5Supplementary Information

Worobey *et al., 1970s and 'Patient 0' HIV-1 genomes illuminate the early history of HIV/AIDS in North America*

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A. Supplementary Discussion

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A. Supplementary Discussion

Throughout history, deadly epidemics have been accompanied by attempts to understand the reasons for their appearance. Responses have frequently included searches for the source of an outbreak and for individuals suspected of deliberately spreading disease. Blaming 'others' – whether the foreign, the poor, or the wicked – has often served to reinforce community morals and to establish a notional safe distance between the majority and the groups or individuals identified as threats[1, 2, 3].

The rise of laboratory science and its applications to public health in the last third of the nineteenth century facilitated efforts to identify individual disease carriers and to emphasize their own responsibility in preventing others from becoming infected[4, 5]. Yet the public health need to locate the source of an outbreak overlaps with popular attempts to understand epidemics and to seek comfort amidst fears of infection. Historians have shown how foreigners were often blamed for past American epidemics[1, 5, 6]. For example, the Irish-born Mary Mallon faced accusations of deliberately spreading typhoid fever – and endured long periods of confinement –

when she continued to work as a cook in New York City after public health officials identified her as a healthy carrier in the early twentieth century[5, 6]. Set against this history, the example of the AIDS cluster study further indicates the care with which researchers and reporters must discuss outbreaks of disease, when terms like index case, 'source', patient O [letter], and patient 0 [number] can be interpreted interchangeably, and questions of origin can shift into suggestions of blame.

The individual identified first as Case 057, then as Patient O, and finally as Patient 0, was a gay man born in 1952 who reported approximately 250 different partners a year between 1979 and 1981, close to the average of 227 reported by other cluster patients[7]. Of the 72 sexual partners whose names he passed to CDC investigators, eight were found to have AIDS; four of these partners lived in southern California and four were from New York City. Patient 0 shared many characteristics with the early cohort of AIDS patients described in the cluster study. Being highly mobile, sexually active, and unaware of his infection, he also matched the profile of what some CDC investigators at the time thought might be the small number of individuals whose sexual contacts may have helped the disease spread quickly amongst MSM[8]. Like 'LA 1' and 'NY 1'[9], he was employed by an airline, traveling widely within the US and abroad[10]. He worked during the 1970s and early '80s, a period when gay men and lesbians faced widespread social and legal discrimination[11], but which also witnessed the emergence of more visible, commercially oriented gay communities across North America. Growing numbers of bars, clubs, and bathhouses provided increased opportunities for men to meet other men for sex and sociability[12]. Many of these men had numerous short-term sexual

contacts[13], during a time when many sexually transmitted infections were deemed treatable and few men used condoms with their male partners[14].

When the CDC's lead investigator for the cluster study went to New York in July and August 1982 to try to connect more cases to the cluster, one of his priorities was to find more information about the New York cases who may have had sexual contact with Case 057, or with his sexual partners. It was chiefly through the information that Case 057 shared with him that the cases in New York, some of them already reported, were later linked to the Los Angeles cluster. The investigator's trip report warned that the data it summarized needed to be interpreted with 'extreme caution' and not used 'to test any hypotheses about the possible transmission of etiologic agents'. The report noted that most of Case 057's contacts were 'exposed during a single occasion', and estimated a range of 4 to 30 months between the time of exposure and the contacts' first signs of infection[15].

Decades of additional research have since clarified the low likelihood of HIV transmission on a single occasion, or of symptoms of infection appearing so swiftly. In other words, the sexual connections depicted between the cluster's cases were so recent that most of them were not related to the viral transmission events that gave rise to these cases. Though it may no longer be viable to view the cluster study as an 'epidemiologic proof' of the sexual transmission route for a causative agent[8], it remains a remarkable reconstruction of a historical sexual network from widely dispersed and fragmentary data sources. Furthermore, the cluster likely shares key characteristics with the older, undocumented network where - years earlier - the necessary factors were present for an unknown sexually transmissible agent to be widely disseminated.

