Executive Summary of Blood Systems Research Institute Performance in 2013

Highlights

Formally created in 2004, Blood Systems Research Institute (BSRI) continued to mature and advance in its mission to improve transfusion quality and outcomes worldwide. BSRI achieved a major milestone in 2012, being voted as one of the top 10 places to work in academia in the annual survey by The Scientist magazine. In 2013 BSRI rose from number 10 to number 2 in the ranking of US institutions.

TOP INSTITUTIONS IN THE U.S.

RANK 2013	RANK 2012	INSTITUTION LOCATION
1	5	La Jolla Institute for Allergy and Immunology, California
2	8	Blood Systems Research Institute San Francisco, California
3	3	Stowers Institute for Medical Research Kansas City, Missouri
4	14	University of Pittsburgh Pennsylvania
5	-	Carnegie Institution for Science, Department of Plant Biology Stanford, California
6	7	St. Jude Children's Research Hospital Memphis, Tennessee
7	-	Fox Chase Cancer Center Philadelphia, Pennsylvania
8	12	Scripps Institution of Oceanography La Jolla, California
9	-	ECRI Institute Plymouth Meeting, Pennsylvania
10	17	Oklahoma Medical Research Foundation Oklahoma City, Oklahoma

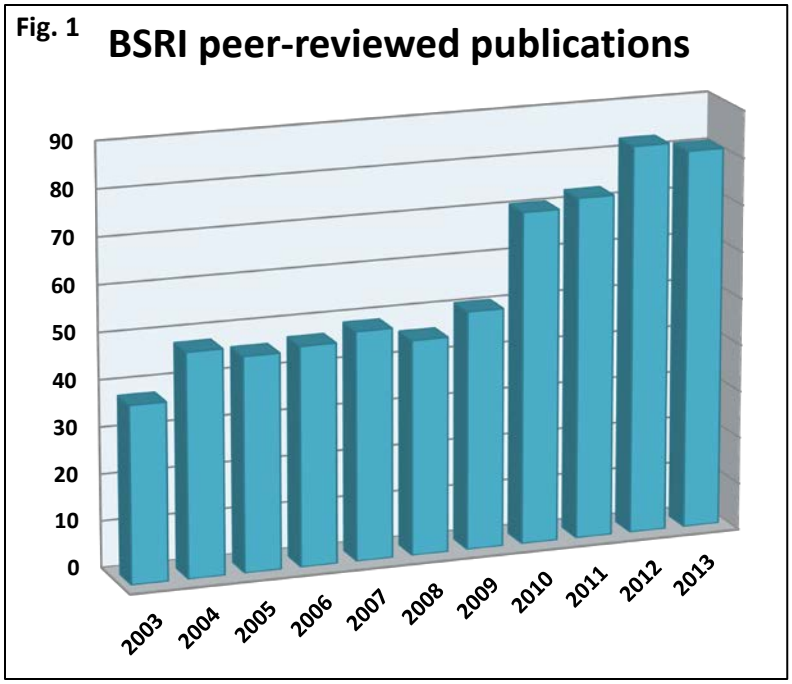
http://www.the-scientist.com//?articles.view/articleNo/36737/title/Best-Places-to-Work-Academia-2013/

Highlights from the article explain the power of having the research institute embedded in the blood bank:

"Everything is related to blood transfusion, but there is virology, epidemiology, immunology," says Rachael Jackman, a staff scientist at the institute. When Jackman was setting up a mouse model to study transfusions following traumatic blood loss, for example, she sought advice from technicians at the blood bank on preparing the blood transfer. "You can read about it, but it's much more helpful to go downstairs and talk to people who are doing the processing," she says.

"It kind of reminds you that there is a real, practical purpose to our research, which is maintaining the safety and availability of blood," says Eric Delwart, a senior investigator at the institute and a professor at the University of California, San Francisco (UCSF).

The quality and quantity of research performed at BSRI continued to flourish in 2013, with 81 manuscripts published in peer-reviewed journals (see Figure 1).



