

# Mitochondrial DNA haplogroups influence AIDS progression

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**Objective:** Mitochondrial function plays a role in both AIDS progression and HAART toxicity; therefore, we sought to determine whether mitochondrial DNA variation revealed novel AIDS restriction genes, particularly as mitochondrial DNA single-nucleotide polymorphisms are known to influence regulation of oxidative phosphorylation, reactive oxygen species production, and apoptosis.

**Design:** This is a retrospective cohort study.

**Methods:** We performed an association study of mitochondrial DNA haplogroups among 1833 European American HIV-1 patients from five US cohorts: the Multicenter AIDS Cohort Study, the San Francisco City Clinic Study, Hemophilia Growth and Development Study, the Multicenter Hemophilia Cohort Study, and the AIDS Linked to Intravenous Experiences cohort to determine whether the mitochondrial DNA haplogroup correlated with AIDS progression rate.

**Results:** Mitochondrial DNA haplogroups J and U5a were elevated among HIV-1 infected people who display accelerated progression to AIDS and death. Haplogroups Uk, H3, and IWx appeared to be highly protective against AIDS progression.

**Conclusion:** The associations found in our study appear to support a functional explanation by which mitochondrial DNA variation among haplogroups, influencing ATP production, reactive oxygen species generation, and apoptosis, is correlated to AIDS disease progression; however, repeating these results in cohorts with different ethnic backgrounds would be informative. These data suggest that mitochondrial genes are important indicators of AIDS disease progression in HIV-1 infected persons.

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**Keywords:** AIDS, apoptosis, disease, HIV-1, mitochondria

## Introduction

Mitochondria are critical for energy production and control of apoptosis in the cell. Through oxidative

phosphorylation, mitochondria convert calories to ATP, release heat to maintain body temperature, and generate reactive oxygen species (ROS). Mitochondrial energetics is accomplished by cooperation of 37 genes encoded by

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the mitochondrial genome with an estimated 1500 nuclear genes [1]. Although mitochondrial DNA (mtDNA) encodes only 13 proteins directly involved in ATP production, their roles are central to mitochondrial function. MtDNA variation in these genes from indigenous populations correlates with latitude and climate, suggesting that these differences are adaptive [2–4]. Genotypes differ in coupling efficiency such that there is a trade-off between highly efficient ATP production and increased heat release in colder temperatures. Because mitochondrial gene function is critical, mtDNA variation has also been directly associated with propensity for metabolic disease, neurodegenerative disease, cancer, and microbial infections [1,5–9].

Interactions between viral infection and mitochondrial energetics suggest that mtDNA variation could also play a role in viral disease progression. Mitochondria are the key regulators of apoptosis, an important host immune response to viral infection [10]. Many viruses have evolved strategies to prevent viral suppression through apoptosis or even exploit mitochondrial pathways to destroy cells involved in the host immune response. HIV-1 uses both antiapoptotic and apoptotic strategies during infection and AIDS progression. Early in infection, HIV-1-encoded viral protein R (Vpr) impedes apoptosis to prevent eradication of virus [11]. As HIV-1 infection progresses, higher concentrations of Vpr [12,13] and other viral-encoded proteins, including Tat [14] and the gp120-gp41 envelope complex [15,16], elicit apoptosis of cells in the immune system. Loss of CD4<sup>+</sup> T cells, in particular, correlates well to stage of HIV-1 disease [17]. Compared with HIV-1+ long-term non-progressors, patients with AIDS have a higher frequency of peripheral blood lymphocytes exhibiting mitochondrial membrane permeabilization (MMP), the point of no-return in apoptosis [18]. AIDS progression is also associated with mtDNA depletion [19], disruption of energy production through oxidative phosphorylation, increased ROS production [20], antioxidant enzyme deficiency [21], and increased oxidative damage that accelerates AIDS progression [22]. In addition, mitochondrial toxicity to drugs used in HAART for HIV-1 has been linked to severe side effects including lipodystrophy, peripheral neuropathy, hepatic steatosis, myopathy, cardiomyopathy, pancreatitis, bone marrow suppression, and lactic acidosis [23–27]. Nearly all of these side effects resemble clinical symptoms seen in inherited mitochondrial diseases [28], and mtDNA

haplogroup T has been associated with peripheral neuropathy [29].

Because AIDS progression is associated with changes in mitochondrial oxidative phosphorylation, ROS production, and apoptosis, which can be influenced by functional mtDNA variants, herein, we survey the mtDNA haplotypes of 1833 HIV-1 infected European American patients to determine whether host mtDNA haplogroup correlates with AIDS progression rate. We examined mtDNA haplotypes in the context of our recent global mutational phylogeny [30] and describe five associations with AIDS progression that can be interpreted in light of the physiological influences known for the mitochondrial genotypes.

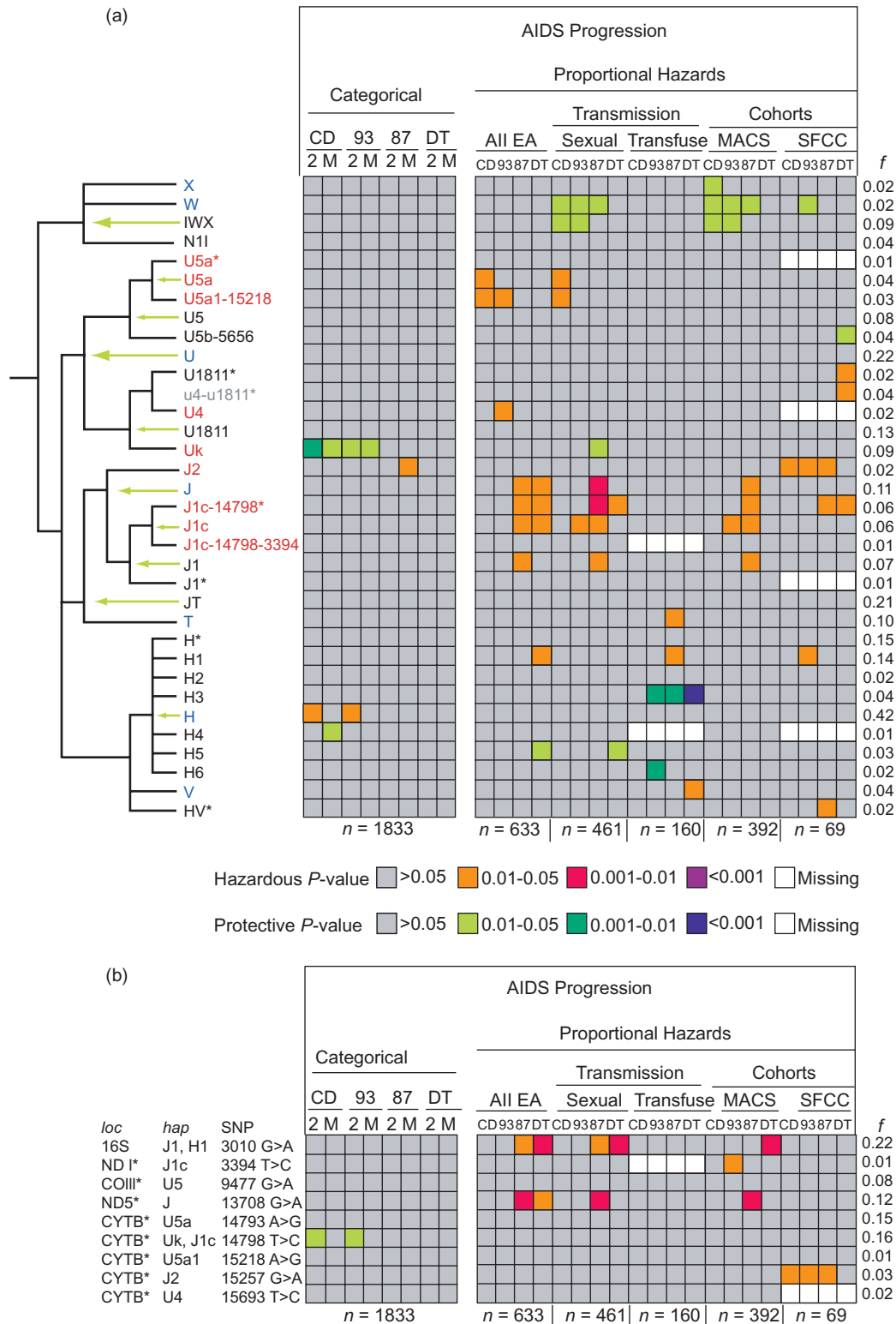
## Methods

### Cohorts

The study group consisted of 1833 HIV-1 infected European American patients including 633 seroconvertors (infected after study enrollment) and 1200 seropositives (infected prior to enrollment) from five longitudinal cohorts: the Multicenter AIDS Cohort Study (MACS), the San Francisco City Clinic Study (SFCC), Hemophilia Growth and Development Study (HGDS) [31], the Multicenter Hemophilia Cohort Study (MHCS) [32], and the AIDS Linked to Intravenous Experiences (ALIVE) cohort. Informed consent was obtained from all patients. Ninety-seven percent of patients were men. Cohorts can be divided into mode of infection (intravenous versus sexual transmission). There are two cohorts of people with hemophilia who would have likely contacted AIDS through exposure to contaminated blood products: the MHCS is a multicenter longitudinal cohort study enrolling patients from 17 American or European treatment centers beginning in September 1982 [32], and the HGDS is a US-based multicenter cohort of participants from 14 US treatment centers who became infected between 1982 and 1983 [31]. Sexual transmission is the most likely mode of infection for the MACS and SFCC. MACS is a US-based ongoing prospective study of HIV-1 infection in adult (ages 18–70) men who have sex with men (MSM) in Baltimore, Chicago, Pittsburgh, and Los Angeles enrolled between 1984 and 1991 [33]. The SFCC is a prospective study of the natural history of HIV and AIDS conducted

**Fig. 1.** (continued)

indicated by orange and red squares, whereas significant protection is shown in green and blue. In AIDS progression categorical analyses, '2' indicates dichotomous categorical analysis and 'M' indicates multipoint categorical analysis. The AIDS association tests illustrated on the horizontal are non-independent. However, the hypothesis study groups: AIDS progression in MSM patients and AIDS progression in patients with hemophilia can be considered independent, though tests within each hypothesis study group are related. The five associations IWX, U5a, Uk, J, and H3 did not replicate between MSM cohorts and hemophilia cohorts perhaps as a result of fewer study participants among the hemophiliacs ( $N = 158$  versus MSM  $N = 615$ ). EA, European Americans; MACS, Multicenter AIDS Cohort Study; MSM, men who have sex with men.



**Fig. 1. A visual heat plot display of P values for genetic association for each of the 34 mtDNA genotypes.** (a) An ARG ARRAY display [37] of categorical and survival analyses for AIDS progression in 34 European mitochondrial haplogroups. A phylogenetic tree showing the relationship between haplogroups is shown on the left [29]. Each major haplogroup was analyzed, and then successively more definitive subgroups within the haplogroups were analyzed separately. The haplogroups known to contain uncoupling single nucleotide polymorphism (SNP) are in red type in the phylogenetic tree. (b) Individual SNP genotypes within the U and J mitochondrial haplogroups. Locations of SNP in coding genes of the mitochondria are given. The symbol ‘asterisk’ indicates non-synonymous substitution. Significant values are shown in color (non-gray). Unfavorable hazard and odds ratios are

in adult MSM and bisexual men enrolled in 1978–1980 for studies of hepatitis B (HBV), followed by a HBV vaccine trial in 1980–1983. Recruitment into the SFCC for follow-up studies of HIV and AIDS began in 1983–1992 [34]. SFCC contains more long-term survivors than the other cohorts [35]. ALIVE is a community-based cohort of injecting drug users in Baltimore, Maryland established in 1988 and followed until 2000 [36]. ALIVE patients were included in the analyses of all European Americans but were not analyzed separately due to limited sample size. Clinical data used here were collected from 1978 to 1996 (or censored), before widespread use of HAART.

### Genotyping

DNA was extracted from immortal lymphoblastoid B cell lines for each patient. Initially six haplotype-tagging single-nucleotide polymorphisms (SNP) were used to put individuals into major mitochondrial N, M, and L groups. Individuals within the Western European (N) subset were further parsed into haplogroups using the Mitochondrial Haplogrouping using Candidate Functional Variants, a multistep haplotyping strategy that interrogates key European mtDNA polymorphisms located at internal branch points of the global human mitochondrial phylogenetic tree. On the basis of the hierarchical nature of the tree, we devised a strategy for identifying haplotypes by subdividing the samples using highly conserved polymorphic sites located at key haplogroup branch points. In this way, samples were defined to a high degree using the minimal number of SNP. In total, the study used 32 sequential SNP [Supplemental Online Material (SOM): <http://home.ncifcrf.gov/ccr/lgd/publications.asp?PY=2008>] to define haplogroups. Genotyping was performed using TaqMan assays-by-design (SM). Thermocycling conditions were an initial 95°C hold for 3 min, followed by 30 cycles of 92°C for 15 s, and 56°–62°C annealing for 1 min depending on primer specificity.

### Analyses

Because mtDNA is inherited maternally as a single haplotype, a ‘dominant’ genetic model was tested. Analyses were performed in each successive level of the phylogenetic tree of N haplogroups. All analyses were performed with SAS version 8.1 (SAS Institute, Inc., Cary, North Carolina, USA). SAS analyses were visualized with the AIDS restriction gene (ARG) ARRAY and ARG Highway software created at National Cancer Institute and ABCC, Frederick, Maryland, USA [37]. Statistical significance in these figures was declared at the *P* value of 0.05 or less.

### AIDS progression

Four separate end points reflecting advancing AIDS morbidity were considered: CD4 cell count less than 200 cells/ $\mu$ l; AIDS-1993, the Centers for Disease Control and Prevention 1993 definition [38] (HIV-1

infected and AIDS-defining illness, decline of CD4 T lymphocytes to less than 200 cells/ $\mu$ l or death); the more stringent AIDS-1987 definition [39] (HIV-1 infection plus AIDS-defining illness) or death; and death during follow-up from AIDS of an HIV-1-infected patient.

Tests for association were performed using both categorical case–control and Cox proportional hazards models [40]. For survivorship models, only known seroconvertors ( $n=633$ ) were used for analysis. Therefore, we also performed categorical analyses using time categories (<8 years and  $\geq 8$  years for dichotomous, and <3.5, 3.5 to  $\leq 7$ , 7 to  $\leq 10$ , 10 to  $\leq 13$ , 13 to  $\leq 16$ , and >16 years for multipoint models) [41] in order to capture the information available from the additional 1200 seropositives with estimated seroconversion dates in our study. A Fisher’s exact test was used for dichotomous categorical analyses, and a Mantel–Hanzel  $\chi^2$  test (degrees of freedom = 1) was used for multipoint models. Cox proportional hazard models were stratified by age at seroconversion (0–20, 20–40, and >40 years). Survival analyses were performed on all European American seroconvertors in the study, on subgroups separated by mode of transmission, and on individual cohorts in the case of the MACS and SFCC, which had larger samples of seroconvertors than the other cohorts. Significance was based on the log-likelihood  $\chi^2$  test ( $P < 0.05$ ).

### Population structure

For seroconvertors, we used data for 304 SNP from previous studies [35,42–44] (for which the missing genotype information was less than 5%) and applied the EIGENSOFT [45] program to examine and adjust for potential population stratification. Analysis of variation (ANOVA) *F*-statistic was performed on the recovered eigenvectors given the mitochondrial haplogroups.

Despite that we found no significant geographic substructure among the mitochondrial haplogroups based on the nuclear markers, we did adjust for known European ARGs including *CCR5-Δ32*, *CCR2-64I*, *CCR5 P1* haplotype, *HLA* class I *B27*, *B57*, *B35-Px* alleles, and *HLA* class I homozygosity [46,47], some of which are known to have geographic substructure.

### Results

Our study included 1833 European Americans within the N haplogroup that is ancestral to almost all European and many Eurasian haplogroups [48]. The N subgroup frequencies (‘f’ in Fig. 1) in our study were consistent with an independent population dataset (D.C.W., unpublished observation). Genetic association tests were performed on major haplogroups and then on haplotypes from successively more definitive phylogenetic nodes (Fig. 1a). Minor haplogroups with frequencies less than

Table 1. Significant results in AIDS association tests using the Cox proportional model.