CDC never publicly disclosed the identity of Patient 0, although with his consent they shared information about him with other epidemiologists and physicians involved in his care. But discussion of the cluster study by doctors treating AIDS patients revealed enough information about him that the journalist Randy Shilts was able to establish the flight attendant's identity when he interviewed surviving persons with AIDS for his research on the book that became *And the Band Played On*. Having reported increasingly on AIDS since 1983, Shilts began in 1985 to focus his efforts on writing a history of the first five years of the epidemic. Amid rising fear and panic about the disease[16], he became convinced that the gay community's survival was at stake, and believed that an accessible, journalistic account highlighting the epidemic's heroes and victims might succeed in shifting the focus of public debate at the national level[3, 17].

Unlike the initial reports of the cluster, newspaper stories accompanying the publication of *And the Band Played On* in October 1987 strongly insinuated that Patient 0 was the source of the North American epidemic. Despite repeated assertions by the cluster study's authors that Patient 0 was likely not the 'source' of AIDS for the cluster or the U.S. epidemic[18, 19], this media coverage reinforced the suggestive inferences in Shilts's book, which highlighted the 'unique role' of 'Patient Zero'. One *New York Post* headline – from a thinly veiled publicity piece commissioned by Shilts's editor at St. Martin's Press[20] – read 'The man who gave us AIDS'[21]. Similar coverage followed, with an Associated Press story noting that '…scientists suspect [Patient 0] brought the disease to this country [the U.S.] after having contracted it in Europe through sexual contacts with Africans, like a jet age version of ['Typhoid'] Mary Mallon…'[22]. With the widespread publication of stories

like these, the story of Patient 0 became embedded in the American popular imagination. Despite attempts at clarification and protest then and since[19, 23, 24, 25], many still believe the story today. Initially coined as part of a study that drew attention to the sexual transmission of an AIDS-causing agent, the flexible and imprecise idea of 'patient zero' – sometimes an outbreak's primary case, a memorable early patient, or an individual with ill-intent – has been reiterated many times since for other outbreaks of infectious disease[26, 27, 28, 29].

Shortly before his own death from AIDS in 1994, Shilts described how he had been struck by the term's storytelling potential, foreshadowing its widespread usage: 'In the middle of that study was a circle with an *O* [letter] next to it . . . . When I went to the CDC, they started talking about Patient Zero. I thought, *Ooh, that's catchy*'[30]. Yet the journalist was reportedly horrified at his editor's decision to focus the book's publicity campaign on the 'Patient Zero' story thread, which he viewed as less significant reportage than his uncovering of political stalling and institutional failures. Nonetheless, Shilts eventually accepted his editor's reasoning that the media would not otherwise give coverage to a critique of President Reagan's administration, and that his hopes for a national-level intervention would die through lack of readership[3, 20, 31]. *And the Band Played On* went on to become an international bestseller and the dramatized television film it inspired was viewed by millions[32].

Less ambiguous than his inference that Patient 0 may have been a primary case of the American epidemic was Shilts's belief that the flight attendant was intent on transmitting his infection to others. Once Shilts had discovered the identity of the CDC's Patient 0, he became persuaded – on the basis of dubious evidence – that the flight attendant had deliberately attempted to spread his infection to other gay

men before his death in 1984[17]. The journalist's depiction of the flight attendant's refusal in 1982 and 1983 to stop having sex reinforced existing public fears about persons with AIDS and the likelihood that they posed a danger through malicious or at least reckless behavior. This occurred at a time when lawmakers were poised to recommend strong criminal sanctions against such individuals[33]. In October 1987, during the build-up to the nation-wide release of Shilts's book and as the Presidential Commission on the Human Immunodeficiency Virus Epidemic began its hearings, *U.S. News & World Report* featured a rumored comment from Patient 0 as a quote of the week. 'I've got gay cancer,' the man allegedly told bathhouse patrons after having sex with them, 'I'm going to die, and so are you'[34].