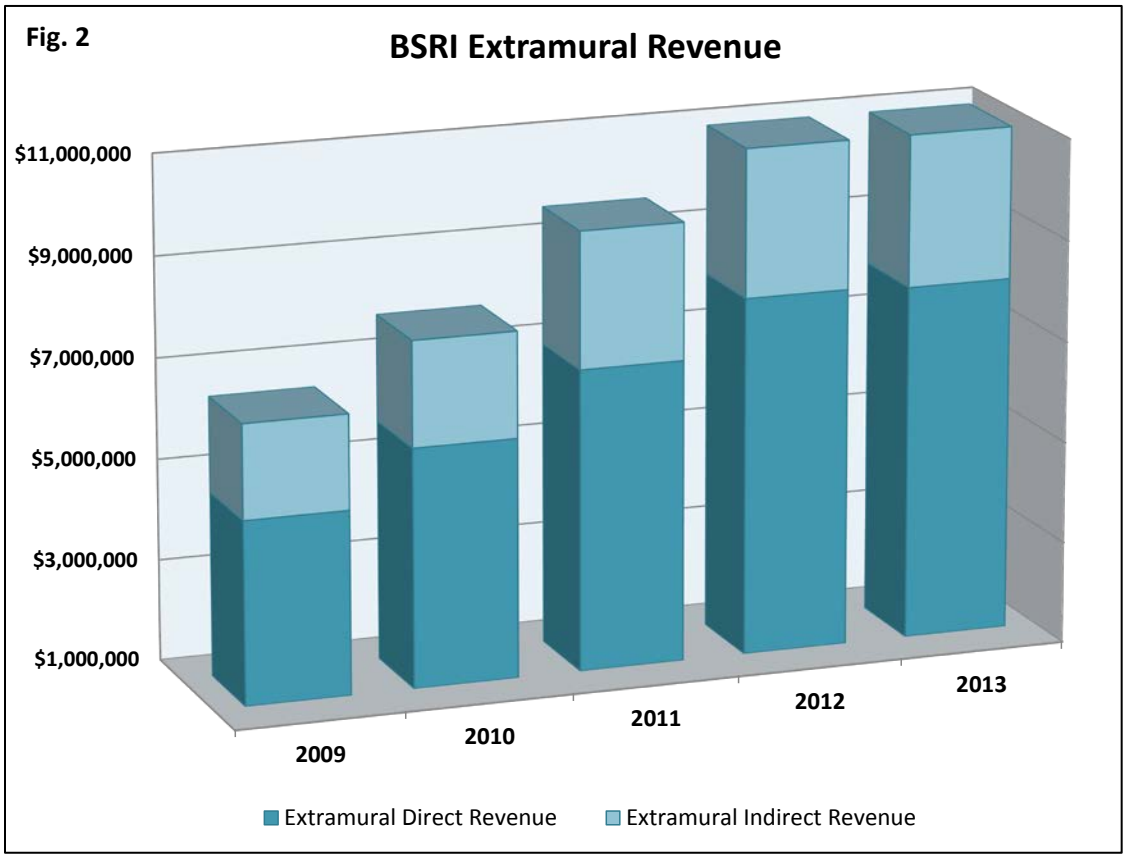
The epidemiology group achieved recognition for two studies published in 2013, with Dr. Ed Murphy as senior author. His paper published in Circulation documented the incidence of cardiomyopathy in blood donors infected with *Trypanasoma cruzi* (the parasite that causes Chagas disease). The article was featured at the Interscience Conference on Antimicrobial Agents and Chemotherapy **(**ICAAC) as one of the top papers in Tropical Medicine from 2012-2013. In addition, Dr. Murphy was interviewed in a video for an AABB SmartBrief about work published in The Journal of Infectious Diseases documenting the 10-year prevalence of human T-lymphotropic virus (HTLV) in BSI blood donors.