Haplogroup	Population	Endpoint	N events	N	Relative hazard	95% CI	P
IWX	MSM	AIDS'93	285	452	0.65	0.42–1.01	0.0426
IWX	MACS	AIDS'93	240	384	0.64	0.4–1.03	0.0490
IWX	MSM	CD4 < 200 cells/ $\mu$ l	234	452	0.56	0.33–0.96	0.0215
IWX	MACS	CD4 < 200 cells/ $\mu$ l	194	384	0.52	0.29–0.94	0.0170
X	MACS	CD4 < 200 cells/ $\mu$ l	193	383	0.00	0– $\infty$	0.0329
W	MSM	AIDS'87	206	455	0.35	0.11–1.1	0.0316
W	MACS	AIDS'87	179	387	0.36	0.11–1.12	0.0366
W	MSM	AIDS'93	285	452	0.41	0.17–1	0.0225
W	MACS	AIDS'93	240	384	0.44	0.18–1.08	0.0420
W	SFCC	AIDS'93	45	68	0.00	0– $\infty$	0.0369
W	MSM	CD4 < 200 cells/ $\mu$ l	234	452	0.32	0.1–1.01	0.0191
W	MACS	CD4 < 200 cells/ $\mu$ l	194	384	0.36	0.11–1.14	0.0402
U5a	EA	CD4 < 200 cells/ $\mu$ l	339	615	1.78	1.11–2.85	0.0277
U5a	MSM	CD4 < 200 cells/ $\mu$ l	236	453	2.06	1.17–3.63	0.0237
U5a1-15218	EA	AIDS'93	395	620	1.77	1.05–2.98	0.0493
U5a1-15218	EA	CD4 < 200 cells/ $\mu$ l	338	614	1.99	1.18–3.38	0.0197
U5a1-15218	MSM	CD4 < 200 cells/ $\mu$ l	235	452	2.04	1.13–3.67	0.0317
U5b	SFCC	Death	21	69	0.00	0– $\infty$	0.0182
U1811*	SFCC	Death	21	69	10.07	1.51–67.39	0.0372
U4-U1811*	SFCC	Death	21	69	10.07	1.51–67.39	0.0372
U4	EA	AIDS'93	396	620	2.40	1.12–5.15	0.0464
Uk	MSM	AIDS'87	206	456	0.53	0.29–1	0.0309
J	EA	AIDS'87	277	628	1.55	1.08–2.23	0.0236
J	MSM	AIDS'87	206	457	1.84	1.22–2.76	0.0061
J	MACS	AIDS'87	179	388	1.69	1.08–2.66	0.0302
J	EA	Death	239	627	1.53	1.03–2.26	0.0428
J1	EA	AIDS'87	277	627	1.57	1.03–2.38	0.0463
J1	MSM	AIDS'87	206	456	1.80	1.12–2.87	0.0228
J1	MACS	AIDS'87	179	388	1.91	1.13–3.25	0.0263
J1c	EA	AIDS'87	277	626	1.67	1.07–2.61	0.0338
J1c	MSM	AIDS'87	206	456	1.94	1.18–3.17	0.0159
J1c	MACS	AIDS'87	179	388	2.25	1.27–3.98	0.0116
J1c	MSM	AIDS'93	287	453	1.64	1.05–2.55	0.0408
J1c	MACS	AIDS'93	241	385	1.82	1.08–3.09	0.0383
J1c	EA	Death	239	625	1.72	1.07–2.78	0.0381
J1c-14798*	EA	AIDS'87	277	626	1.80	1.12–2.91	0.0247
J1c-14798*	MSM	AIDS'87	206	456	2.24	1.3–3.84	0.0082
J1c-14798*	MACS	AIDS'87	179	388	2.01	1.09–3.7	0.0403
J1c-14798*	SFCC	AIDS'87	27	68	6.23	1.33–29.23	0.0351
J1c-14798*	EA	Death	239	625	2.03	1.24–3.33	0.0101
J1c-14798*	MSM	Death	175	455	2.27	1.27–4.05	0.0123
J1c-14798*	SFCC	Death	21	68	9.13	1.68–49.67	0.0177
J2	SFCC	AIDS'87	27	68	63.69	3.61–1124.28	0.0194
J2	SFCC	AIDS'93	46	68	44.26	3.71–528.15	0.0236
J2	SFCC	CD4 < 200 cells/ $\mu$ l	41	68	23.13	2.33–229.65	0.0441
T	HE	AIDS'87	68	159	0.30	0.11–0.86	0.0125
H1	HE	AIDS'87	68	159	2.38	1.11–5.09	0.0386
H1	MHCS	AIDS'87	68	159	2.38	1.11–5.09	0.0386
H1	SFCC	AIDS'93	46	68	0.00	0– $\infty$	0.0317
H1	EA	Death	240	629	1.50	1.04–2.16	0.0403
H3	HE	AIDS'87	68	159	0.12	0.02–0.94	0.0060
H3	HE	AIDS'93	104	156	0.21	0.06–0.72	0.0025
H3	HE	Death	63	159	0.00	0– $\infty$	0.0004
H5	EA	Death	239	626	0.39	0.15–1.07	0.0326
H5	MSM	Death	175	456	0.30	0.07–1.21	0.0381
H6	HE	AIDS'93	104	155	0.07	0.01–0.66	0.0040
V	HE	Death	62	157	7.76	1.61–37.44	0.0381
HV*	SFCC	AIDS'87	27	68	28.37	2.1–383.55	0.0418

CI, confidence interval; HE, patients with haemophilia; MACS, Multicenter AIDS Cohort Study; MSM, men who have sex with men; RH, relative hazard; SFCC, San Francisco City Clinic Study.

0.01 were collapsed into more inclusive haplogroups to minimize type I errors. Statistical tests were non-independent for two reasons: the phylogenetic overlap of haplogroups and subgroup haplotypes; and the non-independence of varying AIDS endpoint association tests. As non-independence precludes Bonferroni corrections

for multiple tests, we focused on signals that were repeated within successive nested haplogroups; replicated in cohorts tested separately in survivorship analyses; and/or had strong *P* values in related hypotheses. We are also aware that the European American combined and MSM combined analyses had more power due to a larger sample

**Table 2. Significant results in AIDS association tests for progression categorical analysis.**

Haplogroup	Disease	Comparison	N risk haplogroup	N alt haplogroup	N	OR	95% CI	P
U4-U1811*	CD < 200 cells/ $\mu$ l	D2	34	795	829	2.02	0.95–4.27	0.0423
Uk	CD < 200 cells/ $\mu$ l	D2	81	748	829	0.47	0.24–0.85	0.0081
Uk	CD < 200 cells/ $\mu$ l	DM	60	604	664	0.60	0.37–0.97	0.0381
Uk	AIDS'93	D2	93	928	1021	0.50	0.27–0.87	0.0121
Uk	AIDS'93	DM	72	764	836	0.61	0.4–0.95	0.0224
J1c-14798-3394	All	3	12	826	838	0.29	0.1–0.84	0.0175
H	CD < 200 cells/ $\mu$ l	D2	333	506	839	1.39	1.02–1.89	0.0328
H	AIDS'93	D2	418	615	1033	1.34	1.01–1.77	0.0374
H4	CD < 200 cells/ $\mu$ l	DM	6	658	664	0.13	0.03–0.57	0.0287

D2 indicates dichotomous model with events occurring before 8 years and after 8 years. DM indicates multipoint models with the following intervals: <3.5, 3.5 to  $\leq$ 7, 7 to  $\leq$ 10, 10 to  $\leq$ 13, 13 to  $\leq$ 16, and >16 years. *P* values from these categorical models are from the Fisher's exact test and Mantel–Hanzel test, respectively. CI, confidence interval; OR, odds ratio.

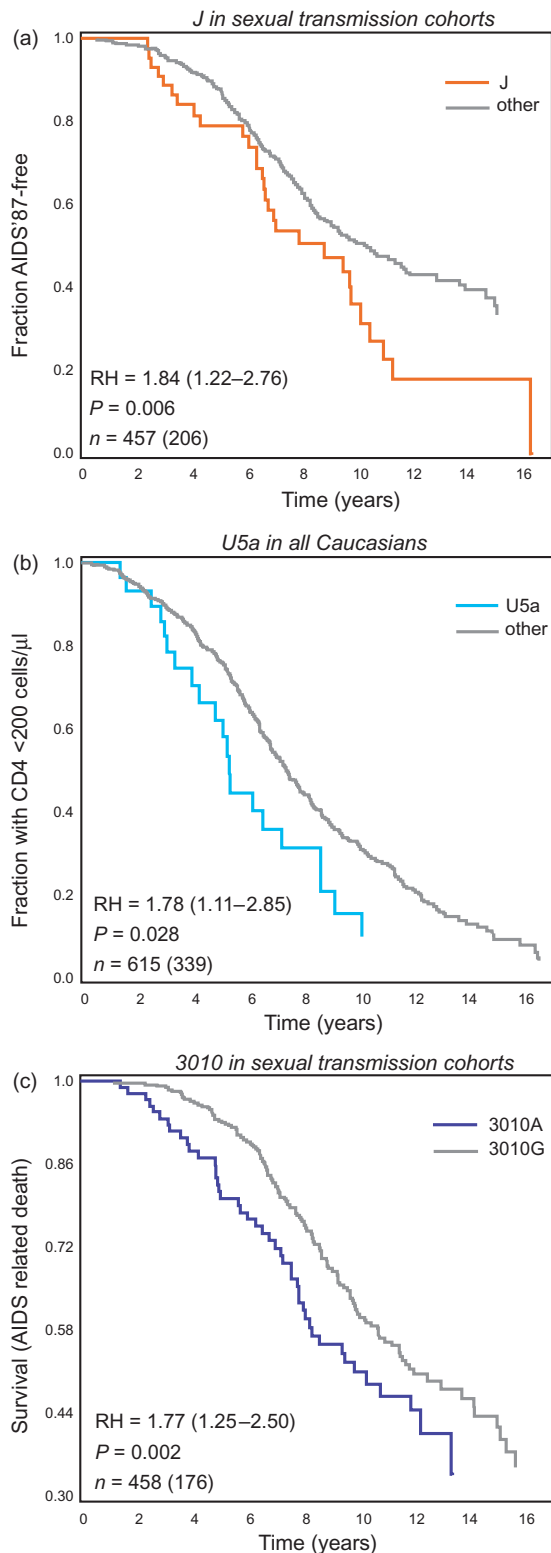
size. This is important given the relative rarity of some of the haplogroups [49]. Figure 1 presents a visual heat plot display of *P* values for genetic association for each of the 34 mtDNA genotypes. On the basis of ARG ARRAY visualization routine [37], different colors represent different levels of statistical significance. MtDNA haplotypes related by a phylogenetic tree can be inspected individually or as a group for each AIDS progression test. Figure 1b presents the same ARG ARRAY display for candidate SNP variants included within the mtDNA haplotypes that showed association signals in Fig. 1a. The significant tests, *P* values, relative hazard (RH), and confidence interval (CI) values are tabulated in Tables 1 and 2 (unabridged test results are provided in SOM: <http://home.ncifcrf.gov/ccr/lgd/publications.asp?PY=2008>). The association tests revealed five mtDNA haplogroups that showed consistent, significant associations: IWX, U5a, Uk, J, and H3 (Fig. 1; Tables 1 and 2). Each haplogroup will be described separately.

The J haplogroup was associated with accelerated progression to AIDS'87 (RH = 1.55, 95% CI = 1.08–2.23, *P* = 0.024) and AIDS-related death (RH = 1.53, 95% CI = 1.03–2.26, *P* = 0.043) in all European Americans. This association appears to be primarily driven by the cohorts who were infected through sexual transmission (RH = 1.84, 95% CI = 1.22–2.76, *P* = 0.006) (Figs. 1a and 2a, Table 1); however, the signal is observed in AIDS'87 and not in AIDS'93. Perhaps the J haplogroup specifically increases the risk of Kaposi's sarcoma, an AIDS-defining condition that occurred at high rates in MSM cohorts but that was seldom seen in injecting drug use and hemophilia cohorts. Additional research will be needed to examine this hypothesis. When we consider the MSM cohorts individually, there is a significant acceleration of AIDS'87 with J haplotypes in the MACS cohort (RH = 1.69, 95% CI = 1.08–2.66, *P* = 0.03) and a non-significant trend for acceleration in the SFCC (RH = 2.74, 95% CI = 0.97–7.70, *P* = 0.08). Within haplogroup J, both subhaplogroups J1 and J2 are associated with accelerated disease progression. J1 is associated with accelerated AIDS'87 in European Americans (RH = 1.57,

95% CI = 1.03–2.38, *P* = 0.046) and in MSM cohorts (RH = 1.80, 95% CI = 1.12–2.87, *P* = 0.023). The J1 association signal for accelerated AIDS progression is driven largely by the J1c-14798\* haplotype (*f* = 0.057), which is consistently highly significant in all patients, MSM, and individual MSM cohorts (MACS and SFCC; Fig. 1a; Table 1). J1c was significant for AIDS'87 (all RH = 1.67, CI = 1.07–2.61, *P* = 0.034; MSM RH = 1.94, 95% CI = 1.18–3.17, *P* = 0.016; MACS RH = 2.25, 95% CI = 1.27–3.98, *P* = 0.012), AIDS'93 (MSM RH = 1.64, 95% CI = 1.05–2.55, *P* = 0.041; MACS RH = 1.82, 95% CI = 1.08–3.09, *P* = 0.038), and death (all RH = 1.72, 95% CI = 1.07–2.78, *P* = 0.038). J2 shows an association with accelerated AIDS progress in the SFCC (CD4 cell count < 200 cells/ $\mu$ l: RH = 23.13, 95% CI = 2.33–229.65, *P* = 0.044; AIDS'87: RH = 63.69, 95% CI = 3.61–1124.28, *P* = 0.019; AIDS'93: RH = 44.26, 95% CI = 3.71–528.15, *P* = 0.024). As this cohort is biased towards long-term survivors [35], this signal may represent a moderate, late-term effect.

The U5a haplogroup is associated with accelerated AIDS progression to CD4 cell count less than 200 cells/ $\mu$ l in European Americans (RH = 1.78, 95% CI = 1.11–2.85, *P* = 0.028) and in MSM pooled cohorts (RH = 2.06, 95% CI = 1.17–3.63, *P* = 0.024). The signal is largely driven by the U5a1-15218 haplotype, which comprises 79% of the U5a haplotype (Fig. 1a; Table 1).

The Uk haplotype was associated with a decrease in the rate of AIDS progression to CD4 cells less than 200 cells/ $\mu$ l in both dichotomous and multipoint categorical models (OR = 0.47, 95% CI = 0.24–0.85, *P* = 0.008; common OR = 0.60, 95% CI = 0.37–0.97, *P* = 0.038, respectively) as shown in Table 2 and Fig. 3. Uk was also protective against AIDS'93 (Fig. 3c,d) (OR = 0.50, 95% CI = 0.27–0.87, *P* = 0.012; common OR = 0.61, 95% CI = 0.40–0.95, *P* = 0.022, dichotomous and multipoint models, respectively). In survivorship analyses (Fig. 1a, Table 1), only one signal was observed indicating Uk is protective against AIDS'87 in the MSM cohorts (relative hazard = 0.53, 95% CI = 0.29–1.00, *P* = 0.031).



**Fig. 2. Representative Kaplan–Meier plots for significant results.** (a) *J* haplogroup and AIDS'87 progression in sexual transmission cohorts; (b) haplogroup *U5a* and drop to CD4 cell count less than 200 cells/μl; and (c) SNP 3010, which is in haplogroups *J1* and *H1* and time to death in sexual transmission cohorts. Relative hazard, *P* values, and numbers

A strong association signal suggests *H3* was protective for hemophiliacs against progression to AIDS'93 (relative hazard = 0.21, 95% CI = 0.06–0.72, *P* = 0.003), AIDS'87 (relative hazard = 0.12, 95% CI = 0.02–0.94, *P* = 0.006), and death (relative hazard = undefined, *P* = 0.0004) (Fig. 1a, Table 1). However, this result is based on few individuals as only seven of the hemophiliacs analyzed in the survival model are in haplogroup *H3*, and, of those, one patient developed AIDS and no patients died. Protection, albeit relatively weak and inconsistent, was also observed in *H4*, *H5*, and *H6* (Fig. 1a; Table 1).

*IWX* haplogroup was associated with delayed progression to CD4 cell count less than 200 cells/μl in MSM cohorts, driven largely by the MACS cohort (relative hazard = 0.56, 95% CI = 0.33–0.96, *P* = 0.022; relative hazard = 0.52, 95% CI = 0.29–0.94, *P* = 0.017); however, we did not see an association when we look at all European Americans combined. Within the *IWX* group, The *W* (*W8994*) haplotype showed the strongest protective association among MSM cohorts pooled or individually (Fig. 1a; Table 1).

Haplogroups *U* and *J* contain a number of functional variants that we analyzed separately (Fig. 1b). Strong disease accelerating associations consistent with parent haplotypes were observed for SNP 3010 *G* > *A* (included in *J1* and *H1* haplotypes) and SNP 13708*G* > *A* (found at the root of the *J* haplogroup). The 13708*G* > *A* SNP is a amino acid-altering variant in the *ND5* protein coding gene. As both associated SNP variants, 3010*G* > *A* and 13708*G* > *A*, are carried together on the *J1* haplogroups, it was not possible to resolve their independent contributions to the *J1* association with rapid AIDS progression among MSM. However, the 3010*G* > *A* association may explain the accelerating association seen in *H1*, which is counter to the protective associations observed for *H3* and other *H* subhaplogroups. The *Uk* haplotype protecting against AIDS progression was recapitulated by non-synonymous *CYTb*-14798*T* > *C* SNP. SNP 14798*T* > *C* is present on *J1* and *Uk* haplotypes, but the protective influence was only apparent in *Uk*.

