Name	Catherine M. Bollard
Current Position & Affiliation	Senior Vice President and Chief Research Officer Director, Center for Cancer and Immunology Research Professor of Pediatrics and Immunology Children's National Hospital and The George Washington University
Country	USA
Major Field	Immunotherapy, T cell therapy, bone marrow transplant

Educational Background

INSTITUTION AND LOCATION	DEGREE	Completion Date	FIELD OF STUDY
Otago Medical School, Dunedin, New Zealand	MBChB	12/1991	Medicine & Surgery
The Royal Australasian College of Physicians, Auckland, New Zealand	FRACP	02/2002	Pediatrics
Royal Australasian College of Pathologists, Auckland, New Zealand	RCPA	01/2002	Hematology
Otago Medical School, Dunedin, New Zealand	MD	08/2005	Immunology

A. Personal Statement

Dr. Bollard is a Hematologist and Immunologist with an extensive background in immunotherapy for cancer, GvHD and post hematopoietic stem cell transplant viral infections. For the past 25 years, she has investigated the efficacy of virus and tumor specific T cells for the prophylaxis and treatment of viral infection after transplant and cancer, respectively. Over the past 2 decades, as the sponsor/PI on >20 investigator-initiated IND studies using immune based therapies for patients with malignancies or after stem cell transplant, she is highly experienced in developing and running clinical studies and the development of translational bench to bedside studies. She was Director of the Pediatric Lymphoma Program at Texas Children's Hospital and in 2013 relocated to DC to head the new Program for Cell Enhancement and Technologies for Immunotherapy at Children's National Hospital (CNH). She is currently the Senior Vice President and Chief Research Officer and the Director of the Center for Cancer and Immunology Research at Children's National and Professor of Pediatrics and Microbiology and Immunology at The George Washington University in Washington, DC. Dr. Bollard has treated >500 patients with novel cell therapeutics at Baylor College of Medicine and CNH. She is a member of the American Society for Clinical Investigation, Past President of the International Society of Cellular Therapy (ISCT) and President of the Foundation for the Accreditation for Cellular Therapy (FACT). Dr. Bollard has a long-standing research interest in immune therapies for cancer and virus associated diseases (e.g., post-transplant infections, HIV, EBV-associated lymphomas), and conducting laboratory research and translating novel cell therapeutics to the clinic. Moreover, she has a highly successful track record mentoring graduate students, postdoctoral fellows and physicians and/or scientists in laboratory projects that investigate novel cellular therapies that are then translated to early phase clinical trials.

Professional Experience

2024-present	Senior Vice President and Chief Research Officer (interim from September 2024-February 2025), Children's National Hospital, Washington, DC
2023-2024	Interim Executive Vice President, Chief Academic Officer and Chair of Pediatrics – Children's National Hospital and The George Washington University, Washington, DC
2018-present	Associate Center Director (ACD) for Translational Research and Innovation, GW Cancer Center
2017-present	Director, Center for Cancer and Immunology Research, Children's National Hospital
2015-2017	Chief, Division of Allergy and Immunology, Children's National Hospital, Washington, DC
2013-present	Professor of Pediatrics and of Microbiology, Immunology and Tropical Medicine (Tenured), The George Washington University School of Medicine and Health Sciences, Washington, DC
2013-present	Director, Program for Cell Enhancement and Technologies for Immunotherapy (CETI), Center for Cancer and Immunology Research, Children's National Hospital, Washington, DC
2012-2013	Professor (Tenured), Pediatric Hematology/Oncology, CAGT, BCM, Houston, TX
2007-2012	Associate Professor (Tenured), Pediatric Hematology/Oncology, CAGT, BCM, Houston, TX
2001-2007	Assistant Professor, Pediatric Hematology/Oncology, Center for Cell and Gene Therapy (CAGT), Baylor College of Medicine (BCM), Houston, TX
2000-2001	Postdoctoral Fellow, Pediatric Hematology/Oncology, Texas Children's Hospital, Houston, TX
1998-1999	Hematology Registrar, Auckland Hospital, Auckland, New Zealand
1995-1997	Pediatric Registrar, Auckland Children's Hospital, New Zealand
1993-1994	Pediatric Senior House Officer and Registrar, General Pediatrics and Pediatric Hematology/Oncology, St. Bartholomew's Hospital, London, England
1991-1993	House Surgeon, Medicine and Surgery, Auckland Hospital, Auckland, New Zealand

