

# CURRICULUM VITAE

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**DATE OF BIRTH:** October 2, 1978

**CITIZENSHIP:** US Citizen

**EDUCATION:** B.S., Microbiology and Cell Science, University of Florida, 2001. Graduated with high honors.

Ph.D., Immunology and Microbiology, University of Florida, College of Medicine, Interdisciplinary Program in Biomedical Sciences, 2006.

**MISSION:** The research program of the Brusko laboratory is broad in scope but is ultimately directed at identifying a prevention and/or cure for type 1 (i.e., insulin-dependent) diabetes (T1D). Key to achieving this goal is an improved understanding of the interactions between environmental, immunologic, and genetic factors that underlie the inability of patients with T1D to maintain immunological tolerance to insulin secreting pancreatic beta cells. In order to achieve this goal, four avenues of research are actively pursued. The first is that of identifying immune defects that herald the progression towards diabetes (e.g., cellular and serological biomarkers). The second involves precision medicine genomics to identify genotype:phenotype interactions leading to abnormalities in

immune regulation that associate with autoimmunity and influence the progression to disease. These studies have highlighted TCR signaling, co-stimulation (CD226/TIGIT axis), and the IL-2 signaling as key pathways of disease susceptibility. The third involves immunosequencing of highly variable TCRs and the generation of antigen-specific regulatory T cells (Tregs) by CRISPR/Cas9 gene editing and lentiviral TCR gene transfer. Finally, our labs have pioneered the collection of blood and tissues from key developmental sites (e.g., bone marrow, thymus, secondary lymphatics) to understand the developmental program of the human immune system using cutting-edge imaging and single cell sequencing technologies. Our studies are heavily focused on human sample acquisition and analysis with a commitment to clinical translation in T1D.

#### **PROFESSIONAL EXPERIENCE:**

<b>2024-present</b>	Director, University of Florida Diabetes Institute
<b>2023-present</b>	Assistant Dean for Basic Science Research, College of Medicine, University of Florida. Gainesville, FL.
<b>2021-present</b>	Professor, Department of Pathology, Immunology and Laboratory Medicine and Pediatrics (joint), University of Florida, College of Medicine. Gainesville, FL.
<b>2020-present</b>	Research Director, University of Florida Diabetes Institute
<b>2019-present</b>	Associate Professor, Pediatrics (joint appointment).
<b>2010-2021</b>	Associate Professor (tenure), Department of Pathology, Immunology and Laboratory Medicine, University of Florida, College of Medicine. Gainesville, FL.
<b>2007-2010</b>	Post Doctoral Fellow, Laboratory of Dr. Jeffrey Bluestone, Ph.D., Diabetes Center, University of California, San Francisco, San Francisco, CA.
<b>2006-2007</b>	Post Doctoral Fellow, Laboratory of Dr. Mark Atkinson, Ph.D., Department of Pathology, Immunology and Laboratory Medicine,

University of Florida, College of Medicine.  
Gainesville, FL.

- 2002-2006** Graduate Student in the Interdisciplinary Program in Biomedical Sciences, University of Florida, Department of Pathology Immunology and Laboratory Medicine, University of Florida College of Medicine.
- 2001-2002** Laboratory Technician, Laboratory of Dr. Mark Atkinson, Ph.D., Department of Pathology, Immunology and Laboratory Medicine, University of Florida, College of Medicine.
- 2000-2001** Laboratory Technician and Undergraduate Research, Laboratory of Dr. Jing-Xiong She, Ph.D. Department of Pathology, Immunology and Laboratory Medicine, University of Florida, College of Medicine.
- 1998-2000** Laboratory Technician and Teaching Assistant, Laboratory of Dr. Jack Gartner, Ph.D., Department of Natural Sciences, St. Petersburg College, St. Petersburg, FL.

## **HONORS/AWARDS**

- 2023** UF College of Medicine Outstanding Basic and Translational Science Award
- 2017-2020** University of Florida, College of Medicine Term Professorship
- 2017, 2021** UF College of Medicine Exemplary Teacher Award
- 2013** Pfizer Aspire Award Recipient
- 2012** JDRF Career Development Award
- 2011** American Diabetes Association, Scientific Sessions – Young Investigator Travel Grant Award
- 2010** JDRF Early Career Investigator Travel Award

<b>2009</b>	FOCIS Meeting – National Institutes of Health and JDRF Travel Awards
<b>2008</b>	Midwinter Conference of Immunologists – JDRF Travel Award Recipient
<b>2007</b>	FOCIS Meeting – National Institutes of Health Travel Award Recipient
<b>2005</b>	Graduate Fellowship for Outstanding Research Award, College of Medicine, University of Florida
<b>2001</b>	Elected to the Golden Key Society

#### **PUBLICATIONS:**

**1)** Zhang, Y.C.; Pileggi, A.; Agarwal, A.; Molano, R.D.; Powers, M.; **Brusko, T.M.**; Wasserfall, C.; Goudy, K.; Zahr, E.; Poggioli, R.; Scott-Jorgensen, M.; Campbell-Thompson, M.; Crawford, J.M.; Nick, H.; Flotte, T.; Ellis, T.M.; Ricordi, C.; Inverardi, L.; Atkinson, M.A.: Adeno-associated virus-mediated IL-10 gene therapy inhibits diabetes recurrence in syngeneic islet cell transplantation of NOD mice. *Diabetes*. 52:708-16, 2003. PMID: 12606512.

**2)** Zhang, Y.C.; Pileggi, A.; Agarwal, A.; Molano, R.D.; Powers, M.; **Brusko, T.M.**; Wasserfall, C.; Goudy, K.; Zahr, E.; Poggioli, R.; Scott-Jorgensen, M.; Campbell-Thompson, M.; Crawford, J.M.; Nick, H.; Flotte, T.; Ellis, T.M.; Ricordi, C.; Inverardi, L.; Atkinson, M.A.: Adeno-associated virus-mediated IL-10 gene therapy inhibits diabetes recurrence in syngeneic islet cell transplantation of NOD mice. *Diabetes*. 52:708-16, 2003. PMID: 12606512.

**3)** Goudy, K.S.; Burkhardt, B.R.; Wasserfall, C.; Song, S.; Campbell-Thompson, M.L.; **Brusko, T.M.**; Powers, M.A.; Clare-Salzler, M.J.; Sobel, E.S.; Ellis, T.M.; Flotte, T.R.; Atkinson, M.A.: Systemic overexpression of IL-10 induces CD4<sup>+</sup>CD25<sup>+</sup> cell populations in vivo and ameliorates type 1 diabetes in nonobese diabetic mice in a dose-dependent fashion. *J. Immunol.* 171:2270-78, 2003. PMID: 12928371.

**4)** Guo, D.; Li, M.; Zhang, Y.; Yang, P.; Eckenrode, S.; Hopkins, D.; Zheng, W.; Purohit, S.; Podolsky, R.H.; Muir, A.; Wang, J.; Dong, Z.; **Brusko, T.M.**; Atkinson, M.; Pozzilli, P.; Zeidler, A.; Raffel, L.J.; Jacob, C.O.; Park, Y.; Serrano-Rios, M.; Larrad, M.T.; Zhang, Z.; Garchon, H.J.; Bach, J.F.; Rotter, J.I.; She, J.X.; Wang, C.Y.: A functional variant of SUMO4, a new I kappa B alpha modifier, is associated with type 1 diabetes. *Nat. Genet.* 36:837-841, 2004. PMID: 15247916.

5) Kapturczak, M.H., Wasserfall, C.; **Brusko, T.M.**; Campbell-Thompson, M.; Ellis, T.M.; Atkinson, M.A.; Agarwal, A.: Heme oxygenase-1 modulates early inflammatory responses: evidence from the heme oxygenase-1-deficient mouse. *Am. J. Pathol.* 165:1045-53, 2004. PMID: 15331427.

6) Morales, A.; Wasserfall C.; **Brusko, T.M.**; Carter, C.; Schatz, D.; Silverstein, J.; Ellis, T.; Atkinson, M.: Adiponectin and leptin concentrations may aid in discriminating disease forms in children and adolescents with type 1 and type 2 diabetes. *Diabetes Care.* 27:2010-14, 2004. PMID: 15277432.

7) You, S.; Chen, C.; Lee, W.H.; **Brusko, T.M.**, Atkinson, M.; Liu, C.P.: Presence of diabetes-inhibiting, glutamic acid decarboxylase-specific, IL-10-dependent, regulatory T cells in naive nonobese diabetic mice. *J. Immunol.* 173:6777-85, 2004. PMID: 15557171.

8) **Brusko, T.M.**; Wasserfall, C.H.; Clare-Salzler, M.J.; Schatz, D.A.; Atkinson, M.A.: Functional defects and the influence of age on the frequency of CD4+CD25+ T-cells in type 1 diabetes. *Diabetes.* 54:1407-14, 2005. PMID: 15855327.

9) **Brusko, T.M.**; Wasserfall, C.H.; Agarwal, A.; Kapturczak, M.H.; Atkinson, M.A.: An integral role for heme oxygenase-1 and carbon monoxide in maintaining peripheral tolerance by CD4+CD25+ regulatory T cells. *J. Immunol.* 174:5181-86, 2005. PMID: 15843512.

10) Burkhardt, B.R.; Greene, S.R.; White, P.; Wong, R.K.; Brestelli, J.E.; Yang, J.; Robert, C.E.; **Brusko, T.M.**; Wasserfall, C.H.; Wu, J.; Atkinson, M.A.; Gao, Z.; Kaestner, K.H.; Wolf, B.A.: PANDER-induced cell-death genetic networks in islets reveal central role for caspase-3 and cyclin-dependent kinase inhibitor 1A (p21). *Gene.* Jan 10; 369:134-141, 2006. PMID: 1642588.

11) Araya, C.E.; Wasserfall, C.H.; **Brusko, T.M.**; Mu, W.; Segal, M.S.; Johnson, R.J.; Garin, E.H.: A case of unfulfilled expectations. Cytokines in idiopathic minimal lesion nephrotic syndrome. *Pediatric Nephrology Reviews.* May;21(5):603-610, 2006. PMID: 16525836.

12) **Brusko T.M.**; Atkinson, M.A.: Treg in type 1 diabetes. *Cell Biochem Biophys.* 48(2-3):165-75, 2007. PMID: 17709886.

13) Scumpia, P.; Kelly-Scumpia, K.; Reeves, W.; Clare-Salzler, M.; Delano, M.; O'Malley, K.; McAuliffe, P.; Efron, P.; **Brusko, T.M.**; Atkinson M.; Wynn, J.; Barker, T.; Moldower, L.: Increased natural CD4+CD25+ regulatory T cells and their suppressor activity do not contribute to mortality in murine polymicrobial sepsis. *J. Immunol.* Dec 1;177(11):7943-49, 2006. PMID: 17114466.

14) Ostrov, D.A.; Barnes, C.L.; Smith, L.E.; Binns, S.; **Brusko, T.M.**; Brown, A.C.; Quint, P.S.; Litherland, S.A.; Roopenian, D.C.; Iczkowski, K.A.:

Characterization of HKE2: an ancient antigen encoded in the major histocompatibility complex. *Tissue Antigens*. Feb;69(2):181-88, 2007. PMID: 17257322.

**15) Brusko, T.M.**; Wasserfall, C.; McGrail, K.; Schatz, R.; Viener, H.L.; Schatz, D.; Haller, M.; Rockell, J.; Gottlieb, P.; Clare-Salzler, M.; Atkinson, M.A.: No alterations in the frequency of FOXP3<sup>+</sup> regulatory T-cells in type 1 diabetes. *Diabetes*. Mar;56(3):604-612, 2007. PMID: 17327427.

**16) Lowe, C.E.**; Cooper, J.D.; **Brusko, T.M.**; Walker, N.M.; Smyth, D.J.; Bailey, R.; Bourget, K.; Plagnol, V.; Field, S.; Atkinson, M.; Clayton, D.G.; Wicker, L.S.; Todd, J.A.: Large-scale genetic fine mapping and genotype-phenotype associations implicate polymorphism in the IL2RA region in type 1 diabetes. *Nat Genet*. Sep; 39(9):1074-82, 2007. PMID: 17676041.

**17) Brusko, T.M.**; Hulme, M.A.; Myhr, C.B.; Haller, M.J.; Atkinson, M.A.: Assessing the in vitro suppressive capacity of regulatory T cells. *Immunol Invest*. 36(5-6):607-28, 2007. PMID: 18161521.