## Discussion

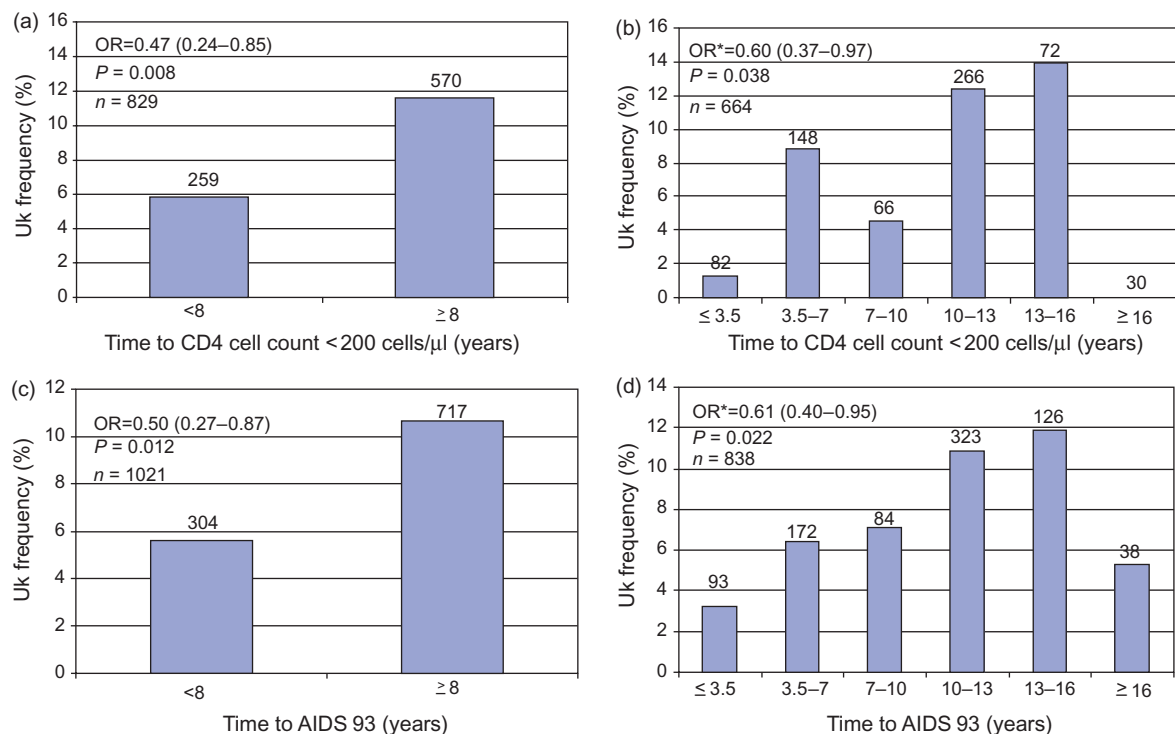
We determined the mitochondrial haplogroups of 1833 HIV-infected patients from five AIDS cohort studies in the United States and found certain haplogroups associated with progression to AIDS and death. For these analyses, we used a nested phylogenetic approach that allowed us to look for consistent signals between

**Fig. 2. (continued)** shown in the lower left of each graph are from Cox proportional models controlling for confounding variables (nuclear ARG genotype, age).

related clades at different levels of the mitochondrial tree and to pinpoint associations within specific haplogroups. The strongest signals for AIDS survival indicate haplogroups U5a and J are associated with accelerated AIDS progression, whereas haplogroups IWX and H3 are associated with a delay in AIDS onset (Figs 1 and 2; Table 1). In categorical analyses, Uk was found to lower AIDS risk (Fig. 3).

There are at least two potential explanations consistent with the results. First, because of the strong phylogeographic structure of mitochondrial haplogroups, it is possible that the associations observed in our study are correlated with background nuclear genetic effects that are distinctive between geographically separated populations. However, population stratification analysis using 304 autosomal markers did not find significant difference between the major haplogroups, and we adjusted for known ARGs as an additional control against population substructure. However, replicating these haplotype associations in additional cohorts from different ethnic backgrounds would be informative. Second, an interesting trend was observed that uncoupled haplogroups with lower ATP and ROS production (U5 and J) are associated with accelerated disease, whereas more tightly coupled groups (H3 and H4, H5, and H6) are associated with protection, suggesting mitochondrial functional variation plays a role in AIDS progression. Combined data on

longevity [50–52], neurodegenerative disease susceptibility [5,6,52,53], sperm motility [54,55], sprint performance [56], and climate adaptation [1,2] suggest functional mtDNA variation in different haplogroups influences ATP production efficiency and correlated ROS and heat generation. Less efficient ATP production in partially uncoupled mitochondria (haplogroups J and U5) would accelerate AIDS because it would exacerbate the energetic effects of the mtDNA depletion [19], disruption of oxidative phosphorylation, antioxidant enzyme deficiency [21], apoptosis [12,13,15], and increased oxidative damage observed during AIDS progression [22,57]. In contrast, in tightly coupled haplogroups (H3, H4, H5, H6), increased ATP production would allow HIV-infected patients to remain healthy for longer, and increased ROS production may enhance innate immunity and thus retard AIDS progression. Perhaps relevant is the report that haplogroup H has also been found to increase the survival rate of individuals with sepsis [7]. It may also be important that the H signal was observed only in the transfusion patients and not in MSM groups, even though the MSM sample is much larger, and mitochondria genetic studies with small samples size and rare haplogroups have been found to be less reliable [49]. Haplogroup Uk lowers AIDS risk in categorical analyses (Fig. 1a). The most common subhaplogroup of Uk, Uk1, harbors functional variants ND3 A10398G (T114A) and cytb T14798C (F18L),



**Fig. 3. The association of Uk haplotype with a decrease in the rate of AIDS progression to CD4 cells less than 200 cells/μl.** Frequencies of Uk in categorical analyses for Uk using dichotomous (a and c) and multipoint (b and d) models to CD4 cells less than 200 cells/μl (a and b) and AIDS 93 (c and d). Symbol asterisk indicates that odds ratios shown for multipoint models are common odds ratios.



which it shares with J1c, and variants tRNA<sup>Leu(CUN)</sup> A12308G and 16S rRNA A1811G which it shares with U4. HIV-1 relies on mitochondrial ATP production for replication and productive infection, yet inhibits mitochondrial ATP production [58]. One possibility is that, the large number of uncoupling SNP in Uk causes ATP production to fall below the threshold level needed for productive viral replication. Further, as AIDS viral transcription is driven by NFkappaB [59], and NFkappaB is activated by ROS [60], the low ROS production of Uk would be protective. The IWX association with slow progression is intriguing but cannot be interpreted in the context of uncoupling/AIDS acceleration as coupling status of IWX is unknown.

Further functional studies and replication in other cohorts are needed for a better understanding of whether and how functional differences between haplogroups influence AIDS progression. Nonetheless, the associations here observed, interpreted in the limited functional inferences about mtDNA phylogeography and function, offer important genetic insight in the complex interaction of HIV and host physiology in AIDS pathogenesis.

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**Table 1. Supplemental Molecular Classification of European mtDNA Haplogroups.**

Haplogroup	SNP	Change
M	10400	C>T
L0-2	3594	T>C
N	10873	C>T
X	6221	T>C
W	5460	G>A
N11	10238	T>C
R	12705	T>C
U	12308	A>G
U5	9477	G>A
U5a	13637	A>G
U5a*	Non U5a1	
U5a1	15218	A>G
U5b	5656	A>G
U1811	1811	A>G
U4	15693	T>C
U1811*	U1811 nonU4orUk	
Uk	14798	T>C
JT	4216	T>C
J	13708	G>A
J1	3010	G>A
J1*	J1, Non J1c	
J1c	14798	T>C
J1c-14798*	J1c non 14798–3394	T>C
J1c-14798-3394	3394	T>C
J2	15257	G>A
T	4917	A>G
HV	14766	T>C
H	7028	T>C
H1	3010	G>A
H2	1438	G>A
H3	6776	T>C
H4	4024	A>G
H5	4336	T>C
H6	3915	G>A
H*	Non H1-6	
V	4580	G>A
HV*	Non H or V	

**Table 2. Supplemental Proportional Hazards models for AIDS 1987, AIDS 1993, CD4 <200, and AIDS related death.**

Haplogroup	Pop	Disease	RH	RH lower 95% CI	RH upper 95% CI	P-value	N	N risk haplo	N alt haplo	N events	N events risk haplo	N events alt haplo
X	EA	AIDS'87	1.41	0.66	3.01	0.3938	624	10	614	275	7	268
X	HE	AIDS'87	1.23	0.28	5.42	0.7923	158	4	154	67	2	65
X	GA	AIDS'87	1.52	0.62	3.73	0.3920	454	6	448	205	5	200
X	MACS	AIDS'87	1.39	0.51	3.79	0.5410	386	5	381	178	4	174
X	SFCC	AIDS'87	5.91	0.53	65.94	0.2078	68	1	67	27	1	26
X	EA	AIDS'93	1.21	0.60	2.45	0.6117	618	10	608	392	8	384
X	HE	AIDS'93	2.12	0.59	7.64	0.2891	155	4	151	103	3	100
X	GA	AIDS'93	0.96	0.39	2.36	0.9361	451	6	445	284	5	279
X	MACS	AIDS'93	0.85	0.31	2.30	0.7383	383	5	378	239	4	235
X	SFCC	AIDS'93	1.85	0.21	16.59	0.6067	68	1	67	45	1	44
X	EA	CD4<200	0.93	0.34	2.51	0.8805	612	10	602	335	4	331
X	HE	CD4<200	1.98	0.55	7.14	0.3297	149	4	145	98	3	95
X	GA	CD4<200	0.35	0.05	2.54	0.2158	451	6	445	233	1	232
X	MACS	CD4<200	0.00	0.00	∞	<b>0.0329</b>	383	5	378	193	0	193
X	SFCC	CD4<200	1.83	0.20	16.61	0.6130	68	1	67	40	1	39
X	EA	Death	1.75	0.81	3.75	0.1863	623	10	613	237	7	230
X	HE	Death	0.89	0.19	4.15	0.8810	158	4	154	62	2	60
X	GA	Death	2.38	0.96	5.89	0.0958	453	6	447	174	5	169
X	MACS	Death	2.00	0.73	5.48	0.2225	385	5	380	153	4	149
X	SFCC	Death	18.59	1.24	279.16	0.0705	68	1	67	21	1	20
W8994 (W)	EA	AIDS'87	0.54	0.22	1.32	0.1364	625	14	611	276	5	271
W8994 (W)	HE	AIDS'87	4.77	0.92	24.88	0.1048	158	2	156	67	2	65
W8994 (W)	GA	AIDS'87	0.35	0.11	1.10	<b>0.0316</b>	455	11	444	206	3	203
W8994 (W)	MACS	AIDS'87	0.36	0.11	1.12	<b>0.0366</b>	387	10	377	179	3	176
W8994 (W)	SFCC	AIDS'87	0.00	0.00	∞	0.1506	68	1	67	27	0	27
W8994 (W)	EA	AIDS'93	0.52	0.25	1.10	0.0579	619	14	605	393	7	386
W8994 (W)	HE	AIDS'93	5.50	1.04	28.99	0.0815	155	2	153	103	2	101
W8994 (W)	GA	AIDS'93	0.41	0.17	1.00	<b>0.0225</b>	452	11	441	285	5	280
W8994 (W)	MACS	AIDS'93	0.44	0.18	1.08	<b>0.0420</b>	384	10	374	240	5	235
W8994 (W)	SFCC	AIDS'93	0.00	0.00	∞	<b>0.0369</b>	68	1	67	45	0	45
W8994 (W)	EA	CD4<200	0.47	0.19	1.14	0.0568	613	14	599	336	5	331
W8994 (W)	HE	CD4<200	3.48	0.70	17.38	0.1756	149	2	147	98	2	96
W8994 (W)	GA	CD4<200	0.32	0.10	1.01	<b>0.0191</b>	452	11	441	234	3	231
W8994 (W)	MACS	CD4<200	0.36	0.11	1.14	<b>0.0402</b>	384	10	374	194	3	191
W8994 (W)	SFCC	CD4<200	0.00	0.00	∞	0.0579	68	1	67	40	0	40
W8994 (W)	EA	Death	0.75	0.31	1.82	0.5020	624	14	610	238	5	233
W8994 (W)	HE	Death	1.51	0.17	13.12	0.7210	158	2	156	62	1	61
W8994 (W)	GA	Death	0.66	0.24	1.79	0.3859	454	11	443	175	4	171
W8994 (W)	MACS	Death	0.71	0.26	1.93	0.4784	386	10	376	154	4	150
W8994 (W)	SFCC	Death	0.00	0.00	∞	0.1781	68	1	67	21	0	21
IWX	EA	AIDS'87	0.90	0.59	1.37	0.6193	625	51	574	276	25	251
IWX	HE	AIDS'87	2.09	0.91	4.77	0.1064	158	11	147	67	7	60
IWX	GA	AIDS'87	0.74	0.45	1.20	0.2000	455	39	416	206	18	188
IWX	MACS	AIDS'87	0.66	0.39	1.13	0.1134	387	33	354	179	15	164
IWX	SFCC	AIDS'87	1.25	0.36	4.31	0.7324	68	6	62	27	3	24
IWX	EA	AIDS'93	0.75	0.52	1.10	0.1264	619	51	568	393	30	363
IWX	HE	AIDS'93	1.92	0.89	4.14	0.1241	155	11	144	103	8	95
IWX	GA	AIDS'93	0.65	0.42	1.01	<b>0.0426</b>	452	39	413	285	22	263
IWX	MACS	AIDS'93	0.64	0.40	1.03	<b>0.0490</b>	384	33	351	240	19	221
IWX	SFCC	AIDS'93	0.60	0.18	1.99	0.3671	68	6	62	45	3	42
IWX	EA	CD4<200	0.70	0.45	1.07	0.0817	613	51	562	336	23	313
IWX	HE	CD4<200	1.70	0.79	3.69	0.2031	149	11	138	98	8	90
IWX	GA	CD4<200	0.56	0.33	0.96	<b>0.0215</b>	452	39	413	234	15	219
IWX	MACS	CD4<200	0.52	0.29	0.94	<b>0.0170</b>	384	33	351	194	12	182
IWX	SFCC	CD4<200	0.68	0.20	2.29	0.5143	68	6	62	40	3	37
IWX	EA	Death	1.11	0.73	1.71	0.6230	624	51	573	238	24	214
IWX	HE	Death	1.24	0.48	3.25	0.6649	158	11	147	62	5	57
IWX	GA	Death	1.07	0.66	1.73	0.7866	454	39	415	175	19	156
IWX	MACS	Death	0.96	0.57	1.62	0.8685	386	33	353	154	16	138
IWX	SFCC	Death	1.93	0.53	6.99	0.3492	68	6	62	21	3	18
N11	EA	AIDS'87	0.99	0.54	1.82	0.9683	625	24	601	276	11	265
N11	HE	AIDS'87	1.68	0.39	7.22	0.5182	158	4	154	67	2	65
N11	GA	AIDS'87	0.89	0.45	1.76	0.7379	455	20	435	206	9	197
N11	MACS	AIDS'87	0.84	0.41	1.73	0.6312	387	17	370	179	8	171
N11	SFCC	AIDS'87	2.02	0.21	19.50	0.5697	68	3	65	27	1	26
N11	EA	AIDS'93	0.73	0.41	1.31	0.2750	619	24	595	393	12	381
N11	HE	AIDS'93	0.99	0.24	4.17	0.9932	155	4	151	103	2	101
N11	GA	AIDS'93	0.75	0.39	1.41	0.3468	452	20	432	285	10	275
N11	MACS	AIDS'93	0.73	0.37	1.43	0.3333	384	17	367	240	9	231

Table 2 (continued)