Editorial Boards

2021-present	Editor in Chief, *Blood Advances*
2014-2021	Associate Editor, *Blood*
2010-2018	Associate Editor, *Cytotherapy*
2010-2014	Co-Editor in Chief, *Pediatric Hematology-Oncology*
2009-2014	Editorial Board, *Leukemia Lymphoma*
2009-2013	Editorial Board, *International Journal of Pediatrics*
2004-present	Editorial Boards, *Bone Marrow Transplant* and *Biology of Blood and Marrow Transplant*

Other Experience and Professional Memberships

2023-present	Member, Board of Directors, Alliance for Regenerative Medicine (ARM)
2021-present	President, Foundation for the Accreditation of Cellular Therapy (FACT)

2020-present	Chair, Scientific & Strategic advisory group- National Marrow Donor Program (NMDP)
2020-2021	President Elect, Foundation for the Accreditation of Cellular Therapy (FACT)
2018-2022	Member, Frederick National Laboratory Advisory Committee (FNLAC) – NIH
2018-2020	Immediate Past President and Chair, Strategic Advisory Committee – International Society for Cellular Therapy (ISCT)
2016-2018	President – International Society for Cellular Therapy (ISCT)
2015-2018	Member, Cellular, Tissues and Gene Therapies Advisory Committee, FDA
2014-2022	Reviewer, SEP, Loan Repayment Programs, NHLBI, NIH
2014-2018	Clinical Oncology (CONC) Study Section, NCI, NIH
2013-present	Member, National Heart Lung and Blood Institute (NHLBI), Gene/Cell Therapy DSMB
2013-2017	Board of Directors, American Society for Blood and Marrow Transplantation (ASBMT)
2012-2021	Chair, Non-Hodgkin's Lymphoma Committee, Children's Oncology Group
2010-2018	Board of Directors, Foundation for the Accreditation of Cellular Therapy (FACT)
2010-2018	Chair, Professional Relations Committee, FACT
2009-2022	Reviewer, SEP, Loan Repayment Program, National Cancer Institute (NCI), NIH
2009-2013	Gene and Drug Delivery Systems (GDD) Study Section, National Institutes of Health (NIH)
2007-2018	Inspector Training Committee, Foundation for the Accreditation of Cellular Therapy
2006-2011	Cell Therapy Committee, Advancing Transfusion and Cellular Therapies (AABB)
2004-2011	Immunotherapy Committee, International Society for Cellular Therapy

Honors

2025	Induction into the Association of American Physicians (AAP)
2021	*Darwin J. Prockop Mentoring Award, International Society of Cellular Therapy (ISCT)*
2013	Induction into the Henry Kunkel Society
2011	Basic Science Award, European Group for Blood and Marrow Transplantation (EBMT)
2010	Induction into the American Society for Clinical Investigation (ASCI)
2004-2006	Scholar of the Sidney Kimmel Foundation for Cancer Research
2001, '06, '07	Best Abstract Award, American Society of Blood and Marrow Transplantation (ASBMT)

Clinical Licensure and Board Certifications

2013-present	District of Columbia Board of Medical Examiners - License MD041704
2004-2015	Texas State Board of Medical Examiners - License L9630
2002-present	Fellow, Royal Australasian College of Pathologists (FRCPA), Hematology/Hematopathology
2002-present	Fellow, Royal Australasian College of Physicians (FRACP), Pediatrics and Hematology/Oncology

Main Scientific Publications

1. **Priming Immune Responses from Naïve Donors**.