These media-reported rumors had a substantial impact. The American Legislative Exchange Council included the story of Patient 0 as a lead example in a December 1987 article that demanded criminal penalties for those who passed on the virus[35]. In one of the Presidential Commission's April 1988 hearings, one of the commissioners would emphasize the need to deal effectively with individuals like 'the patient zero' – by which she meant those infecting others through 'antisocial behavior.' One legal article, by two authors whose work informed the Commission's deliberations on criminal penalties for reckless and intentional HIV exposure, cited Shilts's book and identified 'the now notorious "Patient Zero"' by name, comparing his actions to those of 'a person who deliberately injects a victim with a lethal poison in the hope of causing death'[17, 36]. The Commission's final report would encourage 'continued state efforts to explore the use of the criminal law in the face of this epidemic.' Such efforts were further aided by the Ryan White CARE Act of 1990, which largely implemented the Commission's recommendations. The act required

that states, as a condition of federal funding, have 'adequate' criminal laws in place to prosecute HIV-infected individuals who, knowing their infection status, intentionally exposed others to HIV without their consent[17, 37].

It might be naïve to expect that Patient 0's legendary status or the popular impulse to attribute blame for disease outbreaks will ever completely disappear. However, perhaps this interdisciplinary research will give researchers, journalists, and members of the public pause before using the term 'patient zero' – the phrase carries many meanings and a freighted history, and has seldom pointed to what its users have intended. Perhaps, too, it can finally dispel the notion that this individual – the first Patient 0 – was the source of the North American epidemic. He was evidently just one of many thousands infected prior to the recognition of HIV/AIDS. Our finding of extensive genomic diversity of HIV-1 in the US in the late 1970s, reflecting several years of prior evolution – plus the high viral growth rates early in the American epidemic (Fig. 3) – mirror the remarkably high prevalence of the virus in MSM in NYC and SF by 1978-79[38].

Drawing on archival samples and documents, our results reinforce the idea that highly-connected transmission networks within and among urban settings may have repeatedly played a pivotal role in the unfolding of the HIV/AIDS pandemic[39]. Men like many of those included in the cluster study – who often had unprotected anal intercourse, travelled frequently, had numerous short-term partners, and were at risk of concurrent sexually transmitted infections – likely contributed to a rapid growth rate in the early American epidemic (Fig. 3). Yet then, as now, the epidemic

was driven substantially by individuals going about their lives unaware they were contracting, and sometimes transmitting, a deadly infection.

Supplementary Discussion References

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Table S1. Primers used in this project

HIVL Primers	
HIVL1F	TCACTCCCARMRAAGACA
HIVL1R	CTGGYTYTACTTTCGCTT
HIVL2F	CCAGGGATCAGRTWYCCA
HIVL2R	TTTGGCGTACTCACCAGT
HIVL3F	GAGGCCAAMDAAGGAGAGA
HIVL3R	GCACCCATCTCTCTCCTT
HIVL4F	TTTGACTAGCGGAGGCTA
HIVL4R	CATTCTGCAGCYTCCTCA
HIVL5F	CTTTCAGCCCAGAAGTRA
HIVL5R	TCCTCCYACTCCCTGRCA
HIVL6F	GGACATAARACAAGGRCCAA
HIVL6R	CCCYCCTAYCTTTATTGTGA
HIVL7F	CCCACCAGMRGARAGCTT
HIVL7R	CTTCCCAGAARTCTTGAGT
HIVL8F	CCTATTGARACTGTACCAGT
HIVL8R	ARATGYTGTCTCAGYTCCT
HIVL9F	GACTTAGAAATAGGGCRRCA
HIVL9R	RTCCMCCATGYTTCCCAT
HIVL10F	GARCCAGTACRTGGRGTGT
HIVL10R	TCTRATCCYGAATCYTGCA
HIVL11F	GCAGCYAAYAGGGARACT
HIVL11R	GCTACATGRACTGCTACYA
HIVL12F	GTAGTCCAGGAATATGGCAA
HIVL12R	CCTGCCATCTGTTTTCCA
HIVL13F	GAAAGGACCAGCAAARCT