Haplogroup	Pop	Disease	RH	RH lower 95% CI	RH upper 95% CI	P-value	N	N risk haplo	N alt haplo	N events	N events risk haplo	N events alt haplo
N11	SFCC	AIDS'93	1.07	0.13	9.10	0.9493	68	3	65	45	1	44
N11	EA	CD4<200	0.76	0.41	1.40	0.3563	613	24	589	336	11	325
N11	HE	CD4<200	0.90	0.21	3.84	0.8867	149	4	145	98	2	96
N11	GA	CD4<200	0.78	0.40	1.54	0.4608	452	20	432	234	9	225
N11	MACS	CD4<200	0.73	0.36	1.50	0.3736	384	17	367	194	8	186
N11	SFCC	CD4<200	1.10	0.13	9.46	0.9308	68	3	65	40	1	39
N11	EA	Death	1.09	0.57	2.08	0.7956	624	24	600	238	10	228
N11	HE	Death	0.94	0.13	7.03	0.9507	158	4	154	62	1	61
N11	GA	Death	1.11	0.56	2.21	0.7704	454	20	434	175	9	166
N11	MACS	Death	0.98	0.47	2.03	0.9612	386	17	369	154	8	146
N11	SFCC	Death	5.93	0.48	73.87	0.2177	68	3	65	21	1	20
U5a*	EA	AIDS'87	1.10	0.35	3.47	0.8777	626	5	621	277	3	274
U5a*	HE	AIDS'87	1.32	0.29	6.00	0.7265	159	3	156	68	2	66
U5a*	GA	AIDS'87	0.79	0.11	5.71	0.8086	455	2	453	206	1	205
U5a*	MACS	AIDS'87	0.64	0.09	4.63	0.6345	386	2	384	179	1	178
U5a*	EA	AIDS'93	1.12	0.41	3.06	0.8313	620	5	615	395	4	391
U5a*	HE	AIDS'93	1.04	0.30	3.59	0.9457	156	3	153	104	3	101
U5a*	GA	AIDS'93	0.89	0.12	6.58	0.9063	452	2	450	286	1	285
U5a*	MACS	AIDS'93	0.84	0.11	6.26	0.8641	383	2	381	240	1	239
U5a*	EA	CD4<200	1.20	0.44	3.30	0.7299	614	5	609	338	4	334
U5a*	HE	CD4<200	0.86	0.25	2.92	0.8028	150	3	147	99	3	96
U5a*	GA	CD4<200	2.11	0.28	15.77	0.5128	452	2	450	235	1	234
U5a*	MACS	CD4<200	1.98	0.27	14.75	0.5465	383	2	381	194	1	193
U5a*	EA	Death	1.08	0.26	4.43	0.9137	625	5	620	239	2	237
U5a*	HE	Death	1.05	0.13	8.33	0.9629	159	3	156	63	1	62
U5a*	GA	Death	1.60	0.22	11.65	0.6646	454	2	452	175	1	174
U5a*	MACS	Death	1.31	0.18	9.51	0.7989	385	2	383	154	1	153
U5a	EA	AIDS'87	1.25	0.69	2.25	0.4817	627	28	599	277	12	265
U5a	HE	AIDS'87	0.56	0.15	2.15	0.3770	159	7	152	68	3	65
U5a	GA	AIDS'87	1.37	0.70	2.70	0.3847	456	20	436	206	9	197
U5a	MACS	AIDS'87	1.22	0.60	2.50	0.5941	387	18	369	179	8	171
U5a	SFCC	AIDS'87	0.68	0.06	7.48	0.7463	69	2	67	27	1	26
U5a	EA	AIDS'93	1.59	0.99	2.54	0.0694	621	28	593	396	19	377
U5a	HE	AIDS'93	0.95	0.38	2.36	0.9055	156	7	149	104	6	98
U5a	GA	AIDS'93	1.68	0.95	2.95	0.0950	453	20	433	287	13	274
U5a	MACS	AIDS'93	1.56	0.87	2.81	0.1640	384	18	366	241	12	229
U5a	SFCC	AIDS'93	1.64	0.17	15.79	0.6831	69	2	67	46	1	45
U5a	EA	CD4<200	1.78	1.11	2.85	<b>0.0277</b>	615	28	587	339	19	320
U5a	HE	CD4<200	0.69	0.26	1.85	0.4504	150	7	143	99	6	93
U5a	GA	CD4<200	2.06	1.17	3.63	<b>0.0237</b>	453	20	433	236	13	223
U5a	MACS	CD4<200	1.89	1.04	3.41	0.0536	384	18	366	195	12	183
U5a	SFCC	CD4<200	2.06	0.21	20.25	0.5625	69	2	67	41	1	40
U5a	EA	Death	1.52	0.82	2.82	0.2131	626	28	598	239	11	228
U5a	HE	Death	0.42	0.08	2.17	0.2665	159	7	152	63	2	61
U5a	GA	Death	1.82	0.92	3.60	0.1140	455	20	435	175	9	166
U5a	MACS	Death	1.59	0.77	3.27	0.2370	386	18	368	154	8	146
U5a	SFCC	Death	1.63	0.13	20.17	0.7121	69	2	67	21	1	20
U5a1-15218	EA	AIDS'87	1.24	0.63	2.45	0.5501	626	23	603	277	9	268
U5a1-15218	HE	AIDS'87	0.22	0.03	1.99	0.1184	159	4	155	68	1	67
U5a1-15218	GA	AIDS'87	1.46	0.71	3.00	0.3262	455	18	437	206	8	198
U5a1-15218	MACS	AIDS'87	1.36	0.63	2.91	0.4551	386	16	370	179	7	172
U5a1-15218	SFCC	AIDS'87	0.68	0.06	7.48	0.7463	69	2	67	27	1	26
U5a1-15218	EA	AIDS'93	1.77	1.05	2.98	<b>0.0493</b>	620	23	597	395	15	380
U5a1-15218	HE	AIDS'93	0.86	0.23	3.18	0.8130	156	4	152	104	3	101
U5a1-15218	GA	AIDS'93	1.80	1.00	3.23	0.0698	452	18	434	286	12	274
U5a1-15218	MACS	AIDS'93	1.68	0.91	3.09	0.1218	383	16	367	240	11	229
U5a1-15218	SFCC	AIDS'93	1.64	0.17	15.79	0.6831	69	2	67	46	1	45
U5a1-15218	EA	CD4<200	1.99	1.18	3.38	<b>0.0197</b>	614	23	591	338	15	323
U5a1-15218	HE	CD4<200	0.52	0.11	2.39	0.3869	150	4	146	99	3	96
U5a1-15218	GA	CD4<200	2.04	1.13	3.67	<b>0.0317</b>	452	18	434	235	12	223
U5a1-15218	MACS	CD4<200	1.86	1.01	3.44	0.0689	383	16	367	194	11	183
U5a1-15218	SFCC	CD4<200	2.06	0.21	20.25	0.5625	69	2	67	41	1	40
U5a1-15218	EA	Death	1.58	0.80	3.13	0.2199	625	23	602	239	9	230
U5a1-15218	HE	Death	0.25	0.03	2.30	0.1627	159	4	155	63	1	62
U5a1-15218	GA	Death	1.77	0.86	3.64	0.1537	454	18	436	175	8	167
U5a1-15218	MACS	Death	1.56	0.72	3.38	0.2845	385	16	369	154	7	147
U5a1-15218	SFCC	Death	1.63	0.13	20.17	0.7121	69	2	67	21	1	20
U5	EA	AIDS'87	1.05	0.66	1.67	0.8283	627	52	575	277	20	257
U5	HE	AIDS'87	0.66	0.21	2.06	0.4546	159	10	149	68	4	64

Table 2 (continued)

Haplogroup	Pop	Disease	RH	RH lower	RH upper	P-value	N	N risk haplo	N alt haplo	N events	N events	
				95% CI	95% CI						risk haplo	alt haplo
U5	GA	AIDS'87	1.06	0.63	1.78	0.8188	456	41	415	206	16	190
U5	MACS	AIDS'87	1.24	0.71	2.15	0.4656	387	35	352	179	14	165
U5	SFCC	AIDS'87	0.31	0.07	1.43	0.0876	69	6	63	27	2	25
U5	EA	AIDS'93	1.23	0.85	1.77	0.2899	621	51	570	396	32	364
U5	HE	AIDS'93	1.27	0.60	2.70	0.5356	156	10	146	104	9	95
U5	GA	AIDS'93	1.12	0.73	1.73	0.6006	453	40	413	287	23	264
U5	MACS	AIDS'93	1.35	0.85	2.15	0.2194	384	34	350	241	20	221
U5	SFCC	AIDS'93	0.38	0.11	1.36	0.1015	69	6	63	46	3	43
U5	EA	CD4<200	1.23	0.84	1.81	0.2986	615	51	564	339	30	309
U5	HE	CD4<200	0.91	0.41	2.01	0.8056	150	10	140	99	9	90
U5	GA	CD4<200	1.24	0.78	1.96	0.3685	453	40	413	236	21	215
U5	MACS	CD4<200	1.59	0.97	2.60	0.0815	384	34	350	195	18	177
U5	SFCC	CD4<200	0.45	0.13	1.59	0.1763	69	6	63	41	3	38
U5	EA	Death	1.06	0.64	1.75	0.8103	626	52	574	239	17	222
U5	HE	Death	0.58	0.15	2.18	0.3928	159	10	149	63	3	60
U5	GA	Death	1.12	0.64	1.94	0.6974	455	41	414	175	14	161
U5	MACS	Death	1.35	0.76	2.40	0.3290	386	35	351	154	13	141
U5	SFCC	Death	0.25	0.03	1.93	0.1063	69	6	63	21	1	20
U5b-5656	EA	AIDS'87	0.85	0.42	1.74	0.6558	627	24	603	277	8	269
U5b-5656	HE	AIDS'87	1.03	0.14	7.73	0.9745	159	3	156	68	1	67
U5b-5656	GA	AIDS'87	0.82	0.38	1.76	0.5961	456	21	435	206	7	199
U5b-5656	MACS	AIDS'87	1.23	0.54	2.79	0.6338	387	17	370	179	6	173
U5b-5656	SFCC	AIDS'87	0.23	0.03	1.76	0.0804	69	4	65	27	1	26
U5b-5656	EA	AIDS'93	0.90	0.51	1.58	0.7157	621	23	598	396	13	383
U5b-5656	HE	AIDS'93	2.66	0.81	8.78	0.1564	156	3	153	104	3	101
U5b-5656	GA	AIDS'93	0.77	0.41	1.47	0.4113	453	20	433	287	10	277
U5b-5656	MACS	AIDS'93	1.10	0.54	2.24	0.7962	384	16	368	241	8	233
U5b-5656	SFCC	AIDS'93	0.28	0.06	1.27	0.0539	69	4	65	46	2	44
U5b-5656	EA	CD4<200	0.78	0.42	1.45	0.4180	615	23	592	339	11	328
U5b-5656	HE	CD4<200	1.58	0.47	5.33	0.4883	150	3	147	99	3	96
U5b-5656	GA	CD4<200	0.72	0.35	1.49	0.3545	453	20	433	236	8	228
U5b-5656	MACS	CD4<200	1.16	0.51	2.63	0.7325	384	16	368	195	6	189
U5b-5656	SFCC	CD4<200	0.32	0.07	1.45	0.0904	69	4	65	41	2	39
U5b-5656	EA	Death	0.68	0.30	1.55	0.3349	626	24	602	239	6	233
U5b-5656	HE	Death	1.16	0.15	8.73	0.8910	159	3	156	63	1	62
U5b-5656	GA	Death	0.65	0.26	1.59	0.3130	455	21	434	175	5	170
U5b-5656	MACS	Death	1.05	0.43	2.59	0.9091	386	17	369	154	5	149
U5b-5656	SFCC	Death	0.00	0.00	∞	<b>0.0182</b>	69	4	65	21	0	21
U	EA	AIDS'87	0.93	0.69	1.25	0.6204	629	135	494	278	55	223
U	HE	AIDS'87	1.32	0.74	2.35	0.3565	160	34	126	69	18	51
U	GA	AIDS'87	0.81	0.56	1.16	0.2420	457	99	358	206	37	169
U	MACS	AIDS'87	0.90	0.60	1.34	0.5998	388	80	308	179	31	148
U	SFCC	AIDS'87	0.53	0.21	1.33	0.1534	69	19	50	27	6	21
U	EA	AIDS'93	1.11	0.87	1.41	0.4056	623	133	490	397	89	308
U	HE	AIDS'93	1.48	0.94	2.35	0.1027	157	33	124	105	28	77
U	GA	AIDS'93	0.97	0.73	1.30	0.8443	454	98	356	287	60	227
U	MACS	AIDS'93	0.99	0.72	1.37	0.9595	385	79	306	241	46	195
U	SFCC	AIDS'93	1.03	0.52	2.03	0.9357	69	19	50	46	14	32
U	EA	CD4<200	1.08	0.84	1.40	0.5525	617	133	484	340	79	261
U	HE	CD4<200	1.10	0.67	1.79	0.7089	151	33	118	100	28	72
U	GA	CD4<200	1.01	0.73	1.39	0.9601	454	98	356	236	50	186
U	MACS	CD4<200	1.04	0.72	1.50	0.8381	385	79	306	195	37	158
U	SFCC	CD4<200	1.10	0.54	2.24	0.8018	69	19	50	41	13	28
U	EA	Death	0.89	0.65	1.23	0.4896	628	134	494	240	47	193
U	HE	Death	1.25	0.69	2.28	0.4710	160	34	126	64	17	47
U	GA	Death	0.77	0.52	1.16	0.1957	456	98	358	175	30	145
U	MACS	Death	0.78	0.50	1.22	0.2629	387	79	308	154	24	130
U	SFCC	Death	0.87	0.33	2.26	0.7706	69	19	50	21	6	15
U1811*	EA	AIDS'87	0.88	0.46	1.66	0.6822	632	22	610	279	10	269
U1811*	HE	AIDS'87	1.04	0.37	2.95	0.9450	159	8	151	68	4	64
U1811*	GA	AIDS'87	1.18	0.52	2.69	0.6999	461	13	448	208	6	202
U1811*	MACS	AIDS'87	1.02	0.37	2.79	0.9711	392	9	383	181	4	177
U1811*	SFCC	AIDS'87	5.06	1.06	24.27	0.0858	69	4	65	27	2	25
U1811*	EA	AIDS'93	1.19	0.74	1.93	0.4819	626	22	604	399	18	381
U1811*	HE	AIDS'93	1.51	0.65	3.46	0.3565	156	8	148	104	7	97
U1811*	GA	AIDS'93	1.21	0.64	2.30	0.5696	458	13	445	290	10	280
U1811*	MACS	AIDS'93	1.07	0.49	2.30	0.8721	389	9	380	244	7	237
U1811*	SFCC	AIDS'93	4.00	1.11	14.46	0.0661	69	4	65	46	3	43
U1811*	EA	CD4<200	1.22	0.73	2.02	0.4620	620	22	598	342	16	326

Table 2 (continued)

Haplogroup	Pop	Disease	RH	RH lower 95% CI	RH upper 95% CI	P-value	N	N risk haplo	N alt haplo	N events	N events risk haplo	N events alt haplo
U1811*	HE	CD4<200	1.17	0.47	2.91	0.7349	150	8	142	99	7	92
U1811*	GA	CD4<200	1.19	0.58	2.43	0.6496	458	13	445	239	8	231
U1811*	MACS	CD4<200	1.11	0.49	2.53	0.8095	389	9	380	198	6	192
U1811*	SFCC	CD4<200	2.90	0.64	13.19	0.2233	69	4	65	41	2	39
U1811*	EA	Death	0.82	0.42	1.60	0.5412	631	22	609	241	9	232
U1811*	HE	Death	0.88	0.30	2.57	0.8067	159	8	151	63	4	59
U1811*	GA	Death	1.18	0.48	2.91	0.7235	460	13	447	177	5	172
U1811*	MACS	Death	0.91	0.29	2.88	0.8699	391	9	382	156	3	153
U1811*	SFCC	Death	10.07	1.51	67.39	<b>0.0372</b>	69	4	65	21	2	19
U4-U1811*	EA	AIDS'87	1.18	0.71	1.96	0.5392	626	32	594	277	16	261
U4-U1811*	HE	AIDS'87	1.47	0.62	3.52	0.4066	158	11	147	68	6	62
U4-U1811*	GA	AIDS'87	1.37	0.72	2.60	0.3657	456	20	436	206	10	196
U4-U1811*	MACS	AIDS'87	1.16	0.54	2.48	0.7129	387	16	371	179	8	171
U4-U1811*	SFCC	AIDS'87	5.06	1.06	24.27	0.0858	69	4	65	27	2	25
U4-U1811*	EA	AIDS'93	1.41	0.93	2.12	0.1220	620	31	589	396	25	371
U4-U1811*	HE	AIDS'93	1.58	0.76	3.27	0.2450	155	10	145	104	9	95
U4-U1811*	GA	AIDS'93	1.46	0.86	2.49	0.1798	453	20	433	287	15	272
U4-U1811*	MACS	AIDS'93	1.33	0.73	2.41	0.3662	384	16	368	241	12	229
U4-U1811*	SFCC	AIDS'93	4.00	1.11	14.46	0.0661	69	4	65	46	3	43
U4-U1811*	EA	CD4<200	1.33	0.86	2.06	0.2219	614	31	583	339	22	317
U4-U1811*	HE	CD4<200	1.03	0.47	2.22	0.9498	149	10	139	99	9	90
U4-U1811*	GA	CD4<200	1.44	0.80	2.60	0.2498	453	20	433	236	12	224
U4-U1811*	MACS	CD4<200	1.35	0.71	2.58	0.3827	384	16	368	195	10	185
U4-U1811*	SFCC	CD4<200	2.90	0.64	13.19	0.2233	69	4	65	41	2	39
U4-U1811*	EA	Death	0.98	0.56	1.73	0.9481	625	32	593	239	13	226
U4-U1811*	HE	Death	1.31	0.53	3.21	0.5710	158	11	147	63	6	57
U4-U1811*	GA	Death	1.03	0.48	2.21	0.9449	455	20	435	175	7	168
U4-U1811*	MACS	Death	0.68	0.25	1.84	0.4164	386	16	370	154	5	149
U4-U1811*	SFCC	Death	10.07	1.51	67.39	<b>0.0372</b>	69	4	65	21	2	19
U4	EA	AIDS'87	2.56	1.12	5.85	0.0508	626	10	616	277	6	271
U4	HE	AIDS'87	5.30	1.22	23.02	0.0706	158	3	155	68	2	66
U4	GA	AIDS'87	1.78	0.62	5.10	0.3164	456	7	449	206	4	202
U4	MACS	AIDS'87	1.38	0.43	4.48	0.6075	387	7	380	179	4	175
U4	EA	AIDS'93	2.40	1.12	5.15	<b>0.0464</b>	620	9	611	396	7	389
U4	HE	AIDS'93	1.83	0.44	7.61	0.4480	155	2	153	104	2	102
U4	GA	AIDS'93	2.51	0.98	6.45	0.0869	453	7	446	287	5	282
U4	MACS	AIDS'93	2.06	0.79	5.34	0.1751	384	7	377	241	5	236
U4	EA	CD4<200	1.72	0.75	3.97	0.2367	614	9	605	339	6	333
U4	HE	CD4<200	0.76	0.18	3.33	0.7106	149	2	147	99	2	97
U4	GA	CD4<200	2.54	0.89	7.23	0.1215	453	7	446	236	4	232
U4	MACS	CD4<200	2.09	0.72	6.04	0.2154	384	7	377	195	4	191
U4	EA	Death	1.74	0.64	4.75	0.3210	625	10	615	239	4	235
U4	HE	Death	6.07	1.36	27.07	0.0560	158	3	155	63	2	61
U4	GA	Death	0.75	0.18	3.21	0.6912	455	7	448	175	2	173
U4	MACS	Death	0.37	0.05	2.73	0.2532	386	7	379	154	2	152
U1811	EA	AIDS'87	0.94	0.65	1.35	0.7398	627	77	550	277	34	243
U1811	HE	AIDS'87	1.79	0.95	3.36	0.0864	159	21	138	68	13	55
U1811	GA	AIDS'87	0.75	0.47	1.20	0.2166	456	55	401	206	21	185
U1811	MACS	AIDS'87	0.81	0.48	1.36	0.4208	387	42	345	179	17	162
U1811	SFCC	AIDS'87	0.85	0.28	2.59	0.7720	69	13	56	27	4	23
U1811	EA	AIDS'93	1.07	0.80	1.43	0.6615	621	76	545	396	54	342
U1811	HE	AIDS'93	1.66	0.96	2.86	0.0815	156	20	136	104	17	87
U1811	GA	AIDS'93	0.91	0.64	1.30	0.6053	453	55	398	287	36	251
U1811	MACS	AIDS'93	0.84	0.55	1.27	0.3992	384	42	342	241	25	216
U1811	SFCC	AIDS'93	1.78	0.82	3.87	0.1586	69	13	56	46	11	35
U1811	EA	CD4<200	0.99	0.72	1.37	0.9708	615	76	539	339	46	293
U1811	HE	CD4<200	1.40	0.79	2.46	0.2649	150	20	130	99	17	82
U1811	GA	CD4<200	0.90	0.60	1.35	0.6022	453	55	398	236	28	208
U1811	MACS	CD4<200	0.80	0.49	1.31	0.3526	384	42	342	195	18	177
U1811	SFCC	CD4<200	1.86	0.82	4.25	0.1549	69	13	56	41	10	31
U1811	EA	Death	0.88	0.59	1.30	0.5013	626	76	550	239	29	210
U1811	HE	Death	1.59	0.83	3.02	0.1773	159	21	138	63	13	50
U1811	GA	Death	0.67	0.39	1.14	0.1171	455	54	401	175	16	159
U1811	MACS	Death	0.57	0.30	1.09	0.0663	386	41	345	154	11	143
U1811	SFCC	Death	1.72	0.58	5.08	0.3419	69	13	56	21	5	16
Uk	EA	AIDS'87	0.79	0.49	1.29	0.3335	626	45	581	277	18	259
Uk	HE	AIDS'87	2.01	0.86	4.72	0.1317	158	10	148	68	7	61
Uk	GA	AIDS'87	0.53	0.29	1.00	<b>0.0309</b>	456	35	421	206	11	195
Uk	MACS	AIDS'87	0.66	0.34	1.30	0.2065	387	26	361	179	9	170