Viral infection in stem cell recipients is highest in seropositive recipients of seronegative stem cells, especially if the stem cell source is umbilical cord blood (CB). We discovered

that (i) naïve T-cells can be primed *in vitro* with specificity for multiple viruses; (ii) the virus-specific T-cell immune responses are not derived from contaminating maternal cells; (iii) CMV-specific T-cells primed from CB recognize highly unique and novel CMV epitopes not typically seen in memory CMV-specific T cells and (iv) these observations are a direct consequence of the clonal diversity of T-cells derived from naïve rather than memory derived T-cells. An understanding of how protective immune epitopes to viral infection develop is essential for the successful treatment of individuals with a naïve immune repertoire. Knowledge gained from these studies provide us with the mechanistic insights to proceed with clinical trials using naïve derived immune cells to prevent virus infection in recipients of naïve donor grafts.

a. Hanley PJ, Cruz CR, Savoldo B, Leen AM, Decker WK, Molldrem JJ, Liu H, Gee A, Rooney C, Heslop HE, Dotti G, Brenner MK, Shpall EJ, **Bollard CM**. Functionally active virus-specific T-cells that target CMV, adenovirus and EBV can be expanded from naïve T cell populations in cord blood and will target a broad range of viral epitopes. Blood. 2009;114(9):1958-67. PMCID: PMC2738578
b. Hanley PJ, Melenhorst JJ, Nikiforow S, Scheinberg P, Blaney JW, Demmler-Harrison G, Cruz CR, Lam S, Krance RA, Leung KS, Martinez CA, Liu H, Douek DC, Heslop HE, Rooney CM, Shpall EJ, Barrett AJ, Rodgers JR, **Bollard CM**. CMV-specific T cells generated from naïve T cells recognize atypical epitopes and may be protective in vivo. Sci Transl Med. 2015 Apr 29;7(285):285ra63. PMCID: PMC4479400
c. Patel S, Chorvinsky E, Albihani S, Cruz CR, Jones RB, Shpall EJ, Margolis DM, Ambinder RF, **Bollard CM**. HIV-specific T cells generated from naive T cells suppress HIV in vitro and recognize wide epitope breadths. Mol Ther. 2018 Jun 6;26(6):1435-1446. PMCID: PMC5986979
d. Abraham AA, John TD, Keller MD, Cruz CRY, Salem B, Roesch L, Liu H, Hoq F, Grilley BJ, Gee AP, Dave H, Jacobsohn DA, Krance RA, Shpall EJ, Martinez CA, Hanley PJ, **Bollard CM.** Safety and feasibility of virus-specific T cells derived from umbilical cord blood in cord blood transplant recipients. Blood Adv. 2019 Jul 23;3(14):2057-2068. PMCID: PMC6650740

2. <u>Developing Novel Cell Therapies for Infection</u>.

Pathogen-specific memory CD4+ and $CD8^+$ T cells are important for mediating recall responses to secondary infection. However, in the immune-compromised host, these responses are either absent or impaired. My laboratory showed that the genetic modification of antigen-presenting cells facilitates the expansion of cytotoxic T lymphocytes that are consistently specific for multiple antigens. These monoculture-derived T cells were polyclonal with a diverse V repertoire, recognized a broad range of previously unidentified CD4+ and CD8 restricted epitopes, and when adoptively transferred could expand and supply potent clinically measurable antiviral activity against life-threatening infections in patients after hematopoietic stem cell transplants. Further, we have extended our novel approach to target virus infections outside the context of HSCT (e.g., HIV and SARS-CoV2) and also to fungal pathogens.

a. Leen AM, Myers GD, Sili U, Huls MH, Weiss H, Leung KS, Carrum G, Krance RA, Molldrem JJ, Gee AP, Brenner MK, Heslop HE, Rooney CM, **Bollard CM.** Monoculture-derived T lymphocytes specific for multiple viruses expand and produce clinically relevant effects in immunocompromised patients. Nat Med. 2006 Nov;12(10):1160-6. PMID: 16998485
b. Keller MD, Harris KM, Jensen-Wachspress MA, Kankate VV, Lang H, Lazarski CA, Durkee-Shock J, Lee PH, Chaudhry K, Webber K, Datar A, Terpilowski M, Reynolds EK, Stevenson EM, Val S, Shancer Z, Zhang N, Ulrey R, Ekanem U, Stanojevic M, Geiger A, Liang H, Hoq F, Abraham AA, Hanley PJ, Cruz CR, Ferrer K, Dropulic L, Gangler K, Burbelo PD, Jones RB, Cohen JI, **Bollard CM.** SARS-CoV-2-specific T cells are rapidly expanded for therapeutic use and target conserved regions of the membrane protein. Blood. 2020 Dec 17;136(25):2905-2917. PMCID: PMC7746091.