HIVL13R	GCTTGTTCCATCTATCYTCT
HIVL14F	TACTTGGCACTARYARCA
HIVL14R	GAGAARCYTGATGAGTCTBA
HIVL15F	GCATCTCCTATGGCAGGA
HIVL15R	RCTRACACAGAGTGGGGTT
HIVL16F	CWGTRTGGAAAGAAGCAA
HIVL16R	CTGGYCTAATTCCATGTGT
HIVL17F	CACCACAAGCRTRRGAGAT
HIVL17R	CCCYCCTGAGGAKTGMTT
HIVL18F	GTCTAGCAGWAGARGAGRTA
HIVL18R	CTTCTCCAATTGTCCMTCA
HIVL19F	AATGTATGCYCCTCCCAT
HIVL19R	GYAGTGGTGCARATGAGT
HIVL20F	AAGARTCCTRGCTGTGGA
HIVL20R	CCAGAAKTTCCACARTCCT
HIVL21F	MGAAGRAGAMGGTGGAGAGA
HIVL21R	CYYCYTCCTCTTGTGCTT
HIVL22F	CKCTTGAGAGACTTACTMT
HIVL22R	GTRAAYTAGCCCWTCCAGT
HIVL23F	AGTAGCTGRGGGGACAGA
HIVL23R	CTCTCCTTYATTGGCCTYT
HIVL24F	GGDTGGTGCTWCAAGCTAG
HIVL24R	CAGCTGCTTATATGCAGSA
HIVL25F	TYKCWACAAGGGACTTTCC
HIVL25R	CACACTGACTAAAAKGGTCT
HIVLB Primers	

HIVLB1F	GAGGCCAAADAAGGAGAGA
HIVLB1R	ATCYAATTYTCCCCCGCTT
HIVLB2F	GGAGGCTAGAAGGAGAGA
HIVLB2R	CAGCTTCCTCATTRATGGT
HIVLB3F	CATCARGCMATATCACCTA
HIVLB3R	YACTCCCTGRCATGCTGT
HIVLB4F	CACCTATCCCAGTAGGAGA
HIVLB4R	AAGGCCAGATYTTCCCTA
HIVLB5F	AGCAAGRGTTTTGGCKGA
HIVLB5R	AAACCTCCAATTCCYCCTA
HIVLB6F	RTCACTCTTTGGCARCGA
HIVLB6R	CTTCCCAGAARTCTTGAGT
HIVLB7F	RAACTCAAGAYTTCTGGGAA
HIVLB7R	GCTTTGGYTCCYCTAAGGA
HIVLB8F	GAYTTWMCACACCAGACA
HIVLB8R	CAAACTCCCMYTCAGGAA
HIVLB9F	ADTATTGGCAAGCCACCT
HIVLB9R	CYARTTGCCATATTCCTGGA
HIVLB10F	GAAATAGTAGCCAGCTGTGA
HIVLB10R	CCCCTTCACCTTTCCASA
HIVLB11F	CGGGTTTATTACAGRGACA
HIVLB11R	TCCATCTATCCTCTGTCART
HIVLB12F	CAGGACATAAYAAGGTAGGA
HIVLB12R	TTCTTCCTGCCATDGGAGA
HIVLB13F	CTAGMYTAGAGCCCTGGA
HIVLB13R	CTTCTYTCCAYACAGGYA
HIVLB14F	GAAGACAGTGGCAATGAVA