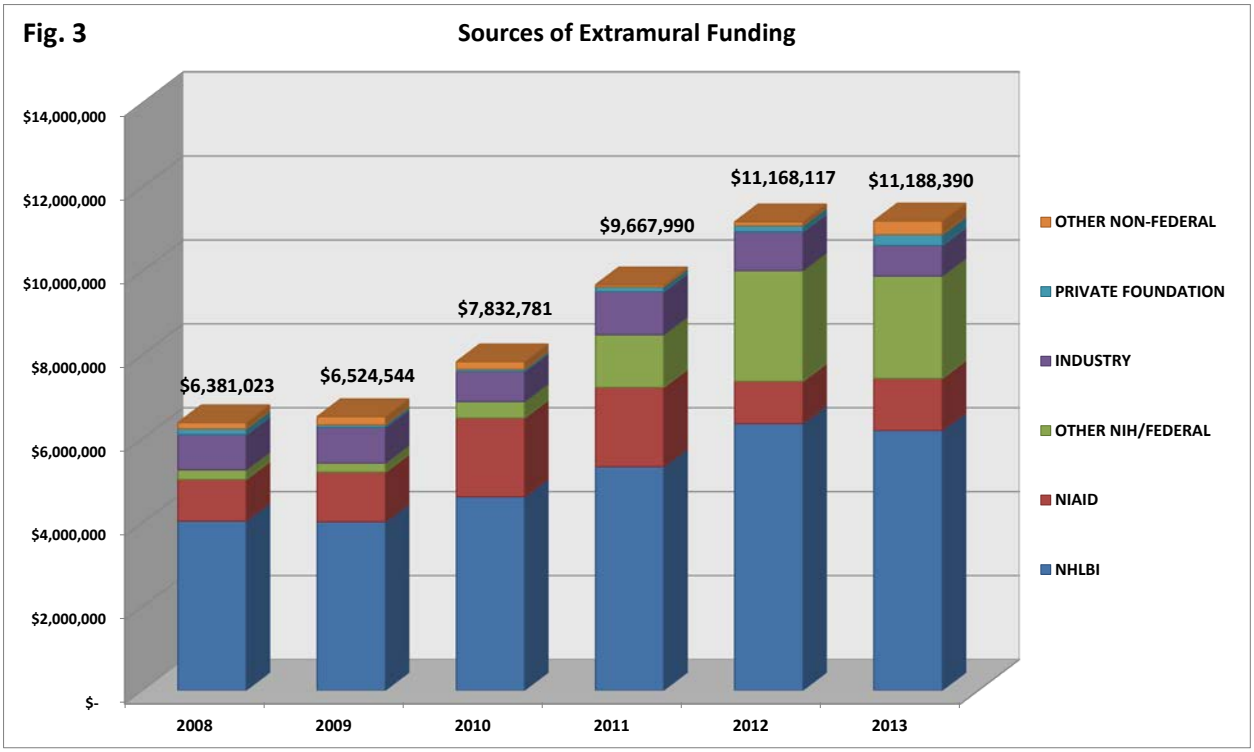
Dr. Eric Delwart's virus discovery program continued to thrive in 2013. His lab discovered three novel human enteric viruses in the last year, and he published an influential article in PLoS Pathogens outlining how to sequence the human virome. The most important discovery from the Delwart group in 2013 was likely demonstrating that a virus was not a human pathogen. Parvovirus-like hybrid virus (PHV) was described in a series of patients in China with unexplained hepatitis. This virus could have represented an important blood-borne emerging pathogen. Dr. Delwart's group was able to show that the virus was not derived from samples from humans with disease, but rather was a contaminant of silica-binding spin columns used for RNA extraction. Having the capability to rapidly identify and sequence novel viruses plays an important part in ensuring safety of the blood supply in the US and worldwide.

Dr. Shibani Pati has continued to spearhead cellular therapy efforts at BSRI. Over the past 18 months she has formed a collaborative amongst multiple groups - Terumo-BCT, BSI, BCP, BSRI, and UCSF on how we can work together to develop stem cell therapeutics and create a translational pipeline to support and launch clinical trials. Dr. Shibani in collaboration with Dr. Frank Nizzi's group at BSI have also initiated a cell therapeutics program with an eye toward the future of the field and the spaces that will be created as these therapies become FDA approved for clinical use. Quantum devices have been installed at BSRI and soon will be installed at BSI in Tempe, AZ. The machines are up and running at BSRI and experiments have started for device validation. The translational research goal of the Shibani group is to establish the expertise and ability to produce cells for clinical trials starting with trauma trials to be run with and Drs. Michael Matthay and Mitchell Cohen at UCSF as first steps.

Extramural Funding

The Investigators at BSRI led extensive research on 62 different programs funded by NIH, the US Department of Defense, the Gates Foundation, and private industry partners such as Novartis and Shimadzu corporations. Revenue from extramural grants and contracts was $11.2 million ($8 million direct and $3.2 million indirect revenue). In addition Drs. Murphy and Seielstad, UCSF-employed investigators based at BSRI, generated $3.2 million in extramural revenue not included in BSRI subcontracted funding, so the total extramural support to BSRI was approximately $12 million in 2013. This represents a significant expansion over prior years' funding, reflecting the diverse and strong research programs at BSRI. Figures 2 and 3 below illustrate the steady growth as well as diversification of extramural funding over the past 6 years. Of note, the expansion in BSRI extramural funding has occurred during declining NIH funding over the past several years. In addition BSRI received ~$4.6 million in intramural support from BSI and CTS which was used to support investigators, cores, training and education programs and our extremely responsive and efficient administrative team led by JoAnn Yates.