Table 2 (continued)

Haplogroup	Pop	Disease	RH	RH lower	RH upper	P-value	N	N risk haplo	N alt haplo	N events	N events	
				95% CI	95% CI						risk haplo	alt haplo
Uk	SFCC	AIDS'87	0.43	0.10	1.88	0.2108	69	9	60	27	2	25
Uk	EA	AIDS'93	0.87	0.59	1.27	0.4576	620	45	575	396	29	367
Uk	HE	AIDS'93	1.64	0.76	3.54	0.2291	155	10	145	104	8	96
Uk	GA	AIDS'93	0.70	0.44	1.11	0.1155	453	35	418	287	21	266
Uk	MACS	AIDS'93	0.63	0.36	1.10	0.0836	384	26	358	241	13	228
Uk	SFCC	AIDS'93	1.29	0.54	3.09	0.5714	69	9	60	46	8	38
Uk	EA	CD4<200	0.79	0.51	1.22	0.2689	614	45	569	339	24	315
Uk	HE	CD4<200	1.97	0.90	4.33	0.1150	149	10	139	99	8	91
Uk	GA	CD4<200	0.68	0.40	1.16	0.1410	453	35	418	236	16	220
Uk	MACS	CD4<200	0.53	0.26	1.08	0.0548	384	26	358	195	8	187
Uk	SFCC	CD4<200	1.55	0.63	3.77	0.3545	69	9	60	41	8	33
Uk	EA	Death	0.81	0.48	1.36	0.4116	625	44	581	239	16	223
Uk	HE	Death	1.79	0.76	4.22	0.2069	158	10	148	63	7	56
Uk	GA	Death	0.54	0.27	1.07	0.0527	455	34	421	175	9	166
Uk	MACS	Death	0.53	0.23	1.22	0.1007	386	25	361	154	6	148
Uk	SFCC	Death	1.00	0.28	3.64	0.9964	69	9	60	21	3	18
J2	EA	AIDS'87	1.45	0.74	2.82	0.3062	627	14	613	277	9	268
J2	HE	AIDS'87	0.53	0.07	3.88	0.4847	159	4	155	68	1	67
J2	GA	AIDS'87	2.08	1.02	4.27	0.0701	456	10	446	206	8	198
J2	MACS	AIDS'87	1.52	0.71	3.27	0.3101	388	9	379	179	7	172
J2	SFCC	AIDS'87	63.69	3.61	1124.28	<b>0.0194</b>	68	1	67	27	1	26
J2	EA	AIDS'93	1.19	0.65	2.18	0.5837	621	14	607	396	11	385
J2	HE	AIDS'93	0.80	0.25	2.58	0.7015	156	4	152	104	3	101
J2	GA	AIDS'93	1.38	0.68	2.82	0.3974	453	10	443	287	8	279
J2	MACS	AIDS'93	1.05	0.49	2.26	0.8920	385	9	376	241	7	234
J2	SFCC	AIDS'93	44.26	3.71	528.15	<b>0.0236</b>	68	1	67	46	1	45
J2	EA	CD4<200	1.32	0.70	2.50	0.4098	615	14	601	339	10	329
J2	HE	CD4<200	0.85	0.26	2.80	0.7859	150	4	146	99	3	96
J2	GA	CD4<200	1.50	0.70	3.21	0.3277	453	10	443	236	7	229
J2	MACS	CD4<200	1.11	0.49	2.53	0.8045	385	9	376	195	6	189
J2	SFCC	CD4<200	23.13	2.33	229.65	<b>0.0441</b>	68	1	67	41	1	40
J2	EA	Death	1.42	0.69	2.89	0.3632	626	14	612	239	8	231
J2	HE	Death	1.91	0.57	6.44	0.3359	159	4	155	63	3	60
J2	GA	Death	1.32	0.54	3.23	0.5654	455	10	445	175	5	170
J2	MACS	Death	0.93	0.34	2.53	0.8812	387	9	378	154	4	150
J2	SFCC	Death	14.02	1.33	148.17	0.0795	68	1	67	21	1	20
J	EA	AIDS'87	1.55	1.08	2.23	<b>0.0236</b>	628	65	563	277	35	242
J	HE	AIDS'87	1.05	0.46	2.39	0.9059	159	20	139	68	7	61
J	GA	AIDS'87	1.84	1.22	2.76	<b>0.0061</b>	457	45	412	206	28	178
J	MACS	AIDS'87	1.69	1.08	2.66	<b>0.0302</b>	388	38	350	179	23	156
J	SFCC	AIDS'87	2.74	0.97	7.70	0.0809	69	7	62	27	5	22
J	EA	AIDS'93	1.20	0.87	1.64	0.2741	622	65	557	396	45	351
J	HE	AIDS'93	0.98	0.54	1.79	0.9488	156	20	136	104	13	91
J	GA	AIDS'93	1.38	0.95	2.01	0.1018	454	45	409	287	32	255
J	MACS	AIDS'93	1.22	0.80	1.87	0.3608	385	38	347	241	25	216
J	SFCC	AIDS'93	1.98	0.81	4.80	0.1552	69	7	62	46	7	39
J	EA	CD4<200	1.22	0.86	1.71	0.2756	616	64	552	339	39	300
J	HE	CD4<200	0.70	0.36	1.37	0.2807	150	19	131	99	12	87
J	GA	CD4<200	1.35	0.90	2.03	0.1677	454	45	409	236	27	209
J	MACS	CD4<200	1.22	0.77	1.94	0.4025	385	38	347	195	21	174
J	SFCC	CD4<200	1.84	0.71	4.81	0.2353	69	7	62	41	6	35
J	EA	Death	1.53	1.03	2.26	<b>0.0428</b>	627	65	562	239	30	209
J	HE	Death	1.93	0.92	4.04	0.0992	159	20	139	63	10	53
J	GA	Death	1.43	0.89	2.29	0.1562	456	45	411	175	20	155
J	MACS	Death	1.23	0.73	2.08	0.4556	387	38	349	154	16	138
J	SFCC	Death	3.07	0.94	10.07	0.0907	69	7	62	21	4	17
J1c-14798*	EA	AIDS'87	1.80	1.12	2.91	<b>0.0247</b>	626	36	590	277	19	258
J1c-14798*	HE	AIDS'87	1.01	0.35	2.89	0.9903	158	11	147	68	4	64
J1c-14798*	GA	AIDS'87	2.24	1.30	3.84	<b>0.0082</b>	456	25	431	206	15	191
J1c-14798*	MACS	AIDS'87	2.01	1.09	3.70	<b>0.0403</b>	388	22	366	179	12	167
J1c-14798*	SFCC	AIDS'87	6.23	1.33	29.23	<b>0.0351</b>	68	3	65	27	3	24
J1c-14798*	EA	AIDS'93	1.34	0.88	2.04	0.1870	620	36	584	396	24	372
J1c-14798*	HE	AIDS'93	0.96	0.44	2.12	0.9264	155	11	144	104	7	97
J1c-14798*	GA	AIDS'93	1.70	1.03	2.81	0.0529	453	25	428	287	17	270
J1c-14798*	MACS	AIDS'93	1.64	0.93	2.86	0.1057	385	22	363	241	14	227
J1c-14798*	SFCC	AIDS'93	3.36	0.76	14.84	0.1389	68	3	65	46	3	43
J1c-14798*	EA	CD4<200	1.40	0.88	2.22	0.1746	614	36	578	339	20	319
J1c-14798*	HE	CD4<200	0.64	0.24	1.72	0.3584	149	11	138	99	6	93
J1c-14798*	GA	CD4<200	1.51	0.87	2.61	0.1674	453	25	428	236	14	222

Table 2 (continued)

Haplogroup	Pop	Disease	RH	RH lower 95% CI	RH upper 95% CI	P-value	N	N risk haplo	N alt haplo	N events	N events risk haplo	N events alt haplo
J1c-14798*	MACS	CD4<200	1.45	0.79	2.65	0.2510	385	22	363	195	12	183
J1c-14798*	SFCC	CD4<200	3.23	0.58	17.88	0.2202	68	3	65	41	2	39
J1c-14798*	EA	Death	2.03	1.24	3.33	<b>0.0101</b>	625	36	589	239	18	221
J1c-14798*	HE	Death	1.43	0.54	3.79	0.4917	158	11	147	63	5	58
J1c-14798*	GA	Death	2.27	1.27	4.05	<b>0.0123</b>	455	25	430	175	13	162
J1c-14798*	MACS	Death	1.89	0.97	3.68	0.0822	387	22	365	154	10	144
J1c-14798*	SFCC	Death	9.13	1.68	49.67	<b>0.0177</b>	68	3	65	21	3	18
J1c	EA	AIDS'87	1.67	1.07	2.61	<b>0.0338</b>	626	41	585	277	22	255
J1c	HE	AIDS'87	1.01	0.35	2.89	0.9903	158	11	147	68	4	64
J1c	GA	AIDS'87	1.94	1.18	3.17	<b>0.0159</b>	456	30	426	206	18	188
J1c	MACS	AIDS'87	2.25	1.27	3.98	<b>0.0116</b>	388	24	364	179	14	165
J1c	SFCC	AIDS'87	2.04	0.67	6.27	0.2439	68	6	62	27	4	23
J1c	EA	AIDS'93	1.35	0.92	1.99	0.1411	620	41	579	396	29	367
J1c	HE	AIDS'93	0.96	0.44	2.12	0.9264	155	11	144	104	7	97
J1c	GA	AIDS'93	1.64	1.05	2.55	<b>0.0408</b>	453	30	423	287	22	265
J1c	MACS	AIDS'93	1.82	1.08	3.09	<b>0.0383</b>	385	24	361	241	16	225
J1c	SFCC	AIDS'93	1.60	0.63	4.08	0.3467	68	6	62	46	6	40
J1c	EA	CD4<200	1.29	0.84	1.97	0.2596	614	41	573	339	24	315
J1c	HE	CD4<200	0.64	0.24	1.72	0.3584	149	11	138	99	6	93
J1c	GA	CD4<200	1.36	0.83	2.23	0.2335	453	30	423	236	18	218
J1c	MACS	CD4<200	1.51	0.84	2.71	0.1862	385	24	361	195	13	182
J1c	SFCC	CD4<200	1.45	0.52	4.05	0.4936	68	6	62	41	5	36
J1c	EA	Death	1.72	1.07	2.78	<b>0.0381</b>	625	41	584	239	19	220
J1c	HE	Death	1.43	0.54	3.79	0.4917	158	11	147	63	5	58
J1c	GA	Death	1.80	1.03	3.15	0.0543	455	30	425	175	14	161
J1c	MACS	Death	1.98	1.05	3.74	0.0534	387	24	363	154	11	143
J1c	SFCC	Death	2.20	0.60	8.13	0.2730	68	6	62	21	3	18
J1c-14798-3394	EA	AIDS'87	1.11	0.35	3.51	0.8602	626	5	621	277	3	274
J1c-14798-3394	GA	AIDS'87	1.11	0.35	3.50	0.8659	456	5	451	206	3	203
J1c-14798-3394	MACS	AIDS'87	5.20	1.24	21.77	0.0705	388	2	386	179	2	177
J1c-14798-3394	SFCC	AIDS'87	0.70	0.09	5.33	0.7213	68	3	65	27	1	26
J1c-14798-3394	EA	AIDS'93	1.36	0.54	3.42	0.5278	620	5	615	396	5	391
J1c-14798-3394	GA	AIDS'93	1.42	0.56	3.58	0.4762	453	5	448	287	5	282
J1c-14798-3394	MACS	AIDS'93	5.89	1.36	25.44	0.0573	385	2	383	241	2	239
J1c-14798-3394	SFCC	AIDS'93	1.06	0.30	3.75	0.9256	68	3	65	46	3	43
J1c-14798-3394	EA	CD4<200	0.90	0.32	2.54	0.8428	614	5	609	339	4	335
J1c-14798-3394	GA	CD4<200	1.00	0.35	2.82	0.9933	453	5	448	236	4	232
J1c-14798-3394	MACS	CD4<200	2.72	0.36	20.71	0.4007	385	2	383	195	1	194
J1c-14798-3394	SFCC	CD4<200	1.03	0.28	3.79	0.9683	68	3	65	41	3	38
J1c-14798-3394	EA	Death	0.46	0.06	3.31	0.3783	625	5	620	239	1	238
J1c-14798-3394	GA	Death	0.48	0.07	3.46	0.4108	455	5	450	175	1	174
J1c-14798-3394	MACS	Death	2.98	0.40	21.91	0.3604	387	2	385	154	1	153
J1c-14798-3394	SFCC	Death	0.00	0.00	∞	0.1837	68	3	65	21	0	21
J1	EA	AIDS'87	1.57	1.03	2.38	<b>0.0463</b>	627	48	579	277	25	252
J1	HE	AIDS'87	1.10	0.42	2.87	0.8515	159	14	145	68	5	63
J1	GA	AIDS'87	1.80	1.12	2.87	<b>0.0228</b>	456	34	422	206	20	186
J1	MACS	AIDS'87	1.91	1.13	3.25	<b>0.0263</b>	388	28	360	179	16	163
J1	SFCC	AIDS'87	2.04	0.67	6.27	0.2439	68	6	62	27	4	23
J1	EA	AIDS'93	1.24	0.86	1.78	0.2625	621	48	573	396	33	363
J1	HE	AIDS'93	1.02	0.51	2.07	0.9486	156	14	142	104	9	95
J1	GA	AIDS'93	1.46	0.96	2.23	0.0956	453	34	419	287	24	263
J1	MACS	AIDS'93	1.46	0.89	2.39	0.1505	385	28	357	241	18	223
J1	SFCC	AIDS'93	1.60	0.63	4.08	0.3467	68	6	62	46	6	40
J1	EA	CD4<200	1.16	0.78	1.73	0.4639	615	48	567	339	28	311
J1	HE	CD4<200	0.60	0.26	1.39	0.2106	150	14	136	99	8	91
J1	GA	CD4<200	1.31	0.82	2.09	0.2708	453	34	419	236	20	216
J1	MACS	CD4<200	1.34	0.78	2.29	0.3096	385	28	357	195	15	180
J1	SFCC	CD4<200	1.45	0.52	4.05	0.4936	68	6	62	41	5	36
J1	EA	Death	1.52	0.97	2.40	0.0854	626	48	578	239	21	218
J1	HE	Death	1.56	0.63	3.87	0.3596	159	14	145	63	6	57
J1	GA	Death	1.51	0.88	2.58	0.1520	455	34	421	175	15	160
J1	MACS	Death	1.47	0.81	2.69	0.2291	387	28	359	154	12	142
J1	SFCC	Death	2.20	0.60	8.13	0.2730	68	6	62	21	3	18
J1*	EA	AIDS'87	1.03	0.33	3.25	0.9607	626	7	619	277	3	274
J1*	HE	AIDS'87	1.46	0.20	10.84	0.7284	158	3	155	68	1	67
J1*	GA	AIDS'87	1.07	0.26	4.38	0.9231	456	4	452	206	2	204
J1*	MACS	AIDS'87	0.94	0.23	3.85	0.9336	388	4	384	179	2	177
J1*	EA	AIDS'93	0.75	0.28	2.03	0.5530	620	7	613	396	4	392
J1*	HE	AIDS'93	1.19	0.29	4.94	0.8111	155	3	152	104	2	102