HIVLB14R	GGGAATTGGCTSAAAGGWT
HIVLB15F	GTAGAMCARATGCAKGAGGA
HIVLB15R	ACRAATGCTCTCCCTGST
HIVLB16F	CACATGGAATTAGRCCAGT
HIVLB16R	GAGGRGCATACATTGCTT
HIVLB17F	CAKGTGGCAGRAAGTAGGA
HIVLB17R	CTARYATTCCAAGGCACA
HIVLB18F	MTGTTGCAACTYACAGTCT
HIVLB18R	CCAGAAKTTCCACARTCCT
HIVLB19F	GGAGAGAGAGACAGAGACA
HIVLB19R	CTTAAAGGTACCTGAGGYST
HIVLB20F	GRGGGGACAGAYAGGRTT
HIVLB20R	CTCTCCTTYATTGGCCTYT
HIVLB21F	YTACCACACRCAAGGCTAC
HIVLB21R	GTCAGCAGTYYTTGTAGWAC
HIVLB22F	AKGACCCGGAGRRAGAAG
HIVLB22R	TCCCTAGYYAGCCAGAGAG
HIVM Primers	
>HIVM1F	CCTCAGACCMTTTTAGTCA
>HIVM1R	YTCCCTGCTTGCCCAT
>HIVM2F	GYTAAGGCCAGGRGGAA
>HIVM2R	CTAARGCTTCCTTGGTGTC
>HIVM3F	RCCCTCTATTGTGTRCATC
>HIVM3R	CTGAAAGCCTTYTCTTCTAC
>HIBM4F	ARGCMATATCACCTAGAAC
>HIVM4R	AAYAGGCCCTGCATGCA

>HIVM5F	TCAATGARGAAGCTGCA
>HIVM5R	GTTCYTTTGGTCCTTGTYT
>HIVM6F	CACCTATCCCAGTAGGAGA
>HIVM6R	TCTGGGTTYGCATTTTGG
>HIVM7F	GGATGACAGAAACCTTGTTG
>HIVM7R	TGYCCTTCTTTGCCACA
>HIVM8F	TGTCAGGGAGTRGGRGGA
>HIVM8R	AAGGCCAGATYTTCCCTA
>HIVM9F	WTGYACTGAGAGACAGGCTA
>HIVM9R	CYTTTAGTTGCCCYCCTA
>HIVM10F	CAGRTCACTCTTTGGCAA
>HIVM10R	TTGACAGGTGTAGGTCCT
>HIVM11F	ATAGGGGGAATTGGAGGKT
>HIVM11R	CTTCTGTYAATGGCCAT
>HIVM12F	AAAGCCAGGAATGGATG
>HIVM12R	TGAACTTCCCAGAARYC
>HIVM13F	TGGGCCTGAAAAYCCAT
>HIVM13R	GCAGTATACTTYCTRAAGTC
>HIVM14F	GTAYTGGATGTRGGTGATG
>HIVM14R	TGYYGCCCTATTTCTAAGTC
>HIVM15F	AGGATCACCAGCAATATTCC
>HIVM15R	GGATGGAGTTCATAACCCAT
>HIVM16F	TCAGAARGAACCYCCATTCC
>HIVM16R	CYAGTTCTAGCTCTGCTTC
>HIVM17F	CCTTAGRGGARCCAAAGCA
>HIVM17R	CACCCCTCRTYCTTGCAT
>HIVM18F	GGAGTGTATTATGACCCATC

