

Supplementary information

Applications of cell therapy in the treatment of virus-associated cancers

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Supplementary Table 1 | Selected ongoing clinical trials of virus-specific T cell-based therapies for malignancy

Target virus	Trial identifier ^a ; phase	Study title ^a	Disease	Cell source	Target antigens	Manufacturing approach
EBV	NCT01555892; phase I	Cytotoxic T-lymphocytes for EBV-positive Lymphoma, GRALE (GRALE)	Lymphoma	Autologous or allogeneic	LMP, BARF1, EBNA1	Ex vivo expansion
	NCT02580539; phase I/II	A study of the safety and efficacy of EBV specific T-cell lines (EBV-TCL-01)	Lymphoma	Autologous, allogeneic HSCT donor, or third party	LMP2, EBNA1	Ex vivo expansion
	NCT01192464; phase I	EBV CTLs expressing CD30 chimeric receptors for CD30 ⁺ lymphoma (CARCD30)	Lymphoma	Autologous	Multi-antigen	Ex vivo expansion and genetic modification
	NCT03394365; phase III	Tabelecleucel for solid organ or allogeneic hematopoietic cell transplant participants with Epstein–Barr virus-associated post-transplant lymphoproliferative disease (EBV ⁺ PTLD) after failure of rituximab or rituximab and chemotherapy (ALLELE)	PTLD	Third party	Multi-antigen	Ex vivo expansion
	NCT03769467; phase I/II	Tabelecleucel in combination with pembrolizumab in subjects with Epstein–Barr virus-associated nasopharyngeal carcinoma (EBV ⁺ NPC)	NPC	Third party	Multi-antigen	Ex vivo expansion
	NCT02065362; phase I	TGF- β -resistant cytotoxic T-lymphocytes in treatment of EBV-positive NPC / RESIST-NPC	NPC	Autologous	LMP, BARF1, EBNA1	Ex vivo expansion
	NCT04554914; phase II	A study to evaluate tabelecleucel in participants with Epstein–Barr virus-associated diseases	EBV ⁺ LPD, PTLD or sarcoma	Third party	Multi-antigen	Ex vivo expansion
HBV	NCT05339321; phase I	Autologous HBV-specific T cell receptor engineered T Cells (TCR-T) in patients with HBV-related advanced HCC	HCC	Autologous	HLA-A*02-restricted HBsAg peptide	Genetic modification
	NCT05417932; phase I/II	A study of SCG101 in the treatment of subjects with hepatitis B virus-related hepatocellular carcinoma (TCR-T)	HCC	Autologous	HLA-A*02-restricted HBsAg peptide	Genetic modification
	NCT04745403; phase I	Redirected HBV-specific T cells in patients with HBV-related HCC (SAFE-T-HBV)	HCC	Autologous	HBV epitopes	mRNA electroporation
HPV	NCT02379520; phase I	HPV-16/18 E6/E7-specific T lymphocytes in patients with relapsed HPV-associated cancers	HPV-related cancers	Autologous	E6, E7	Ex vivo expansion
MCPyV	NCT01758458; phase I/II	Viral oncoprotein targeted autologous T cell therapy for Merkel cell carcinoma	MCC	Autologous	TA _g	Ex vivo expansion
	NCT03747484; phase I/II	Gene-modified immune cells (FH-MCVA2TCR) in treating patients with metastatic or unresectable Merkel cell cancer	MCC	Autologous	HLA-A*02-restricted MCPyV oncoprotein	Genetic modification
HIV	NCT04975698; phase II	HIV antigen-specific T-cells targeting conserved epitopes (HST-NEETs) (BMTCTN1903)	Lymphoma	Autologous	Gag, Pol, Nef	Ex vivo expansion
	NCT04248192; phase I	Evaluate the safety, immunologic, and virologic responses of donor derived (DD) HIV-specific T-cells (HST) in HIV-infected individuals following allogeneic bone marrow transplantation (alloRESIST)	Haematological malignancies	Allogeneic BMT donor-derived	Gag, Pol, Nef	Ex vivo expansion

HTLV-1	UMIN000011423 (Japan); phase I	Phase I study of a therapeutic vaccine in ATL patients with autologous dendritic cells pulsed with Tax peptides	ATL	Autologous	Tax	DC vaccine
	UMIN000016683 (Japan); phase I	Novel autologous dendritic cell vaccine therapy targeting HTLV-1 specific antigen combined with anti-CCR4 antibody for previously treated patients with adult T-cell leukemia. A phase Ia/Ib study	ATL	Autologous	Tax	DC vaccine

ATL, adult T cell lymphoma/leukaemia; BARF1, BamHI-A rightward frame 1; BMT, bone marrow transplant; CTLs, cytotoxic T lymphocytes; DC, dendritic cell; EBNA1, Epstein–Barr nuclear antigen 1; EBV, Epstein-Barr Virus; Gag, HIV group specific antigen; HBsAg, hepatitis B surface antigen; HBV, hepatitis B virus; HCC, hepatocellular carcinoma; HIV, human immunodeficiency virus; HPV, human papillomavirus; HTLV-1, human T-cell lymphotropic virus type 1; LMP, latent membrane protein; LPD, lymphoproliferative disease; MCC, Merkel cell carcinoma; MCPyV, Merkel cell polyomavirus; Nef, HIV negative factor; NPC, nasopharyngeal carcinoma; Pol, HIV DNA polymerase; PTLD, post-transplant lymphoproliferative disease; TAg, T antigen; Tax, trans-activating transcriptional regulatory protein; TGF- β , transforming growth factor β . ^aOn [ClinicalTrials.gov](https://clinicaltrials.gov), unless otherwise stated.