c. Keller MD, Schattgen SA, Chandrakasan S, Allen EK, Jensen-Wachspress MA, Lazarski CA, Qayed M, Lang H, Hanley PJ, Tanna J, Pai SY, Parikh S, Berger SI, Gottschalk S, Pulsipher MA, Thomas PG, **Bollard CM.** Secondary bone marrow graft loss after third-party virus-specific T cell infusion: Case report of a rare complication. Nature Com. 2024 Mar 29;15(1):2749. PMCID: PMC10980733.
d. Sohai DK, Keller MD, Hanley PJ, Hoq F, Kukadiya D, Datar A, Reynolds E, Copertino DC, Lazarski C, McCann CD, Tanna J, Shibli A, Lang H, Zhang A, Chansky PA, Motta C, Huynh TT, Dwyer B, Wilson A, Lynch R, Mota TM, Conce Alberto WD, Brumme ZL, Kinloch NN, Cruz CRY, MacLaren Ehui L, Henn S, Brad Jones R, **Bollard CM.** Autologous HIV-specific T cell therapy targeting conserved epitopes is well-tolerated in six adults with HIV: an open-label, single-arm phase 1 study. Nat Commun. 2025 May 15;16(1):4510. doi: 10.1038/s41467-025-59810-2.PMID: 40374689 Free PMC article. Clinical Trial.

3. <u>Developing Novel T Cell Therapies for Cancer</u>.

Our laboratory demonstrated amplification of the tumor-specific T cell responses using gene and non-gene transfer approaches to direct specificity to tumor-associated, viral (e.g. EBV) and non-viral antigens. Over 50% of patients with exceptionally poor prognoses have responded to these T cell therapeutics and we established that the infused effector cells expand by several logs *in vivo*, contribute to the memory pool (answering important immunological questions about the persistence of T cells and their transition from effector memory to central memory phenotypes), and traffic to tumor sites. Finally, we were the first to show that the administration of polyclonal tumor-specific T cells can elicit epitope spreading, which is only seen in patients who respond to immune-based therapies, hence providing important mechanistic insights into the adaptive immune response and how antigen-specific targeting can lead to a broader immune response critical for anti-tumor immunity.

a. **Bollard CM**, Straathof KC, Huls MH, Lacuesta KC, Brenner MK, Rooney CM, Heslop HE. Cytotoxtic T lymphocyte therapy for Epstein-Barr virus+ Hodgkin's disease. J Exp Medicine. 2004 Dec 20;200(12):1623-3. PMCID: PMC2211993
b. **Bollard CM**, Gottschalk S, Torrano V, Diouf O, Ku S, Hazrat Y, Carrum G, Ramos C, Fayad L, Shpall EJ, Pro B, Liu H, Wu MF, Lee D, Sheehan AM, Zu Y, Gee AP, Brenner MK, Heslop HE, Rooney CM. Sustained complete responses in patients with lymphoma receiving autologous cytotoxic T lymphocytes targeting Epstein-Barr virus LMPs. J Clin Oncol. 2014 Mar 10;32(8):798-808. PMCID: PMC3940538
c. Hont AB, Cruz CR, Ulrey R, O'Brien B, Stanojevic M, Datar A, Albihani S, Saunders D, Hanajiri R, Panchapakesan K, Darko S, Banerjee P, Fortiz MF, Hoq F, Lang H, Wang Y, Hanley PJ, Dome JS, **Bollard CM**, Meany HJ. Immunotherapy of relapsed and refractory solid tumors with ex vivo expanded multi-tumor associated antigen specific cytotoxic T lymphocytes: A phase I study. J Clin Oncol. 2019 Sep 10;37(26):2349-2359. PMCID: PMC6804836
d. Kinoshita H*, Cooke KR, Grant M, Stanojevic M, Cruz CR, Keller M, Fortiz MF, Hoq F, Lang H, Barrett AJ, Liang H, Tanna J, Zhang N, Shibli A, Datar A, Fulton K, Kukadiya D, Zhang A, Williams KM, Dave H, Dome JS, Jacobsohn D, Hanley PJ, Jones RJ, **Bollard CM.** Outcome of donor-derived TAA-T cell therapy in patients with high-risk or relapsed acute leukemia post allogeneic BMT. Blood Adv. 2022 Apr 26;6(8):2520-2534. PMID: 35244681
e. Dave H, Terpilowski M, Mai M, Toner K*, Grant M, Stanojevic M, Lazarski C, Shibli A, Bien SA, Maglo P, Hoq F, Schore R, Glenn M, Hu B, Hanley PJ, Ambinder R, **Bollard CM.** Tumor-associated antigen-specific T cells with nivolumab are safe and persist in vivo in relapsed/refractory Hodgkin lymphoma. Blood Adv. 2022 Jan 25;6(2):473-485. PMCID: PMC8791594