Research Directions

The Recipient Epidemiology and Donor Evaluation Study III (REDS-III) is perhaps the most important program led by investigators at BSRI and our collaborators at UCSF and in Brazil and South Africa. REDS-III, a 7 year program designed to improve the safety and effectiveness of blood transfusions in the United States and abroad, is an extension of the successful and productive REDS and REDS-II programs that BSRI helped establish and lead over the past two decades. BSRI was awarded 4 large contracts for REDS-III for a total of over $35 million over the 7 year funding period, including the contract for the REDS III Central Laboratory that will provide laboratory support and expertise to the seven clinical centers in the U.S. and overseas.

The domestic component of REDS-III is comprised of four “hubs,’’ each consisting of a regional blood center and affiliated hospitals. The San Francisco hub involves the Blood Centers of the Pacific, BSRI, UCSF Medical Center, San Francisco General Hospital & Trauma Center, and the San Francisco Veterans Administration Medical Center. Blood Centers of the Pacific supplies more than 90 percent of the blood used by the three hospitals. One of the new projects will focus on improving the practice of blood transfusion and evaluating the positive and negative effects of blood transfusion in the hospital setting. As many as 200,000 patients annually at the assorted hubs who receive blood transfusions, and up to 500,000 blood donors a year will be studied to evaluate, among other things, pulmonary edema after transfusion, transfusion-related lung injury (TRALI), alloimmunization and other immunological effects of transfusion. Other projects will look at use of plasma, currently thought to be overused for clotting disorders, and the effect of RBC and platelet transfusions in several recipient populations, including the effect of component storage on effectiveness and complications of transfusions.

BSRI and UCSF will also feature prominently in the international component of the REDS-III initiative, leading large collaborative research programs in Brazil (directed by Drs. Custer, Busch, Goncalez and Kelly) and South Africa (directed by Drs. Murphy, Custer and Bloch).

International projects will focus on prevention of transfusion-transmitted infectious diseases such as HIV and dengue virus. The researchers also will study obstetric hemorrhage and increased recruitment of black blood donors in South Africa, and treatment and genetics of sickle cell disease patients in Brazil.

Space Considerations

Over the past 10 years BSRI has enjoyed remarkable growth, both in the scope of its research and number of investigators and staff. What was once ample space is now filled to capacity. Blood Centers of the Pacific, which shares the facility at 270 Masonic Avenue with BSRI, is also facing space challenges with an aging building with deferred maintenance and a forecast reduction in parking availability in the community, which has already begun. BCP and BSRI have been actively investigating moving to a new location, preferably near the new UCSF Mission Bay research campus and hospitals. A site has been identified at Pier 70 in the Dogpatch neighborhood of San Francisco, which abuts Mission Bay to the south. This presents an opportunity for growth and enhanced collaboration, but also a challenge to BSRI as facility costs will rise. Fortunately, BSRI has built a solid stream of extramural funding and anticipates rising to the challenge of increasing extramural funding including increased support for overhead costs to make this important transition into a new facility a reality in 2016.

GRANTS, CONTRACTS, AND AWARDS

RC2-HL-101632 (PI: Busch) 09/30/09-08/31/13
NIH/NHLBI
Viral/immune parameters of Dengue and WNV in donors: blood safety implications
The goals of this grant are to establish the infectivity of low-level WNV viremic units in the early convalescent stage of infection not detected by current NAT screening, to implement sensitive NAT screening in Puerto Rico under an FDA IND, and to launch follow-up studies of DENV+ donors. In addition, we established repositories of extensively characterized, longitudinal specimens from Dengue and WNV infected donors to advance research into the pathogenesis of these important agents.

HHSN268200417175C (PI: Busch) 02/14/06-12/31/13
NIH/NHLBI
Retrovirus Epidemiology Donor Study, - Part II (REDS-II) - International Component – Brazil
Compilation of extensive blood donor/donation data and specimens as stipulated in the RFP, as well as conduct of 4 research projects on critical TM issues in Latin America.