>HIVM18R	TCCMCCATGYTTCCCATG
>HIVM19F	TTAACAGAGGCAGTGCA
>HIVM19R	CTRTTRGCTGCCCCATC
>HIVM20F	GARAAAGAACCCATARTAGG
>HIVM20R	TKATCTGGYTGTGCTTG
>HIVM21F	CAGGATTCRGGAYTAGAAG
>HIVM21R	TCTTGGGCCTTATCTATYCC
>HIVM22F	RCTGGAATCAGGAAAGTAC
>HIVM22R	GCTACCAGRATAAYTTTTCC
>HIVM23F	YCCAGGAATATGGCAAYTAG
>HIVM23R	GATYCCYGCCCACCAA
>HIVM24F	GCAGGAAGATGGCCAGT
>HIVM24R	TTCCCCTGCACTGTAYC
>HIVM25F	AAAGAAAAGGGGGGATTGG
>HIVM25R	ACCTGCCRTCTGTTTTCC
>HIVM26F	AGGGGCAGTAGTAATACAAG
>HIVM26R	GTGGGAYRTGTACTTCTGA
>HIVM27F	GCAGGTGATGATWGTGTG
>HIVM27R	RCCCAAATGCCAGTCYCT
>HIVM28F	TAGRGGATGCTARATTGGT
>HIVM28R	CCTAGGACTAACTMTAYGTC
>HIVM29F	AGTCKCCRTAGAATGGAGGA
>HIVM29R	CTTGTTCCATCTATCCTCTG
>HIVM30F	AAAGCCRCCTTTGCCTA
>HIVM30R	TTATGGCYTCCACTCCT
>HIVM31F	GAGGAGCTTAAGARTGAAGC
>HIVM31R	GGCTCTARTYTAGGATCTAC

>HIVM32F	TGYCRACATAGCAGAATAGG
>HIVM32R	MTCTKCGTCGCTGTCTC
>HIVM33F	SCTTAGGCATCTCCYATGG
>HIVM33R	TGCCACTGTCTTCTGCT
>HIVM34F	GCAATAGTTGTGTGGWCYA
>HIVM34R	CTTCYTTCCACACAGGTAC
>HIVM35F	AAWTGTGGGTCACAGTC
>HIVM35R	CACATGGCTTTARGCTT
>HIVM36F	RAYATGGTAGAACAGATGC
>HIVM36R	CTGAGGTRTTACAAYTTATC
>HIVM37F	YTAACCCCACTCTGTGT
>HIVM37R	GTATGGGAATTGGCTSA
>HIVM38F	MTTACACARGCCTGTCCA
>HIVM38R	CAGATTYRTTCAGCTGTAC
>HIVM39F	CASCACAGTACAATGTACAC
>HIVM39R	ATGCTCTCCCTGGTCCT
>HIVM40F	GTAYAAGACCCAACAAC
>HIVM40R	YTTCTGGGTCCCCYCCT
>HIVM41F	GGACCCAGAARTTGTAAYG
>HIVM41R	CTRATGGGAGGRGCAT
>HIVM42F	ACATGTGGCAGAAAGTAGG
>HIVM42R	TYTGCACCACTCTTCTCT
>HIVM43F	GGGACAATTGGAGAAGTGA
>HIVM43R	TGTTGCGCYTCAATAGC
>HIVM44F	GACGGTACAGRCCAGA
>HIVM44R	CCAAGGCACAGYAGTG
>HIVM45F	AGARTCCTGGCTGTRGAA

>HIVM45R	TCCACAAACTTGCCCAT
>HIVM46F	ATCGCARAACCARCAAG
>HIVM46R	CTCTCTCTCCACCTTCTYC
>HIVM47F	GACAGGCCCGAAGGAA
>HIVM47R	CTRTCTGTCCCCTCAGYT
>HIVM48F	GAGGAYTGTGGAAMTTCTG
>HIVM48R	ACCAYTTGCCACCCAT
>HIVM49F	GACAGGGCYTRGAAAGG
>HIVM49R	TGGTCTTAAAGGWACCTGRG
>HIVM50F	TGGCTAGAAGCACAAGAG
>HIVM50R	GWAGCACCAYCCAAAGGT
HIVR Primers	
>HIVR1F	CAGAGGAGMTCTCTCGA
>HIVR1R	CAGGATTRACTGCGAATCG
>HIVR2F	GTGCGAGAGCGTCRGT
>HIVR2R	YACACAATAGAGGGTTGCT
>HIVR3F	TCAGACAGGATCAGAAGARC
>HIVR3R	TTCTAGGTGATATGGCYTGA
>HIVR4F	MARGTCAGCCAAAATTACC
>HIVR4R	CATTTGCATRGCTGCTT
>HIVR5F	CACCATGYTAAACACAGTG
>HIVR5R	TTTCTCCTACTGGGATAGGT
>HIVR6F	CCARATGAGAGAACCAAG
>HIVR6R	TTACCTCYTGTGAAGCT
>HIVR7F	ACAAGGACCAAARGAACC
>HIVR7R	GGTTCCTAAAATTGCCTYTC