**18) Simon, G.**; Parker, M.; Ramiya, V.; Wasserfall, C.; Huang, Y.; Bresson, D.; Schwartz, R.F.; Campbell-Thompson, M.; Tenace, L.; **Brusko, T.M.**; Xue, S.; Scaria, A.; Lukason M.; Eisenbeis, S.; Williams, J.; Clare-Salzler, M.; Schatz, D.; Kaplan, B.; Von Herrath, M.; Womer, K.; Atkinson, M.A.: Murine anti-thymocyte globulin therapy alters disease progression in NOD mice by a time dependent induction of immunoregulation. *Diabetes*. Feb;57(2):405-14, 2008. PMID: 18039815.

**19) Brusko, T.M.**; Bluestone, J.: Clinical application of regulatory T cells for the treatment of type 1 diabetes and transplantation. *Eur. J. Immunol*. Apr 8;38(4):931-34, 2008. PMID: 18395864.

**20) Brusko, T.M.**; Putnam, A.L.; Bluestone, J.A.: Human regulatory T cells: role in autoimmune disease and therapeutic opportunities. *Immunol. Rev*. Jun;223:371-90, 2008. PMID: 18613848.

**21) Haller, M.J.**; Viener, H.; Wasserfall, C.; **Brusko, T.M.**; Atkinson, M.A.; Schatz, D.A.: Autologous umbilical cord blood infusion for type 1 diabetes. *Exp Hematol*. Jun;36(6):710-15, 2008. PMID: 18358588. PMCID: PMC2444031.

**22) George, J.F.**; Braun, A.; **Brusko, T.M.**; Joseph, R.; Bolisetty, S.; Wasserfall, C.H.; Atkinson, M.A.; Agarwal, A.; Kapturczak, M.H.: Suppression by CD4<sup>+</sup>CD25<sup>+</sup> regulatory T cells is dependent on expression of heme oxygenase-1 in antigen-presenting cells. *Am. J. Pathol*. May 29; 173(1):154-60, 2008. PMID: 18511516. PMCID: PMC2438293.

**23) Stalvey, M.S.**; **Brusko, T.M.**; Mueller, C.; Wasserfall, C.H.; Schatz, D.A.;

Atkinson, M.A.; Flotte, T.R.: CFTR mutations impart elevated immune reactivity in a murine model of cystic fibrosis related diabetes. *Cytokine*. Sep 6; 44(1):154-59, 2008. PMID: 18778952.

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25) \***Brusko, T.M.**; Putnam, A.L.; Lee, M.R.; Liu, W.; Szot, G.L.; Ghosh, T.; Atkinson, M.A.; Bluestone, J.A.: Expansion of human regulatory T cells from patients with type 1 diabetes. *Diabetes*. Mar;58(3):652-62, 2009. PMID: 19074986. PMCID: PMC2646064. \* *Co-first author*

26) **Brusko, T.M.**: Mesenchymal stem cells: A possible "border patrol" for transplanted islets. Commentary. *Diabetes*. Aug;58(8):1728-29, 2009. PMID: 19638531. PMCID: PMC2712779.

27) Haller, M.J.; Wasserfall, C.H.; McGrail, K.M.; Cintron, M.; **Brusko, T.M.**; Wingard, J.R.; Kelly, S.S.; Shuster, J.J.; Atkinson, M.A.; Schatz, D.A.: Autologous umbilical cord blood transfusion in very young children with type 1 diabetes. *Diabetes Care*. Nov;32(11):2041-46, 2009. PMID: 19875605. PMCID: PMC2768209.

28) **Brusko, T.M.**; Bluestone, J.: Regulatory T cells directed to the site of the action. Commentary. *Proc. Natl. Acad. Sci. U S A*. Dec 1; 106(49):20553-54, 2009. PMID: 19955436. PMCID: PMC2791590.

29) **Brusko, T.M.**; Wasserfall, C.H.; Hulme, M.; Cabrera, R.; Schatz, D.; Atkinson, M.A.: Influence of membrane CD25 stability on T lymphocyte activity: implications for immunoregulation. *PLoS ONE*. Nov 24;4(11):e7980, 2009. PMID: 19956753. PMCID: PMC2775921.

30) **Brusko, T.M.**; Koya, R.C.; Zhu, S.; Lee, M.R.; Putnam, A.L.; McClymont, S.A.; Nishimura, M.I.; Han, S.; Chang, L.; Atkinson, M.A.; Ribas, A.; Bluestone, J.A.: Human antigen-specific regulatory T cells generated by T cell receptor gene transfer. *PLoS ONE*. 5(7): e11726, 2010. DOI:10.1371/journal.pone.0011726. PMID: 20668510. PMCID: PMC2908680.

31) McClymont, S.A.; Putnam, A.L.; Lee, M.R.; Esensten, J.H.; Liu, W.; Baron, U.; Olek, S.; Bluestone, J.A.; **Brusko, T.M.**: Plasticity of human regulatory T cells in healthy subjects and patients with type 1 diabetes. *J. Immunol*. 186(7):3918-26, 2011. PMID: 21368230. PMCID: PMC3091943.

32) Golovina, T.N.; Mikheeva, T.; **Brusko, T.M.**; Blazar, B.R.; Bluestone, J.A.:

Retinoic acid and rapamycin differentially affect and synergistically promote the *ex vivo* expansion of natural human T regulatory cells. *PLoS ONE*. 6(1): e15868, 2011. DOI:10.1371/journal.pone.0015868. PMID: 21253593. PMCID: PMC3017077.

**33)** Sobel, E.S.; **Brusko, T.M.**; Butfiloski, E.J.; Li, S.; Cuda, C.M.; Abid, A.A.; Reeves, W.H.; Hou, W.; Morel, L.: Defective response of CD4<sup>+</sup> T cells to retinoic acid and TGF-beta in systemic lupus erythematosus. *Arthritis Research & Therapy*. Jun 27;13(3):R106, 2011. PMID: 21708033. PMCID: PMC3218921.

**34)** Haller, M.J.; Wasserfall, C.H.; Hulme, M.A.; Cintron, M.; **Brusko, T.M.**; Wingard, J.R.; Zeigler, A.; Wallner, M.; Simell, O.; Shuster, J.J.; Atkinson, M.A.; Schatz, D.A.: Autologous umbilical cord blood transfusion in young children with type 1 diabetes increases regulatory T cells but fails to preserve C-peptide. *Diabetes Care*. Dec;34(12):2567-69, 2011. PMID: 22011412. PMCID: PMC3220832.

**35)** Hulme, M.A.; Wasserfall, C.H.; Atkinson, M.A.; **Brusko, T.M.**: Central role for interleukin-2 in type 1 diabetes. Perspectives. *Diabetes*. Jan;61(1):14-22, 2012. PMID: 22187370. PMCID: PMC327657.

**36)** Cabrera, R.; Fitian, A.; Ararat, M.; Xu, Y.; **Brusko, T.M.**; Wasserfall, C.; Atkinson, M.A.; Liu, C.; Nelson, D.R.: Serum levels of soluble CD25 as a marker for hepatocellular carcinoma. *Oncology Letters*. Oct;4(4):840-46, 2012. PMID: 23205111. PMCID: PMC3506698.

**37)** Thompson, J.A.; Perry, D.; **Brusko, T.M.**: Autologous regulatory T cells for the treatment of type 1 diabetes. *Cur Diab Rep*. 2012 July 28. 10.1007/s11892-012-0304-5. PMID: 22843491.

**38)** Cabrera, R.; Ararat, M.; Xu, Y.; **Brusko, T.M.**; Wasserfall, C.; Atkinson, M.A.; Chang, L.J.; Liu, C.; Nelson, D.R.: Immune modulation of effector CD4<sup>+</sup> and regulatory T cell function by sorafenib in patients with hepatocellular carcinoma. *Cancer Immunol Immunother*. 2012 Dec 7. PMID: 23223899.

**39)** Haller, M.J.; Wasserfall, C.H.; Hulme, M.A.; Cintron, M.; **Brusko, T.M.**; McGrail, K.M.; Wingard, J.R.; Theriaque, D.W.; Shuster, J.J.; Ferguson, R.J.; Kozuch, M.; Clare-Salzler, M.; Atkinson, M.A.; Schatz, D.A.: Autologous umbilical cord blood (UCB) infusion followed by oral docosahexanoic acid (DHA) and vitamin D (VitD) supplementation for C-peptide preservation in children with type 1 diabetes (T1D). *Biology of Blood and Marrow Transplantation*. Jul;19(7):1126-29, 2013. PMID: 23611977.

**40)** Myhr, C.B.; Hulme, M.A.; Wasserfall, C.H.; Hong, P.J.; Lakshmi, P.S.; Schatz, D.A.; Haller, M.J.; **Brusko, T.M.\***; Atkinson, M.A.\*: The autoimmune disease-associated SNP rs917997 of *IL18RAP* controls IFN $\gamma$  production by

PBMC. *Journal of Autoimmunity*. Aug;44:8-12, 2013. PMID: 23891168. \*Co-corresponding author.

**41)** Mueller, C.; Chulay, J.; Trapnell, B.; Humphries, M.; Carey, B.; Sandhaus, R.; McElvaney, N.G.; Messina, L.; Tang, Q.; Rouhani, F.; Campbell-Thompson, M.; Fu, A.D.; Yachnis, A.; Knop, D.; Ye, G.; Brantly, M.; Calcedo, R.; Somanathan, S.; Richman, L.; Vonderheide, R.; Hulme, M.; **Brusko, T.M.**; Wilson, J.M.; Flotte, T.: Human Treg responses allow sustained recombinant adeno-associated virus-mediated transgene expression. *J. Clin. Invest.* 2013 Nov 15. PMID: 24231351.

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**43)** Lewis, J.S.; Roche, C.; Zhang, Y.; **Brusko, T.M.**; Wasserfall, C.H.; Atkinson, M.; Clare-Salzler, M.J.; Keselowsky, B.G.: Combinatorial delivery of immunosuppressive factors to dendritic cells using dual-sized microspheres. *J Mater Chem B Mater Biol Med*. May 7;2(17):2562-74, 2014. PMID: 24778809.

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**52)** Seay, H.R.; Yusko, E.; Rothweiler, S.J.; Zhang, L.; Posgai, A.L.; Campbell-Thompson, M.; Vignali, M.; Emerson, R.O.; Kaddis, J.S.; Ko, D.; Nakayama, M.; Smith, M.J.; Cambier, J.C.; Pugliese, A.; Atkinson, M.A.; Robins, H.S.; **Brusko, T.M.**: Tissue distribution and clonal diversity of the T and B cell repertoire in type 1 diabetes. *JCI Insight*. Dec 8;1(20):e88242, 2016. PMID: 27942583.

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## PRESENTED ABSTRACTS AND INVITED LECTURES:

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**Brusko T.M.**, C.H. Wasserfall, K.M. McGrail, A.L. Huegel, M.C. Moore, D.A. Schatz, M.A. Atkinson. Regulatory T cells require serum for suppression of effector T cell proliferation and express stable membrane-bound CD25. The Federation of Clinical Immunology Societies (FOCIS). 2007. Oral presentation.

**Brusko T.M.**, A.L. Putnam, S. Zhu, M.R. Lee, W. Liu, M. Nishimura, R. Koya, J.A. Bluestone. Engineered antigen-specific human regulatory T cells by viral TCR gene transfer. 2008 Beijing International Conference on Regulatory T Cells. Oral presentation.

**Brusko T.M.**, A.L. Putnam, S. Zhu, M.R. Lee, W. Liu, M. Nishimura, R. Koya, J.A. Bluestone. Development of engineered antigen-specific human regulatory T cells by viral TCR gene transfer. Meeting of the Midwinter Conference of Immunologists. Asilomar, Pacific Grove, CA. January 26-29, 2009.

**Brusko T.M.** Invited talk entitled "New therapies in the pipeline-regulatory T cells." American Diabetes Association (ADA), 69<sup>th</sup> Scientific Sessions. New Orleans, LA. June 5-9, 2009.

**Brusko T.M.**, S. Zhu, A.L. Putnam, M.R. Lee, S. McClymont, W. Liu, M. Nishimura, R. Koya, T. Tree, J.L. Riley, J.A. Bluestone. Development of engineered antigen-specific human regulatory T cells for the treatment of type 1 diabetes by TCR gene transfer. FOCIS (Federation of Clinical Immunology Societies). San Francisco, CA. June 11-14, 2009.

**Brusko T.M.** Invited talk entitled “Pre-clinical and clinical use of Tregs in autoimmunity.” 9th International Conference on New Trends in Immunosuppression and Immunotherapy. Geneva, Switzerland. February 4-6, 2010.