R01-DA-021550 (PI: Edlin) 06/01/08-05/31/13
NIH/NIDA
HCV Transmission Among Young Injection Drug Users in NYC
To determine the risks of acquiring HCV infection associated with specific injection practices in a cohort of young, high-risk injection drug users (IDUs) on the Lower East Side of Manhattan, and the possible protective effect of pre-existing HCV-specific immune responses.

R01-AI-090677 (McCune) 07/02/10-06/30/13
NIH/NIAID
The Impact of Tolerance in the Newborn on Lentiviral Infection
BSRI will, during the first year, develop and optimize one or more assays to determine whether cells from the mother rhesus macaque move into the fetus during the course of pregnancy.

HHSN268201100001I (PI: Busch) 03/15/11-03/14/18
NIH/NHLBI
Recipient Epidemiology and Donor Evaluation Study-III – Central Laboratory
BSRI established and maintains a central laboratory for all REDS specimen testing. Program objectives are to assure safe and effective blood banking and transfusion medicine through basic, translational and clinical research.

HHSN268201100007I (PI: Custer) 03/21/11-03/20/18
NIH/NHLBI
Recipient Epidemiology and Donor Evaluation Study-III – International Component – Brazil
Multicenter consortium of blood centers in four low and middle income countries to perform epidemiologic and clinical research studies on transfusion safety. Studies will focus on infectious, immunologic and hematologic complications of transfusion, and will involve both blood donors and transfusion recipients.

OPP1017716 (PI: Murphy) 04/01/11-12/31/14
The Bill and Melinda Gates Foundation
Development of specimen repository and evaluation of assays for identification of recent HIV infection and estimation of HIV incidence
The goals of this project are to evaluate and compare currently available assays for use in the measurement of recent HIV infection using a common set of specimens collected for this purpose and to assess the ability of the assays, alone or in combination, to accurately estimate HIV incidence in populations.

HHSN272201000045C (PI: Denny) 09/30/10-09/29/17
NIH/NIAID
EQAPOL
The goals of this program are to establish and characterize HIV plasma and viral isolate panels from samples collected from diverse geographic regions.

HHSN268201200067C (PI: Levin) 08/31/12–08/30/14
NIH/NHLBI
Screening and Confirmatory Tests for Human Babesia
The aims of this proposal are to implement *B. microti* screening under a Food and Drug Administration Investigational New Drug (FDA IND) protocol, to scale-up the enrollment and follow-up of infected blood donors, and to acquire and characterize critical specimens so as to support studies that evaluate the risk of transfusion-transmitted Babesiosis (TTB) infection.

OPP1062806 (PI: Pilcher) 09/01/12-07/31/15
The Bill and Melinda Gates Foundation
HIV Incidence Testing using Multiple Biological Specimens (CEPHIA II)
BSRI will receive and assemble specimen sets collected under the CEPHIA-II project, distributing to collaborating researchers, and maintaining the specimens in storage. Additionally, BSRI will assist as required in assay evaluations or in characterization of CEPHIA II specimens on existing laboratory testing as determined by the CEPHIA leadership.

7636sc00 (PI: McKerrow) 06/01/13-05/31/15
The Bill and Melinda Gates Foundation
Fighting Infections through Research, Science and Technology (FIRST) Phase 1 and 2: Creating a Partnership to Fight Neglected Infectious Disease in Mesoamerica
BSRI's role is to identify biomarkers that allow assessment of response to new therapeutic interventions for Chagas' disease and establish a repository of samples that can be used to validate novel markers discovered by other groups.

OTHER SIGNIFICANT ACTIVITIES

Academic Affiliations: Professor of Laboratory Medicine at UCSF; member of UCSF AIDS Research Institute Executive Committee; member of Biological Specimens Central Storage, UCSF; Affiliated Faculty Member of UCSF-UCB, Institute for Global Health (IGH); Associate Member of Liver Center, UCSF; member of endowed Lectures Committee, Dept. of Laboratory Medicine, UCSF

