Quiescent profile of T cells from Colombian MSM with high-risk sexual behaviours and HIV-1 specific CTL response

Ossa Giraldo Ana[1], Blanquiceth Y[1,2], Contreras K[2], Flórez L[2], Hernández J[1], Zapata W[1,2]

1. Universidad Cooperativa de Colombia, Infettare Research Group. 2.Universidad de Antioquia, Inmunovirología Research Group

Background

MSM still being a key population on HIV-1 epidemiology [1]. MSM with high-risk sexual behaviours are at great risk of exposure to infection [2]. Better intervention strategies are urgently needed, such as biomedical research to develop new options for prevention and treatment. The study of seronegative MSM with high-risk behaviours represents an important opportunity to better understand HIV-1 infection and immune response to improve the current intervention strategies [3,4].

Methods

Prospective descriptive study in 45 MSM of Medellín-Colombia-South America. Sociodemographic and sexual behavior data were collected through a structured survey. The basal activation profile of T cells was evaluated from PBMCs by the expression of CD38, HLA-DR, CD69 and Ki67 by flow cytometry. To evaluate the functional response of T lymphocytes against HIV-1, PBMCs were cultured overnight in the presence of *Staphylococcus aureus* Enterotoxin B (positive control) or HIV-1 Gag peptides; the percentage of cells that produce TNFα, IFNɣ, MIP1-β and Granzyme B was quantified by intracellular flow cytometry.

Results

We included 44 MSM with high and low risk of exposure (14 and 30, respectively). The high-risk group presented a higher frequency of sexual partners in the 3 months prior to the inclusion of the study (Me=31 vs Me=2; p<0.05), sexual partners throughout life (Me=900 vs Me=30; p<0.005) and unprotected anal intercourses, showing higher risk behaviours compared to other international MSM cohorts (Tables 1 and 2).

Variable	Category	MSM at high risk of HIV-1 sexual exposure	MSM at low risk of HIV-1 sexual exposure
		# (%)	# (%)
Type of sexual partners last three months	Only Men	9 (100)	3 (100)
Condom use with stable partners	Always	0	7 (23.3)
	Sometimes	5 (55.6)	16 (53.3)
	Never	3 (33.3)	5 (16.7)
	Have never had a stable partner	1 (11.1)	0
Condom use with casual partners	Always	1 (11.1)	15 (50.0)
	Sometimes	8 (88.9)	13 (43.3)
	Never	0	1 (3.3)
	Have never had a casual partner	0	1 (3.3)
Has had a sexual partner with HIV/AIDS	Yes	5 (44.4)	11 (36.7)
Has had STI	Yes	8 (88.9)	12 (40.0)

Table 1. Risk factors associated to HIV-1 exposure. *MSM with ≥14 sexual partners in last 3 months.

Variable	Median (IQR)	Minimum Value	Maximum Value
Number of different sexual partners in 3 last months			
MSM at high risk of HIV-1 sexual exposure*	25 (22-36)	14	58
MSM at low risk of HIV-1 sexual exposure	2 (1-4)	1	11
Number of sexual intercourses in 3 last months			
MSM at high risk of HIV-1 sexual exposure*	34 (20.5-57.5)	20	174
MSM at low risk of HIV-1 sexual exposure	5.5 (2-12.5)	1	360
Number of sexual intercourses without protection in 3 last months			
MSM at high risk of HIV-1 sexual exposure*	17 (5-22)	1	40
MSM at low risk of HIV-1 sexual exposure	2 (0-7)	0	359
% of unprotected sex 3 last months			
MSM at high risk of HIV-1 sexual exposure*	50 (9.9-70.4)	5	85
MSM at low risk of HIV-1 sexual exposure	50 (0-99.7)	0	100
Approximate number of sexual partners through all life			
MSM at high risk of HIV-1 sexual exposure*	961.5 (253-4938.5)	147	11570
MSM at low risk of HIV-1 sexual exposure	26.5 (10.7-100)	5	1842

Table 2. Frequency of sexual partners and sexual intercourses *MSM with ≥14 sexual partners in last 3 months.