**Brusko T.M.** Invited talk entitled “Engineering tolerance to autoantigens in type 1 diabetes-Lentiviral TCR delivery to human regulatory T cells.” Tri-institutional Stem Cell Retreat. Asilomar, CA. April 14-16, 2010.

S. McClymont, M.R. Lee, A.L. Putnam, W. Liu, J. A. Bluestone, **Brusko T.M.** Stability and plasticity of human regulatory T cells: characterization of IFN- $\gamma$ <sup>+</sup> Tregs. FOCIS (Federation of Clinical Immunology Societies). Boston, MA. June 11-14, 2010.

**Brusko T.M.**, R.C. Koya, S. Zhu, M.R. Lee, S. McClymont, A.L. Putnam, M. Nishimura, J.A. Bluestone. Lentiviral TCR-engineered Tregs demonstrate effective suppression of T cell responses. FOCIS (Federation of Clinical Immunology Societies). Boston, MA. June 11-14, 2010.

**Brusko T.M.** Engineered antigen-specific human regulatory T cells for the treatment of type 1 diabetes. The 11<sup>th</sup> International Congress of the International Diabetes Society. Incheon, Korea. October 31-November 3, 2010. Invited lecture.

**Brusko T.M.** Engineered antigen-specific regulatory T cells. The 11<sup>th</sup> Annual Rachmiel Levine Diabetes and Obesity Symposium, Advances in Diabetes Research. Pasadena, CA. March 20-23, 2011. Invited lecture.

**Brusko T.M.** Flow cytometric analysis and cell sorting in the context of type 1 diabetes. Southeastern Cytometry Interest Group. University of Georgia, Athens, GA. June 23-24, 2011. Invited lecture.

Z. Han, R. Whitener, M.A. Atkinson, M.J. Haller, D.A. Schatz, J.A. Bluestone, **Brusko T.M.** Generation of antigen-specific regulatory T cells from human umbilical cord blood. Scientific Sessions of the American Diabetes Association (ADA). San Diego, CA. June 24-28, 2011. President’s Poster Selection.

**Brusko T.M.** Genetically-engineered Tregs: where are we going? UCSF Treg Retreat. San Francisco, CA. August 29, 2011. Invited lecture.

**Brusko T.M.** Tregs in the pathogenesis and treatment of type 1 diabetes. University of Alabama, Birmingham, AL. September 20-21, 2011. Invited lecture.

C. Furhman, **Brusko T.M.** Flow cytometric immunophenotyping of nPOD Donors. Annual JDRF nPOD meeting. Miami, FL. January 15-17, 2012. Oral and poster presentations.

C. Fuhrman, K. Kelsey, J. Wiencke, B. Christensen, M. Elliot, M.A. Atkinson, C.H. Wasserfall, **Brusko T.M.** Epigenetic global methylation signature of CD8+ T cells in type 1 diabetes. Annual meeting of the JDRF nPOD Program. Atlantic Beach, FL. February 10-13, 2012. Oral presentation.

**Brusko, T.M.** Immune regulation in T1D. University of South Florida (USF). Tampa, FL. March 23, 2012. Invited lecture.

**Brusko, T.M.** Regulatory T cells in the pathogenesis and treatment of type 1 diabetes. Meeting of the Pediatric Academic Society. Boston, MA. April 28-May 1, 2012. Invited lecture.

D.J. Perry, J.A. Thompson, Z. Han, M.A. Atkinson, **Brusko T.M.** Modulation of T cell receptor and Interleukin-2 receptor signaling in human primary CD4<sup>+</sup> T cells. Meeting of the American Association of Immunologists (AAI). Boston, MA. May 4-8, 2012. Poster presentation.

J.A. Thompson, J.A. Bluestone, **Brusko T.M.** Generation of antigen-specific human regulatory T cells by lentiviral knockdown of endogenous receptor and *de novo* TCR expression. Abstract - Federation of Clinical Immunology Societies (FOCIS) Vancouver, BC. June 2012. Poster presentation.

**Brusko, T.M.** Immune regulation in T1D. JDRF Autoimmunity Consortium Center Seminar Series. Harvard Medical School. Boston, MA. October 16-17, 2012. Invited lecture.

**Brusko, T.M.** Type 1 diabetes: moving beyond daily insulin injections. Tampa Bay Diabetes Society lecture series. University of South Florida (USF) Diabetes Center. Tampa, FL. November 1, 2012. Invited lecture.

**Brusko, T.M.** Immunotherapy for type 1 diabetes. UF Adult Endocrinology Seminar Series. Gainesville, FL. April 4, 2013. Invited lecture.

**Brusko, T.M.** Toward cellular therapies for the treatment of type 1 diabetes. Meeting of the American Diabetes Association's 73rd Scientific Sessions. Chicago, Illinois. June 21-25, 2013. Invited lecture.

**Brusko, T.M.** Nanoparticle conjugated Tregs for the treatment of type 1 diabetes. FOCiS JDRF Sponsored Symposium. Boston, MA. June 27, 2013. Invited lecture.

**Brusko, T.M.** Altered T cell metabolism in type 1 diabetes. Meeting of the Immunology of Diabetes Society (IDS). Lorne, Australia. December 3-12, 2013. Oral presentation.

**Brusko, T.M.** Moving Beyond GWAS in Type 1 Diabetes. University of Miami Immunology Seminar Series. Miami, FL. April 29, 2014. Invited lecture.

K.D. Davidson, C.A. Fuhrman, W. Yeh, H.R. Seay, K.T. Balavage, **Brusko, T.M.** Lymphocyte expression and activity of the co-stimulatory molecules CD226 and TIGIT in decidual tissue and umbilical cord blood. Abstract - Federation of Clinical Immunology Societies (FOCIS). Chicago, IL. June 25-28, 2014. Poster presentation.

P.S. Lakshmi, G. Tahhan, C. Wasserfall, M. Wallet, M. Atkinson, **Brusko, T.M.** Genetic regulation of TLR7/8 by SNP rs5979785 and its impact on T1D. Abstract - Federation of Clinical Immunology Societies (FOCIS). Chicago, IL. June 25-28, 2014. Poster presentation.

**Brusko, T.M.** Moving beyond GWAS in type 1 diabetes. University of Florida Animal Sciences Seminar Series. Gainesville, FL. August 28, 2014. *Invited lecture.*

S. Rothweiler, H.R. Seay, H. Robins, J.A. Bluestone, **T.M. Brusko.** The adaptive immune repertoire in T1D. Meeting of the JDRF nPOD consortium. St. Petersburg, FL. February 22-25, 2015. Poster presentation.

**Brusko, T.M.** Immunometabolic dysregulation in type 1 diabetes. Meeting of the Immunology of Diabetes Society (IDS). Munich, Germany. April 9-13, 2015. Invited lecture.

**Brusko, T.M.** Optimizing Treg stability and specificity for the treatment of type 1 diabetes. Meeting of the American Society for Cell and Gene Therapy (ASCGT). New Orleans, LA. May 13-16, 2015. Invited lecture.

**Brusko, T.M.,** Sean N. Parker. Autoimmunity Research Retreat. University of California, San Francisco (UCSF). May 28, 2015. Invited participant.

**Brusko, T.M.** The business of science: using SBIR funding to advance science and translation. UF Department of Pathology and Laboratory Medicine. Grand rounds lecture seminar series. Gainesville, FL. June 3, 2015.

**Brusko, T.M.** A cord blood stem cell program involving Treg cell expansion for the treatment of type 1 diabetes. Sanford Research's 5th Annual T1D Symposium, "Advances in Stem Cell Therapies for Type 1 Diabetes." Sioux Falls, South Dakota. June 18-19, 2015. Invited lecture.

J. Cserny, J.S. Lewis, B.G. Keselowsky, H.R. Seay, M.J. Haller, D.J. Perry, **Brusko, T.M.** Development of Nanoparticle-coupled Regulatory T cell Vaccine for Treatment of Type 1 Diabetes. Federation of the Clinical Immunology Society (FOCIS). Boston, MA. June 22-28, 2015.

**Brusko, T.M.** “Engineering T cells”. 76<sup>th</sup> Scientific Sessions of the American Diabetes Association (ADA). New Orleans, LA. June 10-14, 2016. Invited lecture.

W-I Yeh, A. Schultz, Atkinson M., C. Wasserfall, B. Newby, C. Mathews, H.R. Seay, Y-G Chen, **Brusko, T.M.** “The type 1 diabetes costimulatory molecule CD226 impacts lymphocyte frequency and CD8+ T cell function”. 76<sup>th</sup> Scientific Sessions of the American Diabetes Association (ADA). New Orleans, LA. June 10-14, 2016. Invited lecture.

**Brusko, T.M.** Human immune phenotyping in human T1D – Lessons from PBMC and nPOD donors. Meeting of the Immunology of Diabetes Society (IDS). San Francisco, CA. January 19-23, 2017. Oral invited lectures (platform and T cell working group).

**Brusko, T.M.** Optimizing regulatory T cell therapies for the treatment of T1D. Joslin Diabetes Center Seminar Series. Harvard Medical School. Boston, MA. February 17, 2017. Invited lecture.

**Brusko, T.M.** Immune Checkpoints in T1D: The CD226 and TIGIT axis. Meeting of the Brehm Coalition. Seattle, WA. April 13-15, 2017. Invited talk.

**Brusko, T.M.** Immunoregulatory checkpoints in T1D. Seminar Series to the Biomedical Engineering Department. University of Florida. August 28, 2017. Invited talk.

K. Motwani et al. and **Brusko, T.M.** T-cell and B-cell receptors as a biomarker for T1D. Meeting of the JDRF nPOD Consortium. Hollywood, FL. February 20-23, 2018. Invited talk.

**Brusko, T.M.** Immune phenotyping of nPOD tissues. Meeting of the JDRF nPOD Consortium. Hollywood, FL. February 20-23, 2018. Invited talk.

**Brusko, T.M.** Type 1 Diabetes endotypes. TrialNet Scientific Steering Committee Meeting. Reston, VA. March 2018. Invited talk and group discussion leader.

**Brusko, T.M.** Multiple immunogenetic and phenotypic interactions in T1D. Invited lecture at the BRI Seminar Series. Seattle, WA. April 2018.

**Brusko, T.M.** The insulin-like growth factor axis in T1D. Invited lecture at Novo Nordisk. Seattle, WA. April 2018.

**Brusko, T.M.** Cellular phenotypic and adaptive receptor repertoire profiles from pancreatic organ donors with type 1 diabetes. Invited oral abstract at annual HIRN meeting. Washington D.C. May 2018.

**Brusko, T.M.** The challenge of heterogeneity in disease progression. Invited symposium lecture entitled “Challenges and Hope in Finding a Cure for Type 1 Diabetes”. 78<sup>th</sup> Scientific Sessions of the American Diabetes Association. Orlando, FL. June 24, 2018.

**Brusko, T.M.** “Tracking cellular signatures of type 1 diabetes - moving from blood to peripheral tissues.” Invited lecture 16<sup>th</sup> Immunology of Diabetes Society. London, UK. October 25-29, 2018.

**Brusko, T.M.** “Decoding heterogeneity in type 1 diabetes.” Invited lecture at the Icahn School of Medicine at Mount Sinai, NY. Oct 31, 2018.

V Greiff, K Motwani, **Brusko, T.M.** Invited lecture to the JDRF Biomarker Working Group. Topic: Immune repertoire analysis as a biomarker in type 1 diabetes. January 7, 2019.

**Brusko, T.M.** Immune repertoire signatures in type 1 diabetes”. Invited lecture at Genentech. San Francisco, CA. Feb 4, 2019.

**Brusko, T.M.** Harnessing tissue biobanks to identify biomarkers in type 1 diabetes. Invited lecture at University of Arizona. Tucson, AZ. June 14, 2019.

**Brusko, T.M.** The human immune system over the first decade of life – introduction to the Human Atlas of Neonatal and Developmental Early Life-Immunity (HANDEL-I). Invited lecture in Warsaw, Poland for the GPPAD Consortium meeting. Oct 12, 2019.

#### **CO-AUTHORED ABSTRACTS:**

K. Goudy, C. Wasserfall, B.A. Burkardt, **Brusko, T.M.**, et al. Evaluation of mechanism, dose, and time dependency for AAV-IL-10 gene therapy in NOD mice. *Diabetes* 51: 1159 Suppl. 2, June 2002.

Y. Zhang, A. Pileggi, R. Damaris Molano, C. Wasserfall, M. Campbell-Thompson, E. Zahr, R. Poggioli, **Brusko, T.M.**, T. Flotte, C. Ricordi, M. Atkinson, L. Inverardi. Adeno-associated virus mediated Interleukin-10 gene therapy markedly inhibits islet allograft rejection in NOD mice. Scientific Sessions of the American Diabetes Association. 2004. Oral presentation.