Advisory Committees: AABB Transfusion Transmitted Diseases Committee; ARC Medical Advisory Committee; Canadian Blood Services Advisory Committee; ISBT TTID Working party; member of Medical Advisory Board, Creative Testing Solutions (a division of Blood Systems, Inc.); member of External Quality Assurance Program Oversight Laboratory (EQAPOL) Scientific Advisory Board, Center for HIV/AIDS Vaccine Immunology/Duke Human Vaccine Institute, Duke University; Scientific Committee on Transfusion Medicine, American Society of Hematology (ASH); Chair, International Society of Blood Transfusion (ISBT) Working Party for Transfusion Transmitted Infectious Diseases; Committee, Vaccine-Induced Seroreactivity (VISR); Committee, Transfusion Transmitted Diseases, AABB; Member, Clinical Trials Subcommittee, IAVI; Member, HCV Workgroup, APHL and CDC.

Reviewer for professional publications: Associate Ed for Transfusion; Journal for Transfusion Medicine; Chimerism; invited reviewer for numerous journals

ABSTRACTS, PUBLICATIONS, AND PRESENTATIONS

Peer-Reviewed Papers (Professional Journals):

1. Azzoni L, Foulkes AS, Papasavvas E, Mexas AM, Lynn KM, Mounzer K, Tebas P, Jacobson JM, Frank I, **Busch MP**, Deeks S, Carrington M, O'Doherty U, Kostman J, Montaner LJ. Pegylated Interferon-alpha2A Mono-therapy Results in Suppression of HIV-1 Replication and Decreased Cell-Associated HIV DNA Integration. J Infect Dis, 2013 Jan;207(2):213-22. (accepted 7/30/12, 186397, MS # 50052). PMID: 23105144.

2. Page K, Osburn W, Evans J, Hahn JA, Lum P, Asher A, Delwart E, Tobler L, Cox AL, **Busch MP**. Frequent longitudinal sampling of HCV infection in IDU reveals intermittently detectable viremia and reinfection. Clin Infect Dis. 2013 Feb;56(3):405-13 (accepted 9/12/12, MS #68832). PMID: 23090930.

3. Terrault N, Dodge J, Murphy E, Travis J, Kiss A, Gish R, **Busch M**, Levin T, Alter M. Sexual Transmission of HCV Among Monogamous Heterosexual Couples: The HCV Partners Study. Hepatology 2013 Mar;57(3):881-9 (accepted 9/20/12, MS# HEP-12-1361). PMID: 23175457.

4. Goncalez TT, Sabino EC, Schlumpf KS, Wright DJ, Mendrone A, Lopes MI, Leão S, Miranda C, Capuani L, Proitetti AB, Ferreira JE, **Busch MP**, Custer B. Analysis of Donor Deferral at Three Blood Centers in Brazil. Transfusion 2013 Mar;53(3):531-8 (accepted 5/23/12, TRANS-2011-0151-March 2012). PMID: 22845775.

5. Ribeiro AL, Sabino EC, Marcolino MS, Salemi VM, Ianni BM, Fernandes F, Nastari L, Antunes A, Menezes M, Oliveira CD, Sachdev V, Carrick DM, **Busch MP**, Murphy EL; NHLBI Retrovirus Epidemiology Donor Study-II (REDS-II), International Component. Electrocardiographic Abnormalities in Trypanosoma cruzi Seropositive and Seronegative Former Blood Donors. PLoS Negl Trop Dis. 2013 Feb;7(2):e2078 (accepted 1/10/2013). PMID: 23469305.

6. Sabino EC, Ribeiro AL, Salemi VMC, Oliveira CDL, Angunes AP, Menezes MM, Ianni BM, Nastari L, Fernandes F, Patavino GM, Sachdev V, Capuani L, de Almeida-Neto C, Carrick DM, Wright D, Kavounis K, Goncalez TT, Carneiro-Proietti AB, Custer BS, **Busch MP**, Murphy EL. Ten-year Incidence of Chagas cardiomyopathy among asymptomatic, T. cruzi seropositive former blood donors. Circulation 2013 Mar 12;127(10):1105-15 (accepted 12/21/2012). PMID: 23393012.

7. de Almeida-Neto C, Sabino E, Liu J, Blatyta P, Mendrone-Jr A, Salles N, Leao S, Wright D, Basques F, Ferreira J, **Busch M**, Murphy E. Prevalence of Serologic Markers for Hepatitis B and C Viruses in Brazilian Blood Donors and Incidence and Residual Risk of Transfusion Transmission of Hepatitis C Virus. Transfusion 2013 Apr;53(4):827-34 (accepted 6/25/12, MS #TRANS-2012-0142). PMID: 22882510.