f. Toner K*, **Bollard CM.** EBV+ lymphoproliferative diseases: opportunities for leveraging EBV as a therapeutic target. Blood. 2022 Feb 17;139(7):983-994. PMCID: PMC8854679
g. Kinoshita H*, Durkee-Shock J, Jensen-Wachspress M, Kankate VV, Lang H, Lazarski CA, Keswani A, Webber KC, Montgomery-Recht K, Walkiewicz M, Notarangelo LD, Burbelo PD, Fuss I, Cohen JI, **Bollard CM**, Keller MD. Robust Antibody and T Cell Responses to SARS-CoV-2 in Patients with Antibody Deficiency. J Clin Immunol. 2021 Aug;41(6):1146-1153. PMCID: PMC8117127

4. <u>Overcoming Tumor Immune Evasion</u>.

A long-standing question in cancer immunobiology is how to overcome tumor immune evasion strategies such as tumor antigen loss, as seen with antibody and chimeric antigen receptor (CAR)-based T-cell therapies, and the secretion of immune-suppressive cytokines. To overcome this defense, I first studied T-cells from patients with EBV+ Hodgkin's Lymphoma, identifying numerous discrete, tumor-related epitopes. This advance provided the rationale for targeting multiple tumor antigens simultaneously. My work includes the first description of the expansion of multi-tumor antigen-specific T cells from healthy donors as well as umbilical cord blood, confirming that such T cell populations are derived from naïve T cells. Further, this work has facilitated the discovery of multiple unique and immunogenic CD4- and CD8-restricted T cell epitopes within viral and non-viral tumor antigens including neoantigens. In addition, adoptively transferred tumor-specific T cells are susceptible to immunosuppressive factors secreted by tumors, and I showed that TGFb secreted by tumors has significant inhibitory effects on T cell function and developed a novel strategy, using a dominant-negative TGF-b receptor to overcome this tumor escape mechanism.

a. **Bollard CM,** Rössig C, Huls MH, Massague J, Brenner MK, Heslop HE, Rooney CE. Adapting a TGFb-related tumor immune evasion strategy to enhance anti-tumor immunity. Blood. 2002 May 1;99(9):3179-87.
b. **Bollard CM**, Tripic T, Cruz CR, Dotti G, Gottschalk S, Torrano V, Dakhova O, Carrum G, Ramos CA, Liu H, Wu MF, Marcogliese AN, Barese C, Zu Y, Lee DY, O'Connor O, Gee AP, Brenner MK, Heslop HE, Rooney CM. Tumor-specific T-cells engineered to overcome tumor immune evasion induce clinical responses in patients with relapsed Hodgkin Lymphoma. J Clin Oncol. 2018 Apr 10;36(11):1128-1139. PMCID: PMC5891126
c. Burga RA, Yvon E, Chorvinsky E, Fernandes R, Cruz CRY, **Bollard CM**. Engineering the TGFβ Receptor to Enhance the Therapeutic Potential of Natural Killer Cells as an Immunotherapy for Neuroblastoma. Clin Cancer Res. 2019 Jul 15;25(14):4400-4412. PMCID: PMC6635028
d. Rivero-Hinojosa S, Grant M, Panigrahi A, Zhang H, Caisova V, **Bollard CM**, Rood BR. Proteogenomic discovery of neoantigens facilitates personalized multi-antigen targeted T cell immunotherapy for brain tumors. Nat Commun. 2021 Nov 18;12(1):6689. PMCID: PMC8602676

Complete list of publications in MyBibliography (total of >250):
https://www.ncbi.nlm.nih.gov/myncbi/catherine.bollard.1/bibliography/public/