Table 2 (continued)

Haplogroup	Pop	Disease	RH	RH lower	RH upper	P-value	N	N risk haplo	N alt haplo	N events	N events	
				95% CI	95% CI						risk haplo	alt haplo
J1*	GA	AIDS'93	0.66	0.16	2.71	0.5426	453	4	449	287	2	285
J1*	MACS	AIDS'93	0.57	0.14	2.34	0.3928	385	4	381	241	2	239
J1*	EA	CD4<200	0.73	0.27	1.98	0.5114	614	7	607	339	4	335
J1*	HE	CD4<200	0.58	0.14	2.41	0.4122	149	3	146	99	2	97
J1*	GA	CD4<200	0.97	0.24	3.93	0.9621	453	4	449	236	2	234
J1*	MACS	CD4<200	0.77	0.19	3.14	0.7048	385	4	381	195	2	193
J1*	EA	Death	0.71	0.17	2.90	0.6161	625	7	618	239	2	237
J1*	HE	Death	1.98	0.26	15.05	0.5488	158	3	155	63	1	62
J1*	GA	Death	0.46	0.06	3.35	0.3841	455	4	451	175	1	174
J1*	MACS	Death	0.39	0.05	2.83	0.2748	387	4	383	154	1	153
JT	EA	AIDS'87	1.15	0.86	1.53	0.3528	629	134	495	278	64	214
JT	HE	AIDS'87	0.60	0.31	1.17	0.1182	160	37	123	69	13	56
JT	GA	AIDS'87	1.37	0.99	1.89	0.0654	457	96	361	206	50	156
JT	MACS	AIDS'87	1.20	0.85	1.70	0.3142	388	84	304	179	43	136
JT	SFCC	AIDS'87	2.37	0.97	5.81	0.0763	69	12	57	27	7	20
JT	EA	AIDS'93	1.05	0.82	1.34	0.7186	623	133	490	397	86	311
JT	HE	AIDS'93	0.92	0.56	1.51	0.7451	157	36	121	105	24	81
JT	GA	AIDS'93	1.11	0.83	1.47	0.4993	454	96	358	287	61	226
JT	MACS	AIDS'93	1.01	0.74	1.37	0.9739	385	84	301	241	52	189
JT	SFCC	AIDS'93	1.41	0.66	3.02	0.3886	69	12	57	46	9	37
JT	EA	CD4<200	0.96	0.73	1.26	0.7533	617	132	485	340	74	266
JT	HE	CD4<200	0.60	0.35	1.03	0.0566	151	35	116	100	23	77
JT	GA	CD4<200	1.08	0.79	1.49	0.6161	454	96	358	236	51	185
JT	MACS	CD4<200	0.99	0.70	1.39	0.9398	385	84	301	195	43	152
JT	SFCC	CD4<200	1.35	0.60	3.03	0.4726	69	12	57	41	8	33
JT	EA	Death	1.15	0.85	1.55	0.3837	628	134	494	240	57	183
JT	HE	Death	1.08	0.58	2.01	0.8094	160	37	123	64	17	47
JT	GA	Death	1.08	0.75	1.55	0.6797	456	96	360	175	39	136
JT	MACS	Death	0.92	0.62	1.36	0.6636	387	84	303	154	33	121
JT	SFCC	Death	2.42	0.89	6.55	0.1023	69	12	57	21	6	15
T	EA	AIDS'87	0.81	0.54	1.22	0.3008	628	66	562	277	27	250
T	HE	AIDS'87	0.30	0.11	0.86	<b>0.0125</b>	159	16	143	68	5	63
T	GA	AIDS'87	0.96	0.61	1.53	0.8712	457	49	408	206	21	185
T	MACS	AIDS'87	0.87	0.53	1.41	0.5613	388	44	344	179	19	160
T	SFCC	AIDS'87	1.60	0.33	7.76	0.5755	69	5	64	27	2	25
T	EA	AIDS'93	0.90	0.64	1.26	0.5359	622	65	557	396	39	357
T	HE	AIDS'93	0.86	0.40	1.85	0.7020	156	15	141	104	10	94
T	GA	AIDS'93	0.87	0.59	1.30	0.5024	454	49	405	287	28	259
T	MACS	AIDS'93	0.86	0.56	1.30	0.4565	385	44	341	241	26	215
T	SFCC	AIDS'93	0.69	0.15	3.17	0.6134	69	5	64	46	2	44
T	EA	CD4<200	0.81	0.55	1.20	0.2821	616	65	551	339	33	306
T	HE	CD4<200	0.68	0.28	1.67	0.3895	150	15	135	99	10	89
T	GA	CD4<200	0.86	0.56	1.35	0.5116	454	49	405	236	23	213
T	MACS	CD4<200	0.83	0.52	1.33	0.4360	385	44	341	195	21	174
T	SFCC	CD4<200	0.75	0.16	3.48	0.6987	69	5	64	41	2	39
T	EA	Death	0.88	0.58	1.34	0.5552	627	66	561	239	26	213
T	HE	Death	0.50	0.19	1.32	0.1375	159	16	143	63	6	57
T	GA	Death	0.90	0.55	1.47	0.6686	456	49	407	175	19	156
T	MACS	Death	0.82	0.49	1.37	0.4312	387	44	343	154	17	137
T	SFCC	Death	1.45	0.30	7.01	0.6537	69	5	64	21	2	19
H*	EA	AIDS'87	1.17	0.85	1.62	0.3395	623	98	525	275	45	230
H*	HE	AIDS'87	1.34	0.67	2.67	0.4227	158	24	134	68	10	58
H*	GA	AIDS'87	1.12	0.77	1.63	0.5512	453	74	379	204	35	169
H*	MACS	AIDS'87	1.20	0.80	1.80	0.3833	385	59	326	177	29	148
H*	SFCC	AIDS'87	1.72	0.66	4.51	0.2892	68	15	53	27	6	21
H*	EA	AIDS'93	1.11	0.85	1.46	0.4467	617	97	520	394	64	330
H*	HE	AIDS'93	1.24	0.71	2.18	0.4601	155	24	131	104	15	89
H*	GA	AIDS'93	1.10	0.81	1.51	0.5375	450	73	377	285	49	236
H*	MACS	AIDS'93	1.21	0.86	1.71	0.2860	382	58	324	239	40	199
H*	SFCC	AIDS'93	1.48	0.67	3.27	0.3410	68	15	53	46	9	37
H*	EA	CD4<200	1.03	0.76	1.39	0.8596	611	97	514	337	51	286
H*	HE	CD4<200	1.00	0.54	1.86	0.9967	149	24	125	99	13	86
H*	GA	CD4<200	1.06	0.74	1.51	0.7619	450	73	377	234	38	196
H*	MACS	CD4<200	1.27	0.86	1.86	0.2428	382	58	324	193	32	161
H*	SFCC	CD4<200	1.09	0.43	2.76	0.8562	68	15	53	41	6	35
H*	EA	Death	1.13	0.80	1.61	0.4935	622	98	524	237	38	199
H*	HE	Death	1.35	0.65	2.80	0.4293	158	24	134	63	9	54
H*	GA	Death	1.07	0.71	1.61	0.7425	452	74	378	173	29	144
H*	MACS	Death	1.34	0.88	2.04	0.1882	384	59	325	152	27	125

Table 2 (continued)

Haplogroup	Pop	Disease	RH	RH lower 95% CI	RH upper 95% CI	P-value	N	N risk haplo	N alt haplo	N events	N events risk haplo	N events alt haplo
H*	SFCC	Death	0.53	0.12	2.34	0.3650	68	15	53	21	2	19
H1	EA	AIDS'87	1.27	0.89	1.82	0.2002	630	76	554	278	36	242
H1	HE	AIDS'87	2.38	1.11	5.09	<b>0.0386</b>	159	16	143	68	10	58
H1	GA	AIDS'87	1.11	0.73	1.70	0.6291	459	57	402	207	25	182
H1	MACS	AIDS'87	1.14	0.74	1.75	0.5673	391	53	338	180	25	155
H1	SFCC	AIDS'87	0.00	0.00	∞	0.0951	68	4	64	27	0	27
H1	EA	AIDS'93	1.17	0.86	1.60	0.3176	624	76	548	398	47	351
H1	HE	AIDS'93	1.92	0.98	3.73	0.0740	156	16	140	104	11	93
H1	GA	AIDS'93	1.12	0.78	1.60	0.5402	456	57	399	289	35	254
H1	MACS	AIDS'93	1.15	0.79	1.66	0.4716	388	53	335	243	34	209
H1	SFCC	AIDS'93	0.00	0.00	∞	<b>0.0317</b>	68	4	64	46	1	45
H1	EA	CD4<200	1.26	0.91	1.74	0.1754	618	73	545	341	43	298
H1	HE	CD4<200	1.83	0.93	3.59	0.0978	150	13	137	99	11	88
H1	GA	CD4<200	1.24	0.84	1.82	0.2943	456	57	399	238	31	207
H1	MACS	CD4<200	1.23	0.83	1.84	0.3158	388	53	335	197	30	167
H1	SFCC	CD4<200	0.00	0.00	∞	0.0594	68	4	64	41	1	40
H1	EA	Death	1.50	1.04	2.16	<b>0.0403</b>	629	76	553	240	35	205
H1	HE	Death	1.95	0.86	4.42	0.1325	159	16	143	63	9	54
H1	GA	Death	1.52	1.00	2.33	0.0619	458	57	401	176	26	150
H1	MACS	Death	1.57	1.02	2.43	0.0515	390	53	337	155	26	129
H1	SFCC	Death	0.00	0.00	∞	0.2615	68	4	64	21	0	21
H2	EA	AIDS'87	0.74	0.30	1.80	0.4853	627	18	609	277	5	272
H2	HE	AIDS'87	0.46	0.08	2.73	0.3550	158	7	151	68	2	66
H2	GA	AIDS'87	0.88	0.28	2.77	0.8238	457	10	447	206	3	203
H2	MACS	AIDS'87	0.83	0.26	2.63	0.7474	389	9	380	179	3	176
H2	SFCC	AIDS'87	1.13	0.00	∞	1.0000	68	1	67	27	0	27
H2	EA	AIDS'93	1.06	0.52	2.16	0.8674	621	17	604	397	8	389
H2	HE	AIDS'93	0.58	0.13	2.55	0.4402	155	6	149	104	2	102
H2	GA	AIDS'93	1.66	0.74	3.77	0.2568	454	10	444	288	6	282
H2	MACS	AIDS'93	1.63	0.72	3.70	0.2752	386	9	377	242	6	236
H2	SFCC	AIDS'93	0.00	0.00	∞	0.5973	68	1	67	46	0	46
H2	EA	CD4<200	1.44	0.71	2.92	0.3412	615	16	599	340	8	332
H2	HE	CD4<200	0.60	0.14	2.63	0.4672	149	5	144	99	2	97
H2	GA	CD4<200	1.93	0.85	4.39	0.1529	454	10	444	237	6	231
H2	MACS	CD4<200	1.72	0.76	3.92	0.2322	386	9	377	196	6	190
H2	SFCC	CD4<200	0.00	0.00	∞	0.7315	68	1	67	41	0	41
H2	EA	Death	0.52	0.17	1.65	0.2195	626	18	608	239	3	236
H2	HE	Death	0.18	0.01	2.27	0.1127	158	7	151	63	1	62
H2	GA	Death	0.67	0.17	2.73	0.5540	456	10	446	175	2	173
H2	MACS	Death	0.61	0.15	2.47	0.4495	388	9	379	154	2	152
H2	SFCC	Death	0.00	0.00	∞	0.7690	68	1	67	21	0	21
H3	EA	AIDS'87	0.85	0.50	1.44	0.5421	629	32	597	277	15	262
H3	HE	AIDS'87	0.12	0.02	0.94	<b>0.0060</b>	159	7	152	68	1	67
H3	GA	AIDS'87	1.14	0.64	2.02	0.6687	458	22	436	206	13	193
H3	MACS	AIDS'87	1.39	0.77	2.52	0.2976	390	19	371	179	12	167
H3	SFCC	AIDS'87	0.37	0.04	3.21	0.3172	68	3	65	27	1	26
H3	EA	AIDS'93	1.08	0.71	1.65	0.7170	623	32	591	397	24	373
H3	HE	AIDS'93	0.21	0.06	0.72	<b>0.0025</b>	156	7	149	104	4	100
H3	GA	AIDS'93	1.35	0.83	2.20	0.2451	455	22	433	288	18	270
H3	MACS	AIDS'93	1.47	0.86	2.50	0.1783	387	19	368	242	15	227
H3	SFCC	AIDS'93	0.96	0.26	3.60	0.9517	68	3	65	46	3	43
H3	EA	CD4<200	1.14	0.72	1.79	0.5872	617	32	585	340	21	319
H3	HE	CD4<200	0.41	0.12	1.44	0.1220	150	7	143	99	4	95
H3	GA	CD4<200	1.22	0.71	2.09	0.4805	455	22	433	237	15	222
H3	MACS	CD4<200	1.28	0.70	2.33	0.4354	387	19	368	196	12	184
H3	SFCC	CD4<200	1.02	0.27	3.90	0.9789	68	3	65	41	3	38
H3	EA	Death	0.57	0.29	1.12	0.0760	628	32	596	239	9	230
H3	HE	Death	0.00	0.00	∞	0.0004	159	7	152	63	0	63
H3	GA	Death	0.93	0.47	1.84	0.8264	457	22	435	175	9	166
H3	MACS	Death	0.86	0.40	1.86	0.7017	389	19	370	154	7	147
H3	SFCC	Death	1.66	0.29	9.53	0.5837	68	3	65	21	2	19
H	EA	AIDS'87	1.05	0.83	1.33	0.6948	632	269	363	279	119	160
H	HE	AIDS'87	0.89	0.52	1.53	0.6806	160	67	93	69	27	42
H	GA	AIDS'87	1.08	0.82	1.42	0.6075	460	195	265	207	90	117
H	MACS	AIDS'87	1.16	0.86	1.56	0.3439	391	168	223	180	81	99
H	SFCC	AIDS'87	0.94	0.41	2.15	0.8763	69	27	42	27	9	18
H	EA	AIDS'93	1.04	0.85	1.27	0.7305	626	267	359	399	170	229
H	HE	AIDS'93	0.75	0.48	1.15	0.1825	157	66	91	105	40	65
H	GA	AIDS'93	1.11	0.88	1.41	0.3701	457	194	263	289	127	162

Table 2 (continued)