8. Jackman RP, Deng X, Bolgiano D, Lebedeva M, Heitman JW, **Busch MP**, Slichter SJ, Norris PJ. Low-level HLA antibodies do not predict platelet transfusion failure in TRAP study participants. Blood 2013 Apr 18;121(16):3261-6 (accepted 2/7/2012). Epub 2013 Feb 7.

9. Henrich TJ, Hu Z, Li JZ, Sciaranghella G, **Busch MP**, Keating SM, Gallien S, Lin NH, Giguel FF, Lavoie L, Ho VT, Armand P, Soiffer RJ, Sagar M, LaCasce AS, Kuritzkes DR. Long-Term Reduction in Peripheral Blood HIV-1 Reservoirs Following Reduced-Intensity Conditioning Allogeneic Stem Cell Transplantation. JID 2013 Jun;207(11):1694-702 (accepted 12/19/12, MS# 51214R1). PMID: 23460751.

10. Yukl S, Boritz E, **Busch M**, Chun T-W, Douek D, Eisele E, Haase A, Ho Y-C, Hütter G, Lee T-H, Justement JS, Keating S, Li P, Murray D, Palmer S, Pillai S, Price RW, Rothenberger M, Schacker T, Siliciano J, Siliciano R, Sinclair E, Strain M, Wong J, Richman D, Deeks SG. Challenges in Detecting HIV Persistence during Potentially Curative Interventions: a Study of the Berlin Patient. PLoS Pathogens 2013 May;9(5):e1003347 (accepted 3/20/2013). PMID: 23671416.

11. Hatano H, Jain V, Hunt PW, Lee T-H, Sinclair E, Do TD, Hoh R, Martin JN, McCune JM, Hecht F, **Busch MP**, Deeks SG. Cell-based Measures of Viral Persistence Are Associated with Immune

Activation and PD-1 Expressing CD4+ T cells. J Infect Dis, 2013 Jul;208(1):50-56 (accepted 7/30/12, MS# 49831). PMID: 23089590.

12. Takecian PL, Oikawa MK, Braghetto KR, Rocha P, Lucena F, Kavounis K, Schlumpf KS, Acker S, Carneiro-Proietti AB, Sabino EC, Custer B, **Busch MP**, Ferreira JE. Methodological Guidelines for Reducing the Complexity of Data Warehouse Development for Transactional Blood Bank Systems. Decision Support Systems 2013 Jun 1;55(3):728-739 (accepted 2/19/2013). PMID: 23729945.

13. Sabino E, Lee T-H, Montalvo L, Nguyen M, Leiby D, Carrick D, Otani M, Vinelli E, Wright D, Stramer S, **Busch MP**. Antibody levels correlate with detection of Trypanosoma cruzi DNA by sensitive PCR assays in seropositive blood donors and possible resolution of infection over time. Transfusion 2013 Jun;53(6):1257-65 (accepted 8/3/12, Manuscript #: Trans-2012-0380). PMID: 23002996.

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15. Mast AE, Schlumpf KS, Wright DJ, Johnson B, Glynn SA, **Busch MP**, Olbina G, Westerman M, Nemeth E, Ganz T. Hepcidin predicts hemoglobin in individuals experiencing repeated phlebotomy. Haematologica 2013 Aug;98(8):1324-30 (accepted 2/26/2013). PMID: 23445875.

16. Fleck S, Bautista G, Keating SM, Lee T-H, Keller RL, Moon-Grady AJ, Gonzales K, Norris PJ, **Busch MP**, Kim CJ, Romero R, Lee H, Miniati D, MacKenzie TC. Fetal Production of Growth Factors and inflammatory Mediators Predicts Pulmonary Hypertension in Congenital Diaphragmatic Hernia. Pediatric Research 2013 Sep;74(3):290-8 (accepted 1/17/13, MS# 12-PR-04-0204R2). PMID: 23770923.

17. Jain V, Hartogensis W, Bacchetti P, Hunt PW, Hatano H, Sinclair E, Epling L, Lee T-H, **Busch MP**, McCune JM, Pilcher CD, Hecht FM, Deeks SG. Antiretroviral Therapy Initiated within Six Months of HIV Infection is Associated with Lower T-cell Activation and Smaller HIV Reservoir Size. Journal of Infectious Disease 2013 Oct;208(8):1202-11 (accepted 4/12/2013). PMID: 23852127.