All subjects are negative for anti-HIV-1 antibodies, HIV-1 proviral DNA and delta 32 mutation in the CCR5 gene in a homozygous state. The individuals at high risk showed a lower percentage of CD4+CD38+ and CD8+CD38+ T cells (p<0.05), a higher percentage of CD4+HLA-DR+ and CD8+HLA-DR+ T cells (p<0.05) and lower CD4+Ki-67 T cells (p<0.05). (Figure 1).

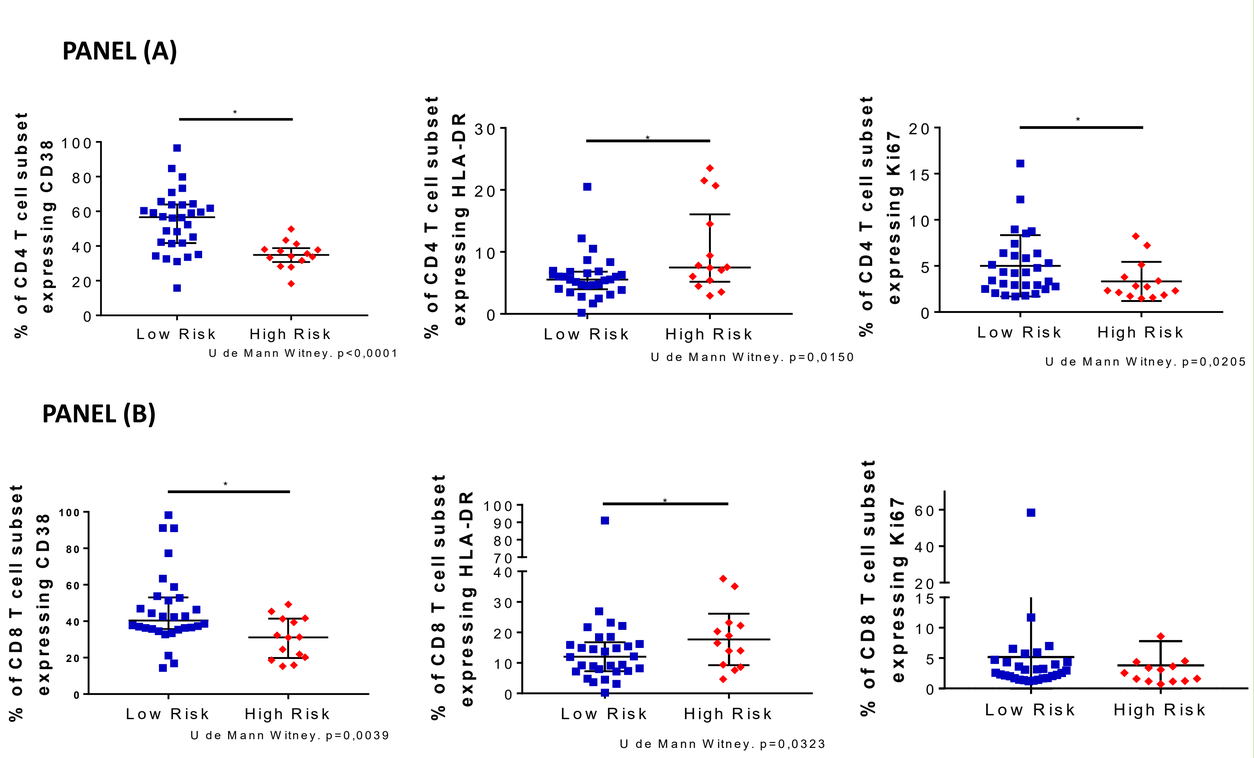

Figure 1. T cells basal activation pro file from MSM with high and low risk of sexual HIV-1 exposure. **(A)** Percentage of CD4 T cells subsets expressing CD38, HLA-DR.and Ki67. **(B)** Percentage of CD8 T cells subsets expressing CD38, HLA-DR.and Ki67.