Haplogroup	Pop	Disease	RH	RH lower	RH upper	P-value	N	N risk haplo	N alt haplo	N events	N events	
				95% CI	95% CI						risk haplo	alt haplo
H	MACS	AIDS'93	1.21	0.94	1.57	0.1402	388	167	221	243	111	132
H	SFCC	AIDS'93	0.80	0.41	1.58	0.5180	69	27	42	46	16	30
H	EA	CD4<200	1.12	0.90	1.40	0.3220	620	262	358	342	145	197
H	HE	CD4<200	1.17	0.71	1.92	0.5354	151	61	90	100	37	63
H	GA	CD4<200	1.12	0.86	1.45	0.3948	457	194	263	238	105	133
H	MACS	CD4<200	1.24	0.93	1.65	0.1490	388	167	221	197	92	105
H	SFCC	CD4<200	0.72	0.34	1.53	0.3837	69	27	42	41	13	28
H	EA	Death	0.98	0.76	1.27	0.8867	631	269	362	241	98	143
H	HE	Death	0.68	0.38	1.21	0.1831	160	67	93	64	21	43
H	GA	Death	1.12	0.83	1.52	0.4554	459	195	264	176	77	99
H	MACS	Death	1.26	0.91	1.74	0.1667	390	168	222	155	72	83
H	SFCC	Death	0.58	0.20	1.65	0.2895	69	27	42	21	5	16
H4	EA	AIDS'87	3.37	1.06	10.69	0.0825	627	4	623	277	3	274
H4	GA	AIDS'87	3.16	0.99	10.06	0.0986	457	4	453	206	3	203
H4	MACS	AIDS'87	3.04	0.95	9.73	0.1095	389	4	385	179	3	176
H4	EA	AIDS'93	1.64	0.52	5.16	0.4316	621	4	617	397	3	394
H4	GA	AIDS'93	1.68	0.53	5.29	0.4142	454	4	450	288	3	285
H4	MACS	AIDS'93	1.45	0.46	4.58	0.5511	386	4	382	242	3	239
H4	EA	CD4<200	1.40	0.35	5.66	0.6538	615	4	611	340	2	338
H4	GA	CD4<200	1.55	0.38	6.27	0.5688	454	4	450	237	2	235
H4	MACS	CD4<200	1.19	0.29	4.85	0.8109	386	4	382	196	2	194
H4	EA	Death	3.81	1.20	12.06	0.0602	626	4	622	239	3	236
H4	GA	Death	3.44	1.08	10.95	0.0792	456	4	452	175	3	172
H4	MACS	Death	2.91	0.91	9.29	0.1216	388	4	384	154	3	151
H5	EA	AIDS'87	0.61	0.30	1.25	0.1442	627	25	602	277	8	269
H5	HE	AIDS'87	0.69	0.20	2.33	0.5252	158	10	148	68	3	65
H5	GA	AIDS'87	0.61	0.25	1.49	0.2418	457	15	442	206	5	201
H5	MACS	AIDS'87	0.55	0.20	1.49	0.1926	389	14	375	179	4	175
H5	SFCC	AIDS'87	2.30	0.17	30.89	0.5437	68	1	67	27	1	26
H5	EA	AIDS'93	0.74	0.44	1.24	0.2286	621	25	596	397	15	382
H5	HE	AIDS'93	0.92	0.41	2.07	0.8471	155	10	145	104	7	97
H5	GA	AIDS'93	0.65	0.32	1.32	0.2031	454	15	439	288	8	280
H5	MACS	AIDS'93	0.68	0.32	1.45	0.2900	386	14	372	242	7	235
H5	SFCC	AIDS'93	0.18	0.02	1.80	0.1055	68	1	67	46	1	45
H5	EA	CD4<200	0.72	0.40	1.29	0.2448	615	24	591	340	12	328
H5	HE	CD4<200	1.30	0.54	3.09	0.5699	149	9	140	99	6	93
H5	GA	CD4<200	0.52	0.23	1.19	0.0877	454	15	439	237	6	231
H5	MACS	CD4<200	0.54	0.22	1.33	0.1416	386	14	372	196	5	191
H5	SFCC	CD4<200	0.15	0.01	1.63	0.0919	68	1	67	41	1	40
H5	EA	Death	0.39	0.15	1.07	<b>0.0326</b>	626	25	601	239	4	235
H5	HE	Death	0.62	0.15	2.65	0.4903	158	10	148	63	2	61
H5	GA	Death	0.30	0.07	1.21	<b>0.0381</b>	456	15	441	175	2	173
H5	MACS	Death	0.33	0.08	1.36	0.0665	388	14	374	154	2	152
H5	SFCC	Death	0.00	0.00	∞	0.1870	68	1	67	21	0	21
H6	EA	AIDS'87	0.85	0.40	1.83	0.6707	623	14	609	275	7	268
H6	HE	AIDS'87	0.49	0.05	5.03	0.5289	158	2	156	68	1	67
H6	GA	AIDS'87	0.86	0.38	1.95	0.7158	453	12	441	204	6	198
H6	MACS	AIDS'87	0.77	0.31	1.90	0.5591	385	10	375	177	5	172
H6	SFCC	AIDS'87	0.75	0.09	6.36	0.7855	68	2	66	27	1	26
H6	EA	AIDS'93	0.63	0.32	1.25	0.1579	617	14	603	394	9	385
H6	HE	AIDS'93	0.07	0.01	0.66	<b>0.0040</b>	155	2	153	104	1	103
H6	GA	AIDS'93	0.76	0.37	1.55	0.4342	450	12	438	285	8	277
H6	MACS	AIDS'93	0.71	0.31	1.62	0.3962	382	10	372	239	6	233
H6	SFCC	AIDS'93	0.99	0.21	4.80	0.9943	68	2	66	46	2	44
H6	EA	CD4<200	0.93	0.46	1.89	0.8312	611	14	597	337	8	329
H6	HE	CD4<200	1.24	0.12	12.44	0.8568	149	2	147	99	1	98
H6	GA	CD4<200	0.95	0.45	2.04	0.9010	450	12	438	234	7	227
H6	MACS	CD4<200	0.79	0.32	1.96	0.6041	382	10	372	193	5	188
H6	SFCC	CD4<200	1.58	0.31	7.92	0.5958	68	2	66	41	2	39
H6	EA	Death	0.77	0.34	1.76	0.5186	622	14	608	237	6	231
H6	HE	Death	0.00	0.00	∞	0.0651	158	2	156	63	0	63
H6	GA	Death	0.96	0.42	2.18	0.9195	452	12	440	173	6	167
H6	MACS	Death	0.80	0.33	1.98	0.6250	384	10	374	152	5	147
H6	SFCC	Death	1.00	0.11	9.08	0.9984	68	2	66	21	1	20
V	EA	AIDS'87	0.78	0.38	1.58	0.4720	625	21	604	277	8	269
V	HE	AIDS'87	4.51	0.94	21.54	0.1067	157	3	154	68	2	66
V	GA	AIDS'87	0.62	0.27	1.41	0.2182	456	18	438	206	6	200
V	MACS	AIDS'87	0.68	0.28	1.67	0.3738	388	15	373	179	5	174
V	SFCC	AIDS'87	0.35	0.04	2.72	0.2442	68	3	65	27	1	26

Table 2 (continued)

Haplogroup	Pop	Disease	RH		P-value	N	N risk haplo	N alt haplo	N events	N events risk haplo	N events alt haplo	
			RH	95% CI								
V	EA	AIDS'93	1.07	0.62	1.83	0.8117	619	21	598	394	14	380
V	HE	AIDS'93	3.41	0.80	14.57	0.1590	154	3	151	103	2	101
V	GA	AIDS'93	1.04	0.58	1.86	0.9089	453	18	435	286	12	274
V	MACS	AIDS'93	1.02	0.52	2.01	0.9529	385	15	370	241	9	232
V	SFCC	AIDS'93	1.13	0.33	3.90	0.8471	68	3	65	45	3	42
V	EA	CD4<200	1.02	0.56	1.87	0.9542	613	21	592	337	11	326
V	HE	CD4<200	2.34	0.30	18.06	0.4672	148	3	145	98	1	97
V	GA	CD4<200	1.08	0.57	2.05	0.8191	453	18	435	235	10	225
V	MACS	CD4<200	1.12	0.52	2.42	0.7701	385	15	370	195	7	188
V	SFCC	CD4<200	1.24	0.36	4.30	0.7445	68	3	65	40	3	37
V	EA	Death	0.92	0.45	1.89	0.8251	624	21	603	238	8	230
V	HE	Death	7.76	1.61	37.44	<b>0.0381</b>	157	3	154	62	2	60
V	GA	Death	0.74	0.32	1.68	0.4459	455	18	437	175	6	169
V	MACS	Death	0.84	0.34	2.07	0.7037	387	15	372	154	5	149
V	SFCC	Death	0.45	0.06	3.59	0.4060	68	3	65	21	1	20
HV*	EA	AIDS'87	0.81	0.38	1.75	0.5887	625	16	609	277	7	270
HV*	HE	AIDS'87	0.68	0.16	2.98	0.5908	157	6	151	68	2	66
HV*	GA	AIDS'87	1.23	0.49	3.10	0.6706	456	9	447	206	5	201
HV*	MACS	AIDS'87	0.89	0.32	2.49	0.8169	388	7	381	179	4	175
HV*	SFCC	AIDS'87	28.37	2.10	383.55	<b>0.0418</b>	68	2	66	27	1	26
HV*	EA	AIDS'93	0.78	0.40	1.53	0.4525	619	15	604	394	9	385
HV*	HE	AIDS'93	0.48	0.14	1.56	0.1743	154	6	148	103	3	100
HV*	GA	AIDS'93	1.19	0.51	2.74	0.6959	453	8	445	286	6	280
HV*	MACS	AIDS'93	1.05	0.42	2.63	0.9129	385	6	379	241	5	236
HV*	SFCC	AIDS'93	15.72	1.54	160.15	0.0687	68	2	66	45	1	44
HV*	EA	CD4<200	0.91	0.46	1.79	0.7834	613	15	598	337	9	328
HV*	HE	CD4<200	0.96	0.28	3.32	0.9538	148	6	142	98	3	95
HV*	GA	CD4<200	1.14	0.50	2.64	0.7552	453	8	445	235	6	229
HV*	MACS	CD4<200	1.01	0.40	2.56	0.9808	385	6	379	195	5	190
HV*	SFCC	CD4<200	3.43	0.38	31.21	0.3354	68	2	66	40	1	39
HV*	EA	Death	0.77	0.33	1.76	0.5118	624	16	608	238	6	232
HV*	HE	Death	0.84	0.19	3.77	0.8153	157	6	151	62	2	60
HV*	GA	Death	0.97	0.34	2.74	0.9503	455	9	446	175	4	171

**Table 3. Supplemental Categorical analyses of disease progression for all Mitochondrial haplogroups.**

Haplogroup	Disease	Genetic model	Odds Ratio	OR lower 95% CI	OR upper 95% CI	P-value*	N at risk haplo	N alt haplo	N events	N
X	CD<200	D2	0.34	0.06	1.17	0.1002	22	800	565	822
X	CD<200	DM	0.55	0.22	1.37	0.1701	16	642	146	658
X	AIDS'93	D2	0.55	0.16	1.53	0.2823	26	988	712	1014
X	AIDS'93	DM	0.87	0.39	1.93	0.6093	20	809	170	829
X	AIDS'87	D2	0.59	0.15	1.79	0.4775	25	923	720	948
X	AIDS'87	DM	0.88	0.42	1.84	0.5803	25	923	111	948
X	Death	D2	1.17	0.36	3.29	0.7991	20	768	576	788
X	Death	DM	0.81	0.40	1.67	0.7024	27	1036	78	1063
W8994 (W)	CD<200	D2	1.38	0.35	4.82	0.5587	13	810	565	823
W8994 (W)	CD<200	DM	0.96	0.33	2.83	0.9815	11	648	147	659
W8994 (W)	AIDS'93	D2	1.18	0.36	3.43	0.7960	18	997	712	1015
W8994 (W)	AIDS'93	DM	1.01	0.42	2.47	0.9585	16	814	171	830
W8994 (W)	AIDS'87	D2	1.44	0.39	4.55	0.5553	16	933	720	949
W8994 (W)	AIDS'87	DM	1.29	0.52	3.22	0.5801	16	933	112	949
W8994 (W)	Death	D2	2.28	0.54	9.08	0.1783	11	778	576	789
W8994 (W)	Death	DM	1.50	0.64	3.55	0.3543	19	1045	78	1064
IWX	CD<200	D2	0.70	0.38	1.22	0.1998	77	748	567	825
IWX	CD<200	DM	0.80	0.49	1.31	0.3946	58	603	147	661
IWX	AIDS'93	D2	0.72	0.42	1.21	0.2320	92	926	715	1018
IWX	AIDS'93	DM	0.93	0.60	1.45	0.6702	69	764	171	833
IWX	AIDS'87	D2	0.93	0.51	1.62	0.8933	83	869	723	952
IWX	AIDS'87	DM	1.00	0.66	1.51	0.8965	83	869	112	952
IWX	Death	D2	1.11	0.62	1.93	0.6805	73	718	578	791
IWX	Death	DM	1.08	0.73	1.60	0.6974	97	970	78	1067
N11	CD<200	D2	0.65	0.27	1.42	0.2925	39	785	566	824
N11	CD<200	DM	0.85	0.43	1.69	0.6664	28	632	147	660
N11	AIDS'93	D2	0.59	0.25	1.28	0.1817	44	973	714	1017
N11	AIDS'93	DM	0.84	0.44	1.62	0.5765	30	802	171	832
N11	AIDS'87	D2	0.98	0.40	2.16	1.0000	38	913	722	951
N11	AIDS'87	DM	0.95	0.52	1.73	0.8477	38	913	112	951
N11	Death	D2	0.84	0.34	1.85	0.7120	38	753	578	791
N11	Death	DM	1.06	0.61	1.84	0.9764	47	1019	78	1066
U5a*	CD<200	D2	0.73	0.13	2.98	0.7630	12	817	571	829
U5a*	CD<200	DM	0.75	0.24	2.32	0.6191	10	654	147	664
U5a*	AIDS'93	D2	0.89	0.15	3.73	1.0000	11	1010	718	1021
U5a*	AIDS'93	DM	0.94	0.29	3.06	0.9173	9	827	171	836
U5a*	AIDS'87	D2	0.70	0.07	3.43	1.0000	11	945	727	956
U5a*	AIDS'87	DM	0.83	0.28	2.49	0.6138	11	945	112	956
U5a*	Death	D2	0.78	0.08	4.13	1.0000	9	785	581	794
U5a*	Death	DM	0.97	0.33	2.82	0.8597	12	1059	78	1071
U5a	CD<200	D2	1.07	0.53	2.09	0.8703	46	784	571	830
U5a	CD<200	DM	1.02	0.58	1.81	0.9388	41	624	148	665
U5a	AIDS'93	D2	1.15	0.57	2.24	0.6251	46	977	719	1023
U5a	AIDS'93	DM	1.16	0.66	2.03	0.6172	41	797	172	838
U5a	AIDS'87	D2	0.99	0.40	2.18	1.0000	38	920	729	958
U5a	AIDS'87	DM	0.87	0.48	1.59	0.7537	38	920	112	958
U5a	Death	D2	1.12	0.49	2.38	0.7118	38	757	582	795
U5a	Death	DM	1.03	0.59	1.79	0.8343	47	1026	78	1073
U5a1-15218	CD<200	D2	1.22	0.54	2.62	0.5754	34	795	571	829
U5a1-15218	CD<200	DM	1.15	0.60	2.20	0.7001	31	633	147	664
U5a1-15218	AIDS'93	D2	1.25	0.56	2.65	0.5734	35	986	718	1021
U5a1-15218	AIDS'93	DM	1.23	0.65	2.32	0.5370	32	804	171	836
U5a1-15218	AIDS'87	D2	1.11	0.39	2.79	0.8198	27	929	727	956
U5a1-15218	AIDS'87	DM	0.89	0.44	1.82	0.9579	27	929	112	956
U5a1-15218	Death	D2	1.24	0.49	2.90	0.6694	29	765	581	794
U5a1-15218	Death	DM	1.06	0.56	1.99	0.7341	35	1036	78	1071
U5	CD<200	D2	0.88	0.50	1.49	0.7038	80	750	571	830
U5	CD<200	DM	0.98	0.62	1.55	0.9283	67	598	148	665
U5	AIDS'93	D2	0.91	0.53	1.51	0.8054	86	937	719	1023
U5	AIDS'93	DM	0.97	0.64	1.49	0.9442	76	762	172	838
U5	AIDS'87	D2	0.87	0.46	1.57	0.7766	74	884	729	958
U5	AIDS'87	DM	0.85	0.55	1.32	0.5858	74	884	112	958
U5	Death	D2	0.90	0.48	1.64	0.7766	68	727	582	795
U5	Death	DM	0.88	0.59	1.34	0.5149	87	986	78	1073
U5b-5656	CD<200	D2	0.67	0.26	1.55	0.4495	34	796	571	830
U5b-5656	CD<200	DM	0.92	0.45	1.88	0.8141	26	639	148	665
U5b-5656	AIDS'93	D2	0.68	0.28	1.48	0.3790	40	983	719	1023
U5b-5656	AIDS'93	DM	0.80	0.44	1.48	0.5226	35	803	172	838
U5b-5656	AIDS'87	D2	0.76	0.28	1.81	0.6904	36	922	729	958

Table 3 (continued)

