Virology Journal

CORRECTION

Open Access

Correction to: Deep sequencing of the HIV-1 polymerase gene for characterisation of cytotoxic T-lymphocyte epitopes during early and chronic disease stages

Paballo Nkone[1], Shayne Loubser[2], Thomas C. Quinn[3,4], Andrew D. Redd[3,4], Arshad Ismail[2], Caroline T. Tiemessen[2] and Simnikiwe H. Mayaphi[1,5*]

Correction to: Virology Journal (2022) 19:56
https://doi.org/10.1186/s12985-022-01772-8

Following publication of the original article [1], the authors informed us that many epitopes from Table 3 have gross alignment issues, which were probably caused by formatting of this table before publication. The correct table is given below.

The original article has been corrected.

The original article can be found online at https://doi.org/10.1186/s12985-022-01772-8.

*Correspondence: sim.mayaphi@up.ac.za; smayaphi@absamail.co.za
[1] Department of Medical Virology, University of Pretoria, Private Bag X323, Gezina 0031, South Africa
Full list of author information is available at the end of the article

Table 3 Frequently targeted Pol CTL epitopes and their predicted HLA alleles

Early HIV infection

Epitope position	Wild type and variant epitope sequences	Subtype identified for epitope	Predicted HLA	Participants
PR (68-76)	GKKAIGTVL E…… …..R…….. ……...M……	Subtype B and C	**B*15:03**; **B*13:02**; **C*02**	3469, 8047, 6743
RT (139-149)	TPGIRYQYNVL ……I.. ……..F	Subtype C	**B*81:01**; **B*81**	6737, 261, 9049
RT (243-251)	PIQLPEKDS …….E. ……...N	Subtype C	Not reported	6737, 6743
RT (268-277)	SQIYPGIKVR …….S…… ……N	Subtype C	**A*74:01**	6743, 6638
RT (485-493)	ALQDSGLEV ……N……	Subtype B	**A*02:01**; **A*02**	8047, 6743
RT (516-525)	ELVNQIIEQL ……K…… ……..V…. ……K…	Not reported	**A*02**	9049, 8047, 6743
IN (20-28)	RAMASDFNL K…… …….V……	Not reported	**A*02:01**; **A*02**	6582, 3469, 6743
IN (123-131)	SAAVKAACW ..T…… ……M……. …….S….	Subtype C	**B*58:01**	7084, 9049, 8047, 6743
IN (135-146)	IQQEFGIPYNPQ .H…… ……..H…...	Subtype C	**B*15:03**	2504, 8047
IN (213-220)	LQKQITKI ……...V…. ……I….	Subtype B	B*52:01	9049, 8047, 8575
IN (263-271)	RKAKIIKDY …….R…….. ……..R….	Subtype C	**B*15:03**	9049, 8047, 8575

Chronic HIV infection

Epitope position	Wild type and variant epitope sequences	Subtype identified for epitope	Predicted HLA	Participants
PR (11-20)	VTIKIGGQLK ……..D…… ……...M..	Subtype B and C	**A*03:01**; **A*11:01**	6990, 641, 3253, 3910, 3912, 3920,
PR (30-38)	DTVLEEMNL …….D……	Subtype A and B	**A*68:02**; A*28; **A*68**	3253, 6565, 9986
PR (34-42)	EEINLPGKW ……...V.……	Subtype A, C and D	**A*11**; **A*68**; **B*08**	843, 3880
PR (42-50)	WKPKMIGGI …R……. …….R……	Subtype B	Cw3	6649, 6990, 1121, 1475, 3253
PR (56-66)	VRQYDQIPIEI F…… ……A……	Subtype B	**B*13**	6649, 3253, 3920, 3935, 6565
PR (68-76)	GKKAIGTVL …..Q…….. ……V……	Subtype B and C	**B*15**; **B*15:03**; **B*13:02**; **C*02**	3253, 3910, 3869, 5054, 9986
PR (80-90)	TPVNIIGRNML ……..L.. …….M	Subtype C	**B*81:01**; **B*81**	1475, 3253, 3910, 3920, 5054, 6596

Table 3 (continued)