M. Stalvey, C. Muller, C. Wasserfall, **Brusko, T.M.**, D. Schatz, M. Atkinson, T. Flotte. Modeling cystic fibrosis related diabetes in CFTR-deficient mice: Effects of CFTR genotype on glycemic control after sub-lethal beta cell injury or pulmonary sensitization and challenge. North American Cystic Fibrosis Conference. 2005. Oral presentation.

M. Stalvey, C. Wasserfall, **Brusko, T.M.**, T. Flotte, D. Schatz, M. Atkinson. A pro-inflammatory state and hyperglycemia are associated with a cystic fibrosis related diabetes mouse model. Scientific Sessions of the American Diabetes Association. 2005.

C. Wasserfall, R. Schwartz, G. Simon, S. Binns, **Brusko, T.M.**, M. Stalvey, M. Tang, Y. Lu, **Brusko, T.M.**, C. Wasserfall, B. Zhang, M. Campbell-Thompson, M. Atkinson, S. Song. Prevention of type 1 diabetes by AAT gene therapy is dose and time dependent. Scientific Sessions of the American Diabetes Association. 2005.

M. Haller, S. Cooper, A. Putnam, B. Freed, **Brusko, T.M.**, P. Chase, M. Atkinson, D. Schatz. Autologous cord blood transfusion associated with prolonged honeymoon in a child with type 1 diabetes (T1D). Scientific Sessions of the American Diabetes Association. 2005.

M.J. Haller, H.L. Viener, **Brusko, T.M.**, C. Wasserfall, K. McGrail, S. Staba, C. Cogle, M. Atkinson, D.A. Schatz. Insulin requirements, HbA1c, and stimulated C-peptide following autologous umbilical cord blood transfusion in children with T1D. *Diabetes* 56: A82-A82 Suppl. 1, June 2007. Oral presentation.

A.L. Putnam, **Brusko T.M.**, M.R. Lee, W. Liu, G.L. Szot, J.A. Bluestone. Moving Tregs to the clinic: expansion and characterization of human regulatory T cells. 2008 Beijing International Conference on Regulatory T Cells. Type: Oral presentation.

A.L. Putnam, S.A. McClymont, **Brusko, T.M.**, M.R. Lee, W. Liu, T. Ghosh, J.A. Bluestone. Expanded Tregs as a cellular therapy in Type 1 Diabetes. International Society of Cellular Therapy (ISCT). San Diego, CA. May 2009.

A.L. Putnam, S.A. McClymont, **Brusko, T.M.**, M.R. Lee, W. Liu, T. Ghosh, J.A. Bluestone. Stability and purity of expanded human CD4<sup>+</sup>CD127<sup>lo/-</sup>CD25<sup>+</sup> Tregs for use in cellular for the treatment of type 1 diabetes. Abstract - Federation of Clinical Immunology Societies (FOCIS). June 2009.

A. Putnam, M. Lee, W.H. Liu, H. Escosa, **Brusko, T.M.**, J. Bluestone. The Use of CD4<sup>+</sup>CD127<sup>lo/-</sup>CD25<sup>+</sup> Polyclonal Tregs for the Treatment of Recent Onset T1D in a Phase I Clinical Trial. *Clinical Immunology*. 135: S23-S23, 2010.

R. Cabrera, M. Ararat, M. Cao, Y. Xu, C. Wasserfall, **Brusko, T.M.**, M.A. Atkinson, C. Liu, D.R. Nelson. Sorafenib modulates immune responses in patients with hepatocellular carcinoma. 102<sup>nd</sup> Annual Meeting of the American Association for Cancer Research. Orlando, FL. April 2-6, 2011.

C.A. Fuhrman, D.M. Gubernick, **Brusko, T.M.**, D.A. Ostrov. Targeting the PD-1/PD-L1 complex with drug-like small molecules to induce T-cell tolerance.

Meeting of the American Association of Immunologists (AAI). San Francisco, CA. May 13-17, 2011.

M.A. Hulme, Z. Han, J. Alexander, C. Wasserfall, M.J. Haller, D.A. Schatz, **Brusko, T.M.**, M.A. Atkinson. Soluble CD25 expression in primary human CD4+ T cells enhance cellular expansion and IL-2 responsiveness. Immunology of Diabetes Society (IDS). Victoria, BC, CA. June 15-18, 2011.

C. Myhr, C. Wasserfall, M.J. Haller, D.A. Schatz, **Brusko, T.M.**, M.A. Atkinson. Increased IL-18 pathway phenotypes are associated with human type 1 diabetes. Immunology of Diabetes Society (IDS). Victoria, BC, CA. June 15-18, 2011.

J. Chen, Y.L. Lightfoot, J. Thompson, **Brusko, T.M.**, C.E. Mathews. Mt-MD2<sup>a</sup> protects mouse and human  $\beta$  cells against immune insults. Immunology of Diabetes Society (IDS). Victoria, BC, CA. June 15-18, 2011.

M.A. Hulme, C. Wasserfall, **Brusko, T.M.**, M.J. Haller, D.A. Schatz, D.A. Ostrov, M.A. Atkinson. Small molecule modifications of the IL-2 receptor: Implications for therapy in type 1 diabetes. Scientific Sessions of the American Diabetes Association (ADA). San Diego, CA. June 24-28, 2011.

M.J. Haller, C. Wasserfall, K. McGrail, M. Cintron, **Brusko, T.M.**, J. Wingard, W.B. Slayton, M.A. Atkinson, D.A. Schatz. Pilot study of autologous umbilical cord blood (UCB) transfusion followed by docosahexanoic acid (DHA) and vitamin D (VitD) supplementation in children with type 1 diabetes (T1D). Scientific Sessions of the American Diabetes Association (ADA). Philadelphia, PA. June 8-12, 2012.

D. Sarkar, D.M. Markusic, C. Terhorst, **Brusko, T.M.**, R.W. Herzog. Suppression of inhibitor formation in protein and gene therapy for hemophilia using *ex vivo* expanded Treg. American Society of Hematology.

D. Perry, J. Li, **Brusko, T.M.**, C. Mathews, J. Chen. Patients and individuals at-risk for developing type 1 diabetes exhibit peripheral T cell mitochondrial inner membrane hyperpolarization. American Diabetes Association (ADA) Scientific Sessions. June 21–25, 2013. Chicago, IL.

B. Newby, Y. Lightfoot, J. Thompson, M. Clare-Salzler, **Brusko, T.M.**, C. Mathews. Type 1 interferons prime human  $\beta$  cells for destruction by autoreactive human cytotoxic T lymphocytes. American Diabetes Association (ADA) Scientific Sessions. June 21–25, 2013. Chicago, IL.

D.J. Perry, P.L. Saikumar, X. Jia, **Brusko, T.M.** Functional consequences of *PTPN22* modulation in primary human CD4+ T cells. Federation of Clinical Immunology Societies. Boston, MA. Jun 27-30, 2013. Poster.

D. Sarkar, D. Markusic, C. Terhorst, **Brusko, T.M.**, R.W. Herzog. Suppression of inhibitor formation in protein and gene therapy for hemophilia using ex vivo expanded Treg. *Molecular Therapy*. 21(Suppl. 1): S45-S45, June 2013. Meeting Abstract: 109.

M.J. Haller, M.A. Atkinson, S.E. Gitelman, P.A. Gottlieb, A. Michels, S. Sanda, S. Rosenthal, M.A. Dennis, M. Cintron, R. Wesch, M. Wertz, K. McGrail, J. Lungaro, M. Schwartz, M.A. Hulme, **Brusko, T.M.**, C.E. Mathews, C. Wasserfall, D.A. Schatz. Combination low-dose antithymocyte globulin (ATG) and granulocyte colony stimulating factor (GCSF) preserves beta-cell function in patients with established type 1 diabetes (T1D). American Diabetes Association (ADA) Scientific Sessions. San Francisco, CA. June 15, 2014.

G. Ventriglia, G. Sebastiani, A. Stabilini, F. Mancarella, L. Nigi, **Brusko, T.M.**, M. Battaglia; F. Dotta. MiR-125a-5p is up-regulated in un-functional CD4+FOXP3+T regulatory cells deriving from pancreatic lymph nodes of patients with type 1 diabetes and targets C-C chemokine receptor type 2. *Diabetologia*. 57 (Suppl. 1): S104, September 2014. Meeting Abstract: 231.

D.J. Perry, P.L. Saikumar, L. Zhang, **Brusko, T.M.** Functional evaluation of *PTPN22* modulation in human T cells. The 101st Annual Meeting of the American Association of Immunologists. Boston, MA. 2015. Poster presentation.

M. Hulme, M. Nelson, C. Graves, B. Amador, **Brusko, T.M.**, S. Wallet. Altered gastrointestinal environment and immune cellular plasticity during disease progression of type 1 diabetes. Meeting of the Immunology of Diabetes Society (IDS). Munich, Germany. April 9-13, 2015. Poster presentation.

B.N. Newby, Y.L. Lightfoot, J. Chen, **Brusko, T.M.**, C.E. Mathews. The T1D-associated protective allotype of MT-ND2 inhibits the cytotoxic activity of beta cells directed T cells. American Diabetes Association (ADA) 75<sup>th</sup> Scientific Sessions. Boston, MA. June 5-9, 2015.

A.A. Titov, **Brusko, T.M.**, H.V. Baker, E. Sobel, L. Morel. MDM2 ubiquitin ligase in Lupus CD4 T-Cell pathology. Meeting of the American Association of Immunologists. Seattle, WA. May 13-17, 2016. Poster presentation.

D.J. Perry, Y. Yin, L.M. Morel, **Brusko, T.M.** Metabolic profiling of human PBMC subsets. Society of Leukocyte Biology guest symposium at the 102nd Annual Meeting of the American Association of Immunologists. Seattle, WA. May 13-17, 2016. Oral presentation.

B.N. Newby, **Brusko, T.M.**, C.E. Mathews. Type 1 interferon in the islet microenvironment contribute to autoreactive CTL cytotoxicity. American Diabetes Association (ADA) 76<sup>th</sup> Scientific Sessions. New Orleans, LA. June 10-14, 2016.

M.A. Hulme, J. Lewis, J. Stewart, **Brusko, T.M.** M.A. Atkinson, B. Keselowsky.

Immunomodulatory microparticle vaccine induces tolerogenic dendritic cells and prevents human T-cell proliferation. American Diabetes Association (ADA) 76<sup>th</sup> Scientific Sessions. New Orleans, LA. June 10-14, 2016.

M.J. Haller, S.E. Gitelman, P.A. Gottlieb, A.W. Michels, S.M. Rosenthal, J.J. Shuster, B. Zou, **Brusko, T.M.**, M. Hulme, C.H. Wasserfall, D. Perry, C.E. Mathews, M.A. Atkinson, D.A. Schatz. Combination therapy with ATG + GCSF in established type 1 diabetes: two-year outcomes. American Diabetes Association (ADA) 76<sup>th</sup> Scientific Sessions. New Orleans, LA. June 10-14, 2016.

W.I. Yeh, H.R. Seay, B. Newby, C.E. Mathews, **Brusko, T.M.** The type 1 diabetes-associated co-stimulatory molecule CD226 impacts lymphocyte frequency and CD8<sup>+</sup> Tcell function. American Diabetes Association (ADA) 76<sup>th</sup> Scientific Sessions. New Orleans, LA. June 10-14, 2016.

D.J. Perry, P.L. Saikumar, L. Zhang, **Brusko, T.M.** Functional evaluation of *PTPN22* modulation in human T cells. The Human Islet Research Network Annual Investigator Meeting. Bethesda, MA. 2016. Poster presentation.

M.R. Shapiro, C.H. Wasserfall, S.M. McGrail, M.J. Haller, D.A. Schatz, M.A. Atkinson, **Brusko, T.M.** Diminished insulin-like growth factors in pre-type 1 diabetes. 77<sup>th</sup> Scientific Sessions of the American Diabetes Association. San Diego, CA. June 9-13, 2017. Poster presentation.

W.I. Yeh, H.R. Seay, B. Newby, C.E. Mathews, **Brusko, T.M.** Costimulatory molecule CD226 impacts lymphocyte frequency and CD8<sup>+</sup> T cell function during type 1 diabetes. 77<sup>th</sup> Scientific Sessions of the American Diabetes Association. San Diego, CA. June 9-13, 2017.

B.N. Newby, M. Annamalai, **Brusko, T.M.** I.C. Gerling, C.E. Mathews. Type 1 interferons create a virulent islet microenvironment. 77<sup>th</sup> Scientific Sessions of the American Diabetes Association. San Diego, CA. June 9-13, 2017.