Haplogroup	Disease	Genetic model	Odds Ratio	OR lower 95% CI	OR upper 95% CI	P-value*	N at risk haplo	N alt haplo	N events	N
U5b-5656	AIDS'87	DM	0.85	0.46	1.57	0.6578	36	922	112	958
U5b-5656	Death	D2	0.67	0.22	1.72	0.5289	30	765	582	795
U5b-5656	Death	DM	0.75	0.42	1.36	0.2443	40	1033	78	1073
U	CD<200	D2	0.77	0.53	1.10	0.1405	205	630	576	835
U	CD<200	DM	0.90	0.66	1.24	0.5736	166	503	148	669
U	AIDS'93	D2	0.78	0.55	1.10	0.1652	233	795	724	1028
U	AIDS'93	DM	0.90	0.67	1.20	0.4337	196	647	172	843
U	AIDS'87	D2	0.73	0.49	1.09	0.1189	209	754	734	963
U	AIDS'87	DM	0.93	0.70	1.24	0.4458	209	754	112	963
U	Death	D2	0.78	0.52	1.16	0.2168	183	618	588	801
U	Death	DM	0.96	0.73	1.26	0.4193	238	841	78	1079
U1811*	CD<200	D2	2.24	0.87	5.78	0.0642	22	814	574	836
U1811*	CD<200	DM	1.81	0.83	3.95	0.1123	21	649	149	670
U1811*	AIDS'93	D2	1.50	0.66	3.31	0.3187	31	997	721	1028
U1811*	AIDS'93	DM	1.49	0.75	2.96	0.2855	27	815	173	842
U1811*	AIDS'87	D2	1.31	0.45	3.37	0.6282	24	935	728	959
U1811*	AIDS'87	DM	1.03	0.49	2.19	0.9610	24	935	112	959
U1811*	Death	D2	1.37	0.46	3.68	0.4660	21	711	583	798
U1811*	Death	DM	1.10	0.55	2.19	0.8274	30	1046	79	1076
U4-U1811*	CD<200	D2	2.02	0.95	4.27	0.0572	34	795	570	829
U4-U1811*	CD<200	DM	1.78	0.93	3.41	0.0646	31	633	148	664
U4-U1811*	AIDS'93	D2	1.74	0.88	3.38	0.0883	43	978	717	1021
U4-U1811*	AIDS'93	DM	1.67	0.93	2.99	0.0902	38	798	172	836
U4-U1811*	AIDS'87	D2	1.33	0.61	2.74	0.4540	41	915	727	956
U4-U1811*	AIDS'87	DM	1.33	0.74	2.37	0.5364	41	915	112	956
U4-U1811*	Death	D2	1.25	0.52	2.81	0.5460	32	762	581	794
U4-U1811*	Death	DM	1.24	0.71	2.17	0.6238	46	1025	78	1071
U4	CD<200	D2	1.58	0.39	5.84	0.5313	12	816	569	828
U4	CD<200	DM	1.62	0.53	4.96	0.3749	10	653	148	663
U4	AIDS'93	D2	2.38	0.63	8.97	0.1995	12	1007	715	1019
U4	AIDS'93	DM	2.06	0.71	5.97	0.1631	11	823	172	834
U4	AIDS'87	D2	1.32	0.36	4.08	0.5738	17	934	722	951
U4	AIDS'87	DM	1.72	0.71	4.15	0.3485	17	934	112	951
U4	Death	D2	1.02	0.17	4.28	1.0000	11	779	577	790
U4	Death	DM	1.44	0.57	3.68	0.6574	16	1050	78	1066
U1811	CD<200	D2	0.78	0.48	1.23	0.2818	116	715	572	831
U1811	CD<200	DM	0.86	0.58	1.29	0.5250	92	574	148	666
U1811	AIDS'93	D2	0.79	0.51	1.20	0.2706	137	887	720	1024
U1811	AIDS'93	DM	0.87	0.61	1.24	0.3812	111	728	172	839
U1811	AIDS'87	D2	0.75	0.45	1.22	0.2644	127	832	730	959
U1811	AIDS'87	DM	0.98	0.69	1.38	0.6401	127	832	112	959
U1811	Death	D2	0.82	0.49	1.35	0.4804	106	690	583	796
U1811	Death	DM	0.99	0.71	1.38	0.6125	141	933	78	1074
Uk	CD<200	D2	0.47	0.24	0.85	<b>0.0081</b>	81	748	570	829
Uk	CD<200	DM	0.60	0.37	0.97	<b>0.0381</b>	60	604	148	664
Uk	AIDS'93	D2	0.50	0.27	0.87	<b>0.0121</b>	93	928	717	1021
Uk	AIDS'93	DM	0.61	0.40	0.95	<b>0.0224</b>	72	764	172	836
Uk	AIDS'87	D2	0.55	0.27	1.02	0.0614	85	871	727	956
Uk	AIDS'87	DM	0.83	0.55	1.26	0.3212	85	871	112	956
Uk	Death	D2	0.67	0.34	1.23	0.2153	74	720	581	794
Uk	Death	DM	0.88	0.59	1.32	0.3354	94	977	78	1071
J2	CD<200	D2	1.95	0.59	6.23	0.2587	15	814	570	829
J2	CD<200	DM	1.84	0.71	4.75	0.1713	14	649	148	663
J2	AIDS'93	D2	1.59	0.56	4.27	0.3276	20	1001	717	1021
J2	AIDS'93	DM	1.67	0.74	3.77	0.2047	19	817	172	836
J2	AIDS'87	D2	1.99	0.70	5.25	0.1273	21	935	727	956
J2	AIDS'87	DM	2.39	1.08	5.27	<b>0.0344</b>	21	935	112	956
J2	Death	D2	2.43	0.74	7.78	0.1356	15	779	581	794
J2	Death	DM	1.59	0.75	3.37	0.2466	25	1047	78	1072
J	CD<200	D2	1.05	0.62	1.74	0.9011	84	748	573	832
J	CD<200	DM	1.07	0.69	1.66	0.8170	72	594	148	666
J	AIDS'93	D2	0.95	0.59	1.50	0.9114	108	916	720	1024
J	AIDS'93	DM	1.07	0.73	1.58	0.7476	93	746	172	839
J	AIDS'87	D2	1.22	0.73	1.99	0.3867	99	860	730	959
J	AIDS'87	DM	1.19	0.81	1.76	0.2898	99	860	112	959
J	Death	D2	1.25	0.73	2.11	0.4265	81	716	584	797
J	Death	DM	1.07	0.74	1.55	0.7674	113	962	78	1075
J1c-14798*	CD<200	D2	0.84	0.41	1.64	0.6409	50	776	567	826
J1c-14798*	CD<200	DM	1.00	0.56	1.78	0.9857	40	620	148	660



Table 3 (continued)

Haplogroup	Disease	Genetic model	Odds Ratio	OR lower 95% CI	OR upper 95% CI	P-value*	N at risk haplo	N alt haplo	N events	N
J1c-14798*	AIDS'93	D2	0.82	0.43	1.51	0.5667	61	955	712	1016
J1c-14798*	AIDS'93	DM	1.00	0.59	1.68	0.9287	48	783	172	831
J1c-14798*	AIDS'87	D2	1.30	0.65	2.47	0.4069	52	898	721	950
J1c-14798*	AIDS'87	DM	1.01	0.60	1.69	0.6690	52	898	112	950
J1c-14798*	Death	D2	1.29	0.63	2.51	0.4975	47	743	577	790
J1c-14798*	Death	DM	0.98	0.60	1.59	0.8936	61	1005	78	1066
J1c	CD<200	D2	0.90	0.47	1.67	0.8833	58	770	569	828
J1c	CD<200	DM	0.95	0.56	1.62	0.8688	48	614	148	662
J1c	AIDS'93	D2	0.94	0.52	1.64	0.8927	70	949	715	1019
J1c	AIDS'93	DM	1.04	0.64	1.68	0.8045	57	711	172	834
J1c	AIDS'87	D2	1.24	0.65	2.27	0.4426	61	893	725	954
J1c	AIDS'87	DM	0.93	0.57	1.50	0.8368	61	893	112	954
J1c	Death	D2	1.13	0.57	2.12	0.7526	55	738	580	793
J1c	Death	DM	0.89	0.56	1.40	0.7269	70	1000	78	1070
J1c-14798-3394	CD<200	D2	1.32	0.20	6.83	0.7109	8	818	567	826
J1c-14798-3394	CD<200	DM	0.72	0.20	2.54	0.6469	8	652	148	660
J1c-14798-3394	AIDS'93	D2	1.89	0.37	8.82	0.4640	9	1007	712	1016
J1c-14798-3394	AIDS'93	DM	1.28	0.39	4.15	0.7100	9	822	172	831
J1c-14798-3394	AIDS'87	D2	0.90	0.09	4.77	1.0000	9	941	721	950
J1c-14798-3394	AIDS'87	DM	0.54	0.16	1.79	0.6115	9	941	112	950
J1c-14798-3394	Death	D2	0.38	0.01	3.02	0.6895	8	782	577	790
J1c-14798-3394	Death	DM	0.48	0.14	1.62	0.1953	9	1057	78	1066
J1	CD<200	D2	0.88	0.48	1.58	0.7819	66	765	572	831
J1	CD<200	DM	0.92	0.56	1.51	0.7293	55	610	148	665
J1	AIDS'93	D2	0.86	0.49	1.45	0.6153	82	941	719	1023
J1	AIDS'93	DM	0.97	0.62	1.51	0.9283	68	770	172	838
J1	AIDS'87	D2	1.09	0.59	1.94	0.7730	71	887	729	958
J1	AIDS'87	DM	0.91	0.58	1.42	0.9997	71	887	112	958
J1	Death	D2	1.06	0.56	1.95	0.8805	61	735	583	796
J1	Death	DM	0.91	0.59	1.39	0.6683	80	994	78	1074
J1*	CD<200	D2	0.88	0.08	5.41	1.0000	7	821	569	828
J1*	CD<200	DM	0.81	0.19	3.49	0.6946	6	656	148	662
J1*	AIDS'93	D2	0.52	0.05	2.53	0.5213	11	1008	715	1019
J1*	AIDS'93	DM	0.77	0.25	2.37	0.4805	10	824	172	834
J1*	AIDS'87	D2	0.39	0.01	2.96	0.6950	9	945	725	954
J1*	AIDS'87	DM	0.82	0.24	2.75	0.6135	9	945	112	954
J1*	Death	D2	0.68	0.01	6.92	1.0000	5	788	580	793
J1*	Death	DM	1.03	0.30	3.54	0.7540	9	1061	78	1070
JT	CD<200	D2	1.00	0.68	1.45	1.0000	171	664	576	835
JT	CD<200	DM	0.86	0.62	1.20	0.3701	147	522	148	669
JT	AIDS'93	D2	0.98	0.69	1.37	0.9336	219	809	724	1028
JT	AIDS'93	DM	0.92	0.68	1.23	0.6197	186	657	172	843
JT	AIDS'87	D2	1.18	0.81	1.71	0.3508	198	765	734	963
JT	AIDS'87	DM	0.96	0.72	1.28	0.9755	198	765	112	963
JT	Death	D2	1.06	0.71	1.58	0.7681	167	634	588	801
JT	Death	DM	0.87	0.66	1.15	0.4446	220	859	78	1079
T	CD<200	D2	0.91	0.53	1.52	0.8050	85	747	573	832
T	CD<200	DM	0.71	0.46	1.11	0.1430	73	593	148	666
T	AIDS'93	D2	0.98	0.61	1.54	1.0000	109	915	720	1024
T	AIDS'93	DM	0.77	0.52	1.15	0.2659	91	748	172	839
T	AIDS'87	D2	1.07	0.63	1.77	0.8012	96	862	729	958
T	AIDS'87	DM	0.77	0.52	1.14	0.2641	96	862	112	958
T	Death	D2	0.90	0.51	1.55	0.7947	84	713	584	797
T	Death	DM	0.74	0.50	1.08	0.2254	104	970	78	1074
H*	CD<200	D2	1.12	0.73	1.71	0.5983	123	701	567	824
H*	CD<200	DM	1.21	0.82	1.80	0.3426	93	567	147	660
H*	AIDS'93	D2	1.20	0.81	1.75	0.3399	154	858	710	1012
H*	AIDS'93	DM	1.28	0.91	1.81	0.1593	124	706	171	830
H*	AIDS'87	D2	1.23	0.81	1.83	0.3048	155	795	723	950
H*	AIDS'87	DM	1.30	0.95	1.79	0.1030	155	795	111	950
H*	Death	D2	1.27	0.81	1.98	0.2642	120	671	580	791
H*	Death	DM	1.21	0.88	1.66	0.1560	164	901	78	1065
H1	CD<200	D2	1.15	0.73	1.81	0.5034	106	730	575	836
H1	CD<200	DM	1.24	0.81	1.88	0.3387	81	589	149	670
H1	AIDS'93	D2	0.99	0.65	1.50	1.0000	135	894	723	1029
H1	AIDS'93	DM	1.03	0.72	1.48	0.7694	108	735	173	843
H1	AIDS'87	D2	0.94	0.59	1.47	0.8285	135	828	733	963
H1	AIDS'87	DM	1.12	0.80	1.56	0.5516	135	828	112	963
H1	Death	D2	1.01	0.63	1.59	1.0000	119	682	587	801

Table 3 (continued)

Haplogroup	Disease	Genetic model	Odds Ratio	OR lower 95% CI	OR upper 95% CI	P-value*	N at risk haplo	N alt haplo	N events	N
H1	Death	DM	1.17	0.85	1.61	0.1792	155	924	79	1079
H2	CD<200	D2	1.94	0.59	6.20	0.2593	15	815	570	830
H2	CD<200	DM	1.95	0.70	5.44	0.1768	12	652	149	664
H2	AIDS'93	D2	1.27	0.42	3.47	0.6253	20	1001	716	1021
H2	AIDS'93	DM	1.36	0.55	3.40	0.4635	15	821	173	836
H2	AIDS'87	D2	0.73	0.13	2.69	0.7739	16	940	727	956
H2	AIDS'87	DM	0.82	0.33	2.06	0.7676	16	940	111	956
H2	Death	D2	0.60	0.06	2.96	0.7364	11	785	583	796
H2	Death	DM	0.79	0.33	1.90	0.6525	18	1054	78	1072
H3	CD<200	D2	1.65	0.79	3.34	0.1522	38	796	574	834
H3	CD<200	DM	1.59	0.83	3.05	0.2325	31	637	149	668
H3	AIDS'93	D2	1.75	0.88	3.39	0.0877	43	984	722	1027
H3	AIDS'93	DM	1.82	0.98	3.36	0.0853	34	807	173	841
H3	AIDS'87	D2	1.27	0.56	2.68	0.5645	39	922	732	961
H3	AIDS'87	DM	1.06	0.58	1.91	0.9161	39	922	111	961
H3	Death	D2	1.14	0.39	2.94	0.8153	24	775	586	799
H3	Death	DM	0.93	0.52	1.65	0.6508	43	1034	78	1077
H	CD<200	D2	1.39	1.02	1.89	0.0328	333	506	578	839
H	CD<200	DM	1.36	1.03	1.80	0.0521	260	413	149	673
H	AIDS'93	D2	1.34	1.01	1.77	0.0374	418	615	727	1033
H	AIDS'93	DM	1.24	0.97	1.59	0.0918	339	508	173	847
H	AIDS'87	D2	1.11	0.81	1.51	0.4928	410	557	737	967
H	AIDS'87	DM	1.13	0.89	1.44	0.2987	410	557	112	967
H	Death	D2	1.11	0.79	1.54	0.5692	324	481	591	805
H	Death	DM	1.09	0.87	1.37	0.3232	450	633	79	1083
H4	CD<200	D2	0.31	0.01	2.43	0.4466	8	820	568	828
H4	CD<200	DM	0.13	0.03	0.57	0.0287	6	658	149	664
H4	AIDS'93	D2	1.17	0.19	5.52	1.0000	9	1009	713	1018
H4	AIDS'93	DM	0.35	0.09	1.36	0.2388	7	828	173	835
H4	AIDS'87	D2	1.19	0.20	5.01	0.7311	11	943	725	954
H4	AIDS'87	DM	0.49	0.17	1.47	0.3073	11	943	111	954
H4	Death	D2	1.03	0.17	4.32	1.0000	11	784	582	795
H4	Death	DM	0.52	0.18	1.48	0.3038	12	1058	78	1070
H5	CD<200	D2	2.24	0.87	5.79	0.0641	22	808	570	830
H5	CD<200	DM	1.54	0.66	3.57	0.2926	18	646	149	664
H5	AIDS'93	D2	2.23	0.95	5.19	0.0525	27	994	716	1021
H5	AIDS'93	DM	1.19	0.59	2.39	0.6458	26	810	173	836
H5	AIDS'87	D2	0.95	0.31	2.49	1.0000	26	930	727	956
H5	AIDS'87	DM	0.71	0.35	1.46	0.3744	26	930	111	956
H5	Death	D2	0.84	0.20	2.76	1.0000	17	779	583	796
H5	Death	DM	0.74	0.37	1.46	0.2344	30	1042	78	1072
H6	CD<200	D2	1.21	0.36	3.61	0.7922	17	807	567	824
H6	CD<200	DM	1.12	0.46	2.73	0.9145	16	644	147	660
H6	AIDS'93	D2	0.97	0.34	2.49	1.0000	24	988	710	1012
H6	AIDS'93	DM	0.96	0.44	2.10	0.9069	21	809	171	830
H6	AIDS'87	D2	1.13	0.36	3.04	0.8056	23	927	723	950
H6	AIDS'87	DM	1.26	0.58	2.70	0.5845	23	927	111	950
H6	Death	D2	1.15	0.31	3.56	0.7846	17	774	580	791
H6	Death	DM	1.26	0.58	2.76	0.7295	23	1042	78	1065
V	CD<200	D2	0.76	0.29	1.80	0.6928	31	798	571	829
V	CD<200	DM	0.71	0.33	1.52	0.4879	23	640	147	663
V	AIDS'93	D2	1.02	0.46	2.10	1.0000	40	981	718	1021
V	AIDS'93	DM	0.83	0.44	1.57	0.5736	32	804	171	836
V	AIDS'87	D2	0.97	0.38	2.26	1.0000	34	921	726	955
V	AIDS'87	DM	0.64	0.34	1.20	0.1784	34	921	112	955
V	Death	D2	0.95	0.36	2.25	1.0000	31	763	582	794
V	Death	DM	0.83	0.46	1.49	0.3985	41	1030	78	1071
HV*	CD<200	D2	1.42	0.46	4.06	0.4517	18	811	571	829
HV*	CD<200	DM	1.14	0.45	2.87	0.8112	15	648	147	663
HV*	AIDS'93	D2	1.27	0.46	3.23	0.6451	23	998	718	1021
HV*	AIDS'93	DM	0.98	0.44	2.19	0.9925	20	816	171	836
HV*	AIDS'87	D2	1.17	0.41	2.96	0.8157	26	929	726	955
HV*	AIDS'87	DM	1.27	0.62	2.62	0.4218	26	929	112	955
HV*	Death	D2	1.10	0.35	3.05	0.8061	21	773	582	794
HV*	Death	DM	1.40	0.69	2.81	0.2486	29	1042	78	1071

\*P-values are from the Fisher's Exact Test for the D2 tests and the Mantel-Haenszel test for all. DM.