Although no differences were found in the specific CTL response against HIV-1 between both groups, four individuals were found who exhibited a specific response to HIV-1 by production of TNFα, IFNɣ or both, after overnight stimuli with Gag peptides. HIV-1 One of them showed this specific response in two measurements one year apart (Figure 2).

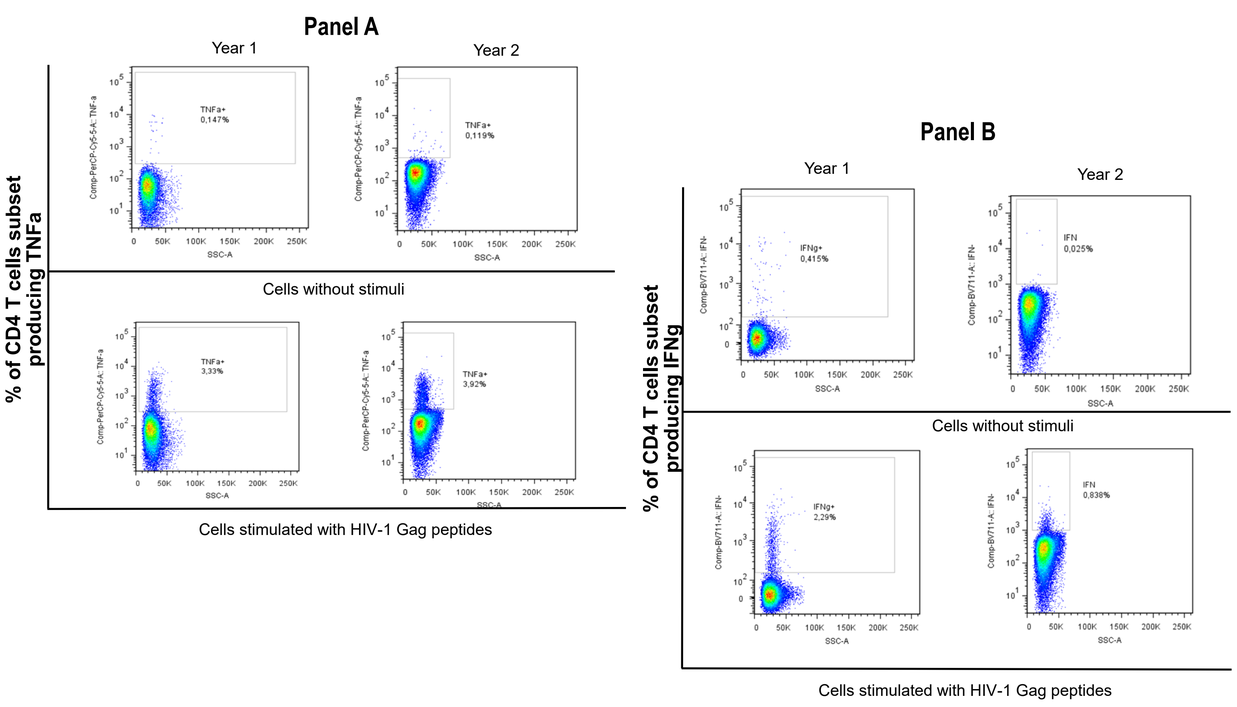

Figure 2. Specific CTL response to HIV-1 Gag peptides in an individual at high risk, with two measurements in one year apart. **(A)** percentage of CD4 T cells subset producing TNFa. **(B)** percentage of CD8 T cells subset producing IFN.

Conclusion

Taking together, our results can show a protective profile with low activation of T cells in MSM with high-risk behaviors and specific CTL response to HIV-1 peptides without evidence of infection. It is necessary to continue the study of MSM in high risk of exposure to HIV-1 to better understand their natural response to the virus and improve the prevention and therapy strategies against HIV-1.

Acknowledgments/Funding Statement

The authors thank the volunteers who kindly participated in this study. This work was supported by Colciencias (511565740820); Universidad de Antioquia UdeA (111565740820 RC660-2014) and Universidad Cooperativa de Colombia (INV1617; INV1900). No funding bodies had any role in study design, data collection and analysis or decision to publish.

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