D.J. Perry, A.R. Schultz, H.R. Seay, M.A. Atkinson, **Brusko, T.M.** Comprehensive immunophenotyping identifies novel subset associations with age and type 1 diabetes status. Federation of Clinical Immunology Societies. Chicago, IL. 2017. Poster presentation.

D.J. Perry, C.H. Wasserfall, M.J. Haller, D.A. Schatz, M.A. Atkinson, **Brusko, T.M.** Assessing a machine learning strategy to improve measurement of T1D genetic risk. Federation of Clinical Immunology Societies. Chicago, IL. 2017. Poster presentation.

J.J. Ross, C. Wasserfall, D.J. Perry, K.M. McGrail, A.L. Posgai, **Brusko, T.M.**, D. Schatz, M.J. Haller, M.A. Atkinson. Exocrine pancreas function as a novel

biomarker in pre-T1D. 78<sup>th</sup> Scientific Sessions of the American Diabetes Association. Orlando, FL. June 22-26, 2018.

M.R. Shapiro, C.H. Wasserfall, A.R. Schultz, S.M. McGrail, M.J. Haller, D.A. Schatz, M.A. Atkinson, **Brusko, T.M.** Insulin-like growth factor axis collectively identifies pre-type 1 diabetes. 78<sup>th</sup> Scientific Sessions of the American Diabetes Association. Orlando, FL. June 22-26, 2018. Poster presentation.

A. Camargo, D.J. Perry, **Brusko, T.M.**, M.A. Wallet. SH2B3 (ink) regulates type 1 diabetes immune phenotypes. 78<sup>th</sup> Scientific Sessions of the American Diabetes Association. Orlando, FL. June 22-26, 2018.

M.R. Shapiro, W.I. Yeh, J.R. Longfield, C.I. Infante, J.P. Gallagher, L.D. Peters, C.R. Grace, Y.G. Chen, **Brusko, T.M.** CD226 knockout inhibits type 1 diabetes via impaired thymocyte development and peripheral T cell activation. Immunology of Diabetes Society Congress 2018. London, UK. October 25-29, 2018. Poster presentation.

W.I. Yeh, H.R. Seay, L.D. Peters, C.E. Mathews, **Brusko, T.M.** Costimulatory molecules CD226 and TIGIT impact CD8<sup>+</sup> T-cell phenotype and activity during type 1 diabetes. Immunology of Diabetes Society Congress 2018. London, UK. October 25-29, 2018.

M. Brusko, H. Seay, I. Kusmartseva, D. Farber, **Brusko, T.M.** The HANDEL-I project – Human Atlas of Neonatal Development and Early Life-Immunity. nPOD 11th Annual Scientific Meeting. Hollywood, Florida. February 19-22, 2019.

A. Vecchione, K. Shankwitz, J. Gerosa, T. Jofra, R. Di Fonte, C.M. Pia, A. Schultz, H. Seay, L. Piemonti, A. Aiuti, C. Petrovas, **Brusko, T.M.**, M. Battaglia, G. Fousteri. Follicular regulatory T cells are reduced in pancreatic lymph nodes of patients with T1D. nPOD 11th Annual Scientific Meeting. Hollywood, Florida. February 19-22, 2019.

A. Carr, D. Perry, C. Flaxman, B. Shields, M.A. Atkinson, **Brusko, T.M.**, R.A. Oram, S. Richardson. A type 1 diabetes genetic risk score can aid classification of nPOD cases. nPOD 11th Annual Scientific Meeting. Hollywood, Florida. February 19-22, 2019.

L. Peters, M. Brusko, D. Perry, M. Shapiro, W. Yeh, **Brusko, T.M.** Unsupervised clustering of high parameter mass cytometry data reveals immune heterogeneity in T1D. nPOD 11th Annual Scientific Meeting. Hollywood, Florida. February 19-22, 2019.

## GRANT FUNDING

Juvenile Diabetes Foundation Research International (JDRF) Pilot and Feasibility

Grant: 7-2006-328. The influence of CD25 genotypes on the control of CD25 and FOXP3 expression. Funding period: 1 year. Mark Atkinson (PI) as addendum to Immunoregulatory Based Therapies for Type 1 Diabetes.

Juvenile Diabetes Foundation Research International (JDRF) Post-Doctoral Fellowship. Engineered regulatory T cells as a means to restore tolerance in T1D. Funding period: 2 years.

Juvenile Diabetes Foundation Research International (JDRF) Advanced Post-Doctoral Fellowship: 10-2010-191. Development of antigen-specific human Tregs for the treatment of T1D. Funding period: 3 years, with 1 year transition funding.

California Institute for Regenerative Medicine (CIRM): RM1-01703. Tolerance induction using engineered stem cell-specific regulatory T cells. Funding period: 3 years. Awarded as co-investigator under Jeffrey Bluestone (PI).

Juvenile Diabetes Foundation Research International (JDRF) Award: 25-2010-702. Post transcriptional regulation of pancreas-targeting nTreg cells. PI-Manuela Battaglia, Institute San Raffaele. Milan, Italy. Funding period: 3 years (6/30/2010-6/30/2013). Role: Sub-contracted Co-Investigator.

Juvenile Diabetes Foundation Research International (JDRF) Pilot and Feasibility Grant: 4-2005-1168. Investigating human autoreactive T cell responses in humanized mice. Funding period: 1 year (9/1/2010-8/31/2011). Role: PI, under JDRF Center Director Jeffrey A. Bluestone. Addendum to Collaborative Center for Cell Therapy (CCCT).

Juvenile Diabetes Foundation Research International (JDRF). Autoimmunity Center Consortium (ACC) Cord Blood Center Grant, Project 1 Cord Blood Therapies for Type 1 Diabetes. JDRF 4-2007-1065. Mark Atkinson (PI). Funding period: 1 year (08/01/2011-08/01/2012). Role: Co-Investigator.

Juvenile Diabetes Foundation Research International (JDRF) Innovative Grant: 5-2011-469. Nanoparticle-coupled Tregs for the treatment of type 1 diabetes. Funding period: 1 year (09/01/2011-9/1/2012). Role: PI.

Juvenile Diabetes Foundation Research International (JDRF): 2-2012-280. Career Development Award. Investigating human autoreactive T cells in humanized mice. Funding period: 4 years (5/1/2012-5/1/2016). Role: PI.

American Diabetes Association (ADA). Innovative Grant: Role of T cell mitochondrial function in type 1 diabetes. Funding period: 2 years (7/1/2012-6/30/2014). Role: Co-Investigator.

Juvenile Diabetes Foundation Research International (JDRF). Pioneering Pilot Grant: 17-2012-595. Lymphocyte mitochondrial dysfunction on type 1 diabetes.

Jing Chen (PI). Funding period: 3 years (09/01/2012-08/31/2015). Role: Co-Investigator.

Alliance for Lupus Research (ALR). CD4 T cell metabolism in SLE: Characterization and target identification. Laurence Morel (PI). Funding period: 3 years (02/01/2013-01/31/2016). Role: Co-Investigator.

National Institutes of Health (NIH): R01-AI045050. Characterization of SLE-susceptibility loci on mouse chromosome 1. Laurence Morel (PI). Funding period: 5 years (6/20/2018-5/31/2023). Role: Co-Investigator.

UF Sponsored Seed Grant. Mucosal Therapeutics for Type 1 Diabetes. David Pascual (PI, Veterinary Medicine). Funding period: 2 years (5/1/2013-4/30/2015). Role: Co-Investigator.

National Institutes of Health (NIH). P01 AI42288. Immune function and the progression to type 1 diabetes. Mark A. Atkinson (PI). Funding period: 5 years (05/01/2013-04/30/2018). Role: Co-Investigator for Project 2.

PerkinElmer Sponsored Non-restricted Research Grant. Autologous umbilical cord blood expanded regulatory T cell therapy in children with type 1 diabetes. T.M. Brusko and MJ Haller (PI's). Funding period: 1 year (06/2013-06/2014). Role: Co-PI.

American Diabetes Association (ADA). Basic Science Award #7-13-BS-022: Influence of IL-12 and IL-18 on immunoregulation and type 1 diabetes pathogenesis. Funding period: 3 years (7/1/2013-6/30/2016). Role: PI.

National Institutes of Health (NIH). Small Business Innovative Research (SBIR) Grant: 1R43DK100132-01. Polymeric biomaterial-based microparticle vaccine for amelioration of type 1 diabetes. Funding period: 9/15/2013-8/31/2014. J. Lewis (PI). Role: Founding Scientific Member for OneVax, LLC.

Pfizer - Inspire Hemophilia Grant. Regulatory T Cells with Chimeric Antigen Receptor for Immune Tolerance to Factor VIII. Funding period: 2 years (10/1/2013-9/30/2015). Role: PI.

National Institutes of Health (NIH). NIDDK Small Business Innovative Research (SBIR): 1R43DK103402-01A1. A novel biomaterial-based therapy to prevent type 1 diabetes. Funding period: 09/15/2014-08/31/2015. G. Marshall (PI). Role: Founding Scientific Member for OneVax, LLC and UF sub-contract PI.

Hyundai Hope on Wheels. Sponsored Non-restricted Research Grant. Minimizing Leukemia Relapses: A Phase I Dose Escalation Study of Decitabine in High Risk. Funding period: 1 year (11/1/2014-11/1/2015). Lamis Eldjerou (PI). Role: Project Co-Investigator.

Univ. of Miami/Helmsley Charitable Trust. The George S. Eisenbarth nPOD Award for Team Science. Funding period: 3 years (11/01/2014-10/31/2017). Alberto Pugliese (PI). Role: Co-Investigator.

National Institutes of Health (NIH). NIDDK Human Islet Research Network (HIRN) UC4 Grant: 1UC4DK104194-01. Genetic Regulation of Human Beta Cell Destruction. Funding period: 5 years (12/01/2014-11/30/2019). C. Mathews (PI/PD). Role: Project Co-Investigator.

Diabetes Research Connection. Nanoparticle coupled regulatory T cells for the treatment of type 1 diabetes. Pilot and feasibility grant mechanism. Funding period: 1 year (1/1/2015-12/31/15). Role: PI.

Cord Blood Registry (CBR) Sponsored Non-restricted Research Grant. Cord blood expansion of regulatory T cells. T.M. Brusko and MJ Haller (PI's). Funding period: 1 year (01/19/2015-01/18/2016). Role: Co-PI.

University of Florida Preparatory Grant Program. Therapeutic targeting of immune metabolism. Funding period: 2 years (05/01/2015-04/30/2017). Laurence Morel and Clayton Mathews (MPI). Role: Co-Investigator and Immune Profiling Core PI.

National Institutes of Health/NIDDK: R01 DK106191. The CD226 and TIGIT costimulatory axis in type 1 diabetes. Funding period: 5 years (7/1/2015-6/30/2020). Role: PI.

American Diabetes Association (ADA). Minority Undergraduate Internship Funding Award #1-16-MUI-02: Determining the influence of IL-12 and IL-18 signaling on Treg activity. Funding period: 1 year (1/1/2016-12/31/2016). Role: Mentor PI.

American Diabetes Association (ADA). Elucidating the Immunoregulatory Roles of TIGIT and CD226 during TD1. Funding period: 2 years (01/01/2016-12/31/2018). Wen Yeh (PI). Role: Mentor.

National Institutes of Health. Human Islet Research Network (HIRN) Pilot Award. NIH NIDDK 0U01DK104162-02. Characterization and in silico reconstruction of TCRs for modeling autoreactive T cells in T1D. Sub-contract through the City of Hope. Funding period: 1 year (2/1/2016-1/31/2017). Joyce Nilan (PI), Role: UF PI.

National Institutes of Health (NIH/NIDDK): R01 DK106191. The CD226 and TIGIT costimulatory axis in type 1 diabetes. Funding period: 04/01/2016-01/31/2027. Role: PI.

Juvenile Diabetes Research Foundation. Altered Immunometabolic Associations with Type 1 Diabetes Clinical Status and Genetic Risk. Funding period: 2 years (05/01/2016-04/30/2018). Daniel Perry (PI). Role: Mentor.

Cord Blood Registry (CBR) Sponsored Non-restricted Research Grant. Clinical Trial Planning Grant for Treg Therapy in Type 1 Diabetes. Funding period: 06/29/2016-11/30/17. MJ Haller (PI, Peds). Role: Co-Investigator.

Univ. of California San Francisco/National Institutes of Health/NIDDK. P01 AI118688-01. Disruption of T cell tolerance in type 1 diabetes. Funding period: 5 years (07/01/2016-06/30/2021). Mark Anderson (PI). Role: Co-Investigator.

