; MOSAIC (MSM observational Study of Acute infection with Hepatitis C) Study Group and the ACS (Amsterdam Cohort Studies).
Liver Int. 2019 Mar;39(3):463-469.
https://pubmed.ncbi.nlm.nih.gov/30260075/

Similarities and differences between native HIV-1 envelope glycoprotein trimers and stabilized soluble trimer mimetics
Torrents de la Peña A, Rantalainen K, Cottrell CA, Allen JD, van Gils MJ, Torres JL, Crispin M, Sanders RW, Ward AB.
PLoS Pathog. 2019 Jul 15;15(7):e1007920. doi: 10.1371/journal.ppat.1007920.
https://pubmed.ncbi.nlm.nih.gov/31306470/

HPV infections and flat penile lesions of the penis in men who have sex with men
van Bilsen WPH, Kovaleva A, Bleeker MCG, et al.
Papillomavirus Res. 2019;8:100173. doi:10.1016/j.pvr.2019.100173
https://pubmed.ncbi.nlm.nih.gov/31226447/

Infection Pressure in Men Who Have Sex With Men and Their Suitability to Donate Blood
van Bilsen WPH, Zaaijer HL, Matser A, et al.
Clin Infect Dis. 2019;68(6):1001-1008. doi:10.1093/cid/ciy596
https://pubmed.ncbi.nlm.nih.gov/30052873/

Effect of incident hepatitis C infection on CD4+ cell count and HIV RNA trajectories based on a multinational HIV seroconversion cohort
van Santen DK, van der Helm JJ, Touloumi G, Pantazis N, Muga R, Gunsenheimer-Bartmeyer B, Gill MJ, Sanders E, Kelleher A, Zangerle R, Porter K, Prins M, Geskus RB; CASCADE Collaboration within EuroCoord.
AIDS. 2019 Feb 1;33(2):327-337. doi: 10.1097/QAD.0000000000002040. PubMed PMID: 30325767.
https://pubmed.ncbi.nlm.nih.gov/30325767/

Theses in 2019 that include ACS data

Janneke Bil – HIV, hepatitis B & C, and sexually transmitted infections: innovations in prevention and testing
https://dare.uva.nl/search?identifier=de4029ab-e910-4b89-b2a5-c80757ff321b

Sabrina Merat - Protective antibody responses against HCV E1E2 in high-risk populations
https://dare.uva.nl/search?field1=keyword;value1=merat;docsPerPage=1;startDoc=1