18. Bloch EM, Lee T-H, Krause PJ, Telford III SR, Montalvo L, Chafes D, Usmani-Brown S, Lepore TJ, **Busch MP**. Development of a real-time polymerase chain reaction assay for sensitive detection and quantitation of Babesia microti infection. Transfusion 2013 Oct;53(10):2299-2306 (accepted 11/13/12, MS# Trans-2012-0495.R1.. PMID: 23362840.

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28. Getchell JP, Wroblewski KE, DeMaria A, Bean CL, et al… **Busch MP**, et al. Testing for HCV infection: an update of guidance for clinicians and laboratorians. MMWR Morb Mortal Wkly Rep. 2013 May 10;62(18):362-5 (accepted 2013). PMID: 23657112.

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34. Kleinman S, **Busch MP**, Murphy EL, Shan H, Ness P, Glynn SA; The National Heart, Lung, and Blood Institute Recipient Epidemiology and Donor Evaluation Study (REDS-III). The National Heart, Lung, and Blood Institute Recipient Epidemiology and Donor Evaluation Study (REDS-III): a research program striving to improve blood donor and transfusion recipient outcomes. Transfusion 2014 (accepted 9/11/2013). PMID: 24188564.

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Abstracts:

1. Kassanjee R, Murphy G, **Busch M**, Pilcher C, McKinney E, Keating S, Facente S, MacArthur J, Welte A. The Performance of Candidate Assays to Detect Recent HIV Infection for Cross-Sectional Incidence Estimation: An Independent, Comparative Evaluation. Abstract #: X-168; Accepted as a Poster #_. XX CROI 2013, Atlanta GA, Mar 3-6, 2013.

2. Lanteri MC, Diamond MS, Govero J, Pinto AK, Law JP, Chew GM, Wu S, Niki T, Inglis H, Hirashima M, **Busch MP**, Norris PJ, Ndhlovu LC. Increased frequency of TIM-3+ cells is associated with symptomatic WNV disease clinical outcome. Accepted as Poster. Immunology 2013, Honolulu, HI, May 3-7, 2013.

3. Lanteri M, Kaidarova B, Bravo M, Hindes D, Kiely N, Kamel H, Norris P, Custer B, **Busch MP**. Association between ABO and D/Rhesus blood groups and WNV disease outcome in blood donors: blood group A and D/Rhesus-negative as new risk factors for symptomatic infection. Accepted as an Oral Presentation. 23rd Regional Congress of the ISBT, Amsterdam, The Netherlands, June 2-5, 2013.

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5. Bruhn R, Lelie N, Custer B, **Busch M**, Kleinman S and the International Individual Donation NAT Study Group. HCV Transmission Risk and Efficacy of Screening Strategies Estimated from Data Provided by an International NAT Study Group. 2013 23rd Regional Congress of the ISBT, Amsterdam, The Netherlands, June 2-5, 2013.

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7. Wright D, Glynn S, Mast AE, Kleinman St, Kiss J, Benjamin RJ, **Busch MP**, Cable R. Limited Impact On Donor Iron Status From Longer Donation Intervals And Higher Male Donor Hemoglobin Cutoff: Results Of Simulation Models Using REDS-II Data. Abstract Control #: 1718992. Accepted as Oral. AABB Annual Meeting & CTTXPO, Denver, CO, Oct 12-15, 2013.

8. Seielstad M, Page GP, Gaddis N, Deng X, Lee T-H, Lanteri M, Wu Y, Kakaiya RM, **Busch MP**. Genome-Wide Association Study of HLA Allo-Antibody Formation and Persistence. Abstract Control #: 1717339. Accepted as Oral. AABB Annual Meeting & CTTXPO, Denver, CO, Oct 12-15, 2013.

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13. Bakkour S, Dupuis K, Chafets D, **Busch MP**, Stassinopoulos A, Lee T-H. Efficient inhibition of mitochondrial DNA amplification using a real-time PCR assay after treatment with the intercept system for pathogen inactivation. Accepted as an Oral Presentation. Abstract code: 2A-S03-02. 24th Regional Congress of the ISBT, Kuala Lumpur, Malaysia, Dec 1-4, 2013.

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