PR (91-99)	TQIGCTLNF ...L…… ……..G……	Subtype B and C	**B*15:01**; **B*15:03**	639, 1475, 3253, 9986
PR (99)-RT (8)	FPISPIETVP ……T…… ……R…... …….I…	Subtype B	B*54:01	6649, 641, 843, 1121, 1475, 3253, 3935, 2678
RT (57-66)	NTPVFAIKKK …….T……...	Subtype B and C	**A*11**; **A*68**; **B*08**	6649, 3253
RT (73-82)	KLVDFRELNK E……	Subtype A, B, C and D	**A*03:01**; **A*34**; **A*29**; **B*18**; B*80	641, 3910, 3869, 6565
RT (105-113)	SVTVLDVGD ..A……..	Subtype B	Not reported	843, 3920, 3935
RT (113-120)	DAYFSVPL …..C…… ……..S…	Subtype C	A*24; **B*51:01**; B*51	1475, 3253
RT (118-127)	VLPDEGFRKY ……S……	Subtype C	**B*35:01**; B*35:02; **B*42:01**	1121, 8828
RT (136-144)	NNETPGIRY ...E…… ……L... …….K..	Subtype C	**B*18:01**; **B*18**	6649, 1475, 3869, 3920
RT (149-159)	LPQGWKGSPAI …….R…… ……..S.	Subtype C	**B*39:10**; **B*42:01**	3253, 3910, 9986
RT (159-167)	IFQSSMTKIL ……F.	Subtype A, B and C	Not reported	843, 5054
RT (171-181)	FRAQNPEIVIY ……H…… ……...H……. ……K…… ……D… ……..T..	Not reported	Not reported	6649, 843, 1475, 3253, 3474, 3869, 3920, 3935, 5054
RT (181-189)	YQYMDDLYV ……I	Subtype A, B, C and D	**A*02:01**; **A*02**	641, 6565
RT (192-202)	DLEIGQHRTKI G…… ……P…… ……V… ……V	Subtype B	**A*03**	6649, 6990, 1121, 3920, 3935, 6596, 8828
RT (203-212)	EELREHLLKW K……... ..K…… ……K……... ……..R…….	Subtype C	**B*44:03**	6990, 1121, 3253, 3474, 3869, 3920, 3935, 6565, 6509, 7959
RT (233-241)	ELHPDRWTV ……..N…….. ……K……	Subtype B and C	Not reported	641, 1121, 3912, 3935, 6565
RT (240-248)	TVQPIVLPE ……A……... ……Q…..	Subtype B	Not reported	6649, 3474
RT (304-312)	AENREILKE ……K…….. …….T….	Subtype B	Not reported	843, 3253, 3910
RT (317-327)	VYYDPSKDLIA …….S…… ……..S……. …….T……... ……...E…. ……V.	Subtype C	Not reported	6990, 1121, 1475, 3253, 3910, 3935
RT (329-339)	IQKQGQGQWTY K……... …….N……...	Subtype B	B*39:01	5054, 6565, 3387, 6509
RT (340-352)	QIYQEPFKNLKTG ..V…… ……S……... …….R…	Subtype B	**A*11**; **A*11:01**	641, 843, 1475, 3474, 3910, 6380

Table 3 (continued)