National Institutes of Health. NIDDK DP3 1DP3DK110845-01. Insulin Specific T and B cells in Type 1 Diabetes. Funding period: 3 years (08/01/2016-07/31/2019). J. Cambier and A. Michaels (PI's), Univ. of Colorado. Role: Co-Investigator.

UC Denver/NIH. DP3DK110845. Insulin Specific T and B cells in Type 1 Diabetes. Funding period: 3 years (08/02/16-07/31/19). Michels (PI). Role: Co-Investigator.

Univ. of California San Francisco/National Institutes of Health/NIDDK: DP3DK111914. Functional Interrogation of Non-Coding Type 1 Diabetes Risk Variants in Human Immune Cells and Beta Cells. Funding period: (09/30/2016-6/30/2021). Alex Marson (PI). Role: Co-Investigator.

US Dept of Defense. Advanced Regenerative Manufacturing Institute (ARMI). Advanced Liver 3-D Tissue Models for Drug Development Applications to Support Toxicology, Drug Metabolism, Target ID & Pharmacology. Funding period: (4/1/2017-7/30/2020). PI: Anthony Angelini (Materials and Aerospace Engineering). Role: Co-Investigator (Immunology).

Onevax, LLC./National Institutes of Health SBIR. Biomaterial-based delivery of Interleukin-2 to Regulatory T Cells for the amelioration of Type 1 diabetes. Funding period: 1 year (04/03/2017-04/02/2018). Greg Marshall (PI). Role UF Sub-contract PI.

Onevax, LLC./National Institutes of Health (NIH) R21. Delivery of biomaterial-conjugated regulatory T Cells for the amelioration of Type 1 Diabetes. Funding period: 2 years (07/03/2017-07/02/2019). Greg Marshall (PI) Role: Co-Investigator.

National Institutes of Health (NIH) R01 GM126089. An Imputation-Consistency Algorithm for Biomedical Complex Data Analysis. Funding period: 5 years (01/01/2018-12/31/2021). Faming Liang (PI). Role: Co-Investigator.

Helmsley Charitable Trust: 2018PG-T1D053. Collaborative Type 1 Diabetes Research Project: The Network for Pancreatic Organ donors with Diabetes (nPOD). Funding period: 2 years (01/01/18-12/31/20). Atkinson (PI). Role: Co-Investigator and director of the cytometry and cell sorting core.

Juvenile Diabetes Research Foundation (JDRF). Characterization of T cell Autoreactivity in Type 1 Diabetes. Funding period: 3 years (02/28/2018-02/27/2021). Laura Jacobsen (PI). Role: Co-Investigator and mentor.

National Institutes of Health (NIH). T32 DK108736. Interdisciplinary Graduate Program in Type 1 Diabetes and Biomedical Engineering. Funding period: 5 years (04/01/2018-03/31/2023). Mark Atkinson (PI). Role: Participating Faculty Member.

Helmsley Charitable Trust: 2018PG-T1D071. Human Atlas of Neonatal Development and Early Life-Immunity (HANDEL-I). Funding period: 7 years (04/01/18-11/30/2025). Role: PI.

National Institutes of Health (NIH/NIAID). 2P01AI42288-25. Immune function and the progression to Type 1 Diabetes. Funding period: 10 years (6/30/2018 - 5/31/2028). Role: PI.

American Diabetes Association (ADA). Minority Undergraduate Research Internship Award:7-18-MUI-005. Recipient: Caridad lafante, Yeh and Brusko (post-doctoral and PI-mentor). The impacts of co-stimulatory molecules CD226 and TIGIT on T1D development. Funding period: 1 year (7/1/18-6/30/19).

National Institutes of Health (NIH): U54 HL142766. A 3D Tissue Map of the Human Lymphatic System. Funding period: 09/14/18 – 06/30/22. Atkinson (PI). Role: Co-Investigator Project-001; Project Lead Project-002; Co-Investigator Project-003.

Helmsley Charitable Trust: 2019PG-T1D011. T cell receptor sequencing in type 1 diabetes - biomarker discovery and technology development. Mark Peakman and Todd Brusko (MPIs). Funding period: 3 years (10/1/2018-9/30/2021). Role: PI.

Juvenile Diabetes Research Foundation (JDRF): 3-SRA-2019-793-S-B. Single cell sequencing for islet-reactive T cell clonotype and transcript signatures. Funding period: 3 years (6/1/2019 – 5/31/2022). Role: PI.

Juvenile Diabetes Research Foundation (JDRF) to Dr. Steven Gitelman (PD-UCSF). Mechanistic Analysis of Gleevec in Type 1 Diabetes. Ancillary mechanistic studies subcontract. Role: UF PI.9/30/16-6/30/2019.

Juvenile Diabetes Research Foundation (JDRF): 3-SRA-2019-793-S-B. Single cell sequencing for islet-reactive T cell clonotype and transcript signatures. 06/01/2019-05/31/2020.

NIH NIDDK Training Supplement for Pediatric Endocrinology Support (M.D. Laura Jacobsen). Parental R01 – R01DK106191. 6/13/2019-2/29/2020.

National Institutes of Health (NIH/NIDDK). UG3 DK122638. Engineering a Human Microphysiological System for the Characterization of Islet-Immune Interactions. Funding period: 7/1/2019 – 6/30/2024. Stabler-Anderson (PI); Role: MPI.

Juvenile Diabetes Research Foundation (JDRF). Engineered regulatory follicular Tregs to block autoantibody development and progression of type 1 diabetes. Funding period: 10/1/2019 – 9/30/2020. Brusko (PI).

UF Office of Research. OR-DRPD-ROF2019. Development of a Novel Immunological test (T-CFtest) to Diagnose and Monitor the Treatment of Autoimmune Central Nervous System Diseases. Funding period: 6/1/2019 – 5/31/2021. Irazuzta (PI); Role: Co-Investigator.

National Institutes of Health (NIH). R01 GM133815. The Role and Mechanisms of Lipid and Lipoprotein Dysregulation in Sepsis. Funding period: 4/1/2020 – 3/31/2025. Guirgis (PI); Role: Co-Investigator.

National Institutes of Health (NIH). R01 HL142887. Role of ADAM17 in MDSC-Mediated Development of Pulmonary Hypertension. Funding period: 4/1/2020 – 3/31/2025. Bryant (PI); Role: Co-Investigator.

Helmsley Charitable Trust: 2004-03813. Human Atlas of Neonatal Developmental and Early Life Pancreas / Immunity (HANDEL)-P/I Continuation. Funding period: 2/1/2020 – 11/30/2025. Brusko (PI).

Baylor/NIH. Type 1 diabetes genetic risk scores for the diagnosis of diabetes type in children of diverse racial and ethnic background. Funding period: 2/1/2021 – 1/31/2025. Brusko (PI).

Juvenile Diabetes Research Foundation (JDRF). The Network for Pancreatic Organ donors with Diabetes (nPOD): A Collaborative Type 1 Diabetes Research Project. Funding period: 5/1/2021 – 9/30/2026. Atkinson (PI); Role: Co-Investigator.

University of Florida Research: Characterizing the internal metabolic state of normal and lupus T cells. Funding period: 6/1/2021 – 5/31/2023. Dixit (PI); Role: Co-Investigator.

University of Pennsylvania/NIH. U01DK112217. Human Pancreas Analysis Program (HPAP) for Type 1 Diabetes. Funding period: 7/1/2021 – 6/30/2025. Naji (PI); Role: Co-Investigator.

Cornell University/NIDDK. R01DK133701. Engineering islet-like organoids from gastric stem cells for T1D cell replacement therapy. Funding period: 9/1/2022 – 5/31/2026. Zhou (PI); Role: Co-Investigator.

NIH/NCI. Exploring novel therapeutic strategies for combinatory therapy to treat renal clear cell carcinomas. Funding period: 01/2023 – 12/2027. Zhang (PI); Role: Co-Investigator.

BreakthroughT1D (formerly JDRF). Restoration of immune regulation in type 1 diabetes through the synergistic action of insulin-like growth factor-1 and interleukin-2. Funding period: 04/2024 – 03/2026. Brusko (PI).

### **PENDING RESEARCH SUPPORT**

Baylor/NIH. Using genetics in the selection of candidates for therapies to prevent type 1 diabetes and its progression. Funding period: 07/2024 – 06/2029. Redondo (PI); Role: Co-Investigator.

### **GRANT REVIEWS AND STEERING COMMITTEES**

Institutional Grant Reviews  
Student Grant Review Committee, 2006.

Medical Guild Research Incentive Awards, 2010.

Experimental Pathology, Departmental Post-Doctoral Grant Review Committee, University of Florida, College of Medicine, 2011.

Thrasher Research Fund for Children's Medical Research Grant Reviewer. (2011, Ad Hoc)

JDRF Medical Science Review Committee (MSRC) Member. Served to review the Autoimmunity Center Consortiums, strategic grant review committees, and training award applications, which include Advanced Postdoctoral Fellowships (APFs), Postdoctoral Fellowships (PFs), Career Development Awards (CDAs), and Early Career Patient Oriented Diabetes Research Award (ECPDRs). 2011-2014: Reviewer for JDRF RFA: Studies Relevant to the Discovery and Development of Antigen Specific Therapies for Human Type 1 Diabetes. 2016-2017: Reviewer for Immune Project Concepts and Biomarker SRAs; Neo-epitope RFA; SRA Program Requests (Ad Hoc).

NIH: Type 1 Diabetes TrialNet: Ancillary Studies Presentations and Publications Subcommittee (PPS) Review Member, 2016-present.

NIH: Type 1 Diabetes TrialNet: Collaborative Mechanistic Studies Panel Member (CMSP), 2018-Present.

NIH: RFA-DK-10-012 Type 1 Diabetes Impact Award (DP3) – Member of the Scientific Review Panel, 2011.

NIH NIDDK: RFA-DK-11-024. “Small Business Innovative Research to Develop New Methods and Technologies Able to Identify Individuals At Risk of Developing Type 1 Diabetes (T1D) (R43)”. SBIR Study Section Reviewer, 2012.

NIH NIDDK: Special Emphasis Panel Review Committee Member. RFA-DK-11-019 entitled, “Function of Type 1 Diabetes Genes (DP3).” June 28-29, 2012.

National Institutes of Health (NIH), National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK): Small Business Innovation Research (SBIR) to Develop New Methods and Technologies for Assessment of Risk and for Early Diagnosis and Prognosis of Type 1 Diabetes (T1D) (R43/R44). Special emphasis panel review committee member. RFA-DK-11-024. Ad Hoc Grant Reviewer. January 2016.

NIH/NCATS Special Emphasis Study Section Ad Hoc Grant Reviewer. “RFA-TR-19-014; Clinical Trials on a Chip.” McLean, VA. Feb 18-19, 2020.

American Diabetes Association (ADA) – Research Grant Review Committee (RGCR) Member, 2013-2015. American Diabetes Association (ADA) – Scientific Sessions Abstract and Late Breaking Abstract Reviewer (Immunology), 2012-2016.

French National Research Agency. “Blanc” program specialized reviewer. B7-IT. Committee SVSE 1, 2012.

Israel Science Foundation. ISF-JDRF Joint Program in Type 1 Diabetes Research. Ad hoc reviewer, 2012, 2019.

Landsteiner Foundation for Blood Transfusion Research. Scientific advisory council. Ad hoc grant reviewer, July 13, 2012.

The Joslin Diabetes Research Center (DRC) at Harvard Medical School. Ad Hoc reviewer for internal Pilot and Feasibility Awards, January 2013.

The Decade of Discovery in Diabetes (DoDD) Grant reviewer for the partnership between the University of Minnesota and the Mayo Clinic, May 2013.

Helmsley Trust Breakthrough Therapeutics Initiative Grant Reviewer, December 2013.

JDRF Biomarker Working Group. Committee member, 2013-present.

JDRF Network for Pancreatic Organ donors with Diabetes (nPOD) Tissue-prioritization Committee (TPC) member, 2017-present.

JDRF nPOD Data Working Group, 2019-present.

Helmsley T1D Exchange Living Biobank Scientific Advisory Board Steering Committee Participant Tampa, FL, March 5, 2014.

R&D Challenge Fund, The Guy's & St Thomas' Charity, South London and the Maudsley Charity, the Medical Research Council and the Wellcome Trust. King's College London. Ad Hoc Grant Reviewer. March 2014.

Board Member, Help a Diabetic Child Foundation  
Diabetes UK. Reviewer for the Special Emphasis Panel for the Prevention and Treatment of Type 1 Diabetes. Ad hoc grant reviewer, July 2014.