>HIVR8F	ACCAGCRGCYACACTAG
>HIVR8R	CCTTCCYTTCCACATYTCC
>HIVR9F	AATTGCARGGCCCCTAG
>HIVR9R	GTGACGAGGGGTCGTT
>HIVR10F	ACARCTCCCYCTCAGAAG
>HIVR10R	GGTCCTACTARTACTGTACC
>HIVR11F	CAGGAGCAGATGATACAGT
>HIVR11R	TAACTYTTGGGCCATCC
>HIVR12F	YCCTATTGARACTGTACCA
>HIVR12R	CCTGCRGGATGTGGTA
>HIVR13F	RAACTCAAGAYTTCTGGGAA
>HIVR13R	GGAATATTGCTGGTGATCC
>HIVR14F	AYAATGAGACACCAGGGAT
>HIVR14R	TTGTCTGGTGTGGTAAAYC
>HIVR15F	GAAAYAGGGCRGCATAGAAC
>HIVR15R	CTGSRTAAATCTGACTTGC
>HIVR16F	CCAGAAAARGACAGCTGGA
>HIVR16R	GGGTCATAATAYACTCCAYG
>HIVR17F	GAACTGGCAGAAAACRGRG
>HIVR17R	CCAATACTCYRTCCACCAT
>HIVR18F	ACTACCYATACAAAARG
>HIVR18R	CCGAATCCTGCAARGCT
>HIVR19F	GTAGGAGCAGAAACYTT
>HIVR19R	TKATCTGGTTGTGCYTG
>HIVR20F	CAGAAGACTGARTTACAAGC
>HIVR20R	CTGATTCCAGYACTGACT
>HIVR21F	CAGCACACAAAGGAATTGG

>HIVR21R	CATGCATGGCTTCTCCTT
>HIVR22F	CCAGCTGTGATAAATGYCAG
>HIVR22R	TTGCTGCCATTGTCWGT
>HIVR23F	AGGRCAGGAAACAGCA
>HIVR23R	AGATGTTCAGCCTGATC
>HIVR24F	CCAAAGTCAAGGAGTAGTAG
>HIVR24R	GCTGTCYCTGTAATAAACC
>HIVR25F	CAGGGGAAAGAATARTAGAC
>HIVR25R	CTGTCTACTTGCCACACA
>HIVR26F	GTGCCAAGAAGAAAAGC
>HIVR26R	CTGTATGCAGACCCCAA
>HIVR27F	GGATGAGGATTARMACATGG
>HIVR27R	AGGGTCTACTTGTGTGCT
>HIVR28F	GTCTCCRTAGAATGGAGGAA
>HIVR28R	TCCCTCTGYGGCCCTT
>HIVR29F	ATGGAACAAGCCCCAGA
>HIVR29R	GCTCTAGTCTAGGATCTACTG
>HIVR30F	TCAGAATTGGGTGTCGA
>HIVR30R	GAGAARCTTGATGAGTCTGA
>HIVR31F	AGGAAGAAGCGGAGACA
>HIVR31R	CTYTCATTGCCACTGTCT
>HIVR32F	GAAARAGCAGAAGACAGTG
>HIVR32R	GTGGGTTGGGGTCTGT
>HIVR33F	CACACATGCCTGTGTACC
>HIVR33R	CCTTAYCTCTTATKCTTGTG
>HIVR34F	TGGGATCAAAGCCTAAAGC
>HIVR34R	ATGGGAATTGGCTCAAAKG