RT (356-366)	KMRTAHTNDVK ...R…… …..K…….. …….E…… ……..A..	Subtype B	**A*03:01**; **A*03**	6649, 6990, 641, 1121, 1475, 3253, 3920, 5054, 9986
RT (367-375)	QLTEAVHKI ……..V……. ……R...	Subtype C	Not reported	3880, 6565, 8828
RT (375-383)	IAMESIVIW ….I…….. ……G……. ……..M...	Subtype B and C	**B*53:01**; B*35:08; **B*57:02**; **B*57:03**; **B*58:01**; **C*12**	6990, 639, 3912, 3935
RT (379-388)	SIVIWGKTPK …….G… ……R	Subtype B	**A*11:01**	3880, 6990, 843, 1121, 3474, 3920, 3935, 9986
RT (397-406)	TWETWWTEYW …..G……	Subtype B	**B*44**	6640, 1121, 3912, 3920
RT (416-425)	FVNTPPLVKL ...I…… ……T..	Subtype C	**B*07**	641, 3253, 3935, 7959
RT (432-441)	EPIAGAETFY ..L…… …M…… …..V…….. ……...Y.	Subtype C	**B*35:01**	641, 843, 3910, 3869, 5054, 6509, 7959
RT (448-457)	RETKIGKAGY ……R……. ……..V…….. ……..R…...	Subtype B	**A*29**	843, 1121, 3253, 3869, 3920, 3935, 9986
RT (461-469)	KGRQKIVTL R…… …….M….. …….I… ……..A..	Subtype B	**B*08:01**	1121, 1475, 3910, 3920, 3935, 9986, 6509, 7959, 9854
RT (468-476)	SLETTNQK ……..R	Subtype C	**A*74:01**	6640, 6990, 1475, 6509, 7959
RT (477-486)	TELQAIQLAL …...R…….	Subtype C	**B*18:01**	641, 843, 3910
RT (491-501)	SEVNIVTDSQY ……..V…….. ……M……...	Subtype C	**B*44:03**	3880, 6649, 6565
RT (509-518)	QPDKSESELV ……..G……..	Subtype A, B, C and D	**B*07**	1121, 3869
RT (519-527)	NQIIEQLIKK S……. …….Q...	Subtype B	Not reported	6640, 6649, 843, 3869, 5054, 8828, 9986
RT (526-534)	IKKEKIYLA …...K…… ……V…... ……..T	Subtype B	Not reported	6649, 641, 3920, 3935, 9986
RT (550-559)	KLVSQGIRKV R…….. ……N……	Subtype A, B, C and D	**A*02:01**	639, 1121, 3869, 9986
IN (22-31)	MASDFNLPPIV …….E…… …….S…… ……..M.. ……E	Not reported	**A*02**	6649, 641, 843, 1121, 1475, 3910, 3869, 3920, 3935, 4351, 5054, 6565
IN (33-43)	AKEIVASCDKC …..K…….. ……..R	Not reported	Not reported	6649, 6990, 3253, 3920, 2678
IN (68-76)	LEGKIILVA …….I….	Subtype B	**B*40:06**	6990, 639, 3253
IN (78-86)	HVASGYIEA E…… …..T…….. ……T……	Subtype B	B*54:01	1121, 3935, 6565
IN (101-105)	ILKLAGRWPVK A…… …..A……..	Subtype C	**A*03:01**	1121, 1475, 3474, 3869, 5054, 2678

Table 3 (continued)