Discovery-Diabetes (DIS-DIA) peer review panel of the 2015 PRMRP Program for the Department of Defense Congressionally Directed Medical Research Programs (CDMRP). Ad Hoc Grant Reviewer, July 2015.

Science Foundation Ireland. SFI/EI Technology Innovation Development Award (TIDA) 2015 Peer review panel. Ad Hoc Grant Reviewer, August 2015.

Foundation ARSEP – French MS Research Society. Ad Hoc Expert Scientific Grant Reviewer, March 2017.

Independent Research Fund Denmark – The Danish Agency for Science and Higher Education. Ad Hoc International Expert Scientific Grant Reviewer. Copenhagen, Denmark, 2018.

NIH NIAID Autoimmunity Centers of Excellence Clinical Research Program. RFA-AI-003. Peer Review Panel - UM1 mechanism. Ad Hoc Grant Reviewer Potomac, Maryland, December 3-5, 2018.

NIH The Environmental Determinants of Diabetes in the Young (TEDDY), Immune Markers Committee Member, 2019-present.

2019. NIH NIDDK Ad Hoc grant reviewer. Special emphasis review panel on novel lead drug development (FOA: PAR16-121).

2020. UG/UH3 Tissue Chips to Inform Clinical Trial Design. ZTR1 TC-7(01). Ad Hoc Grant Reviewer. Feb 18-19, 2020.

2020. University of Colorado, Barbara Davis Center Pilot and Feasibility Grant Reviewer (external ad hoc).

2020. Stanford Diabetes Research Center, Pilot and Feasibility Review (external ad hoc).

2022. NIH National Institute of Diabetes and Digestive and Kidney Diseases Special Emphasis Panel. NIDDK ZDK1 GRB-2(M1). Fellowships in Diabetes Endocrinology and Metabolic Diseases. Agenda Seq Num – 440213. 02/10/2022 – 02/11/2022.

## **TEACHING AND LECTURES**

### **Faculty lecturer**

GMS 6140: Principles of Immunology (Spring 2011-present)

Topics: Peripheral immune regulation; Modulation of immune responses

GMS6383: Current Topics in Immunotherapy (course director)

Taught on odd years; ImmunoMicro Advanced Curriculum

Topics: Gene editing, CAR-T, immunotherapies in cancer and autoimmunity

GMS 6382: Advanced Cellular and Molecular Immunology (Fall 2011)

Topics: Regulatory T cells and immune tolerance

GMS 6140: Principles of Immunology (Spring 2012)

Topics: T cell Development and tolerance, Team Based Learning- Lymphocyte Development, Helper T cell subsets and responses, APC regulation of the immune response, Peripheral immune regulation, Modulation of immune responses

GMS6335: Advanced Stem Cell Engineering: Tissue Engineering (Fall 2013)

Guest lecture on cell therapies in T1D)

BMS 4905: Mentor sponsored undergraduate research

Alton Stone, Amy Patel, Phillip Lichlyter, Christina Denise Go, Aaron Raju, Ashley Bushdorf, Leeana Peters, Caridad lafante

Faculty mentor

Independent Study in Bioinformatics (MCB 4934, section 1D27, 3 credits)

Phillip Lichlyter

## **COURSE DIRECTOR**

GMS 6392: Advanced topics in Immunology (Fall 2012)

Topics: Literature driven discussion of immune regulation and advanced T cell biology.

Medical Guild Faculty Judge: Immunology Concentration student competition. 2011, 2012.

## **PROFESSIONAL DEVELOPMENT**

Innovation HUB-002 - SBIR Workshop  
Oct. 20, 2011  
FEID: 59-6002052

ExCyte advanced flow cytometry module training  
Dec. 8, 2014

## **SERVICE AND ADMINISTRATION**

UF Faculty Senate Counsel – Committee member, 2014-2017.

UF Faculty Senate Counsel – Land Use and Facilities Planning Committee Member, 2015-2018.

UF Commencement Marshall Service, 2014-2015.

Coordinator for the Center for Immunology and Transplantation, 2014-present.

Director of the Immune Phenotyping Core (IMC).

Research Director of the UF Diabetes Institute, 2020-present

Search Committee Member (UF College of Medicine Senior Associate Dean of Research Affairs – 2021)

Search Committee Member (UF College of Medicine Representative for the Artificial Intelligence Initiative – 2022)

UF College of Medicine Space Committee (term 2022-2025)

Immunology of Diabetes Society – Meeting Organization Committee (2022-current)

## **MENTORSHIP**

Graduate Faculty Status conferred June 16, 2011.

UF Clinical and Translational Science Institute Training (CTSI) and Professional Development Program graduate faculty status in Clinical Investigation conferred March 12, 2015. Graduate faculty status in Pharmacology and Therapeutics approved October 6, 2021.

Direct Mentorship

Doctoral Graduate Student Mentor  
Judith Cserny (03/2011 – 2017)  
Topic: Nanoparticle conjugated Tregs

Doctoral Graduate Student Mentor  
Christopher (Kit) Furhman (06/2011 – 6/2014)  
Topic: Innate inflammatory influence over Tregs in T1D

Katherine Davidson, MD  
Maternal Fetal Medicine fellow, Co-mentor with Dr. Anthony Gregg  
Topic: Immune regulation at the maternal:fetal interface  
Status: Successfully defended M.S. in Clinical and Translational Investigation 4/15. Currently at the MAHEC MFM training center in Ashville, NC.

Master's Graduate Student Mentor  
Joseph W. Dean (5/1/15-4/17/2017)  
Topic: Innate influence on Treg activity in T1D

Doctoral Graduate Student Committee Co-mentor (Atkinson)  
Melanie Shapiro (10/2017-4/2020, successfully defended)  
University of Florida, College of Medicine

MD/PhD Graduate Student Mentor  
Puchong Thirawatananond (8/2019-2023)  
University of Florida, College of Medicine

Doctoral Graduate Student Committee Mentor  
Leanna Peters (2018-2023)  
University of Florida, College of Medicine

MD/PhD Graduate Student Mentor  
Kartik Motwani (8/2022-present)  
University of Florida, College of Medicine

Medical Student Faculty Mentor

Summer Research Fellowship Award Recipient  
Lawrence M. Goodman Trust  
Xiaoming (Ming) Jia  
(03/2012)

Committee Member

Doctoral Graduate Student Committee Member

Amanda Posgai (06/2011 – successfully defended 12/2014)

Mentor: Mark A. Atkinson, Ph.D.

Doctoral Graduate Student Committee Member

Geoffrey Rogers (02/2012 – successfully defended 07/2015)

Mentor: Roland Herzog, Ph.D.

Doctoral Graduate Student External Committee Member

Alessandra Ferraro, Ph.D. (successfully defended 03/2012)

San Raffaele Institute, Milan, Italy

Mentor: Manuella Battaglia, Ph.D.

Doctoral Graduate Student External Committee Member

Jamal Lewis, Ph.D. (successfully defended 07/2012)

University of Florida, Department of Biomedical Engineering

Mentor: Benjamin G. Keselowsky, Ph.D.

Doctoral Graduate Student External Committee Member

Andrew Nelson, Ph.D. (successfully defended 11/2018)

University of Florida, College of Veterinary Medicine

Mentor: David Pascual, Ph.D.

Doctoral Graduate Student Committee Member

Ramya Sivakumar (01/2013-12/2/2016, successfully defended)

University of Florida, Department of Pathology

Mentor: Laurence Morel, Ph.D.

Doctoral Graduate Student External Committee Member

Evelyn Brancho-Sanchez (05/2013-2018, successfully defended)

University of Florida, Department of Biomedical Engineering

Mentor: Benjamin G. Keselowsky, Ph.D.

Doctoral Graduate Student External Committee Member

Marcus Hooper (12/2013-2018, successfully defended)

University of Florida, Department of Ophthalmology

Mentor: John Ash, Ph.D.

MD/Doctoral Graduate Student Committee Member

Brittney Newby (12/2013-3/2017, successfully defended)

University of Florida, Department of Ophthalmology

Mentor: Clayton Mathews, Ph.D.

Master's Graduate Student Committee Member

Michael Nelson (02/2012 – 07/2013, MS graduate)  
Mentor: Shannon L. Wallet, Ph.D.

Master's degree Graduate Student External Committee Member  
Kikunj Argrawal, (defended 08/2014)  
University of Florida, Department of Biomedical Engineering  
Mentor: Benjamin G. Keselowsky, Ph.D.

Doctoral Graduate Student External Committee Member  
Xiaomei Yuan, Ph.D. (successfully defended 04/2014)  
University of Miami, Miami, FL  
Mentor: Thomas Malek, Ph.D.

Kathryn D. Davidson, MD, MS  
Maternal Fetal Medicine fellow, MS committee chair (mentor)  
Topic: The TIGIT/CD226 immunoregulatory axis in pre-eclampsia  
Status: 7/13- 6/15 (currently in practice)

Doctoral Graduate Student External Committee Member  
Joshua Stuart (05/2014-2019, successfully defended)  
University of Florida, Department of Biomedical Engineering  
Mentor: Benjamin G. Keselowsky, Ph.D.

Anushka Chelliah, MD  
Maternal Fetal Medicine fellow, committee member  
Topic: Characterization of c-peptide during pregnancy  
Status: 5/15- 1/17 (in practice)

Doctoral Graduate Student Committee Member  
Lucas Hunter Armitage (05/15-present)  
University of Florida  
Mentor: Mark Wallet, Ph.D.

Doctoral Graduate Student Committee Member  
Anton Titov (06/2015-present)  
University of Florida, Department of Pathology  
Mentor: Laurence Morel, Ph.D.

Jessica Rose Jackson, MD  
Maternal Fetal Medicine fellow, committee member  
Topic: Characterization of Tr1 Tregs during Pre-eclampsia  
Status: 7/15- 7/17

Doctoral Graduate Student Committee Member  
MacKenzie Williams (08/2015-2020, successfully defended)  
University of Florida, Department of Pathology

Mentor: Mark A. Atkinson, Ph.D.

Doctoral Graduate Student External Committee Member  
Anthony W. Frei (08/2015-5/2017)  
University of Florida, Department of Biomedical Engineering  
Mentor: Cherie Stabler, Ph.D.

Doctoral Graduate Student External Committee Member  
Kyle Dyson (10/2015-present)  
University of Florida, Department of Neurosurgery  
Mentor: Duane Mitchell, M.D, Ph.D.

Doctoral Graduate Student External Committee Member  
Josephine Brown (10/2017-present)  
University of Florida, Department of Pathology  
Mentor: Laurence Morel, Ph.D.

Doctoral Graduate Student External Committee Member  
Bayli DaVita (10/2018-present)  
University of Florida, Department of Neurosurgery  
Mentor: Duane Mitchell, M.D, Ph.D.

Doctoral Graduate Student External Committee Member  
Joseph Dean (10/2018-present)  
University of Florida, Veterinary Sciences  
Mentor: Liang Zhou, PhD

Doctoral Graduate Student External Committee Member  
Smit Patel (08/2018-12/2021)  
University of Florida, Department of Biomedical Engineering  
Mentor: Cherie Stabler, Ph.D.

Doctoral Graduate Student External Committee Member  
Weihong Gu (7/2018-present)  
University of Florida, Veterinary Sciences  
Mentor: John Driver, PhD

Doctoral Graduate Student External Committee Member  
Jatin Sharma (8/2018-present)  
University of Florida, Microbiology and Cell Sciences  
Mentor: Joseph Larkin III, PhD

Doctoral Graduate Student External Committee Member  
Adithya K Gopinath (1/2019-present)  
University of Florida, Department of Neurosurgery  
Mentor: Habibeh Khoshbouei, PhD

Doctoral Graduate Student External Committee Member  
Shivai Gupta (8/2019-present)  
University of Florida, Veterinary Sciences  
Mentor: Cuong-Nguyen, PhD

MD/PhD Graduate Student Mentor  
Puchong Thirawatananond (8/2019-present)  
University of Florida, College of Medicine

Doctoral Graduate Student Dissertation Committee Member  
Conner Francis (12/2019-present), MD, PhD program  
University of Florida, Department of Neurosurgery  
Mentor: Duane Mitchell, M.D, Ph.D.

Doctoral Graduate Student Dissertation Committee Member  
Lei Wang (11/2020-present), PhD program  
University of Florida, Department of Pathology  
Mentor: Weizhou Zhang, M.D, Ph.D.