>HIVR35F	GTCATTACACARGCCTGT
>HIVR35R	GTTGTTGGGTCTTRTAC
>HIVR36F	GGACCATGTACAAMTGTCAG
>HIVR36R	ACAAATGCTCTCCCTGGT
>HIVR37F	CACRRACAATGCTAAAACC
>HIVR37R	CCCCTCCACAATTAAAACTG
>HIVR38F	GGAGGGGAATTTTTCTACTG
>HIVR38R	CTTCTCCAATTGTCCCTCA
>HIVR39F	CAGGGCTGMTATTAACAAG
>HIVR39R	TGGYCTGTACCGTCAG
>HIVR40F	CAGCAGGAAGCACYATGG
>HIVR40R	TGAGTTTTCCAGAGCAACC
>HIVR41F	CAACAGCTCCTRGGGAT
>HIVR41R	TAAACCTAYCAAGCCTCCT
>HIVR42F	GGCAAGTTTGTGGAATTGG
>HIVR42R	GGATCTGTCTCTGTCTCTC
>HIVR43F	AGGCAGGGATAYTCACCAT
>HIVR43R	GCGTCCCAGAAGTTCCA
>HIVR44F	GATCTGMGGARCCTGT
>HIVR44R	CTTTCCAAGCCCTGTCT
>HIVR45F	GAGGGGACAGATAGGRTT
>HIVR45R	TAGCCAGGCACAAKCA
>HIVR46F	GTGGGAGCAGYATCTC
>HIVR46R	GTRAAYTAGCCCTTCCAGT

Table S2. Genomic coverage of HIV-1 strains sequenced for this study

Sample	*gag* nuc.*	*gag* %	*pol* nuc.	*pol* %	*vif* nuc.	*vif* %	*vpr* nuc.	*vpr* %	*tat* nuc.	*tat* %	*rev* nuc.	*rev* %	*vpu* nuc.	*vpu* %	*env* nuc.	*env* %	*nef* nuc.	*nef* %
Patient 0 (PBMC)	1500	**100**	3012	**100**	579	**100**	291	**100**	306	**100**	351	**100**	246	**100**	2576	**100**	453	**68**
Patient 0 (RNA)	1500	**100**	3012	**100**	579	**100**	291	**100**	306	**100**	351	**100**	246	**100**	2576	**100**	453	**68**
SF3	1503	**100**	2854	**95**	362	**63**	291	**100**	306	**100**	351	**100**	246	**100**	2576	**100**	411	**66**
SF4	1476	**98**	3012	**100**	579	**100**	291	**100**	306	**100**	351	**100**	246	**100**	2575	**100**	412	**66**
SF20	1503	**100**	3012	**100**	579	**100**	291	**100**	306	**100**	351	**100**	246	**100**	2576	**100**	411	**66**
NYC1	1503	**100**	3012	**100**	579	**100**	291	**100**	306	**100**	351	**100**	246	**100**	2558	**100**	411	**66**
NYC4	1503	**100**	2999	**99**	579	**100**	291	**100**	306	**100**	351	**100**	246	**100**	2576	**100**	414	**66**
NYC7	1502	**100**	3011	**100**	579	**100**	291	**100**	306	**100**	351	**100**	246	**100**	2570	**100**	411	**66**
NYC12	1503	**100**	3012	**100**	579	**100**	294	**100**	306	**100**	351	**100**	234	**100**	2570	**100**	410	**66**
NYC16	1503	**100**	2886	**96**	579	**100**	291	**100**	306	**100**	351	**100**	246	**100**	2582	**100**	411	**66**

*number of nucleotides