RT (356-366)	KMRTAHTNDVK ...R…… …..K…….. …….E…… ……..A..	Subtype B	**A*03:01**; **A*03**	6649, 6990, 641, 1121, 1475, 3253, 3920, 5054, 9986
RT (367-375)	QLTEAVHKI ……..V……. ……R...	Subtype C	Not reported	3880, 6565, 8828
RT (375-383)	IAMESIVIW ….I…….. ……G……. ……..M...	Subtype B and C	**B*53:01**; B*35:08; **B*57:02**; **B*57:03**; **B*58:01**; **C*12**	6990, 639, 3912, 3935
RT (379-388)	SIVIWGKTPK …….G… ……R	Subtype B	**A*11:01**	3880, 6990, 843, 1121, 3474, 3920, 3935, 9986
RT (397-406)	TWETWWTEYW …..G……	Subtype B	**B*44**	6640, 1121, 3912, 3920
RT (416-425)	FVNTPPLVKL ...I…… ……T..	Subtype C	**B*07**	641, 3253, 3935, 7959
RT (432-441)	EPIAGAETFY ..L…… …M…… …..V…….. ……...Y.	Subtype C	**B*35:01**	641, 843, 3910, 3869, 5054, 6509, 7959
RT (448-457)	RETKIGKAGY ……R……. ……..V…….. ……..R…...	Subtype B	**A*29**	843, 1121, 3253, 3869, 3920, 3935, 9986
RT (461-469)	KGRQKIVTL R…… …….M….. …….I… ……..A..	Subtype B	**B*08:01**	1121, 1475, 3910, 3920, 3935, 9986, 6509, 7959, 9854
RT (468-476)	SLETTNQK ……..R	Subtype C	**A*74:01**	6640, 6990, 1475, 6509, 7959
RT (477-486)	TELQAIQLAL …...R…….	Subtype C	**B*18:01**	641, 843, 3910
RT (491-501)	SEVNIVTDSQY ……..V…….. ……M……...	Subtype C	**B*44:03**	3880, 6649, 6565
RT (509-518)	QPDKSESELV ……..G……..	Subtype A, B, C and D	**B*07**	1121, 3869
RT (519-527)	NQIIEQLIKK S……. …….Q...	Subtype B	Not reported	6640, 6649, 843, 3869, 5054, 8828, 9986
RT (526-534)	IKKEKIYLA …...K…… ……V…... ……..T	Subtype B	Not reported	6649, 641, 3920, 3935, 9986
RT (550-559)	KLVSQGIRKV R…….. ……N…….	Subtype A, B, C and D	**A*02:01**	639, 1121, 3869, 9986
IN (22-31)	MASDFNLPPIV …….E…… …….S…… ……..M.. ……E	Not reported	**A*02**	6649, 641, 843, 1121, 1475, 3910, 3869, 3920, 3935, 4351, 5054, 6565
IN (33-43)	AKEIVASCDKC …..K…….. ……..R	Not reported	Not reported	6649, 6990, 3253, 3920, 2678
IN (68-76)	LEGKIILVA …….I….	Subtype B	**B*40:06**	6990, 639, 3253
IN (78-86)	HVASGYIEA E…… …..T…….. ……T……	Subtype B	B*54:01	1121, 3935, 6565
IN (101-105)	ILKLAGRWPVK A…… …..A……..	Subtype C	**A*03:01**	1121, 1475, 3474, 3869, 5054, 2678

Table 3 (continued)

	……..R			
IN (114-123)	HTDNGSNFTS ……..I……..	Subtype B	Cw*05	1121, 3869
IN (123-132)	SAAVKAACWW ..T…… ….T……. ……R…..	Subtype C	**B*58:01**	3880, 641, 843, 3935, 8828
IN (135-143)	IQQEFGIPYNPQ ……...C….. ……Y…	Subtype C	**B*15:03**	1475, 6565
IN (164-172)	QVRDQAEHL ...M…… …..L…… …….E……	Subtype C	**A*02:05**	3869, 3920
IN (185-194)	FKRKGGIGGY ….K…… ……...R……	Subtype A, B and C	**B*15:03**; B*27:05; C*01	3920, 3935
IN (206-213)	TDIQTKEL ...E…….. …T…….. …….D..	Subtype B	B*40:02	3935, 6380, 6565
IN (213-220)	LQKQITKI ……H…… …….L...	Subtype B	B*52:01	843, 1475
IN (241-250)	LLWKGEGAVV ……...M..	Not reported	**A*02:01**	6640, 641
IN (259-268)	VPRRKVKII ……G…….. ……..A…	Subtype B and C	**B*08:01**	843, 3253, 3910, 3912, 5054
IN (278-288)	DDCVAGRQDED ……...S……. ……D.. ……N	Not reported	Not reported	3253, 3910, 3935, 8828

HLA alleles in boldface are those that have been identified (reported) in South Africa or southern Africa [11,28–30]. Alleles underlined are those that were reported to be protective [11,28–29,49,50]. PR = protease; RT = reverse transcriptase; IN = integrase; HLA = human leukocyte antigen

Author details
[1]Department of Medical Virology, University of Pretoria, Private Bag X323, Gezina 0031, South Africa. [2]National Institute for Communicable Diseases and Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa. [3]Division of Intramural Research, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, MD, USA. [4]Department of Medicine, Johns Hopkins University, Baltimore, MD, USA. [5]National Health Laboratory Service-Tshwane Academic Division (NHLS-TAD), Tshwane, South Africa.

Published online: 05 May 2022

Reference

1. Nkone P, Loubser S, Quinn TC, et al. Deep sequencing of the HIV-1 polymerase gene for characterisation of cytotoxic T-lymphocyte epitopes during early and chronic disease stages. Virol J. 2022;19:56. https://doi.org/10.1186/s12985-022-01772-8.

Publisher's Note