PhD Graduate Student Mentor  
Miguel Medina-Serpas (8/2020-present)  
University of Florida, College of Medicine

PhD Graduate Student Co-mentor (with Clayton Mathews)  
Similoluwa Ogundare (8/2020-present)  
University of Florida, College of Medicine

PhD Graduate Student Co-mentor (with Rhonda Bacher, Biostatistics)  
Xiaoru (Ruby) Dong (8/2019-present)  
University of Florida, College of Medicine

Doctoral Graduate Student Dissertation Committee Member  
Elnaz Ebrahimi (4/2021-present), PhD program  
University of Florida, Department of Medicine, Division of Pulmonary, Critical  
Care & Sleep  
Mentor: Andrew Bryant, M.D

Junior Faculty Mentorship/Advisor  
Andrew Justin Bryant, MD, Assistant Professor  
Pulmonology  
University of Florida

Billur Akkaya, PhD, Assistant Professor  
Neurology/Immunology  
University of Ohio

Allison Bayer, PhD, Assistant Professor  
Diabetes Research Institute  
University of Miami, FL

Georgia Foustari, PhD, Assistant Professor  
San Raffaele Institute  
Milan, Italy

Laura Jacobsen, MD, Assistant Professor  
University of Florida, Dept. of Pediatrics  
Gainesville, FL UFDI  
\*JDRF Post Doctoral Fellowship  
\*Research Supplement Recipient to Brusko R01 (NIDDK)  
\*K award mentorship (NIDDK)

Undergraduate student research mentor

Phillip Lichlyter  
Amy Patel  
Jean Damisse  
Aureen Arellano  
Alton Stone  
Julia Cuoto  
Manjot Sodhi  
Michelle Adibe  
Sandra Philius  
Brian Soto  
Zubin Paul  
Kristi Balavage  
Aaron Raju  
Lola Castro  
Leeana Peters  
Abigail Schirmer  
Caridad Infante  
Jacquelin Chung  
Ashley Bushdorf  
Ali Mohamed  
Addison Wesson  
Meena Ravi  
Robert Nusbaum  
Diego Gamoneda  
Keshav Motwani (Goldwater Scholarship Recipient)  
Derek Diel  
John Ramos  
Samra Rashid  
Kayla Nguyen

Lindsey Sachs  
Collin Lahde  
Jin-Ju Lee  
Mack Mekler  
Akash Shah  
Alexander Pearce  
Elizabeth Kern  
Marcus Pina  
University Scholars Program  
Roshini Pudhucode  
Mathew Brown  
Ali Mohammed  
Emerson Parks  
Sonali Vijay  
Gbemi Awonusunu

UF-HHMI Science for Life undergraduate intramural research program faculty mentor

Leeana Peters

Topic: Isolation and expansion of human Tregs via CD226 negative selection

Aaron Raju

Topic: Single-cell TCR analysis from nPOD tissues in T1D

High school student research mentor-Student Science Training Program (SSTP)

Overall, the UF-SSTP offers the motivated student a unique and intensive learning environment designed to provide challenging and inspiring experiences and to stimulate interest in science-related careers.

Abigail Schirmer - 2012

Samantha Wong – 2013

Lucas Zhang – 2014

Manasvini Mantripragada –2015

Keshav V. Shah-2016

Keshav Motwani-2017

Anam Ahmed-2018

University of Florida's Center for Precollegiate Education and Training Program (UF CPET). Annual Florida Junior Science, Engineering, and Humanities Symposium (JSEHS). 2013-2018.

Host lab

Admissions Reviewer

Interviewer for the UF MD/PhD program 2013, 2014, 2018

UF College of Medicine IDP Interviewer 2012, 2013

UF College of Medicine Maternal and Fetal medicine fellowship reviewer 2013

External Admission to Candidacy Examination (ACE) committee member  
Weill Medical College of Cornell University  
03/13

## **COMMUNITY OUTREACH**

Invited lecture for 60 high school journalism students hosted by the UF Diabetes Center of Excellence and UF journalism schools. Topic: Biomedical research reporting. June 18, 2011.

Guest lecture for JDRF nPOD program. Tour for organ procurement organization (OPO) staff. October 10, 2011.

Host to mini-medical school tours for elementary and high-school education teachers. November 10, 2011.

JDRF Walk to Cure Diabetes, Jacksonville, FL. March 23, 2012.

JDRF Signature Outreach Event Invited Platform Lecture to 200 T1D families. Nickelodeon Suites Hotel. Orlando, FL. August 24-25, 2012.

UF Diabetes Center of Excellence - Research and Patient Care Symposium. Round table interactive discussion panel member. Gainesville, FL. November 16, 2012.

Radio Interview. Healthy Talk Segment on RadioMD.com, in partnership with LifeExtension. Interview by Dr. Sheldon Baker, MD. Sept 16, 2015.

Naples Diabetes Conference. Invited platform lecture entitled "Harnessing the Immune System to Correct Autoimmunity in T1D". Naples, FL. November 6, 2016.

Elementary school student engagement  
Interactive lecture on science and immunology to 120 2<sup>nd</sup> grade students at Talbot Elementary School. October 12, 2017.

Undergraduate T1D Student Lecture  
Interactive lecture on science and immunology UF undergrads with T1D  
March 2018, 2019. Course Director: Ashby Walker, PhD.

Institute for Learning in Retirement (ILR) - Invited Lecture  
A UF and Road Scholar Collaborative Lecture Series given to a couple hundred local retirees

March 30<sup>th</sup>, 2021

Lecture Title: "Dynamics of the aging immune system"  
Podcast Interview. Using single-cell technologies to understand type 1 diabetes and the immune system. Hosted by 10X Genomics. Aug 22, 2021.

## **SECTIONS CHAIRED**

Immunology session chair  
2006 University of Florida, College of Medicine Pediatric Science Day  
Section on Immunology and Infectious Disease

Immunology session chair  
Autoimmunity Working Group Organizer  
2013, 2014, 2016 JDRF nPOD meetings  
Atlantic Beach, FL; St. Petersburg Beach, FL; Miami, FL

Oral Session Chair at the American Diabetes Association's 73rd Scientific Sessions, June 21-25, 2013 in Chicago, Illinois.  
*Human Immunology in Clinical Trials*

Biomarker Symposium Discussion Chair. Boston, MA. JDRF sponsored symposium. June 28, 2013.

Clinical Immunology Session Chair. Lorne, Australia. Immunology of Diabetes Society. December 9, 2013.

Human Islet Research Network (HIRN). CMAI-CHIB joint breakout session chair. Washington D.C. May 2018.

Human Islet Research Network (HIRN). Meeting Co-director. Washington D.C. Oct. 2020.

18<sup>th</sup> Immunology of Diabetes Society. Plenary lecture session chair. 11/4/21

## **SERVICE**

Diabetes Center of Excellence development search committee member. 2011.

Diabetes Center of Excellence faculty search committee member. 2014.

nPOD faculty search committee member. 2012.

Host for Dept. of Pathology mixer July 9<sup>th</sup>, 2013 – “Focus on diabetes research”

International Student Award faculty selection committee member. 2013.

HHMI international student award selection committee member. 2013.

Faculty Judge – Poster session of the Center for Mucosal Immunology Joint meeting of the UF College of Medicine and Veterinary Medicine. October 2013.

Faculty Judge – Poster session of the Immunology of Diabetes Society Meeting. Lorne, Australia. December 2013.

NIH HIRN annual meeting organization committee member for Center for Modeling Autoimmune Interactions (CMAI). 2016.

NIH HIRN CMAI Consortium Representative Chair to the Trans-Network Committee (TNC). 9/1/2017-8/31/2018.

Faculty Search Committee Chair, UF Diabetes Institute, 2018

UF Center for Immunology and Transplantation, faculty advisor  
Immunophenotyping Core Director

#### **JOURNAL REVIEWER**

*Science Immunology*

*Science Translational Medicine*

*Journal of Clinical Investigation*

*Diabetes*

*Nature Communications*

*Proceedings of the National Academy of Sciences (PNAS), USA*

*New England Journal of Medicine*

*Diabetes Care*

*Clinical Experimental Immunology*

*Journal of Pediatrics*

*International Journal of Endocrinology*

*Journal of Immunology*

*Nature Publishing Group – Molecular Therapy*

*Haematologica*

*Oncotarget*

*Medical Hypotheses*

*Endocrine, Metabolic & Immune Disorders – Drug Targets*

*Scientific Reports (NPG)*

*Cytherapy*

*Cell Transplantation*

*Diabetes/Metabolism Research and Reviews*

*Journal of Visualized Experiments (JoVE)*

*Cancer Immunology Immunotherapy*  
*Pediatric Diabetes*  
*Cellular Physiology and Biochemistry*  
*BioMed Central-Immunology*  
*OMICS Publishing Group-Clinical*  
*Acta Diabetologica*  
*Medical Microbiology and Immunology*  
*Medical Principles and Practice*  
*Hormone and Metabolic Research*  
*Public Library of Science (PLoS)-One*  
*Inflammation Research*  
*Endocrine, Metabolic & Immune Disorders*  
*Clinical Immunology*  
*Immunology*  
*Current Opinion in Immunology*  
*Immunotherapy Advances*  
*The Lancet, Diabetes & Endocrinology*

## **EDITORIAL ACTIVITIES**

F1000 Associate faculty member and reviewer  
Associate Editor – *BMC Immunology* (2012-2015)  
Associate Editor -- *Systems Immunology, Frontiers* (2020-ongoing)

## **SOCIETY MEMBERSHIPS**

American Diabetes Association  
American Association for the Advancement of Sciences  
Federation of Clinical Immunology Societies  
(Immunology of Diabetes Society)  
American Association of Immunologists (AAI)

### **External Activities:**

Founding member of *OneVax*, LLC 2013

**Mission:** *OneVax*, LLC, now acquired by Inspira Therapeutics, Inc., is a business developed to harness the intellectual and research advances of University of Florida faculty for applications in the advancement of human health and, specifically, type 1 diabetes. Members of the UF Diabetes Institute and the Department of Biomedical Engineering constitute the core membership and provide the scientific direction of the company. The initial business interests of the company involve the development of novel vaccine formulations that incorporate biomaterials and polymers for applications including multicomponent and time-release drug delivery. While the business interests of *OneVax* go beyond this

notion and include disease biomarker discovery, the core goal of the company is to harness our knowledge of the immune system and biomaterials to create a tolerogenic vaccine to prevent and/or reverse the autoimmune cause of type 1 diabetes.

## **SCIENTIFIC ADVISORY BOARDS AND CONSULTING**

Caladrius Biosciences

Merck – Expert advisor on Treg cell therapies and applications in autoimmune diseases (2016); Expert advisor on immune interventions in type 1 diabetes (2016)

Sanofi-Aventis Groupe – T1D Prevention and Cure Advisory Board Meeting (2016)

Fate Therapeutics (2016)

Sofinnova Venture Capital – Scientific Consultant (2017)

Brightpoint Consulting (2017)

OneVax, LLC (2016-present)

NIH TrialNet (CMSP) consultant (2017-present)

CSL Behring (2020)

Rubius Therapeutics

SQZ Therapeutics

Pelican/Heat Biologics

Repertoire Immune Medicines, Inc

Quell Therapeutics

## **INTELLECTUAL PROPERTY**

Co-inventor for patent application entitled: “*Antigen-Specific, Tolerance-Inducing Microparticles and Uses Thereof*” by Keselowsky et. al. US Provisional Patent Application Docket No. U.964P/13603. Serial No. 61/405,999 filed October 22, 2010. This technology describes the use of biocompatible biomaterials to elute immunomodulatory agents.

Inventor for U.S. patent entitled: “*Materials and Methods for modulating immune responses*”. Brusko et al. U.S. Serial No. 14/241,228; filed May 24, 2014. Pat No.

9,913,830. This technology utilizes regulatory T cells and nanoparticle vaccine formulations to induce immune tolerance in autoimmunity.

Provisional Patent Application: UF#-14793. Invention Title: "Regulatory T Cells with Chimeric Antigen Receptor for Immune Tolerance to Factor VIII." Co-Inventors: Todd M. Brusko and Roland Herzog

Provisional Patent Application: UF#-14989, UF.1197XPCT. Invention Title: "Novel Regulatory T Cells, Methods for their isolation and uses." Co-Inventors: Todd M. Brusko, Christopher Fuhrman, Howard Seay. (PCT/US2016/030789)

Patent Application Publication. Brusko et al. Pub No.: US2023/0414720 A1. Pub Date: Dec 28, 2023. Use of insulin-like growth factors with common gamma chain cytokines to induce homeostatic proliferation of lymphocytes. Applicant: University of Florida Research Foundation, Inc. Appl. No.: 18/038,321.